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11 Archaeological, Architectural and Cultural Heritage

11.1 Introduction

Cultural Heritage is defined by UNESCO as “the legacy of physical artefacts and intangible attributes of a group or society that are inherited from past generations, maintained in the present and bestowed for the benefit of future generations” (Tangible Cultural Heritage, UNESCO – www.unesco.org/new/en/cairo/culture/tangible-cultural-heritage).

In terms of the present project, Cultural Heritage is assumed to include all humanly created features on the landscape, including portable artefacts, which might reflect the prehistoric, historic, architectural, engineering and/or social history of the area.

This report 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.

The report discusses the receiving environment from a Cultural Heritage perspective, in general terms; it provides information with respect to previously identified baseline data and it recommends that any proposals avoid direct impacts on such previously identified sites and areas of archaeological and architectural interest. The locations of all previously identified sites and areas of Cultural Heritage interest/potential are indicated in **Figure. 11.6**.

11.2 Assessment Methodology

The study involved a documentary and cartographic search, aerial photographic research and preliminary field inspection/surface reconnaissance survey.

The format of this report/section follows the guidelines published by the National Roads Authority (NRA) in 2005 with respect to the preparation of Archaeological and Architectural Heritage Assessments (2005 a & b – Section 6).

11.2.1 Paper Study

This is a documentary source study. The following sources were examined from which a list of sites and areas of archaeological and architectural interest/potential was compiled:

- Record of Monuments and Places (RMP) – Co. Dublin.
- Sites and Monuments Records (SMR) of the Archaeological Survey of Ireland – www.archaeology.ie
- Topographical File Records of the National Museum of Ireland.
- Dublin Archaeological Data – www.heritagemaps.ie
- Annual Archaeological Excavation Bulletin – www.excavations.ie
- Historic Cartographic and Aerial Photographic Archives of the Ordnance Survey of Ireland – www.osi.ie

- Documentary and cartographic sources in Dun Laoghaire-Rathdown County Library.
- Dun Laoghaire – Rathdown County Development Plan 2016 – 2022 (DLRCDP).
- Kiltiernan – Glenamuck Local Area Plan (KGLAP)
- Placenames Commission – www.logainm.ie

In addition, the following reports were inspected:

- *Glenamuck District Distributor Road – Constraints Report*. RPS (July 2007)
- *Glenamuck District Distributor Road – Feasibility Study & Route Selection Report*. RPS (July 2007)
- *Glenamuck District Distributor Road – Preliminary Design Report*. RPS (July 2007)
- *Glenamuck District Distributor Road – Environmental Study* [3 Vols]. RPS (July 2007)

11.3 Baseline Environment

11.3.1 General Historical Background

The subject Study Area incorporates portions of the townlands of Jamestown, Carrickmines Great, Glenamuck North, Glenamuck South, Glebe, Kiltiernan Domain, Kiltiernan and Kingston (O.S. 6" Map – Dublin Sheet 26). All of the townlands are located in the barony of Rathdown. The townlands of Jamestown, Carrickmines Great, Glenamuck North and Glenamuck South form part of the civil parish of Tully, while the townlands of Glebe, Kiltiernan Domain and Kiltiernan form part of the civil parish of Kiltiernan. The townland of Kingston is split into two Electoral Divisions (E.D.) and two civil parishes; the area within Ballybrack E.D. is in Tully civil parish and the area within Glencullen E.D. is in Kiltiernan civil parish. The Irish forms of the townland names, together with the possible derivations of the names – derived from the Placenames Commission: www.lo – are listed below in Table 11.1.

TOWNLAND NAME	IRISH FORM	DERIVATION/MEANING
Jamestown	<i>Baile Shéamais</i>	'townland or homestead of James'
Carrickmines Great	<i>Carraig Mhaighin Mhór</i>	'great plateau of rock'
Glenamuck North	<i>Gleann na Muc Thuaidh</i>	'glen of the pigs north'
Glenamuck South	<i>Gleann na Muc Theas</i>	'glen of the pigs south'
Glebe	<i>An Ghléib</i>	Glebe (church lands)
Kiltiernan Domain	<i>Diméin Chill Tiarnáin</i>	'Demesne of the church of (St) Tiernan'
Kiltiernan	<i>Cill Tiarnáin</i>	'church of (ST) Tiernan'
Kingston	<i>Baile an Rí</i>	Townland or homestead of the king'

Table 11- 1: Information on Townland Names

In the early historic period the whole area of Dublin and the Wicklow mountains was known as Cualu. It was controlled by the Dál Messin Corb, a leading tribe in Leinster but by the seventh century they had withdrawn to an area around Arklow. At around this time, according to Corlett (1999, 35) "the Uí Théig became the leading tribe of north-east Wicklow and south-east Dublin. They were replaced during the eighth century by the Uí Briúin, who lent the name Uí Briúin Cualann to much of the territory known today as Rathdown". During the early Christian period, a number of churches were founded in the area, many of which are still remembered in place names such as Kilmacud (Cill McCudd – the

church of (St.) Macud) and Taney (Teach Nathi – the house or church of (St.) Nathi). The Uí Briúin who had come from north Kildare brought with them the influence of St. Brigid and several churches in the area have a strong association with her, including that of Stillorgan. Indeed, Corlett (1999, 42) notes that “the old texts tell of a visit paid to St. Brigid of Kildare by eight bishops of Tully”.

In 917 the Vikings founded a town at Dublin, after which a number of Viking families settled in the hinterland, including parts of Uí Briúin Cualann and by 980 many had converted to Christianity. Those living in the hinterland of Dublin provided the town with food and raw materials such as timber and thus these areas became relatively wealthy. Indeed, it appears that the Scandinavians became well integrated within the local community and their lasting impression can be gleaned from place names such as Ballaly (Baile Amhlaibh - ‘The town or settlement of Óláf’), while the common local surname Doyle derives from dubh gall – ‘dark foreigner’, a name given to Scandinavian inhabitants in the area.

During the twelfth century the Mac Torcaills were the rulers of Dublin, and members of the family had settled in parts of Glencree, Glencullen and Tully. Sometime after 1130 the Uí Dúinchada became a powerful force of Uí Briúin Cualann, and their kings took the name MacGillaMoCholmóc, taking up residence in Rathdown, near Greystones in 1169.

Following the Anglo-Norman invasion, Henry II granted the kingdom of Leinster to Richard the Earl (Strongbow), reserving Dublin for himself. One of those who received an extensive grant from Strongbow in 1173 was Walter de Ridelesford, including lands in Kildare and much of the territory formerly known as Uí Briúin Cualann. However, when de Ridelesford went to have his landholding confirmed by Henry II, the king took back some of the lands for himself. A similar episode occurred when de Riddlesford’s son, Walter II, went to have his inheritance confirmed, with the king reclaiming further lands for himself.

The lands in the area were, at this time, owned by a branch of the Walsh family, who constructed and garrisoned the nearby Carrickmines Castle in 1441. The general area was subject to attacks by the Gaelic clans during the fourteenth and fifteenth centuries, culminating in an act of parliament in 1494 requiring landowners to construct a line of defences along the borders of the Pale. The subject lands were located outside this defensive line.

The sixteenth century found the Walshes in occupation either as tenants or owners of a wide extent of the general area and they had become one of the most important families in the region. However, their lands were subjected to devastating attacks from Gaelic clans towards the end of the century, when the property was in the custody of Peter Barnewall, a guardian of Richard Walsh, who was a minor at that time (Ball, 1902).

In 1609 the Barony of Rathdown was divided in two by the establishment of the county boundary between Dublin and Wicklow. At around this time, the Walshes were described as ‘of large and ancient stock’ and ‘men of note in the metropolitan county’, which was then ‘rich and plenteous in corn and cattle, and inhabited by a people of stately port and garb’ (Ball, *ibid.*). The Irish rebellion of 1641 and the ensuing Eleven Year’s war merged with the Civil War in England, which subsequently spilled into Ireland. Following the end of these wars, many of the landholdings in the area, particularly those belong to Catholic families or those who had sympathised with the monarchy, were confiscated and granted to Protestant families. In particular, the lands of the Walshes, who had supported the

monarchy, were awarded to the Earl of Meath. A map of the area in 1656 (**Figure 11.1**) indicates a substantial Tudor-type house at Carrickmines, as well as a number of smaller structures.

During the comparatively peaceful years of the eighteenth century the populations of south-east Dublin prospered and many fine mansions were built in the area. However, as illustrated by Rocque (**Figure 11.2**), the area surrounding the subject lands was still largely agricultural, and a number of large houses had been constructed. In addition, the map illustrates a road running from Carrickmines towards Kiltiernan. There are now no surface indications of this road, although a section was detected by a Geophysical Survey (Section 11.3.2.4).



Figure 11- 1: Extract from 'Down Survey' map of 1656 – north to left



Figure 11- 2: Extract from Roque 1760 (north to right)

Pearson (1999, 306) notes that in the early 1800s the inhabitants in the area of Kiltiernan and surrounding areas were largely occupied in dairy farming, and made a living supplying the needs of those living in the city.

The Ordnance Survey Map of 1837 (**Figure 11.3**) indicates that the area was largely rural at this time. Much of the present road systems had been established and there were pockets of settlement along the Enniskerry Road, with larger estate lands located to the east of this road in the townlands of Glenamuck North (Glenamuck House) and Glenamuck South (Rockville). In addition, the embryonic stages of the village of Kiltiernan can be seen with its church, school, post office and mills.



Figure 11- 3: Extract from Ordnance Survey Map - 1837

The Ordnance Survey Name Books (1837) note that the townland of Jamestown contained 64 acres, 16 perches, all arable; it formed part of the property of Lord Carysford and was in the possession of Mr. Rourke who lived in the adjoining townland and keeps a dairy and the soil was described as of 'excellent quality capable of bearing good crops of wheat oats, potatoes, etc.,' and about half was under dairy pasture. Kingston (Kingstown) contained 92 acres, 2 roods, 26 perches and was the property of Sir. Crampton Dunville and let at £3 - £5 per acre. Carrickmines Great contained 545 acres, 1 rood and was described as being the property of Lord Carysford agent, Mr. Franks; The lands were rented at £1 - £5 per acre and about 120 acres were described as 'uncultivated being covered with blocks of granite, furze, etc.' Glenamuck South contained 260 acres, 1 rood and 3 perches of which about 20 were planted and an unknown quantity was described as uncultivated; the property of Mrs. Yeats, with Mr. Brennan of Dublin as the agent; Mr Roach holds 60 acres at £5 per acres, with the remainder let at £2. 10s. - £5 per acre. Rockville is described as a 'fine Gentleman's seat sheltered by plantations, offices, gardens, etc.'

Lewis (1837) notes that the lands in civil parish of Tully were in a 'high state of cultivation, and embellished with numerous seats and well-planted demesnes'; the principal seats included Rockville, Glenamuck House and Carrickmines Castle, and that a 'twopenny' post office was located 'at the village of Golden-Ball'. He further notes that the lands in the civil parish of Kiltiernan largely comprised rock and mountain, with some bog and heath, with a 'considerable quantity of waste, but the system of

agriculture is improving'; the principal houses included Kiltiernan Cottage and Kingston House, and there was a cotton and paper mill [Kiltiernan] each employing about 40 persons.

During the nineteenth century, flax was grown in the district for supply to a cotton mill located on the Kiltiernan River and founded by the Moss family. Part of the mill race and mill pond still remains, as do a terrace of cottages on Kiltiernan Road which are still known as Moss's cottages (Pearson, 1999, 307).

The topographical nature of the area in 1912 is illustrated in **Figure 11.4**. Very little changes are recorded with respect to the lands comprising of the subject road corridor and immediate environs, when compared with the 1837 map (**Figure 11.3**). New property plots with associated dwellings have been established on either side of Glenamuck Road, Enniskerry Road and at Golden Ball and a post-office and a new school have been constructed in Kiltiernan, where the former cotton mill, marked as a factory, is indicated as disused. In addition, to the above, Pearson (1999, 307) notes that Kiltiernan Bridge had been reconstructed in 1852.



Figure 11- 4: Extract from Ordnance Survey Map – 1912

In terms of the present study, the only features of Historical/Cultural Heritage Interest that have the ability to be impacted upon are townland boundaries. A townland is a small geographical division of

land used in Ireland. The townland system is of Gaelic origin, pre-dating the Norman invasion, and most have names of Irish Gaelic origin (Colfer, 2004, 29). However, some townland names and boundaries come from Norman manors, plantation divisions, or later creations of the Ordnance Survey (Barry, 2000, 114; Clarke et al, 2004, 113). During the 19th century an extensive series of maps of Ireland (e.g. **Figure 11.3** above) was created by the Irish division of the Ordnance Survey for taxation purposes. These maps both documented and standardised the boundaries of the more than 60,000 townlands in Ireland. The process often involved dividing or amalgamating existing townlands, and defining townland boundaries in areas such as mountain or bog that had previously been outside the townland system. As noted above in **Table 11.1**, the study area incorporates all, or portions of, eight townlands. In some cases, these are formed by ditches, mature hedge-rows and banks (e.g. Carrickmines Great and Glenamuck North/Jamestown), watercourses (e.g. Glenamuck South and Kingston) or by existing roads (e.g. Glenamuck Road - Glenamuck North and Glenamuck South) The Enniskerry Road acts as both a boundary between the townlands of Glenamuck South and Kiltiernan/Kiltiernan Domain and Glenamuck North and Kiltiernan Domain/Glebe, as well as a civil parish boundary between Tully and Kiltiernan.

The proposed road corridor crosses four townland boundaries. These are listed below in **Table 11.2** and their locations are indicated in **Figure 11.6**.

Site No.	ITM	Townlands	Descriptions
CH-1	720818 723392	Carrickmines Great Glenamuck North	Overgrown ditch, mature banked hedge-row
CH-2	720215 723134	Glenamuck North Jamestown	Overgrown ditch, mature banked hedge-row
CH-3	720826 722959	Glenamuck North Glenamuck South	Glenamuck Road
CH-4	720905 721980	Glenamuck South Jamestown	Loughlinstown River (Banks overgrown)

Table 11- 2: List of Townlands to be crossed by road route

11.3.2 Archaeological Heritage

Archaeology is the study of past societies through their material remains and the landscapes they lived in. "The archaeological heritage consists of such material remains (whether in the form of sites and monuments or artefacts in the sense of moveable objects) and environmental evidence" (DoAHGI 1999, p9).

11.3.2.1 Statutory Protections

The statutory and administrative framework of development control in zone of archaeological potential or in proximity to recorded monuments has two main elements:

- (a) Archaeological preservation and licensing under the National Monuments Acts and
- (b) Development plans and planning applications under the Planning Acts.

National Monuments Acts

Section 12 (1) of the National Monuments (Amendment) Act, 1994 provides that the Minister for the Environment, Heritage and Local Government shall establish and maintain a record of monuments and

places where the Minister believes there are monuments, such record to be comprised of a list of monuments and relevant places and a map or maps showing each monument and relevant place in respect to each county of the State. This is referred to as the 'Record of Monuments and Places' (RMP), and monuments entered into it are referred to as 'Recorded Monuments'.

Section 12(3) of the National Monuments (Amendment) Act 1994 provides for the protection of monuments and places in the record, stating that

"When the owner or occupier (not being the Minister) of a monument or place which has been recorded under subsection (1) of this section or any person proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such monument or place, he shall give notice in writing of his proposal to carry out the work to the Minister and shall not, except in the case of urgent necessity and with the consent of the Minister, commence work for a period of two months after having given the notice".

Dun Laoghaire – Rathdown County Development Plan 2016 – 2022

The following relevant Archaeological Heritage Policies are set out in Section 6.2.1 of the Plan:

AH1	<p>Protection of Archaeological Heritage</p> <p>It is Council policy to protect archaeological sites, National Monuments (and their settings), which have been identified in the Record of Monuments and Places (RMP) and, where feasible, appropriate and applicable to promote access to and signposting of such sites and monuments.</p> <p>In the implementation of this policy, the Council will endeavour to review and assess the feasibility of improving public accessibility to sites and monuments under the direct ownership or control of the Council or of the State.</p>
AH2	<p>Protection of Archaeological Material in Situ</p> <p>It is Council policy to seek the preservation in situ (or where this is not possible or appropriate, as a minimum, preservation by record) of all archaeological monuments included in the Record of Monuments and Places, and of previously unknown sites, features and objects of archaeological interest that become revealed through development activity. In respect of decision making on development proposals affecting sites listed in the Record of Monuments and Places, the Council will have regard to the advice and/ or recommendations of the Department of Arts, Heritage and the Gaeltacht (DoAHG).</p> <p>The Council will strictly control development proposals that could have a negative impact on the significance of archaeological sites and monuments, their settings and/or interpretation. Land uses shall not give rise to significant losses of the integrity, quality or context of archaeological material – except as may be conditioned or directed by the appropriate heritage agencies. This shall be achieved by the application of appropriate design standards and criteria.</p>
AH6	<p>Underwater Archaeology</p> <p>It is Council policy for all developments, which have potential to impact on riverine, intertidal and subtidal environments to require an archaeological assessment prior to works being carried out.</p> <p>Under the National Monuments Act all shipwrecks over one hundred years old, and other underwater archaeological structures, features and objects are protected.</p>

Note: The Record of Monuments and Places (RMP) for County Dublin was published in 1998. Consequently, all monuments discovered since the publication are not RMP Sites but, where preserved ‘in-situ’ are subject to protection under Policy AH2 above.

11.3.2.2 Archaeological Monuments

There are four previously identified individual sites of archaeological interest/potential located within the defined study area, as listed below in **Table 11.3**. Two of these, CH-5 and CH-6, are located within the defined Environmental Assessment Corridor and all but one, CH-6, are listed in the RMP. The

locations of the monuments are illustrated in **Figure 11.6**. The monument classifications are further expanded in **Appendix 11.1** and the monuments are briefly described in **Appendix 11.2**.

The following abbreviations/codes are used in relation to **Table 11.3**:

Site No.: Individual site number assigned to site with respect to the defined study area.

SMR No.: Individual number assigned to site in the Sites and Monuments Record of the Archaeological Survey of Ireland

ITM: International Transverse Mercator Grid Reference (centre-point of monument)

Classification: Brief nature of the archaeological site as listed in the RMP

RMP: Listed in the Record of Monuments and Places for County Dublin

DLRCDP: Listed in the Dun Laoghaire – Rathdown County Development Plan 2016 – 2022

Site No.	SMR No.	ITM	Townland	Classification	Protection
CH-5	DU026-021	720925 722064	Glenamuck South / Kingston	Enclosure(s)	RMP; DLRCDP
CH-6	N/A	721102 723525	Carrickmines Great	Burnt Spread / Fulacht Fiadh	DLRCDP
CH-7	DU026-018	721623 723306	Carrickmines Great	Cross	RMP; DLRCDP
CH-8	DU026-015	720118 723467	Jamestown	Cist	RMP; DLRCDP

Table 11- 3: Archaeological Inventory

NOTE: The Dun Laoghaire – Rathdown County Development Plan indicates a ‘Zone of Archaeological Notification’ associated with DU026-135 (Carrickmines Great Td; Classification: Fulacht Fia; ITM: 721264 723478) adjacent Glenamuck Road. A review of the Sites and Monuments Record (SMR) of the National Monuments Service (Archaeological Survey of Ireland) indicates that DU026-135 is located approx. 1km (ITM: 722220 723726) to the northeast of the location indicated on the Development Plan Map. The matter was discussed with Ms. Margaret Keane, Senior Archaeologist, National Monuments Service and Director, Archaeological Survey of Ireland and it was determined that an error was made when the location of the monument DU026-135 was originally uploaded to the SMR (www.archaeology.ie) and that this has since been rectified. The erroneous location was used by DLR Co. Co. when drafting the Development Plan.

11.3.2.3 Archaeological Artefacts

Two artefacts are listed in the Topographical Registers of the National Museum of Ireland, as having been discovered within the defined study area, as follows:

❖ **NMI Reg. No: 1974:89; Glenamuck North Td.**

Bronze Palstave cast in a bi-valve mould; found approx. 18 inches deep while draining field (ITM: 720900 722937 approx.)

❖ **NMI Reg. No: 1984: 119; Kiltiernan Td.**

Polished Stone Axe found during ploughing (ITM: 720804 721619 approx.)

11.3.2.4 Results from previous documented relevant archaeological investigations

A. Intrusive Investigations

A search undertaken of the annual Archaeological Excavations Bulletin (www.excavations.ie) indicates that a number of archaeological investigations have been undertaken within the general area, as follows:

➤ Carrickmines Great (Site 72)

The site was discovered during monitoring of the South-Eastern Motorway and was investigated by Gary Conboy, Valerie J. Keeley Ltd (Licence No: 02E0653; ITM: 720810 724405). It contained three possible archaeological features, two of which proved to be tree roots. The third feature was a circular pit, 0.3m wide and 0.2m deep. The fill contained burnt clay and frequent charcoal flecking. No finds that could be used to date the feature came from the pit

➤ Carrickmines Great

Excavations were carried out by Red Tobin, Margaret Gowen & Co (Licence No: 04E0773) in the townland of Carrickmines Great, Co. Dublin, in advance of a commercial development and infrastructure works. Monitoring of the topsoil removal took place during May 2004. The topsoil-strip corresponded to the main access, drainage and cabling routes and the Phase 1 development. This development is a large-scale retail outlet with extensive car parking. Access to this retail park will be from the South Eastern Motorway, which bounds the site to the north.

Two significant archaeological sites occur in close proximity to the proposed development, most notably Carrickmines Castle and ancillary earthworks (SMR 26:5), lying immediately to the north-east, and the Pale Boundary (SMR 26:115) to the north-west.

During the course of the topsoil-strip, 22 areas of archaeological potential were demarcated for examination. All features were identified by the presence of charcoal, in situ burning/oxidisation or soil discolouration. Several of the features were likely to be the result of relatively recent field clearance work or land improvements. The landscape showed evidence for the removal of field systems to expand the ploughlands into substantial open farmlands. Previous archaeological work in the environs of this development has revealed little. The type of site identified beyond the limits of 'The Pale' is marginal in nature, prehistoric in date and peripheral to any settlement. The artefact-bearing nature of the soil is quite disappointing; flint is present in the soil but largely natural fragments and small nodules carried in the glacial drift.

During testing it was possible to conclude that nine possible sites were natural in origin, two were substantial land drains and two were tree boles. The remainder of the sites are of archaeological origin. These features are grouped on the well-drained soils but have been heavily truncated during agricultural works over the last thirty years. Of the archaeological features only five survived in any substantial form.

Site 1, NGR 321084.413 223837.274, 87.163m OD

This site was identified in the course of topsoil-stripping as an isolated patch of oxidised clay. The deposit was 0.4m in diameter and a few millimetres in thickness. It was tested and shown to have no

relation to any other archaeological material. The nature of the material defines it as the lowest stratigraphic deposit of a fire or event involving burning. No further archaeological work was deemed necessary at this location.

Site 2, 321086.109 223757.607, 87.006m OD

This site was identified in the course of topsoil-stripping as an isolated patch of oxidised clay. The deposit was 0.45m in diameter and a few millimetres in thickness. It was tested and shown to have no relation to any other archaeological material. The nature of the material defines it as the lowest stratigraphic deposit of a fire or event involving burning. No further archaeological work was deemed necessary at this location.

Site 8, 321085.138 223876.337, 86.695m OD

This site was identified in the course of topsoil-stripping as an isolated patch of oxidised clay 0.5m in diameter, F4. During testing a second feature (F2) was identified to the west of F4. This was sub-rectangular in plan and extended to 0.75m in diameter north-south by 1.2m. F2 was excavated by hand and found to be a shallow pit or hearth with gradual sloping sides and a flat base with a single fill. It is likely that these features are shallow fire pits with, in the case of F2, a single fill representing a transient single usage, while F4 is the remains of a similar hearth heavily truncated by agricultural activity.

Site 10, 321169.697 223863.968 85.633m OD

The site was identified during topsoil-stripping as a large area, approximately 15m², of concentrated burning and intense discolouration. Deposits of charcoal-rich soil and heat-shattered stones (F2) suggested that the site might represent a fulacht fiadh. This firing material deposit was also associated with a dense cover of dark-brown, peaty material (F3) overlying the firing material. Analysis showed it to contain no charcoal. A series of circular and subcircular pits lie adjacent to the F2 material and would appear to be the focus of industrial activity on this site. It appears that the F2 material and the pits are indicative of Site 10's use period. The F3 and F4 materials overlying F2 represent material washed in or silted up after the abandonment of the site.

The main spread of F2 was irregular in plan with a tendency to a 'horseshoe' shape, defined by a sub-rectangular open area (F23) on the north side of the F2 spread. Three pits of uniform size were recorded in the western part of F23. These pits, F6, F7 and F9, all display similar features that suggest a consistency of use. F6 and F7 show evidence of use, while F9 appears to have been prepared but never actually used. The proportions of these three pits and the consistency of their fills suggest a connection through function. It is hard to determine what that function might be, but the presence of deliberately placed and spaced granite stones suggests that the activity may have taken place above, or was supported on, the stones, as against being contained within the pit.

F17, a wide, shallow pit with steep sides and a sloping base, was contained within the main spread of F2 material. It was well defined and cut into the natural. It was 2m in length and 1.6m in width, reaching a maximum depth of 0.34m. The southern extremity of the pit was defined by a deliberately constructed facing of granite stones. The fill was composed in the main of F2 material incorporating some larger fragments of granite, similar to the pits F6, F7 and F9. F17 displays all of the features associated with a trough and maintains the right proportions for such a feature. If this is the case, then

it is directly associated with the use process of the F2 spread and supports an interpretation that the site did function as a fulacht fiadh.

Preliminary evaluation of the material is not conclusive and adds little interpretative strength to the excavation as above. It may be possible to date the features if sufficient quantities of charcoal are available. Further research into the interpretation of the pits is required. It would appear that Site 10 is that of a fulachta fiadh or burnt mound with a central trough (F17) and an array of small roasting pits (F6, F7, F9 and F19), possibly used for heating the stones in small quantities.

Site 13, 321198.342 223810.556, 85.843m OD

This site was exposed during the topsoil-stripping as two distinct areas of discolouration and blackened soil. Approximately 0.3m of soil was removed to identify the features and further topsoil was removed to assess their nature and extent.

Excavation revealed an extensive area of localised burning (F2), 3.8m east-west by 3.1m. The material defines an area irregular in plan consisting of burnt peat and vegetation within and surrounded by a larger deposit of peat. The F2 material appears to have been the result of deliberate burning but not of an industrial nature and is likely to be a result of the clearance of agricultural land. This burning event only penetrated to a depth of 0.2m. Excavation was halted after extensive testing revealed that this site had no structural, industrial or artefactual content. While the F2 burning event is likely to have had an archaeological origin, perhaps as evidence of land clearance, it is sufficient to record the event.

Site 17, 321183.984 223733.257, 86.032m OD

Site 17 was revealed during topsoil-stripping as an isolated pit/hearth displaying evidence for direct burning. The topsoil was c. 0.3m in depth. A subcircular to oval area of burning, 0.89m in length and 0.74m in width and reaching a total depth of 0.13m was exposed. The fill consisted of loose, dark-grey/black sandy soil with charcoal inclusions and a small percentage of small stones and gravel. It also contained an abundance of charred seeds. These suggest a more complex interpretation than a simple hearth. Seed identification will suggest a possible date range, which can then be confirmed through 14C analysis.

Site 22, 321222.689 223862.097, 84.238m OD

This site was revealed during the course of the topsoil removal. It was first identified as a small localised deposit of black soil and later the presence of cremated bone was confirmed. 0.3m of topsoil was removed; this material has been systematically ploughed and cultivated for the last thirty years.

The cremation pit is identified by a circular deposit of dark-black silty clay with loose compaction containing c. 30% burnt bone. The fill was also notable for the frequency of sub-angular stones of 10-40mm in size. It also contained flecks of oxidised clay throughout. The pit cut is circular in plan, measuring 0.46m by 0.53m in diameter and reaching a maximum depth of 0.2m. The total content was removed from the site for analysis. The cremated bone has been extracted from the soil sample and the soil has also produced a large amount of charcoal; charred seeds are also present.

The evidence accrued in the course of this project suggests that the archaeological activity was ephemeral in nature and in keeping with the landscape of the time. It is likely that the area was poorly

drained, with an abundance of retained surface water. The poor drainage marginalised this land until the 20th century, when land improvement grants made it a viable option to undertake a large-scale drainage project to change the land use from rough pasture to tillage.

➤ **Glenamuck Road, Carrickmines Great**

Test excavation for proposed development works undertaken by Emer Dennehy, Margaret Gowen & Co (Licence No: 04E0114) due to the scale of the proposed development and its partial location within the zone of archaeological potential for the site of a cross base. Seventeen trenches were excavated, varying from 9.5m to 50m in length and varied from 0.15m to 1m in depth. No artefacts or stratigraphy of an archaeological nature were discovered.

➤ **Carrickmines Great**

A test excavation was carried out by Theresa Bolger, Margaret Gowen & Co (Licence No: 05E1243; ITM: 721515 723665) at a c. 3.9ha site to the east of the Glenamuck Road adjacent to the new roundabout at Carrickmines. The site forms Phase I of a two-stage development called Carrickmines Green (Phase II will be located to the west of the Glenamuck Road). Seven test-trenches were excavated at the site. No archaeological deposits or features were identified. Following on from this, monitoring of topsoil-stripping was undertaken. No archaeological features or deposits were identified.

➤ **Carrickmines Great / Glenamuck North / Glenamuck South**

Monitoring was carried out by Theresa Bolger, Margaret Gowen & Co (Licence No: 05E0756) in conjunction with the construction programme for the Glenamuck-Kiltiernan Main Drainage. A burnt spread/fulacht Fiadh was uncovered in Carrickmines Great and was preserved 'in-situ' (**Site CH-6; Appendix 11.3**). The overall extent of the feature was not determined.

➤ **Enniskerry Road, Glenamuck South**

Monitoring of topsoil strip was carried out on a development site at Glenamuck South on the Enniskerry Road by Dominick Delaney, Dominick Delaney & Associates (ITM: 720837 21964). The topsoil strip revealed 0.4-0.6m of garden soil over orange/brown silty sand subsoil. Two pet burial sites were uncovered during topsoil strip. The larger burial was centrally located within the garden and consisted of a sub-circular pit (0.75m x 0.6m) with frequent inclusions of animal bone in the fill. An adjoining 'foundation pit' (1.1m x 0.85m) containing a fill of crushed mortar and red brick fragments may indicate the site of a prominent garden feature with the pet burial inserted at its base. A second pet burial was recorded a couple of meters to the west. No archaeological material was uncovered

B. Non-Intrusive Investigations

A limited Geophysical Survey was undertaken by David Harrison, Margaret Gowen & Co (Licence No: 06R0064; Harrison, 2006) in 2006 with respect to the previous proposed Glenamuck Distributor Road proposals. An initial gradiometer scan of an area totalling 14ha was undertaken at two locations – within the extent, and south of, DU026-021 (Site CH-6) and at a location to the north, where there was potential for subsurface remains of a former road which is marked on Rocque's Map of 1760 (**Figure 11.2** above). A subsequent more detailed gradiometer survey was undertaken in nine separate areas at these locations, totalling 3.2ha.

The results of the geophysical survey are summarised in **Appendix 11.3**. The Geophysical Survey Report concluded that several small and isolated geophysical responses were recorded within the constraints area of CH-6 (DU026-021), possibly representing ephemeral archaeological remains and possibly related to deeply buried ferrous objects; none were indicative of the presence of enclosure sites. Similar geophysical responses/anomalies were detected elsewhere but no archaeological patterns were discernible implying that these too may be associated with buried ferrous objects.

11.3.2.5 Underwater Archaeology

Watercourses have always attracted human activity for a variety of reasons, as a source of water and food, as transport routes, as a source of energy and for their spiritual, religious or ritual associations. They also act as depositories for archaeological artefacts.

There are three watercourses within the overall study area, the locations of which are highlighted in **Figure 11.6**. The Loughlinstown River forms part of the townland boundary between Glenamuck South and Kingston, and runs in a west-east manner through the archaeological constraints area of CH-6. A watercourse runs in a general north-easterly manner through the northern areas of Glenamuck North and Carrickmines Great, while a further watercourse runs almost parallel to east of this in the townland of Carrickmines Great.

11.3.2.6 Archaeological Potential of Study Area / Receiving Environment

The siting preferences of particular monument types are well documented. Broadly speaking, the general landscape of the study area offers a potential setting for additional sites and remains as follows:

- The subject lands and surrounding landscape offer many opportunities for the location of Fulachta Fiadh (prehistoric cooking sites). These sites are location specific, generally located close to streams and rivers or in wet marshy areas, and sometimes occur in groups.
- The general rolling nature of the landscape is a favoured position for the location of prehistoric burial sites, ringforts and enclosure sites in the general region surrounding the subject development lands
- Waterways have always attracted human activity for a variety of reasons, as a source of water and food, as transport routes as a source of energy and for their spiritual, religious or ritual associations. They also act as depositories for archaeological artefacts.
- The area under assessment is part of a landscape which is rich in historical and archaeological material. The general region has attracted settlement from early times as evidenced by the presence of monuments dating back to the prehistoric period. Continuity of settlement is illustrated by artefacts dating to the Bronze Age and by identified monuments ranging from Neolithic to Medieval and Post-Medieval remains.

11.3.3 Architectural Heritage

Architectural heritage has several definitions and meanings for people. A useful rule of thumb (which is actually the legal situation) is set out in the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999 which provides the following definition:

- (a) Structures and buildings together with their settings and attendant grounds, fixtures and fittings,
- (b) Groups of such structures and buildings, and
- (c) Sites, which are of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest.

A rich architectural heritage has survived to the present-day area of Dun Laoighaire - Rathdown. While there are impressive demesne features and large houses in the county, much of the architectural heritage has come from vernacular traditions with local craftsmen sometimes borrowing from the traditions of classical architecture to construct buildings that met local needs. This rich architectural heritage contributes enormously to the overall built environment and, indeed, helps to give it definition in terms of place and character for those that live and work in the county as well as those who visit here.

11.3.3.1 Dun Laoghaire – Rathdown County Development Plan 2016 – 2022

Section 51 of the Planning and Development Act, 2000 (as amended) requires the Development Plan to include a record of structures. These structures form part of the architectural heritage of the County and are to be protected. The Council has drawn up this list, referred to as the Record of Protected Structures (RPS). The RPS is a section of the Development Plan in which each structure is given a reference number – Appendix 4 of the County Development Plan. The following policies with respect to Protected Structures and Architectural Heritage, relevant to the subject development, are included in the Plan:

AR-1 Record of Protected Structures

It is Council policy to:

- I. Include those structures that are considered in the opinion of the Planning Authority to be of special architectural, historical, archaeological, artistic, cultural, scientific, technical or social interest in the Record of Protected Structures (RPS).
- II. Protect structures included on the RPS from any works that would negatively impact their special character and appearance.
- III. Ensure that any development proposals to Protected Structures, their curtilage and setting shall have regard to the Department of the Arts, Heritage and the Gaeltacht 'Architectural Heritage Protection Guidelines for Planning Authorities' (2011).
- IV. Ensure that new and adapted uses are compatible with the character and special interest of the Protected Structure.

A Protected Structure, unless otherwise stated, includes the interior of the structure, the land lying within the curtilage of the structure, any other structures lying within that curtilage and their interior and all fixtures and features which form part of the interior or exterior of that structure. The protection also extends to any features specified as being in the attendant grounds including boundary treatments.

AR-8 Nineteenth and Twentieth Century Buildings, Estates and Features

It is Council policy to:

- I. Encourage the appropriate development of exemplar nineteenth and twentieth century buildings and estates to ensure their character is not compromised.
- II. Encourage the retention of features that contribute to the character of exemplar nineteenth and twentieth century buildings and estates such as roof-scapes, boundary treatments and other features considered worthy of retention.

AR-9 Protection of Historic Street Furniture

It is Council policy to:

- I. Preserve the retention of historic items of street furniture where these contribute to the character of the area including items of a vernacular or local significance.
- II. Promote high standards for design, materials and workmanship in public realm improvements within areas of historic character.

Items of historic street furniture can be important elements in establishing the character of our streetscapes and sense of place. Such items could include bollards, railings, street signs, post boxes, telephone kiosks, horse troughs, water pumps, jostle stones, milestones, cobbles and setts, coal hole covers, weighbridges, plaques and granite kerbing.

AR-11 Industrial Heritage

It is Council policy to:

- I. Have regard to those items identified in the Industrial Heritage Survey listed in Appendix 5 [of the Development Plan] when assessing any development proposals.
- II. Identify further sites of industrial heritage significance with a view to assessing them for inclusion in the Record of Protected Structures.

Section 6.1.4 of the Plan deals with Areas of Architectural Conservation (ACA). Those policies relevant to the subject development are as follows:

AR-12 Architectural Conservation Areas

It is Council policy to:

- I. Protect the character and special interest of an area which has been designated as an Architectural Conservation Area (ACA).
- II. Ensure that all development proposals within an ACA be appropriate to the character of the area having regard to the Character Appraisals for each area.
- III. Seek a high quality, sensitive design for any new development(s) that are complimentary and/ or sympathetic to their context and scale, whilst simultaneously encouraging contemporary design.
- IV. Ensure street furniture is kept to a minimum, is of good design and any redundant street furniture removed.
- V. Seek the retention of all features that contribute to the character of an ACA including boundary walls, railings, soft landscaping, traditional paving and street furniture.

AR-15 Public Realm and Public Utility works within an ACA

It is Council policy to:

- I. Retain any surviving items of historic street furniture and finishes such as granite kerbing and paving that contribute to the character of an ACA
- II. Ensure that works to the public realm - such as the provision of traffic control measures, street furniture, materials and finishes - have regard to the distinctive character of the area.
- III. Encourage the undergrounding of over-head services and the removal of redundant wiring/ cables within an ACA.

11.3.3.2 Protected Structures

There are six structures listed in the Record of Protected Structures (RPS) [Appendix 4] included in the Dun Laoghaire – Rathdown County Development Plan 2016 – 2022 as being located within the subject study area. These are listed below in **Table 11.4** and their locations indicated in **Figure 11.6**.

Site No.	RPS No.	ITM	Location	Structure Name	Description
CH-9	1790	720913 722690	Glenamuck Road	Rockville House	House & Gate Lodge
CH-10	1775	720351 722949	Enniskerry Road	Shaldon Grange	House
CH-11	1771	720128 722896	Enniskerry Road	Church of Ireland	Church, School, Sexton's Lodge, Boundary Walls & Gates
CH-12	1802	720519 722138	Ballybetagh Road	Our Lady of the Wayside Church	Church
CH-13	1830	720889 721757	Kiltiernan Gallery, Enniskerry Road	Old Post Office	House and Shop
CH-14	1832	720912 721716	The Old School House, Enniskerry Road	Orange Lodge	House

Table 11- 4: List of Protected Structures with Study Area

11.3.3.3 Industrial Heritage

There are two structures of Industrial Heritage (IH) interest listed in Appendix 6 of the Dun Laoghaire – Rathdown County Development Plan 2016 – 2022. These are listed in **Table 11.5** and their locations illustrated in **Figure 11.6**.

Site No.	IH No	ITM	Location	Description
CH-15	995	720402 722522	On west side of Glenamuck Road at junction with Enniskerry Road	Water Tap
CH-16	996	720917 721754	On south side of Enniskerry Road with junction with Barnaslingan Lane	Post Box

Table 11- 5: List of Industrial Heritage Structures with Study Area

11.3.3.4 Architectural Conservation Areas (ACA)

There is in the Architectural Conservation Area (ACA) listed in the Dun Laoghaire – Rathdown County Development Plan 2016 – 2022. This is listed in **Table 11.6** and its location and extent is illustrated in **Figure 11.6**.

Site No	ITM	Location	Name
CH-17	720837 721847	West side of Enniskerry Road, Kiltiernan	Moss Cottages ACA

Table 11- 6: List of ACA with Study Area

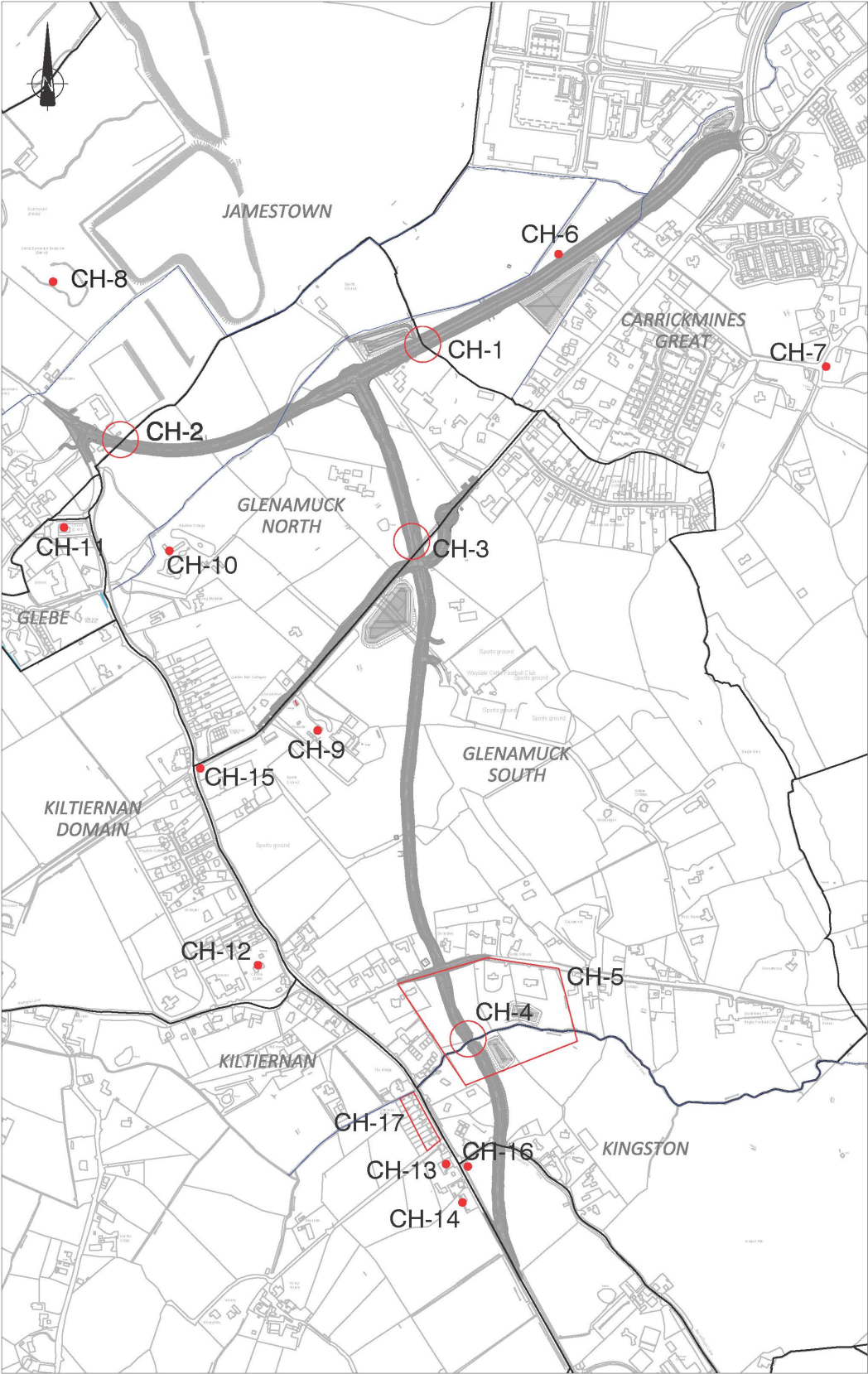


Figure 11- 5: Locations of Cultural Heritage Sites
(Townland Boundaries marked Black; Watercourses Marked Blue)

11.4 Predicted Impacts

The following **Table 11.7** (from EPA, 2017, Table 3.3) provides the baseline criteria used to describe the impacts (effects) that the proposed development will have on Cultural Heritage Sites, Structures and Features.

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

	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Duration and Frequency of Effects	<p>Momentary Effects Effects lasting from seconds to minutes</p> <p>Brief Effects Effects lasting less than a day</p> <p>Temporary Effects Effects lasting less than a year</p> <p>Short-term Effects Effects lasting one to seven years.</p> <p>Medium-term Effects Effects lasting seven to fifteen years.</p> <p>Long-term Effects Effects lasting fifteen to sixty years.</p> <p>Permanent Effects Effects lasting over sixty years</p> <p>Reversible Effects Effects that can be undone, for example through remediation or restoration</p> <p>Frequency of Effects Describe how often the effect will occur.</p>

Table 11- 7: Descriptive Criteria for Cultural Heritage Impacts

11.4.1 Construction Phase

11.4.1.1 Historical Heritage

The general historical background to the development area is discussed above in Section 11.3.1. In summary, there are no significant historical events associated with the proposed development area which have the ability to be impacted upon by the construction of the proposed development.

The proposed road corridor crosses four townland boundaries. These are listed above in **Table 11.2** and their locations are indicated in **Figure 11.6**. Two of the boundaries – CH-1 (Carrickmines Great/Glenamuck North) and CH-2 (Glenamuck North/Jamestown) – comprise overgrown ditches with mature banked hedge-rows; one – CH-3 (Glenamuck North/Glenamuck South) – has no physical evidence as it is located along the centre of the existing Glenamuck Road while the other – CH-4 (Glenamuck South/Kingston) is formed by Loughlinstown River. None of these boundaries are subject to any statutory boundaries.

Short lengths, relative to the overall extents of such boundaries, of CH-1 and CH-2 will be removed to facilitate the development. It is considered that such removal is a localised slight permanent impact and there are no additional predicted impacts with respect to Historical Heritage with regard to the proposed construction phase of the development.

11.4.1.2 Archaeological Heritage

A. Terrestrial Archaeology

The general archaeological background to the subject development area is discussed above in Section 11.3.2. In summary, there are four previously identified monuments of archaeological interest/potential located within the defined study area associated with proposed development, as listed above in **Table 11.3**. No additional monuments or surface features of archaeological potential were noted by aerial photographic research or subsequent field/surface reconnaissance survey. Three of the monuments are listed in the Record of Monuments and Places (RMP) – Sites CH-5, CH-7 & CH-8 – and all are subject to protection under provisions of the DLR County Development Plan.

Two of the monuments – CH-7 and CH-8 are located at sufficient distances from the subject development that no direct impact to such will occur during construction stage.

Site CH-5 (Glenamuck South/Kingston; Enclosure(s)) includes a relatively large Zone of Archaeological Potential/Notification, to the south of Ballycorous Road and straddling the Loughlinstown River (**Figure 11.6** above). A Geophysical Survey undertaken in 2006 included such Zone 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 (Appendix 11.3).

Site CH-6 (Carrickmines Great; burnt spread/fulacht fia) was uncovered during a programme of Archaeological Monitoring undertaken in 2005 in conjunction with the construction programme for the Glenamuck-Kiltiernan Main Drainage. A burnt spread/fulacht Fiadh was uncovered in Carrickmines Great and was preserved 'in-situ' (Site CH-6; Appendix 11.2). However, the exact extent was not determined.

A section of the subject road, together with an associated bridge and two attenuation ponds are proposed within the Zone of Archaeological Potential/Notification established for CH-5. Although the results of a Geophysical Survey within the Zone indicate very little of archaeological potential, it is noted that no intrusive archaeological investigations have been undertaken with respect to this monument and the likelihood for subsurface archaeological remains has not been proven or disproven; therefore, it is considered that the extent of the Archaeological Zone must still be considered to be of archaeological potential. Consequently, without the adoption of a suitable mitigation strategy, the potential effect/impact of the proposed development on this possible monument is of likely negative, very significant and permanent.

CH-6, as uncovered, may be located immediately outside the proposed construction corridor, the overall extent of this feature has not, as yet, been determined, as noted above; consequently, it is likely that related components of this feature may be located within the proposed construction corridor and, without the adoption of a suitable mitigation strategy, the effect/impact of the proposed development on this feature is of likely negative, very significant and permanent.

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. Without the adoption of specific mitigation strategies, such subsurface archaeological features that might exist within the proposed development areas/corridors

would be potentially disturbed and destroyed and not identified and recorded, resulting in a likely negative, very significant and permanent effect/impact.

B. Underwater Archaeology

There are three new watercourse crossings proposed located within the subject construction areas/corridors – two culverts across the Glenamuck Stream and a bridge over the Loughlinstown River. The culverts will require disturbance works to the banks of the stream, as well as to the Glenamuck Stream beds, while only the banks of the Loughlinstown River will be directly disturbed by construction works.

As noted above in Section 11.3.2.5, waterways have always attracted human activity for a variety of reasons, and can act as territorial boundaries (e.g. Loughlinstown River) and as depositories for archaeological artefacts. Where monuments are located immediately adjacent watercourses, there is evidence that the edges of such monuments can be eroded, over time, by fluctuations in the flow of the watercourse, resulting in the dislodgement of artefacts and their transportation downstream by the watercourse. Consequently, it is considered that there is potential for the recovery of artefacts from the Loughlinstown River and, to a lesser extent, from the Glenamuck Stream. Consequently, without the adoption of specific mitigation strategies, 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 effect/impact.

11.4.1.3 Architectural/Industrial Heritage

There are six structures listed in the Record of Protected Structures (RPS) [Appendix 4] included in the Dun Laoghaire – Rathdown County Development Plan 2016 – 2022 as being located within the subject study area. These are listed above in **Table 11.4** as CH-9 to CH-14, and their locations indicated in **Figure 11.6**. None are located within, or in the immediate environs of, the subject proposed road construction corridor/areas. Consequently, it is considered that it is unlikely that any negative/adverse effects/impacts will occur with respect to these structures during the construction phase of the development.

There are two structures of Industrial Heritage (IH) interest listed in Appendix 6 of the Dun Laoghaire – Rathdown County Development Plan 2016 – 2022. These are listed in **Table 11.5** (CH-15 & CH-16) and their locations illustrated in **Figure 11.6**. Neither are located within, or in the immediate environs of, the subject proposed road construction corridor/areas. Consequently, it is considered that it is unlikely that any negative/adverse effects/impacts will occur with respect to these structures during the construction phase of the development.

There is in the Architectural Conservation Area (ACA) listed in the Dun Laoghaire – Rathdown County Development Plan 2016 – 2022. This is listed in **Table 11.6** (CH-17; west side of Enniskerry Road, Kiltiernan) and its location and extent are illustrated in **Figure 11.6**. The subject proposed road construction corridors are not routed through or close to this ACA. Consequently, it is considered that it is unlikely that any negative/adverse effects/impacts will occur with respect to such during the construction phase of the development.

11.4.2 Post-Construction/Operational Phase

11.4.2.1 Historical Heritage

The only extant features of potential historical interest are sections of existing field boundaries which serve as townland boundaries. These features are not subjected to any statutory protections. It is not considered likely these will be negatively impacted upon by the operation of the road, following construction.

11.4.2.2 Archaeological Heritage

There are four previously identified monuments of archaeological interest/potential located within the defined study area associated with proposed development, as listed above in **Table 11.1** (Section 11.3.2.2). Only one of these – CH-7 – has any extant remains; this is a low-visibility cross-base. None are located within, or in the immediate environs of, the proposed road corridors. Consequently, the settings and views associated with these monuments will not be negatively impacted upon by the operation of the road, following construction.

11.4.2.3 Architectural Heritage

There are no structures of architectural or industrial heritage interest located within, or in the immediate environs of, the subject proposed road corridors; likewise, none are routed through any Architectural Conservation Area. Consequently, it is not considered likely that the settings and views associated with these structures will be negatively impacted upon by the operation of the road, following construction.

11.5 Mitigation Measures

11.5.1 Historical Heritage

The general historical background to the development area is discussed above in Section 11.3.1. In summary, there are no significant historical events associated with the proposed development area which have the ability to be impacted upon by the construction of the proposed development.

The proposed road corridor crosses four townland boundaries. These are listed above in **Table 11.2** and their locations are indicated in **Figure 11.6**. Two of the boundaries – CH-1 (Carrickmines Great/Glenamuck North) and CH-2 (Glenamuck North/Jamestown) – comprise overgrown ditches with mature banked hedge-rows; one – CH-3 (Glenamuck North/Glenamuck South) – has no physical evidence as it is located along the centre of the existing Glenamuck Road while the other – CH-4 (Glenamuck South/Kingston) is formed by Loughlinstown River. None of these boundaries are subject to any statutory boundaries.

Short lengths, relative to the overall extents of such boundaries, of CH-1 and CH-2 will be removed to facilitate the development. As noted above in Section 11.4.1.1, this will result in localised slight permanent impacts. Consequently, it is considered that the constructional details of these lengths of boundaries, be recorded as part of the overall suggested pre-construction mitigation strategy for Archaeological Heritage (see Section 11.5.2 below). As part of the overall design of the proposed scheme, consideration should be given to the erection of stone marker, detailing the names of the associated townlands, at the locations of such boundaries adjacent the edges of the construction corridor.

11.5.2 Archaeological Heritage

The general archaeological background to the subject development area is discussed above in Section 11.3.2. In summary, there are four previously identified monuments of archaeological interest/potential located within the defined study area associated with proposed development, as listed above in **Table 11.1** (Section 11.3.2.2). No additional monuments or surface features of archaeological potential were noted by aerial photographic research or subsequent field/surface reconnaissance survey. Three of the monuments are listed in the Record of Monuments and Places (RMP) – Sites CH-5, CH-7 & CH-8 – and all are subject to protection under provisions of the DLR County Development Plan.

Two of the monuments – CH-7 and CH-8 are located at sufficient distances from the subject development that no direct impact to such will occur during construction stage. In addition, no impacts to any of the monuments will occur by the operation of the constructed road and associated features.

Site CH-5 (Glenamuck South/Kingston; Enclosure(s)) includes a relatively large Zone of Archaeological Potential/Notification, to the south of Ballycorous Road and straddling the Loughlinstown River (Figure 11.6 above). A Geophysical Survey undertaken in 2006 included such Zone 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. A section of the subject road, together with an associated bridge and two attenuation ponds are proposed within the Zone of Archaeological Potential/Notification established for CH-5. Although the results of a Geophysical Survey within the Zone indicate very little of archaeological potential, it is noted that no intrusive archaeological

investigations have been undertaken with respect to this monument and the likelihood for subsurface archaeological remains has not been proven or disproven; therefore, it is considered that the extent of the Archaeological Zone must still be considered to be of archaeological potential. Consequently, without the adoption of a suitable mitigation strategy, the potential effect/impact of the proposed development on this possible monument is of likely negative, very significant and permanent.

Site CH-6 (Carrickmines Great; burnt spread/fulacht fia) was uncovered during a programme of Archaeological Monitoring undertaken in 2005 in conjunction with the construction programme for the Glenamuck-Kiltiernan Main Drainage. A burnt spread/fulacht Fiadh was uncovered in Carrickmines Great and was preserved 'in-situ' (Site CH-6; Appendix 11.3). However, the exact extent was not determined. CH-6, as uncovered, may be located immediately outside the proposed construction corridor, the overall extent of this feature has not, as yet, been determined, as noted above and in Section 11.3.2.4 A; consequently, it is likely that related components of this feature may be located within the proposed construction corridor and, without the adoption of a suitable mitigation strategy, the effect/impact of the proposed development on this feature is of likely negative, very significant and permanent.

In addition, it is further noted that in general, ground reductions associated with a development of this kind, in areas of previous generally undisturbed ground, have the ability to uncover and disturb hitherto unrecorded subsurface features, deposits, structures and finds of archaeological interest and potential. Without the adoption and implementation of a suitable mitigation strategy, any subsurface archaeological features or artefacts that might be located within the site during the construction phase of the development might not be identified and recorded.

In terms of potential underwater archaeology, there are three new watercourse crossings proposed located within the subject construction areas/corridors – two culverts across the Glenamuck Stream and a bridge over the Loughlinstown River. The culverts will require disturbance works to the banks of the stream, as well as to the Glenamuck Stream beds, while only the banks of the Loughlinstown River will be directly disturbed by construction works. As discussed above in Sections 11.3.2.5 and 11.4.4.2.B, watercourses are considered to be of archaeological potential interest, particularly with respect to the recovery of artefactual material.

As noted above in Section 11.3.2.5, waterways have always attracted human activity for a variety of reasons, and can act as territorial boundaries (e.g. Loughlinstown River) and as depositories for archaeological artefacts. Where monuments are located immediately adjacent watercourses, there is evidence that the edges of such monuments can be eroded, over time, by fluctuations in the flow of the watercourse, resulting in the dislodgement of artefacts and their transportation downstream by the watercourse. Consequently, it is considered that there is potential for the recovery of artefacts from the Loughlinstown River and, to a lesser extent, from the Glenamuck Stream. Consequently, without the adoption of specific mitigation strategies, 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 effect/impact.

Given the above, and in order that potential subsurface and hitherto unidentified and unrecorded features of archaeological heritage interest that might exist within the subject development/construction corridor, can be identified at an early stage, particularly in advance of the

construction phase of the development, the following pre-construction mitigation measures are suggested:

1. A further programme of Archaeological Geophysical Survey should be undertaken under licence from the Department of Culture, Heritage and the Gaeltacht. This should include all suitable green-field areas within the developmental corridors, including areas for attenuation etc., but outside those areas previously subject to such survey.
2. Following completion of the programme of Geophysical Survey, a programme of Archaeological Testing should be undertaken within the extent of the Construction Corridor, under licence from the Department of Culture, Heritage and the Gaeltacht. The results of the Geophysical Survey will help inform the locations and nature of the test trench, particularly if subsurface anomalies of archaeological potential are detected. In addition, a test trench should be inserted across the field/townland boundaries of CH-1 and CH-2, where possible, in order that a profile and constructional detail can be recorded.
3. Following completion of both the Geophysical Survey and Programme of Archaeological Testing, a report describing the results of such should be prepared. The report should include an impact statement with respect to any subsurface features of archaeological interest/potential that might have been discovered/identified and include a mitigation strategy for the archaeological resolution of such features (e.g. Mitigation by Excavation, Recording and Publication) in advance of the commencement of construction works.
4. A wade survey of the Loughlinstown River, within the extent of the Construction Corridor should be undertaken by an archaeologist, under licence from the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, followed by a metal detecting survey of the River stream bed, as well as the two area of the Glenamuck Stream where it is intended culvers will be inserted.; where required, removal of the overgrowth along the banks of the watercourse, should be undertaken to facilitate access and an inspection of the associated watercourse edges and banks. Any artefacts recovered by such work should be subject to the recording, reporting and conservation requirements of the National Museum of Ireland.

11.5.3 Architectural Heritage

As noted above in Sections 11.4.1.3 and 11.4.2.3, it is not considered likely that any impacts will occur, either at construction or operations phase of the subject development, to structures of architectural or industrial heritage interest, including within the identified ACA. Consequently, it is considered that no mitigation measures are required.

11.6 Residual Impacts

It is considered that with the adoption and implementation of the mitigation strategy suggested above in Section 11.5.2, and any further requirements arising from such, that no residual impacts, with respect to Cultural Heritage, will occur.

11.7 Difficulties Encountered

Access to the Zone of Archaeological Potential established for CH5 was denied and, consequently, no reconnaissance survey was undertaken in such lands. However, the lands were subject to field inspection previously, as part of the Geophysical Survey in 2006

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12 Landscape Townscape & Visual

12.1 Introduction

This chapter has been prepared by Cunnane Stratton Reynolds Ltd (CSR), landscape architects and planners.

Declan O’Leary B.Agr.Sc. Landscape Horticulture, (University College, Dublin) 1986
Post Graduate Diploma Landscape Architecture (University of Central England) 1993
Chartered Landscape Architect, MLI (UK) 1994
Member of the Irish Landscape Institute MILI 1997

Declan O’Leary has over 30 years’ experience in development, landscape design, urban and environmental renewal. This includes masterplanning and design to implementation of a broad range of strategic environmental improvement schemes to industrial, highway and urban regeneration sites as well as reclamation, amenity, rural/countryside, educational and housing projects. He is experienced in working closely with developers, community organisations and statutory agencies to deliver local environmental, social and economic development.

The Landscape and Visual Impact Assessment (LVIA) was informed by a desktop study and a survey of the site and receiving environment in March 2018. The report identifies and discusses the landscape and visual constraints and opportunities in relation to the proposed Glenamuck District Roads Scheme.

12.2 Assessment Methodology

12.2.1 Definition of Landscape

Ireland is a signatory to the European Landscape Convention (ELC). The ELC defines landscape as ‘an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors’. This definition is important in that it expands beyond the idea that landscape is only a matter of aesthetics and visual amenity. It encourages a focus on landscape as a resource in its own right - a shared resource providing a complex range of cultural, environmental and economic benefits to individuals and society.

As a cultural resource, the landscape functions as the setting for our day-to-day lives, also providing opportunities for recreation and aesthetic enjoyment and inspiration. It contributes to the sense of place experienced by individuals and communities and provides a link to the past as a record of historic socio-economic and environmental conditions. As an environmental resource, the landscape provides habitat for fauna and flora. It receives, stores, conveys and cleans water, and vegetation in the landscape stores carbon and produces oxygen. As an economic resource, the landscape provides the raw materials and space for the production of food, materials (e.g. timber, aggregates) and energy (e.g. carbon-based fuels, wind, solar), living space and for recreation and tourism activities.

12.2.2 Forces for Landscape Change

Landscape is not unchanging. Many different pressures have progressively altered familiar landscapes over time and will continue to do so in the future, creating new landscapes. For example, within the receiving environment, the environs of the proposed development have altered over the last thousand years, from wilderness to agriculture and settlement.

Many of the drivers for change arise from the requirement for development to meet the needs of a growing population and economy. The concept of sustainable development recognises that change must and will occur to meet the needs of the present, but that it should not compromise the ability of future generations to meet their needs. This involves finding an appropriate balance between economic, social and environmental forces and values.

The reversibility of change is an important consideration. If change must occur to meet a current need, can it be reversed to return the resource (in this case, the landscape) to its previous state to allow for development or management for future needs.

Climate change is one of the major factors likely to bring about future change in the landscape, and it is accepted to be the most serious long-term threat to the natural environment, as well as economic activity (particularly primary production) and society. The need for climate change mitigation and adaptation, which includes the management of water and more extreme weather and rainfall patterns, is part of this.

12.2.3 Guidance

Landscape and Visual Impact Assessment (LVIA) is a tool used to identify and assess the significance of and the effects of change resulting from development on both the landscape as an environmental resource in its own right and on people's views and visual amenity.

The methodology for assessment of the landscape and visual effects is informed by the following key guidance documents, namely:

- Guidelines for Landscape and Visual Impact Assessment, 3rd Edition 2013, published by the UK Landscape Institute and the Institute of Environmental Management and Assessment (hereafter referred to as the GLVIA).
- Guidelines on the Information to be Contained in Environmental Impact Statements, 2002, published by the Environmental Protection Agency (and the Revised Guidelines on the Information to be Contained in Environmental Impact Statements, Draft 2015)
- Dun Laoghaire Rathdown Development Plan 2016-2022
- Kiltiernan Glenamuck Local Area Plan 2013

Key Principles of the GLVIA

Use of the Term 'Effect' vs 'Impact'

The GLVIA advises that the terms ‘impact’ and ‘effect’ should be clearly distinguished and consistently used in the preparation of an LVIA.

‘Impact’ is defined as the action being taken. In the case of the proposed Glenamuck District Roads Scheme (GDRS), the impact would include the construction of the road and associated infrastructure.

‘Effect’ is defined as the change or changes resulting from those actions, e.g. a change in landscape character, or changes to the composition, character and quality of views in the receiving environment. This report focuses on these effects.

Assessment of Both ‘Landscape’ and ‘Visual’ Effects

Another key distinction to make in a LVIA is that between landscape effects and the visual effects of development.

‘Landscape’ results from the interplay between the physical, natural and cultural components of our surroundings. Different combinations of these elements and their spatial distribution create distinctive character of landscape in different places. ‘Landscape character assessment’ is the method used in LVIA to describe landscape, and by which to understand the potential effects of a development on the landscape as ‘a resource’. Character is not just about the physical elements and features that make up a landscape, but also embraces the aesthetic, perceptual and experiential aspects of landscape that make a place distinctive.

Views and ‘visual amenity’ refer to the interrelationship between people and the landscape. The GLVIA prescribes that effects on views and visual amenity should be assessed separately from landscape, although the two topics are inherently linked. Visual assessment is concerned with changes that arise in the composition of available views, the response of people to these changes and the overall effects on the area’s visual amenity.

This baseline and scoping study identifies the key landscape values and characteristics in the study area including key views and vistas and comments in terms of their capacity as constraints on development and their capacity to accommodate the proposed development

12.2.4 Methodology for Landscape Assessment

In Section 12.4 of this report the landscape effects of the development are assessed. The nature and scale of changes to the landscape elements and characteristics are identified, and the consequential effect on landscape character and value are discussed. Trends of change in the landscape are taken into account. The assessment of significance of the effects takes account of the sensitivity of the landscape resource and the magnitude of change to the landscape which resulted from the development.

Sensitivity of the Landscape Resource

The sensitivity of the landscape is a function of its land use, landscape patterns and scale, visual enclosure and the distribution of visual receptors, and the value placed on the landscape. The nature

and scale of the development in question is also taken into account. For the purpose of assessment, five categories are used to classify the landscape sensitivity of the receiving environment.

Table 12- 1: *Categories of Landscape Sensitivity*

Sensitivity	Description
Very High	Areas where the landscape exhibits a very strong, positive character with valued elements, features and characteristics that combine to give an experience of unity, richness and harmony. The character of the landscape is such that its capacity for accommodating change in the form of development is very low. These attributes are recognised in landscape policy or designations as being of national or international value and the principle management objective for the area is protection of the existing character from change.
High	Areas where the landscape exhibits strong, positive character with valued elements, features and characteristics. The character of the landscape is such that it has limited/low capacity for accommodating change in the form of development. These attributes are recognised in landscape policy or designations as being of national, regional or county value and the principle management objective for the area is conservation of the existing character.
Medium	Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong or has evidence of alteration to / degradation / erosion of elements and characteristics. The character of the landscape is such that there is some capacity for change in the form of development. These areas may be recognised in landscape policy at local or county level and the principle management objective may be to consolidate landscape character or facilitate appropriate, necessary change.
Low	Areas where the landscape has few valued elements, features or characteristics and the character is weak. The character of the landscape is such that it has capacity for change; where development would make no significant change or would make a positive change. Such landscapes are generally unrecognised in policy and where the principle management objective is to facilitate change through development, repair, restoration or enhancement.
Negligible	Areas where the landscape exhibits negative character, with no valued elements, features or characteristics. The character of the landscape is such that its capacity for accommodating change is high; where development would make no significant change or would make a positive change. Such landscapes include derelict industrial lands or extraction sites, as well as sites or areas that are designated for a particular type of development. The principle management objective for the area is to facilitate change in the landscape through development, repair or restoration.

Magnitude of Landscape Change

The magnitude of change is a factor of the scale, extent and degree of change imposed on the landscape with reference to its key elements, features and characteristics (also known as 'landscape receptors'). Five categories are used to classify magnitude of landscape change.

Table 12- 2: Categories of Landscape Change

Magnitude of Change	Description
Very High	Change that is large in extent, resulting in the loss of or major alteration to key elements, features or characteristics of the landscape and/or introduction of large elements considered totally uncharacteristic in the context. Such development results in fundamental change in the character of the landscape.
High	Change that is moderate to large in extent, resulting in major alteration to key elements features or characteristics of the landscape and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the landscape.
Medium	Change that is moderate in extent, resulting in partial loss or alteration to key elements features or characteristics of the landscape, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape.
Low	Change that is moderate or limited in scale, resulting in minor alteration to key elements features or characteristics of the landscape, and/or introduction of elements that are not uncharacteristic in the context. Such development results in minor change to the character of the landscape.
Negligible	Change that is limited in scale, resulting in no alteration to key elements features or characteristics of the landscape key elements features or characteristics of the landscape, and/or introduction of elements that are characteristic of the context. Such development results in no change to the landscape character.

Significance of Effects

In order to classify the significance of effects (both landscape and visual), the predicted magnitude of change is measured against the sensitivity of the landscape/viewpoint, using the following guide. There are seven classifications of significance, namely: (1) imperceptible, (2) not significant, (3) slight, (4) moderate, (5) significant, (6) very significant, (7) profound.

Table 12- 3: Guide to Classification of Significance of Landscape Effects

Sensitivity of the Landscape Resource

	Very High	High	Medium	Low	Negligible
Very High	<i>Profound</i>	<i>Profound-Very Significant</i>	<i>Very Significant-Significant</i>	<i>Moderate</i>	<i>Slight</i>
High	<i>Profound-Very Significant</i>	<i>Very Significant</i>	<i>Significant</i>	<i>Moderate-Slight</i>	<i>Slight-Not Significant</i>
Medium	<i>Very Significant-Significant</i>	<i>Significant</i>	<i>Moderate</i>	<i>Slight</i>	<i>Not Significant</i>
Low	<i>Moderate</i>	<i>Moderate-Slight</i>	<i>Slight</i>	<i>Not significant</i>	<i>Imperceptible</i>
Negligible	<i>Slight</i>	<i>Slight-Not Significant</i>	<i>Not significant</i>	<i>Imperceptible</i>	<i>Imperceptible</i>

The matrix above is used as a guide only. The assessor also uses professional judgement informed by their expertise, experience and common sense, to arrive at a classification of significance that is reasonable and justifiable.

Landscape effects are also classified as positive, neutral or negative/adverse (See definitions in Section 12.2.6), as well as Direct and Indirect. Development has the potential to improve the environment as well as damage it. In certain situations, there might be policy encouraging a type of change in the landscape, and if a development achieves the objective of the policy the resulting effect might be positive, even if the landscape character is profoundly changed.

12.2.5 Methodology for Visual Assessment

In Section 12.4 of this report the visual effects of the development are assessed. Visual assessment considers the changes to the composition of views, the character of the views, and the visual amenity experienced by visual receptors. The assessment is made for a number of viewpoints selected to represent the range of visual receptors in the receiving environment. The significance of the visual effects experienced at these locations is assessed by measuring the viewpoint sensitivity against the magnitude of change to the view resulting from the development.

Table 12- 4: Categories of Viewpoint Sensitivity

Sensitivity	Description
Very High	Iconic viewpoints - towards or from a landscape feature or area - that are recognised in policy or otherwise designated as being of national value. The composition, character and quality of the view are such that its capacity for accommodating change in the form of development is very low. The principle management objective for the view is its protection from change.
High	Viewpoints that that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features focused on the landscape). The composition, character and quality of the view may be such that its capacity for accommodating compositional change in the form of development may or may not be low. The principle management objective for the view is its protection from change that reduces visual amenity.
Medium	Viewpoints representing people travelling through or past the affected landscape in cars or on public transport, i.e. viewing but not focused on the landscape which is regarded as moderately scenic. The views are generally not designated, but which include panoramic views or views judged to be of some scenic quality, which demonstrate some sense of naturalness, tranquillity or some rare element in the view.
Low	Viewpoints reflecting people involved in activities not focused on the landscape e.g. people at their place of work or engaged in similar activities such as shopping, or on heavily trafficked routes etc. The view may present an attractive backdrop to these activities but is not regarded as particularly scenic or an important element of these activities.
Negligible	Viewpoints reflecting people involved in activities not focused on the landscape e.g. people at their place of work or engaged in similar activities such as shopping where the view has no relevance or is of poor quality.

Magnitude of Change to the View

Classification of the magnitude of change takes into account the size or scale of the intrusion of development into the view (relative to the other elements and features in the composition, i.e. its relative visual dominance), the degree to which it contrasts or integrates with the other elements and the general character of the view, and the way in which the change will be experienced (e.g. in full view, partial or peripheral, or glimpses). It also takes into account the geographical extent of the change, the duration and the reversibility of the visual effects.

Five categories are used to classify magnitude of change to a view:

Table 12- 5: Categories of Visual Change

Magnitude of Change	Description
Very High	Full or extensive intrusion of the development in the view, or partial intrusion that obstructs valued features or characteristics, or introduction of elements that are completely out of character in the context, to the extent that the development becomes the dominant the composition and defines the character of the view and the visual amenity.
High	Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.
Medium	Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.
Low	Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.
Negligible	Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity.

Significance of Visual Effects

As for landscape effects, in order to classify the significance of visual effects, the magnitude of change to the view is measured against the sensitivity of the viewpoint, using the guide in Table 12.3 above.

12.2.6 Quality and Timescale

The predicted impacts are also classified as beneficial, neutral or adverse. This is not an absolute exercise; in particular, visual receptors' attitudes to development, and thus their response to the impact of a development, will vary. However, the methodology applied is designed to provide robust justification for the conclusions drawn. These qualitative impacts/effects are defined as:

- Adverse – Scheme at variance with landform, scale, pattern. Would degrade, diminish or destroy the integrity of valued features, elements or their setting or cause the quality of the landscape(townscape)/view to be diminished;
- Neutral - Scheme complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality;
- Beneficial – improves landscape(townscape)/view quality and character, fits with the scale, landform and pattern and enables the restoration of valued characteristic features or repairs / removes damage caused by existing land uses.

Impacts/effects are also categorised according to their longevity or timescale:

- Temporary – Lasting for one year or less;
- Short Term – Lasting one to seven years;
- Medium Term – Lasting seven to fifteen years;
- Long Term – Lasting fifteen years to sixty years;
- Permanent – Lasting over sixty years.

A statement is made as to the appropriateness of the proposed development based on the combined assessment of the predicted landscape and visual effects. This methodology, in accordance with the various guidelines for LVIA, results in a conclusion as to the appropriateness of the proposed development based on objective assessment of its likely landscape and visual impacts.

12.3 Baseline Environment

12.3.1 Relevant Planning Policy

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

- Dun Laoghaire Rathdown County Development Plan 2016-2022
- Kiltiernan Glenamuck Local Area Plan 2013-2018

Dun Laoghaire Rathdown County Development Plan 2016-2022

The *Dun Laoghaire Rathdown Development Plan (DLRDP)* contains a range of policies relevant to establishing the landscape and visual values and sensitivities for the site and site environs. These are set out below. General Planning Policies are set out in Chapter 6 of this EIAR.

It is the stated aim of the Vision Statement for Dun Laoghaire Rathdown:

To continue to facilitate appropriate levels of sustainable development predicated on the delivery of high quality community, employment and recreational environments - allied to the promotion of sustainable transportation and travel patterns - but all the while protecting Dún Laoghaire-Rathdown's unique landscape, natural heritage and physical fabric, to ensure the needs of those living and working in the County can thrive in a socially, economically, environmentally sustainable and equitable manner.

This Development Plan highlights certain areas for development with locally focused policy documents & plans in the form of Local Area Plans (LAP). Kiltiernan is identified (in 3.2.2.3 Policy RET3: Retail Hierarchy) as one of the Key Development Areas for the Development of sustainable mixed-use urban villages in accordance with approved Local Area Plan.

Chapter 4 of the DLRDP sets out policies in relation to Landscape, Heritage and Biodiversity:

Landscape and Visual

Section 4.1.2.1 Policy LHB2: Preservation of Landscape Character Areas*

It is Council policy to continue to preserve and enhance the character of the County's landscapes in accordance with the recommended strategies as originally outlined in the Landscape Character Assessment (2002 and since updated), in accordance with the 'Draft Guidelines for Landscape and Landscape Assessment' (2000) as issued by the Department of Environment and Local Government, in accordance with the European Landscape Convention (Florence Convention) and in accordance with 'A National Landscape Strategy for Ireland - Strategy Issue Paper for Consultation' (2011). The Council shall implement any relevant recommendations contained in the Department of Arts, Heritage and the Gaeltacht's National Landscape Strategy for Ireland, 2015 - 2025.

Section 4.1.2.4 Policy LHB5: Historic Landscape Character Areas

In assessing development proposals and in the preparation of plans it is Council policy to have regard to the recommendations and findings of the Historic Landscape Character Assessments (HLCA) already undertaken for a number of the urban-rural fringe areas of the County most likely to come under development pressure. A HLCA is a detailed holistic study of the historical development and environmental significance of an area. The HLCA offers a dynamic perspective of the total landscape, thereby contributing to the management and promotion of sustainable development within that area. Five HLCAs have been carried out in the County to date – Barnacullia, Kiltiernan, Glencullen, Ballycorus - Rathmichael and Old Conna.

Section 4.1.2.5 Policy LHB6: Views and Prospects

It is Council policy to protect and encourage the enjoyment of views and prospects of special amenity value or special interests. The County contains many sites and vantage points from which views over areas of great natural beauty, local landmarks, historic landscapes, adjoining Counties and the City of Dublin may be obtained. In addition to scenic views, the County also contains important prospects i.e. prominent landscapes or areas of special amenity value or special interest which are widely visible from the surrounding area. Specific Views and Prospects for protection have been identified in the Plan and are considered when assessing planning applications. It is also recognised that visual linkages between landmarks, landscape features and views exist. The Council will also take into account any Views and Prospects of adjoining Counties – Wicklow, Dublin City and South Dublin when assessing planning applications for development in those parts of Dún Laoghaire-Rathdown proximate to the mutual County boundaries.

In the implementation of this policy it is the intention of the Council to:

- Prevent development which would block, or otherwise interfere, with a View which is designated for protection.*
- Preserve the Prospects listed in the Plan.*

Views and prospects relevant to this study include

- *Carrickgollogan from the Enniskerry Road (south of Kiltiernan Village)*
- *Three Rock Mountain and Two Rock Mountain from the Enniskerry Road (Sandyford-Kiltiernan area) and Sandyford Village*

Whilst these are orientated towards the uplands to the south, development plan maps also highlight the scenic route of Ballyedmunduff Road on the slopes of Three Rock Mountain (part of the Dublin Mountains Way) orientated over the city and bay (including the development area) as well as to the mountains. Three Rock Mountain itself also offers a popular upland amenity enjoying similar views.

Biodiversity

Section 4.1.3.1 Policy LHB19: Protection of Natural Heritage and the Environment*

It is Council policy to protect and conserve the environment including, in particular, the natural heritage of the County and to conserve and manage Nationally and Internationally important

and EU designated sites - such as Special Protection Areas, candidate Special Areas of Conservation, proposed Natural Heritage Areas and Ramsar sites - as well as non-designated areas of high nature conservation value which serve as 'Stepping Stones' for the purposes of Article 10 of the Habitats Directive.

Implementation of this policy will include for

- *Retention of trees, hedgerows and woodlands wherever practical.*
- *Retention of Green Belt areas.*
- *Identification of Views and Prospects of special amenity value or special interest.*
- *Protection of existing access (including established rights-of-way) to such sites where feasible and the promotion of public access where it does not exist at present*

Section 4.1.3.2 Policy LHB20: Habitats Directive*

It is Council policy to ensure the protection of natural heritage and biodiversity, including European sites that form part of the Natura 2000 network, in accordance with relevant EU Environmental Directives and applicable National Legislation, Policies, Plans and Guidelines.

Section 4.1.3.4 Policy LHB22: Designated Sites*

It is Council policy to protect and preserve areas designated as proposed Natural Heritage Areas, candidate Special Areas of Conservation, and Special Protection Areas. It is Council policy to promote the maintenance and as appropriate, delivery of 'favourable' conservation status of habitats and species within these areas.

Section 4.1.3.6 Policy LHB24: County-Wide Ecological Network*

It is Council policy to develop an Ecological Network throughout the County which will improve the ecological coherence of the Natura 2000 network in accordance with Article 10 of the Habitats Directive. The network will also include non-designated sites

Section 4.1.3.8 Policy LHB26: Hedgerows*

It is Council policy to protect hedgerows in the County from development, which would impact adversely upon them. It is Council policy to promote the County's hedgerows by increasing coverage, where possible, using locally native species and to develop an appropriate code of practice for road hedgerow maintenance.

The 2007 Habitat Survey identified a pattern of hedgerows and tree lines with the majority of these occurring in the south of the County (south of the M50 Motorway and east of the southern end of the N11 road). Hedgerows were also identified as important heritage and biodiversity features in the County Biodiversity Plan which identified a survey of hedgerows as a targeted action.

The Hedgerow Survey Report (2008), identified the most important hedgerows in the County in terms of their biodiversity. These have been mapped and recorded.

Section 4.1.3.7 Policy LHB25: Rivers and Waterways*

It is Council policy to maintain and protect the natural character and ecological value of the river and stream corridors in the County and where possible to enhance existing channels and to encourage diversity of habitat. It is also policy (subject to the sensitivity of the riverside habitat) to provide public access to riparian corridors to promote improved passive recreational activities.

Section 4.2.2.6 Policy OSR7: Trees and Woodland*

It is Council policy to implement the objectives and policies of the Tree Strategy for the County - 'dlr TREES 2011-2015' - to ensure that the tree cover in the County is managed and developed to optimise the environmental, climatic and educational benefits which derive from an 'urban forest'.

Section 4.2.2.7 Policy OSR8: Greenways Network*

It is Council policy to develop a comprehensive network of County Greenways linking parks and public open spaces and to liaise with adjoining local authorities and other stakeholders to achieve and improve wider external linkages and corridors.

Section 4.2.2.8 Policy OSR9: Former Ballyogan Landfill

It is Council policy to continue the rehabilitation of the former Ballyogan landfill site and following completion of these works the site will be developed as a new public park (Jamestown Park). The former Ballyogan landfill - now decommissioned is located adjacent to the new development areas of Stepside and Kiltiernan/Glenamuck.

There are no designated Special Areas of Conservation (SAC), Special Protection Areas (SPA) nor Natural Heritage Areas (NHA) within the vicinity of the site.

Landscape Character Areas (DLRDP Appendix 7: Landscape)

The DLRDP contains a Landscape Character Assessment for the County. This divides the county into 14 Landscape Character Areas. The proposed road lies in the Kiltiernan Plain LCA.

Kiltiernan Plain

This is a large enclosure which comprises the hilly plain lying between Three Rock to the west, Newtown, Barnaslingan (The Scalp) and Carrickgollogan to the south, the disused lead mines and chimney to the east. The enclosure is curtailed to the north by the coniferous plantation on Three Rock. The edge of Stepside Area Action Plan and Ticknick also forms a boundary to the north east.

This enclosure is characterised by a series of smaller hillocks within a plain. Roads run between the undulations most notably the main Enniskerry Road running northsouth from Stepside and disappearing into the Scalp.

This large hillocky plain which is part of the foothills of the Dublin Mountains accommodates much of the rural development in the County (Kiltiernan and Stepside). Given its terrain and the number of routeways traversing this plain, it is likely to be subject to the most pressure for long-term development which would significantly alter the existing landscape. The area has accommodated much change generated by the pressures of being adjacent to a large urban area. New residential communities have been provided for and will continue to be provided for with the adoption of Kiltiernan/Glenamuck Local Area Plan 2013.

The following sensitivities and strategies are identified for the LCA:

- There is a risk that continued linear development along the road between Kiltiernan and Stepside will simply merge the two villages into a continuous built up strip. Settlement strategy shall concentrate on the consolidation of these villages along with the provision of a substantial open space buffer zone between the two to prevent coalescence. To have regard to the policies and objectives of Kiltiernan/Glenamuck Local Area Plan 2013.
- Protect existing hedgerows particularly those identified as priority hedgerows in the Dún Laoghaire-Rathdown hedgerow survey.
- To have regard to the recommendations and findings of the Historic Landscape Character Assessment for Kiltiernan.

Green Infrastructure Strategy (DLRDP Appendix 14)

This Green Infrastructure (GI) strategy for Dún Laoghaire-Rathdown seeks to provide a vision and a framework which will identify, protect, promote and enhance the GI assets in the urban, rural and coastal environments of the County. The strategy provides a vision for the GI in the County that is supported by a set of key principles and a robust spatial framework. Importantly, the GI strategy aims to guide key aspects of planning policy at County and local level.

Outlined within the Executive summary for Green Infrastructure a few of the main elements of the strategy for natural and cultural heritage are to:

- Restore or mitigate the fragmentation of ecological corridors throughout the County
- Create a network of Greenways, Green Streets
- Ensure new developments enhance the Green Infrastructure Network

Kiltiernan Glenamuck Local Area Plan 2013-2019

The Kiltiernan/Glenamuck Local Area Plan (LAP) (2013) was adopted by Dún Laoghaire-Rathdown County Council in September 2013. In June 2018 it was extended for a further period up to and including September 2023. It sets out a framework plan for the development of residentially zoned lands in the Kiltiernan/Glenamuck area. One of the key elements of the overall planning framework for the area is the proposal to provide a bypass road of the Village Core of Kiltiernan,

Section 1.7 of the LAP identifies following descriptions of the areas that are relevant:

Glenamuck

- The majority of the Glenamuck 'component' of the Plan area comprises large properties (zoned 'Objective A') with well established gardens and large 20th century detached dwellings.
- Large 20th century detached dwellings with well established gardens in the area of Springfield Lane.
- Located on the southern side of Springfield Lane are two recently constructed residential developments (one of which is 'Cairnbrook').
- The Glenamuck Cottages enclave, has a distinctive streetscape character.
- Dwellings located on Glenamuck Cottages Road predominately single storey cottage-style structures.
- Rockville Drive, which comprises two-storey semidetached dwellings.
- Large detached house south of the Glenamuck Cottages is a tranche of agricultural zoned land.

Kiltiernan

- The majority of the Kiltiernan 'component' of the Plan area comprises residential-zoned land, with the exception of the two proposed Neighbourhood Centre nodes and a site located on the southern side of Ballycorus Road, which is zoned for agricultural uses.
- Planning Policy for the area is set out in Chapter 6 of this EIAR 'Planning and Policy'.

The plan contains objectives reflecting DLRDP policies for *the protection of Landscape, Natural Heritage and the Built Environment and includes in Policy LH21 the preservation of the prospect of Three Rock, Two Rock Mountain and Carrickgollogan from Enniskerry Road and the designated protected views southwards from Ballycorus Road.*

In particular it recognises the predominance of hedgerows as a feature of the area:

Section 7.1.5 Hedgerows:

The most significant habitat type in the LAP area is the hedgerow. The HCLA study found that in general, the condition of the hedgerows ranges from very good to excellent. The protection of local hedgerows is a priority for ensuring habitat survival and maintaining local biodiversity. In this regard, the HCLA recommended undertaking a detailed ranking survey of the hedgerows, which could qualify the sustainability of these important resources. This is particularly important considering significant lands, which have been zoned for future development, contain mature hedgerows. Any proposed development area which includes extensive existing hedgerows, should include an assessment of the hedgerows within the subject site boundary, and incorporate proposals for their retention and enhancement, if applicable and feasible.

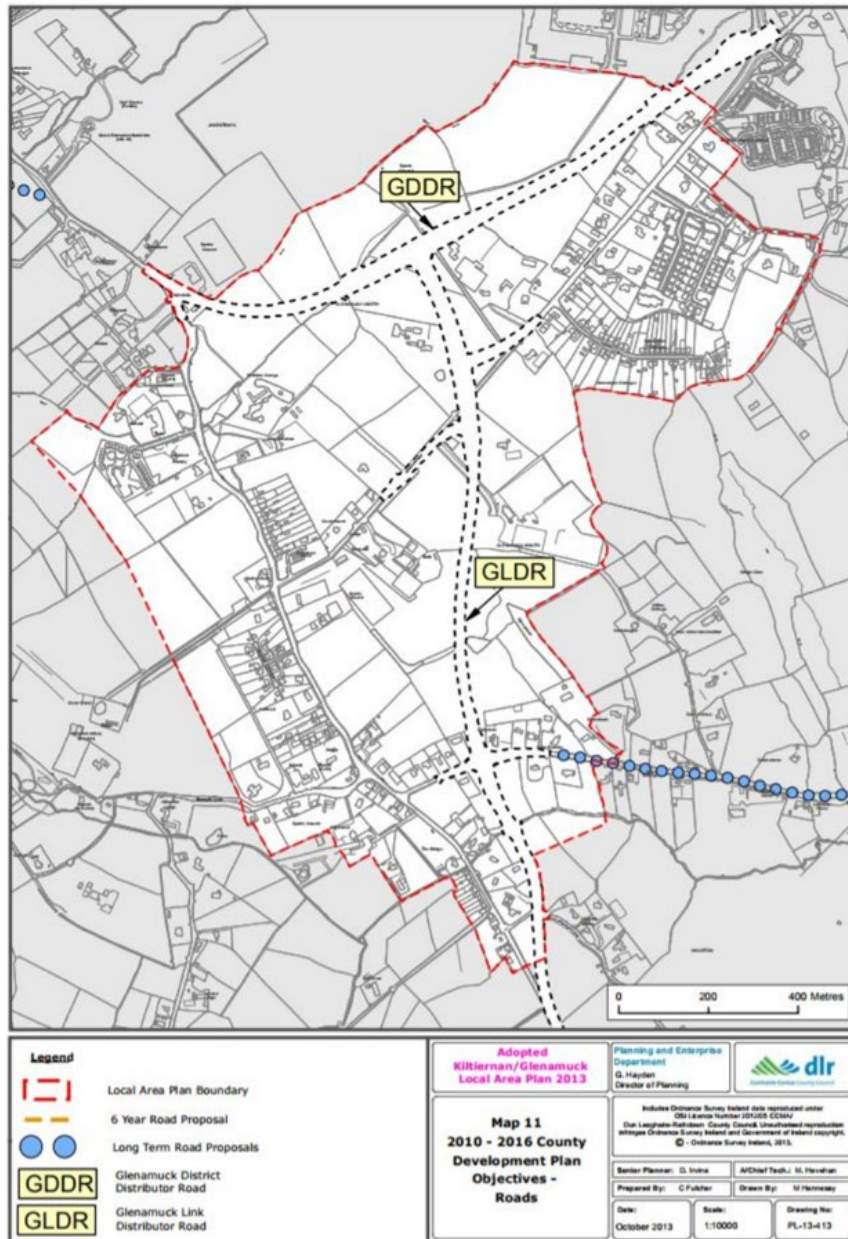


Figure 12- 1: Kiltiernan/Glenamuck LAP Map 11 showing roads objectives

12.3.2 Description of Receiving Environment

The road corridor and environs is described below in terms of:

- Location and overview;
- Topography and drainage;
- Vegetation and natural heritage;
- Built and cultural heritage;
- Character;
- Landscape and visual amenity.

Much of the descriptive information below originates in the existing LAP text supplemented with site survey.

12.3.3 Location and Overview

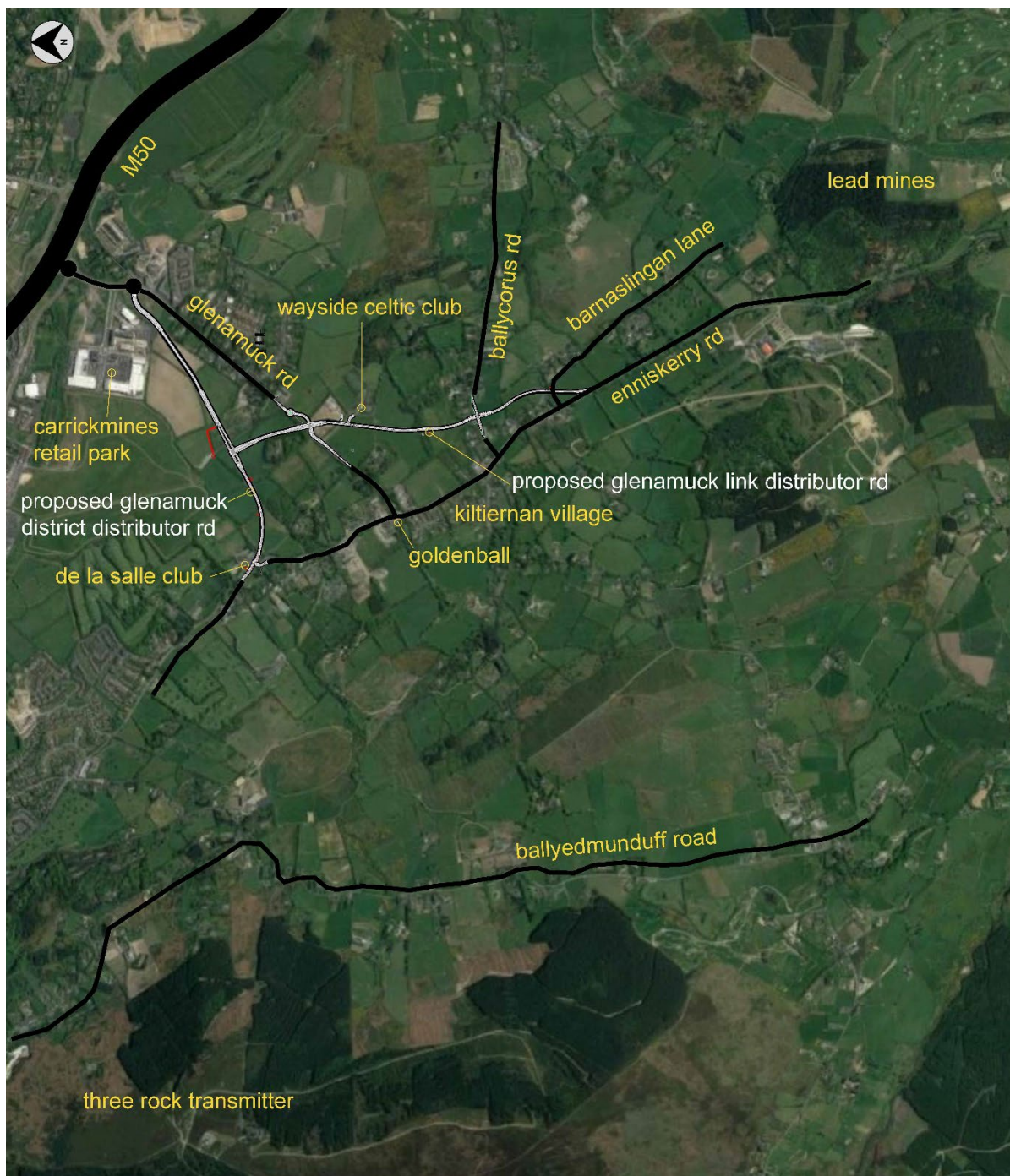


Figure 12- 2: Road Corridor and General Environs Location (Courtesy of Google Maps)

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.



Plate 12.1- Enniskerry Road



Plate 12.2 - Glenamuck Road

The site for the proposed road development is located to the east of the R117 and southwest of the M50 Motorway, between Carrickmines and Kiltiernan. Kiltiernan provides linkages to Enniskerry to the south, Stepside village to the north and to the Carrickmines Interchange of the M50 South Eastern Motorway approximately 1.5km east of Kiltiernan Village.



Plate 12.3 - Golden Ball Junction of the Enniskerry Road and Glenamuck Road

The existing Glenamuck Road links all of these roads together at the Golden Ball junction in the heart of Kiltiernan village. This rural location is situated at the urban fringes of Dublin City and County particularly with the access onto the M50 motorway, which provides linkages to the majority of the national road schemes in the country. The proposed new distributor and link roads would join the existing road network with new junction(s) to be formed with the R117 (Enniskerry Road), the R116 (Ballycorus Road) and the Glenamuck Road.



Plate 12.4 - Looking south west along the Proposed Road Corridor from the Carrickmines Retail Park



Plates 12.5 and 12.6 - Carrickmines Green and Retail Park

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 River (south of the Ballycorus Road). There are some areas where the road frontage of properties along the east of the existing Glenamuck Road have steep embankments. 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.



Plate 12.7 - Glenamuck Road Hedgerows



Plate 12.8 - the Arklow-Carrickmines ESB Pylons

The proposed GDRS road development is approximately 3.3km in length including both the Glenamuck District Distributor Road and the Glenamuck Link Distributor Road.

The lands that the development site traverses can broadly be described as a combination of agricultural grassland with traditional hedgerow/treeline field boundaries, along with built development such as roads, houses and other buildings.



Plate 12.9 - Looking south west from Wayside Football Club – a landscape of fields, hedgerows and settlements.

12.3.4 Topography & Drainage, Geology and Soils

The Glenamuck Stream flows from west to east through the northern part of the lands. A small section of the Loughlinstown/Shanganagh River flows through the southern part. These small water courses combine with each other before discharging to the sea at Shanganagh. The area is drained by a

network of field drainage and small watercourses. The entire scheme lies within the catchment of the Loughlinstown River. See Chapter 14 for Hydrological Assessment.

The LAP area is located in a shallow north-west to southeast aligned valley to the east of Three Rock Mountain at an elevation of approximately 130 metres above sea level. The overall trend of the landscape is falling from uplands in the south-west to lowlands in the north-east. To the east and south-east beyond the LAP area boundary the land rises to a height of 150 and 240 metres respectively while to the west the landscape is dominated by the peak of the Two Rock Mountain (536 metres OD). To the north along Enniskerry Road the landscape opens out to the lowland Plain of Dublin, while to the south the topography reflects the granite uplands of the Dublin/Wicklow mountains. The valley location of this site and the historic use of this valley as a communication route, play key roles in the defining character of this LAP area.



Plate 12.10 - Views to the Dublin Mountains from Carrickmines Green roundabout

The rolling granite of the Dublin Mountains forms the main physical feature of the landscape at Kiltiernan/Glenamuck. Soils in the area is generally 0.3-0.5m topsoil overlying glacial boulder clays on granite bedrock. See Chapter 13 for Land and Soils Assessment

12.3.5 Vegetation, land cover and natural heritage

It is clear that trees, groups of trees or woodlands which form a significant feature in the landscape are important in setting the character of the area. The CDP currently identifies significant trees/woodlands in a location in the extreme northern portion of the LAP area immediately east and west of Glenamuck Road. There are no formal statutory Tree Preservation Orders in the LAP area.

Of additional significance is a wooded strip, located along the south-eastern perimeter of the LAP area and zoned 'Objective G' (see LAP Map No. 7), which contains a small stand of pure blackthorn. This blackthorn forms a dense stand of several metre tall bushes that diminish to bushes of about one metre in the adjacent field. Mature hedgerows, tree lines and field patterns are a distinctive feature in the character of the area and the enclosure of local roads and routes.

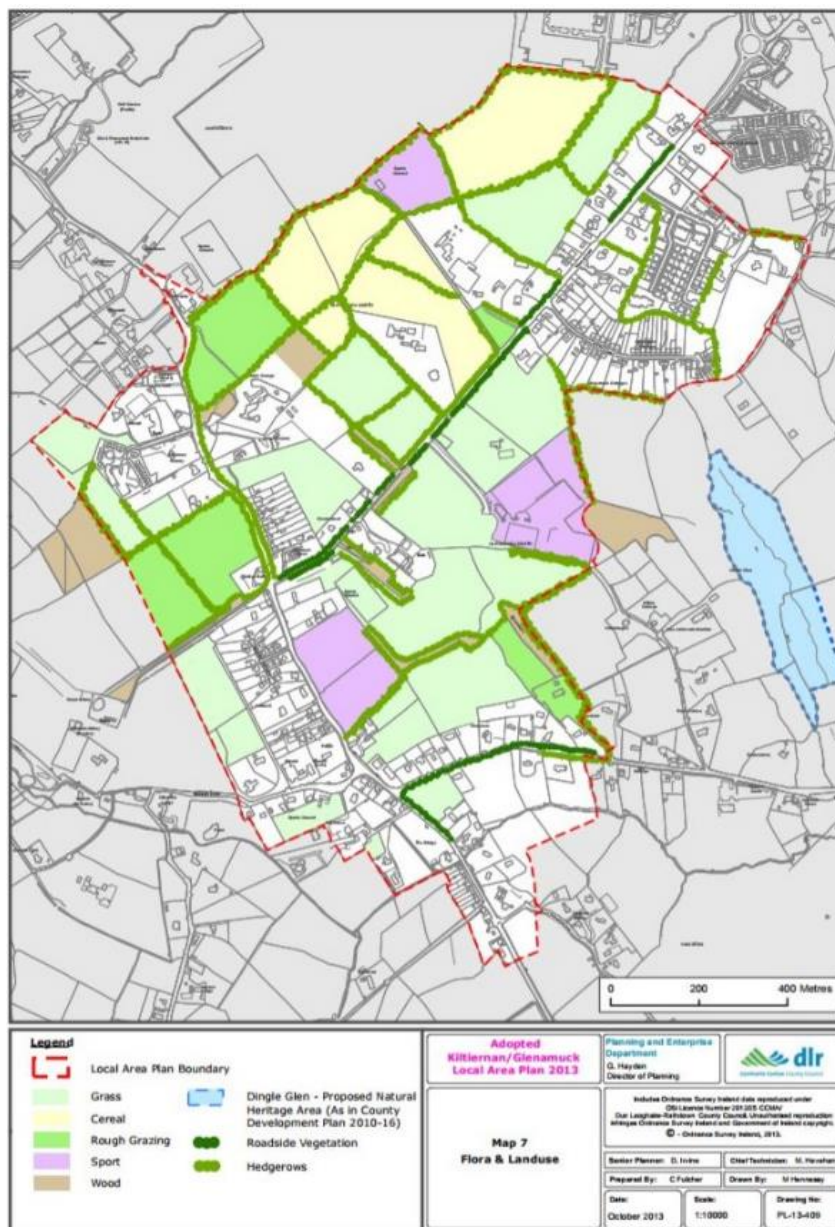


Figure 12- 3: Glenamuck/Kiltiernan LAP Map 7

The LAP describes in detail the vegetation and land cover of the area. These include:

- (i) Agricultural lands used for intensive and active agriculture including, cereal production, fruit production, and grazing grass cutting;
- (ii) Rough grazing poorer pastures;
- (iii) Sports grounds;
- (iv) Gardens and houses; and
- (v) Woodland.



Plate 12.11 - Overview of the LAP area - view from the foothills of the Dublin Mountains- showing field patterns, mature trees, wooded areas, and settlement.

The vegetation is described in the LAP as follows:

Each of these has typical habitat features and influence biodiversity in a characteristic way. In summary, the village of Kiltiernan and surrounding countryside are or have been intensively managed by humans. The most significant habitat type in the LAP area is hedgerow. Many of the hedgerows have a high biodiversity value and preliminary inspection undertaken during the HLCA study identified those classified as mature as being over one hundred years old. In general the condition of the hedgerows ranges from very good to excellent. While lands within the LAP area which have been zoned for future development, contain mature hedgerows, it is acknowledged that it may not be possible to retain all these hedgerows. Future development proposals on respective land parcels may necessitate the undertaking of additional hedgerow surveys. Along the roads of the LAP area the main habitats are hedgerows and stone walls. While the margins of the R117 are of limited biodiversity value, along the Glenamuck Road and the R116 where gardens give way to agricultural lands the hedgerows are mature and rich in species, and in the main well structured. On the approach to the village from Dublin and opposite the Church of Ireland church are fields with very overgrown hedgerows and well developed field margin communities. In and around the village while the churches, schools, garage, public house and houses have intensively managed and planted surrounds, the surrounding fields encroach on the village and no part of the Plan area is currently far from open agricultural countryside. To the west of the village the managed agricultural and recreation lands give way to rough pastures and upland vegetation dominated by gorse. The hillsides are flanked by a network of very mature hedgerows that gives the area a superficially wooded appearance. Such areas could serve as buffers between the developing village and the less intensively managed hinterlands. A network of mature hedgerows link fragments of old woodland and more recent mature gardens.

12.3.6 Built and Cultural Heritage

Section 1.6 of the LAP describes the rich built and cultural heritage of the area which contributes to its character: Refer also to Chapter 11 of the EIAR



Plate 12.12 – Collage of local vernacular features



Plate 12.13 'Golden Ball' Gateway Pier.



Plate 12.14 Changing streetscape

The following protected structures are identified

Location	Protected Structures	Description
Enniskerry Road ('north')	Shaldon Grange Kiltiernan Abbey (at Golden Ball)	House Entrance Piers
Glenamuck Road	Rockville	House and Gate Lodge
Kiltiernan	Church of Our Lady of the Wayside Church of Ireland Parish Church	Church Church, School, Sexton's Lodge, Boundary Walls and Gates
Enniskerry Road ('south')	An Muilleán 1-9 Moss Cottages	Old Post Office Orange Lodge House (formerly a cotton factory) Houses House & Shop House
Bishops's Lane (Kiltiernan)	Kiltiernan Lodge	Entrance Gates (Plus the House and barn which are outside the LAP area)

Protected structures are generally located within the built up clusters and village areas, away from the proposed road alignment.

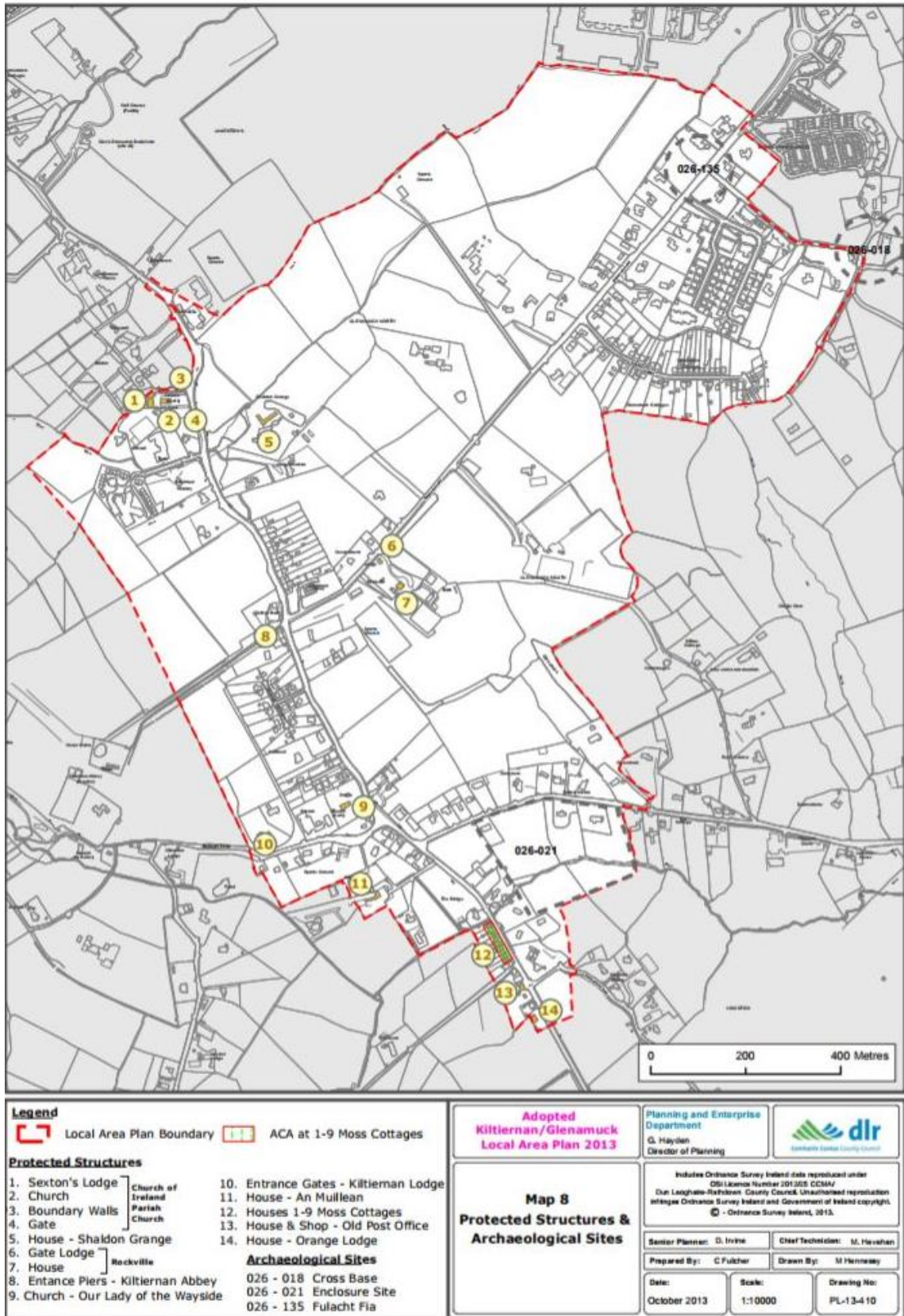


Figure 12- 4: Glenamuck / Kiltiernan LAP Map 8 – Protected Structures

12.3.7 Character

The receiving environment is characterised currently by the two villages of Kiltiernan with its very legible character and scale, and the more dispersed settlement of Glenamuck. The surrounding landscape is typical of the foothills of the Dublin mountains as they meet the outer city suburbs – fields in pasture and narrow country roads surrounded by mature hedgerows with small woods and tree lines scattered through the area. Small streams and ditches take water from the surrounding uplands. The landscape also contains country houses and their walled grounds as well as more modern one-off large houses and gardens as the attractive countryside, local village life, nearby upland amenity and proximity to the city draw new residents. At its best the landscape presents an idyllic rural character, elsewhere the clear pressures of the urban fringe, one-off houses and new estates are evident. There are protected views southwards (to the mountains) from a number of locations including the Ballycorus Road. From the higher land and hills to the south there are a number of protected prospects north over the receiving environment and the wider city and bay.

12.3.8 Landscape and Visual amenity



Plate 12.15 – View from Ballyedmunduff Road

12.3.9 Summary of Landscape Characteristics and Values

The conservation and enhancement values of the Receiving Environment are set out in this section. The conservation values indicate those aspects of the receiving environment which are sensitive and could be negatively impacted on by the proposed development. These values form the potential landscape and visual constraints to the proposed road.

The enhancement values reflect change that is occurring in the landscape and its inherent robustness.

12.3.10 Conservation values

These include:

- Scenic and elevated views from the west – Dublin Mountains Way and Ballyedmonduff Road and Three Rock
- Scenic Views from the R116, although these are orientated south towards the mountains
- Fields patterns, mature hedgerows and trees
- Existing residential areas and the village
- Amenity areas
- Protected structures through the village which contribute to its character - Registered monuments are relatively distant
- Vernacular features – stone walls, gates and fences etc

12.3.11 Enhancement Values

These include:

- Planning policy supporting the road development and its alignment
- Extensive change underway in the receiving environment – from rural to suburban / urban
- Planning policy directing change from rural to urban.
- In the rural context there is significant landscape capacity to absorb the road and also benefits for existing villages and residential areas
- In the context of future urban development the road facilitates change but will also be subsumed by such change, the impact of which will far surpass that of the road itself.

12.3.12 Characteristics of Proposed Development

The Proposed Development

The proposed road is designed to relieve traffic pressure on the two adjacent settlements and is part of wider infrastructure improvements locally to facilitate expanding urban development. The planning policy is discussed in detail in Chapter 6. The road scheme is part of extensive landscape change as new residential development transforms the local landscape character from rural to urban. The proposed new road is part of this change but in itself would not significantly change the area character, however the associated urbanisation of the surrounding rural environment will see significant cumulative change. This is local policy and the approved LAP sets out to guide that development to integrate key aspects of the rural character and landscape features in the new urban area whilst integrating the new urban area into the wider landscape. Urban design principles and design guidelines are set out in the LAP for this landscape change.

It is essential that the quality rural landscape is replaced by a quality urban landscape that reflects the materials, character and natural and cultural heritage of the area and where feasible, trees and hedgerows of merit and built cultural features are retained. As a key part of the urbanisation the new road must reflect these intentions and seek to repair and replace where such elements are negatively affected.

The proposed Glenamuck District Roads Scheme (GDRS) is described in Chapter 5 and generally consists of the following:

Glenamuck District Distributor Road (GDDR) – Connects from the Enniskerry Road adjacent to De La Salle Palmerstown Rugby Club to a tie in at the Glenamuck Road East/Golf Lane Roundabout.

Glenamuck Link Distributor Road (GLDR) - Connects from the approximate midpoint of the GDDR to the Enniskerry Road south of Kiltiernan and will connect the new distributor road with the existing Glenamuck Road, Ballycorus Road and Barnaslingan Lane providing an alternative to the Enniskerry Road for north south travel.

The proposed work 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
- Miscellaneous ancillary works

12.4 Predicted Impacts

12.4.1 Landscape Sensitivity

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 where they will be transected by urban roadways, it must be acknowledged that there have been significant new developments in recent years impinging on the Glenamuck road in particular. This is inevitable in a living and developing village in the Greater Dublin Area and it is the management of that change that is important in order to ensure that such change is positive and sensitive to Kiltiernan village's identity and character and landscape quality.

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).

12.4.2 Magnitude of Landscape Changes

The physical scale of the proposed road scheme is relatively modest due to it being primarily a physical surface presence and integrating with the existing local roads network. In the context of being on the fringes of a city with links to large scale road infrastructure, policy to provide an upgrade to the local road system to accommodate increased usage, fit for purpose for public transport routes, and to reduce traffic pressure on the centre of Kiltiernan Village cannot be considered unexpected in the context of the receiving environment nor inappropriate giving the recent and ongoing urban development in the area. 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).

12.4.3 Predicted Landscape Impact

The proposed District Distributor and Link Distributor roads impact on the enclosed character of the existing Glenamuck and Ballycorus Roads and Barnaslingan Lane but only where they intersect and where wider urban thoroughfares need to integrate with existing rural roads. However by reducing green fields and providing new hard surface corridors in turn dictates the additional requirement for attenuation ponds to manage surface water, generating new habitat typologies.

The significance of the proposed new road is Medium and on balance Neutral – Beneficial 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.

12.4.4 Predicted Visual Impacts

Based on the assessment of the landscape characteristics, values and sensitivities, 13 viewpoints were selected for assessment of visual amenity impact. These are scheduled below.

No.	Location / Description
Location map and Existing and Proposed images in Photomontage booklet by Chris Shackleton Consulting in Appendix 12.3	
PM01.	From Enniskerry Road near De La Salle looking South East
PM02	From outside Carrickmines Green Apartments looking West
PM03	From Glenamuck Road near Rambledown looking South West
PM04	Ballycorus Road looking South
PM05	Barnaslingan Lane looking South
PM06	Three Rock Transmitter & Ticknock Amenity Area view east
PML01	De La Salle Palmerstown Rugby Clubhouse view south
PML02	From Enniskerry Road new entrance looking South
Other Viewpoints	
VP01.	Glenamuck Road view northeast
VP02	Wayside Celtic Football Club view west
VP03	Barnaslingan Lane view northwest
VP04	Kiltiernan Parish Church view northeast
VP05	Lead Mines & Carrickgollogan Amenity Areas view north

Viewpoint PM01 From Enniskerry Road near De La Salle looking South East

Existing View

This view is located at street level near the De La Salle rugby club on the Enniskerry Road near the north west extent of the proposed roadway works .

The view is looking south east along the Enniskerry Road towards a bend in the road at the club entrance. The existing road occupies much of the view and is bounded by local stone walls and enclosed by woodland and trees closing views beyond the road corridor.

Proposed Changes and Impacts

The new road will depart from the existing route crossing directly through trees at the driveway entrance to the club

The main changes to the view would be

- the widening and extension of the existing carriageway.
- the partial loss of mature boundary hedgerows and trees.
- The planting of new trees and placing new boundary treatments creating new and appropriate landscape structure and capacity to mitigate these changes.

Visual Effects

The viewpoint sensitivity is Low, representing people travelling through a busy route and not particularly focused on the landscape which is enclosed.

The magnitude of change would be Medium in the Short term, Medium and Long Term. The tree loss would be noticeable and the new road would be partially intrusive in the view. New tree planting would over time re-establish the landscape structure and mitigate these impacts.

The significance of the change would be Slight in the Short, Medium and Long Term.

Qualitatively the impact would be Adverse in the Construction Stage, and Short Term declining to Neutral in the Medium and Long Term.

Viewpoint PM02 Carrickmines Green Apartments (street level) view west

Existing View

This view is located at street level at the entrance to the Carrickmines Green apartment complex, east (approx. 89m) from where the proposed roadway works are due to begin at the existing Glenamuck Road South Roundabout.

The view is looking northwest across the existing Glenamuck road, toward a meadow with an access gate and boundary post and rail fence which bounds the edge of the existing carriageway. In this foreground are visible road markings, signage, mini pillar, and light standard along the footpath. Beyond, are the foothills of the Wicklow mountains, with the land sweeping up to the three rock transmitters on the horizon across hills and valleys, fields, boundary hedgerows, woodlands and settlements.

To the right of view, across Glenamuck Road but just out of view, is the sprawling Carrickmines Retail Park. To the left of this view the Glenamuck Road narrows beyond the extent of the apartment development, to the character of a rural carriageway bounded by mature trees and informal hedgerows.

The view represents that typically experienced by residents and motorists where pressure from new urban development is experienced in this area.

Proposed Changes and Impacts

The new link road will depart from the existing route crossing into adjacent fields located on the western edge of the carriageway, from where it will continue in an westerly direction until it curves to meet the Enniskerry road north of Kiltiernan.

The main changes to the view would be

- the partial loss of adjacent fields to the northwest of the existing carriageway.
- the partial loss of boundary hedgerows and trees.
- The planting of new trees and boundary hedgerow creating new and appropriate landscape structure and capacity to mitigate these changes.

Visual Effects

The viewpoint sensitivity is High, representing people residing in the apartment complex as well as travelling through or past the affected landscape in cars or on public transport. The backdrop to the

new development is the Wicklow mountains which is the primary focus of the view out from the apartments, although the foreground and adjacent areas are representative of significant ongoing change.

The magnitude of change would be Low in the Short term, Medium and Long Term. The new road would be a minor change to the view and the longer distance backdrop would remain. Over time mitigation would reduce this visibility.

The significance of the change would be Moderate in the Short, Medium and Long Term.

Qualitatively the impact would be Adverse in the Construction Stage, declining to Neutral in the Short, Medium and Long Term.

As the 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.

Viewpoint PM03 Glenamuck Road near Brambledown looking South West

Existing View

This view is located at street level adjacent the Willow Glen development on the existing Glenamuck Road.

The view is looking southwest along the existing Glenamuck road, as it travels towards the Golden Ball junction.

The existing road is visible in the foreground and travelling straight into the distance. To the left (south) the boundary hedges, and ornamental planting of mature gardens and local houses can be seen. This is replicated to the right (north) although immediately adjacent new development is replacing single houses and large gardens with denser housing estates. In the distance the vegetation merges over the road creating a typical green country lane tunnel effect.

The view represents that typically experienced by residents and motorists of an attractive rural area with scattered single housing, in transition.

Proposed Changes and Impacts

The viewpoint looks south west at the junction between the new link road and the Glenamuck road. A roundabout is visible forming the junction for a spur to run to the left (south) to connect to the link road.

The roundabout is visible centrally in the view and an approach ramp. New tree planting and landscape works associated with the junction are also visible.

The main changes to the view would be

- The loss of trees centrally in the view.
- The loss of the “green tunnel” effect of surrounding vegetation.
- New road surfaces and modern components including the roundabout itself.
- The planting of new trees and boundary hedgerow creating new landscape structure and capacity to mitigate these changes.

Visual Effects

The viewpoint sensitivity is Medium, representing people travelling through the landscape as well as residents, although views are constrained by the existing vegetation.

The magnitude of change would be High in the Short term, Medium and Long Term. The new road would be an intrusive new feature and alter the character of the existing country road.

The change would be Significant in the Short, Medium and Long Term.

Qualitatively the impact would be Adverse in the Construction Stage and Short Term reflecting the loss of trees and change in character, **this would decline to Neutral in the Medium and Long Term** as new tree planting recreates a green and leafy context.

Viewpoint PM04 Ballycorus Road view south

Existing View

This view is located on Ballycorus Road looking south towards the Lead Mines visible on the hill and in the foreground where the new distributor road will cross the existing road. As with the Glenamuck Road, the character of Ballycorus Road is that of a semi-rural road with footpath to the edge of Kiltiernan Village, with intermittent residential plots of land and agricultural fields either side of the roadway. The boundary vegetation is of varied height being a mix of informal hedgerow and mature trees. Stone walls, piers and gates punctuate the hedgerows. Road markings, road signage, poles and overhead wires are also visible along the roadway.

In the distance above the boundary hedgerow the raised ground of the Lead Mines & Carrickgollogan Amenity Area are visible, with the tall chimney of the lead mine being the prominent focal point. The conspicuous Arklow – Carrickmines 220kV Double Circuit Electricity route and pylons is visible overhead.

The view represents is typical of a rural road in transition on the fringes of the city.

This road affords recognised scenic views along its length southwards to the mountains.

Proposed Changes and Impacts

The new link road will transect the existing Ballycorus road crossing into adjacent fields located on the north and south sides of the carriageway, the existing road will be widened to the south, from where it will continue in a southerly direction continuing to meet the Enniskerry road south of Kiltiernan.

The main changes to the view would be

- The creation of a significant new junction in the middle of the view.
- the partial loss of adjacent fields to the north and south of the existing Road.
- the partial loss of boundary hedgerows and trees.
- The increased opening in the boundaries to allow for the new road junctions
- The planting of new trees and construction of new stone walls creating new and appropriate landscape structure and capacity to mitigate these changes.

Visual Effects

The viewpoint sensitivity is High, being a recognised scenic route

The magnitude of change would be High – extensive intrusion of the development in the view.

The change would be Very Significant in the Short, Medium and Long Term.

Qualitatively the impact would be Adverse in the Construction Stage and Short Term declining to Neutral in the Medium and Long Term, as mitigation measures establish and the landscape pattern is re-established.

As the 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.

Viewpoint PM05 Barnaslingan Lane looking South

Existing View

This view is located on Barnaslingan Lane looking south along the alignment of the proposed new road. The asphalt surface of the country road can be seen running left to right in the foreground, bounded by a low masonry wall. Beyond this can be seen an attractive framed view of a field in pasture enclosed by mature trees and small woods. Beyond, further south, can be seen the two hills of the Scalp covered with woodland and trees

The lane provides unspoilt scenic views southwards, however part of the field is zoned for residential development under the Kiltiernan LAP.

Proposed Changes and Impacts

The new link road will travel across the field in the view, diagonally from left to right (north to south)

The main changes to the view would be

- The loss of immediate foreground vegetation along the road alignment.
- The loss of the open green field
- The introduction of traffic into the view.
- Reduced visibility of distant hills due to roadside tree planting.

Visual Effects

The **viewpoint sensitivity is Medium**, representing people travelling through the landscape as well as residents, although views are constrained by the existing vegetation.

The **magnitude of change would be High in the Short term, Medium and Long Term**. The new road would be a new feature and alter the character of the view.

The **change would be Significant in the Short, Medium and Long Term**.

Qualitatively the impact would be Adverse in the Construction Stage and Short and Medium Term reflecting the change in character and loss of long distance views. **This would decline to Neutral in the Long Term** as new tree planting recreates a green and leafy context albeit with more constrained distant views.

As the LAP urban development is constructed, the visibility of the new road will decline, and more significant change will see residential development to the right (west) of the new road alignment.

Viewpoint PMo6 Three Rock Transmitter Amenity Area view south east

Existing View

This view is from the top of the Three Rock amenity high point looking south east towards Carrickmines and Kiltiernan. In the foreground is low vegetation, primarily heather, with a plantation of young conifers on the hillside. Discernible in the middle distance is the outline of Carrickmines Retail Park and Carrickmines Green apartment complex, while Kiltiernan Village is obscured by vegetation.

In the background, out beyond a landscape pattern of field systems with hedgerows and woodland planting and associated urban areas, can be seen the sea and the wider Dublin Bay area.

Proposed Changes and Impacts

The new road system will come from the direction of Carrickmines curving northwest to meeting the Enniskerry road north of Kiltiernan Village, and branching off to head south to meet the Enniskerry road south of Kiltiernan Village. The ground plane of proposed road will be substantially obscured by existing and proposed hedgerows and the topography of the land from this vantage point.

The main changes to the view would be

- The partial intrusion of the new road across the existing field pattern
- the partial loss of boundary hedgerows and trees.

- The planting of new trees and boundary hedgerow creating new and appropriate landscape structure and capacity to mitigate any changes.

Visual Effects

The viewpoint sensitivity is High – being a popular recreational and amenity destination with a stunning panorama.

The magnitude of change would be Low – Minor intrusion and alteration to the composition of the view.

The significance of the change would be Moderate to Slight in the Short, Medium and Long Term.

Qualitatively the impact would be Adverse in the Construction Stage declining to Neutral in the Short, Medium and Long Term as mitigation planting is established.

As the 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.

Viewpoint PML01 De La Salle Palmerstown Rugby Clubhouse looking south

Existing View

This view looks south from the clubhouse of De La Salle Rugby Club and stop within the confines of the club grounds as it is enclosed along its boundaries with mature trees and vegetation. To the south temporary prefabricated buildings are visible within the car park of the club. A raised concrete kerb denotes the edge of the parking and a sloped vegetative strip of grass is visible to the left in front of the clubhouse. White lines demark parking spaces on the tarmac surface.

The view is very utilitarian in character but with an attractive wooded backdrop.

Proposed Changes and Impacts

The proposed road coming from the direction of Carrickmines will be located in the southern corner of the club grounds where the temporary school buildings sit, when it curves northwest through the carpark before meeting the Enniskerry road in close proximity to the entrance gate. The new road would be elevated above the current level and retained by a stone clad retaining wall which would be a prominent new feature. New trees would be planted in the car-park along the boundary wall.

The main changes to the view would be

- The partial loss of the car park area
- The intrusion of the new road corridor and retaining wall in the view
- The removal of the temporary school buildings
- the partial loss of boundary hedgerows and trees.
- The reduced distance from the clubhouse to the new boundary of the road

- The planting of new trees and boundary hedgerow creating new and appropriate landscape structure and capacity to mitigate any changes.

Visual Effects

The viewpoint sensitivity is Low – Viewers would not be typically focused on the view whilst using these community facilities, and the view is utilitarian in character.

The magnitude of change would be Medium – introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.

The change would be of Slight Significance in the Short, Medium and Long Term.

Qualitatively the impact would be Adverse in the Construction Stage declining to Neutral in the Short, Medium Term and Long Term, as new trees establish – the existing view is functional and the new stone wall could be an attractive feature. Background trees would predominantly remain.

Viewpoint PMLo2 From Enniskerry Road new entrance looking West

Existing View

This view looks west from the Enniskerry Road outside the De La Salle Rugby Club above the portacabins described PMLo1. The view looks obliquely along the R117 towards the entrance drives of large individual houses on the western side of the road. The road occupies the foreground of the view bounded in the middle ground by a roadside path and a traditional stone wall. Above this dense hedgerow trees and shrubs close the view.

This is a typical view of private drives off the Enniskerry Road.

Proposed Changes and Impacts

The new road will create a minor realignment here as it meets / merges with the Enniskerry Road travelling north west. Changes visible are minor.

The main changes to the view would be

- The road pulls away from the western boundary wall.
- Further north a new grass verge is introduced.
- No trees or other vegetation is affected.

Visual Effects

The viewpoint sensitivity is Medium, representing people travelling through the landscape as well as residents, although views are constrained by the existing vegetation.

The magnitude of change would be Low – Minor intrusion and alteration to the composition of the view.

The change would be of Slight Significance in the Short, Medium and Long Term.

Qualitatively the impact would be Adverse in the Construction Stage becoming Neutral or even Beneficial in the Short, Medium and Long Term.

Other Viewpoints



Figure 12- 5: Viewpoint Map o1 Local Area

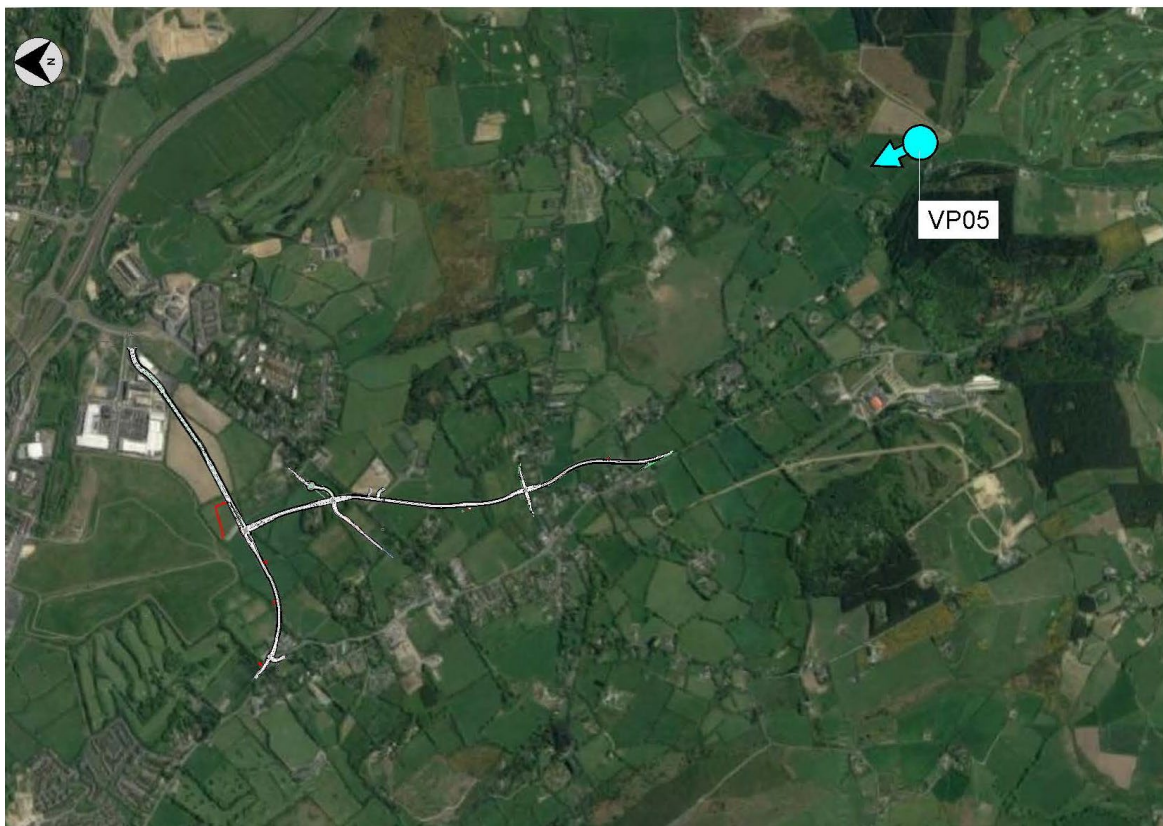


Figure 12- 6: Viewpoint Map o2 Wider Area

Viewpoint 01 Glenamuck Road view northeast



Existing View

This view is located on Glenamuck Road looking north-eastward from the existing entrance gateway of Wayside Football Club towards where the new distributor road will transect Glenamuck Road. The character of Glenamuck Road in the view is that of a semi-rural narrow road lined with large established residential plots of land enclosed with high-level mature boundary vegetation. Road markings, road signage, poles and overhead wires, together with new entrance piers are visible along the roadway. New multi-unit developments are appearing on a number of these older residential plots so the character of the road is changing. In the foreground, and still visible elsewhere, are low dry stone boundary walls with naturalised herbaceous planting; a prominent local feature in the area.

The distant view is narrowed by the tunnel effect created by the overhanging trees meeting in the middle of the road giving the road a sense of enclosure and shelter.

The view represents is typical of a rural road in transition on the fringes of the city.

Proposed Changes and Impacts

The new link road will cross the existing route between adjacent fields located on the northwest and southeast sides of the carriageway. Travelling from the northwest it will continue in a southeast direction, cutting through the access road to Wayside Football Club, and continuing to meet the Enniskerry road south of Kiltiernan.

The main changes to the view would be

- The creation of a significant new junction in the middle of the view.
- the partial loss of adjacent fields to the northwest and southeast of the existing Glenamuck Road.
- the partial loss of boundary hedgerows and trees.
- The break in the continuous vegetative and enclosed character along Glenamuck Road to allow for the new openings at road junctions
- The planting of new trees and boundary hedgerow creating new and appropriate landscape structure and capacity to mitigate these changes.

Visual Effects

The viewpoint sensitivity is Medium, representing people travelling through the affected landscape in cars or public transport, albeit a residential rural road.

The magnitude of change would be High, extensive intrusion of elements that would be uncharacteristic.

The change would be Significant in the Short, Medium and Long Term.

Qualitatively the impact would be Adverse in the Construction Stage, Short and Medium Term declining to Neutral in the Long Term, as mitigation proposals established.

As the LAP urban development is constructed the context to the view will alter significantly and more comprehensive urbanisation will be seen. The road and its junction will remain a permanently visible feature of the area.

Viewpoint 02 Wayside Celtic Football Club view west



Existing View

This view is located at the clubhouse of Wayside Celtic Football Club looking northwest. In the foreground can be seen an open field with little or no boundary planting to the east and west. To the right of the view lies the club's existing access road. Visible to the northwest is a two-storey dwelling set within some mature trees. Excavations and construction works are visible around this dwelling. In the background can be seen a strong line of mature trees. The Arklow – Carrickmines 220kV Double Circuit Electricity Route extends north-south across the Glenamuck Road with three pylons visible within the fields adjoining Wayside Celtic Football Club.

Proposed Changes and Impacts

The new link road will depart from the existing route crossing into fields located on the southern edge of the carriageway, from where it will continue in a southerly direction to meet the Enniskerry road south of Kiltiernan.

The main changes to the view would be

- The introduction of a new road into the view
- the loss of open fields to the northwest
- the partial loss of the access road to the club
- the partial loss of boundary hedgerows and trees.

- The planting of new trees and boundary hedgerow creating new and appropriate landscape structure and capacity to mitigate these changes.

Visual Effects

The viewpoint sensitivity is High, representing an outdoor recreational facility.

The magnitude of change would be High, extensive intrusion of the development in the view

The significance of the change would be Very Significant.

Qualitatively the impact would be Adverse in the Construction Stage and Short Term declining to Neutral Medium and Long Term, as mitigation proposals established

As the 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.

Viewpoint 03 Barnaslingan Lane view northwest



Existing View

This view is located on Barnaslingan Lane looking northwest towards where the new distributor road will cross the lane at the bend. The character of the lane is that of a rural single lane road with little or no verges, and intermittent residential plots of land and agricultural fields to either side. The boundary vegetation is of varied height being a mix of informal hedgerow and mature trees enclosing the laneway, with the exception of a stone wall boundary on the inside bend when the view opens out onto a field. Hidden walls, piers and gates to residential sites punctuate the hedgerows. There are no road markings, but poles and overhead wires are visible along the roadway. The lane disappears around a bend providing no distant views. The proposed road will cross this lane on the bend, running north to south through open fields and between existing dwellings.

The view represents that typically experienced by residents and motorists along a winding country lane.

Proposed Changes and Impacts

The new link road will cross the existing Barnaslingan Lane, crossing into adjacent fields located on the north and south sides of the carriageway, from where it will continue in a southerly direction to meet the Enniskerry road south of Kiltiernan.

The main changes to the view would be

- The lane will be truncated at the new road for vehicles (pedestrian/cyclist) openings will be provided, resulting in the west section of the lane becoming a cul de sac.
- The formation of new accesses/entrance gateways to the existing dwellings.

- The conversion of the western section of the lane to a local access only to residents residing here with no through road.
- The partial loss of adjacent fields to the north and south of the existing lane.
- the partial loss of boundary hedgerows and trees, and stone wall.
- The increased opening in the boundaries to allow for the new road junctions
- The planting of new trees and boundary hedgerow creating new and appropriate landscape structure and capacity to mitigate these changes.

Visual Effects

The viewpoint sensitivity is High representing local residents on a local road

The magnitude of change would be High – extensive intrusion of the development in the view.

The change would be Very Significant in the Short, Medium and Long Term.

Qualitatively the impact would be Adverse in the Construction Stage, Short and Medium Term declining to Neutral in the Long Term, as mitigation measures establish.

As the 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.

Viewpoint 04 Kiltiernan Parish Church looking northeast



Existing View

This view is from the elevated site of the graveyard to the fore of the Kiltiernan Parish Church looking northeast toward the Carrickmines area and Retail Park, visible in the middle distance. The new link road will traverse the fields in the middle-distance, curving from the roundabout at Carrickmines to meet the Enniskerry road to the north of this view.

In the foreground is an urban single lane carriageway with footpath, and a low concrete wall forms the back boundary of the northeast side of this path together with poles and low-hanging wires. Informal hedgerow planting is visible behind, with the field beyond at a lower level to the road. There is extensive urban development in the mid-distance, associated with the Carrickmines area, although this avoids breaking the skyline, and mature field boundaries provide some screening from this view point. The profile of the horizon in the distance is relatively level interrupted by hills and is covered in vegetation. This is punctuated in places by pylons and related infrastructure.

Proposed Changes and Impacts

Although this viewpoint is looking along the proposed alignment of the new link road approaching from Carrickmines, the ground plane of the road will be screened from view by the near field boundaries as it curves northwest before meeting the Enniskerry road.

The main changes to the view would be

- The partial loss of distant fields to the northeast.
- the partial loss of distant boundary hedgerows and trees.
- The planting of new trees and boundary hedgerow creating new and appropriate landscape structure and capacity to mitigate any changes.

Visual Effects

The viewpoint sensitivity Medium – Viewers would not be typically focused on the view whilst using these community facilities.

The magnitude of change would be Medium – Partial intrusion of the development in the view.

The significance of the change would be Moderate in the Short, Medium and Long Term.

Qualitatively the impact would be Adverse in the Construction Stage and Short Term declining to Neutral in the Medium and Long Term.

As the 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.

Viewpoint 05 Lead Mines & Carrickgollogan Amenity Areas view north



Existing View

This view is from the entrance to the Lead Mines scenic amenity area looking north towards Carrickmines and Kiltiernan in the middle distance. Prominent in the foreground and middle-distance is the network of pylons and poles and high voltage wires generally heading north. Visible in the foreground is the undulating topography of the landscape with field systems rich with vegetation and little existing urban development. In the distance the rural landscape gives way to urban development and the city. The focus in this view is on the rolling rural countryside in the foreground and middle distance

Proposed Changes and Impacts

The new road system will come from the direction of Carrickmines curving northwest to meeting the Enniskerry road north of Kiltiernan Village, and branching off to head south to meet the Enniskerry road south of Kiltiernan Village. Although this view is looking towards the alignment of the road, the ground plane of proposed road will be obscured by existing hedgerows and the topography of the land from this vantage point.

- The partial intrusion of the new road across the existing field pattern
- the partial loss of boundary hedgerows and trees.
- The planting of new trees and boundary hedgerow creating new and appropriate landscape structure and capacity to mitigate any changes.

Visual Effects

The viewpoint sensitivity is High – being a recognised recreational and amenity destination.

The magnitude of change would be Low – Minor intrusion and alteration to the composition of the view.

The significance of the change would be Moderate to Slight in the Short, Medium and Long Term.

Qualitatively the impact would be Adverse in the Construction Stage declining to Neutral in the Short, Medium and Long Term as mitigation planting is established.

As the 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.

12.4.5 Summary of Visual Effects

The table below summarises the Visual effects to each representative viewpoint:

Table 12.1 Summary of Visual Impact Results

No.	Location	Sensitivity	Degree of Change	Significance and Term		
				Short	Medium	Long
Location map and Existing and Proposed images in Photomontage booklet by Chris Shackleton Consulting in Appendix 12.3						
PM01.	From Enniskerry Road near De La Salle looking South East	Low	Medium – Short, Medium & Long Term	Slight & Neutral		
PM02	From outside Carrickmines Green Apartments looking West	High	Low - Short, Medium & Long Term	Moderate & Neutral		
PM03	From Glenamuck Road near Brambledown looking South West	Medium	High - Short, Medium & Long Term	Significant & Adverse	Significant & Neutral	
PM04	Ballycorus Road looking South	High	High - Short, Medium & Long Term	Very Significant & Adverse	Very Significant & Neutral	
PM05	Barnaslingan Lane looking South	Medium	High - Short, Medium & Long Term	Significant & Adverse		Significant & Neutral
PM06	Three Rock Transmitter & Ticknock Amenity Area view east	High	Low - Short, Medium & Long Term	Moderate to Slight & Neutral		
PML01	De La Salle Palmerstown Rugby Clubhouse view south	Low	Medium – Short, Medium & Long Term	Slight & Neutral		
PML02	From Enniskerry Road new entrance looking West	Medium	Low - Short, Medium & Long Term	Slight & Neutral		
Other Viewpoints						

VP01.	Glenamuck Road view northeast	Medium	High - Short, Medium & Long Term	Significant & Adverse	Very Significant & Neutral
VP02	Wayside Celtic Football Club view west	High	High - Short, Medium & Long Term	Very Significant & Adverse	Very Significant & Neutral
VP03	Barnaslingan Lane view northwest	High	High - Short, Medium & Long Term	Very Significant & Adverse	Very Significant & Neutral
VP04	Kiltiernan Parish Church view northeast	Medium	Medium	Moderate & Adverse	Moderate and Neutral
VP05	Lead Mines & Carrickgollogan Amenity Areas view north	High	Low	Moderate – Slight & Neutral	

12.5 Mitigation Measures

12.5.1 Mitigation Proposals

The scheme consists of a Road Scheme within an established semi-rural road network servicing a number of villages on the fringes of the Greater Dublin Area. The scheme also incorporates public lighting, traffic signals, surface water drainage, 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, and miscellaneous ancillary works

The rural landscape will in time be replaced by a quality urban landscape that should reflect the materials, character and natural and cultural heritage of the area and where feasible, trees and hedgerows of merit and built cultural features retained. As a key part of the urbanisation the new road reflects these intentions and seek to repair and replace where such elements are negatively affected, provide potentially temporary boundary treatments pending adjacent design development, and seeks to accommodate long term urban streetscape proposals where feasible. In adjacent open spaces, proposed attenuation areas and verges are landscaped to integrate them into the landscape pattern, however such treatments may also be temporary as new uses become established on adjacent areas.

12.6 Residual Impacts

12.6.1 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 and Ballycorus Roads 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 and 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.

12.6.2 Visual Impact and Effects

Section 12.4 above assesses the direct visual effects on representative viewpoints – both public and local residential amenity - of the proposed road development. Table 12.6 above summarises these effects. Of the 13 views assessed, 7 experience Moderate to Very Significant Adverse effects in the short term. Mitigation reduces 6 of these to a neutral impact albeit acknowledging the Significant Impact remains. 2 of these only reduce to Neutral in the Long Term due to proximity to the proposed route.

All of the other views assessed experience Moderate to Significant but Neutral change. These views are located in equated amenity locations overlooking the area but at a distance.

12.6.3 Summary

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 some 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 stated in the assessment, 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.

12.7 Difficulties Encountered

No particular difficulties were encountered in the preparation of this chapter.

12.8 References

- Guidelines for Landscape and Visual Impact Assessment, 3rd Edition 2013, published by the UK Landscape Institute and the Institute of Environmental Management and Assessment (hereafter referred to as the GLVIA).
- Guidelines on the Information to be Contained in Environmental Impact Statements, 2002, published by the Environmental Protection Agency (and the Revised Guidelines on the Information to be Contained in Environmental Impact Statements, Draft 2015)
- Dun Laoghaire Rathdown Development Plan 2016-2022
- Kiltiernan Glenamuck Local Area Plan 2013

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13 Land and Soils

13.1 Introduction

This chapter describes the scope of works and methods applied in the identification and assessment of the potential effects of the construction and operation of the Glenamuck District Roads Scheme (GDRS) with regard to Land and Soils.

The assessment techniques used are aimed at identifying the likely significant impacts, proposing suitable mitigation measures if required and identify the residual impacts.

13.1.1 Impact Assessment - Scope of Works

The report will identify and assess the potential effects on the following:

- Existing bedrock geology
- Structural Geology;
- Superficial Geology;
- Extractive Industries;
- Geological Heritage Areas

To quantitatively assess the preceding, this chapter will:

- Outline relevant policy and legislation relating to the land and soils environment.
- Summarise consultation responses in relation to this assessment.
- Provide baseline information and identify sensitive receptors.
- Identify potential effects, including potential cumulative effects.
- Assess the significance of any adverse impacts and resulting effects based on the magnitude of the impact and the sensitivity of the receptors.
- Outline detailed mitigation measures where required.
- Provide a residual impact assessment.

13.1.2 European, National and Regional Policy

Key European and National legislative policy relevant to this assessment are contained within Table 13.1.

Table 13.1: Key Legislation

Policy	Legislation
EU	Water Framework Directive (2000/60/EC)
	Environmental Liability Directive (2004/35/EC)
National	Planning and Development Regulations 2001
	Planning and Development Act 2000

Further to the above legislation, various bodies including; Transport Infrastructure Ireland (TII, formally National Roads Authority); the Institute of Geologist Ireland (IGI); and the Environmental Protection Agency (EPA) provide detailed guidance to the preparation and content required for an EIAR in relation to the geological environment. In addition, other regional and leading supplementary industry guidance referred to as part of this assessment are as follows:

Table 13.2: Key Supplementary Guidance

Body	Guidance
Transport Infrastructure Ireland (TII)	Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA , 2009)
	Environmental Impact Assessment of National Road Schemes – A Practical Guide (NRA, 2008)
	Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan
	The Management Of Waste From National Road Construction Projects
	Design of Earthworks Drainage, Network Drainage, Attenuation & Pollution Control (DN-DNG-03066)
Environmental Protection Agency (EPA)	Guidelines On The Information To Be Contained In Environmental Impact Assessment Reports (Draft August 2017)
	EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) Sept. 2003
	Geo Portal (https://gis.epa.ie/EPAMaps/)
CIRIA	The SUDS Manual (CIRIA C753)
	Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (CIRIA C532)
	Control of Water Pollution from Linear Construction Sites (CIRIA C648)
	Environmental Good Practice on Site (C692) (2010)
DLRCC	Dun Laoghaire and Rathdown County Council Planning (http://dlrcoco.ie/en/planning)
Institute of Geologists of Ireland (IGI)	Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements. (2013)
Dept of the Environment Heritage and Local Government	Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects
Department for Environment, Food and Rural Affairs (UK)	Construction Code of Practice for the Sustainable Use of Soils on Construction Sites

13.1.3 Local Planning

LAP objectives are set out in Chapter 6 of this EIAR.

13.2 Assessment Methodology

This assessment has been undertaken using a qualitative assessment based on experienced professional judgement and assessment of compliance with statutory and industry guidance, including a number of site visits.

13.2.1 Desktop Study

The desktop study involved collation and assessment of the relevant information from the following information sources.

- Consultation responses
- Vector mapping and aerial photography to assess land usage on the site and its environs
- Site surveys including topographic, underground utilities, orthophotography and site geotechnical investigations
- Utility & Local Authority infrastructure record drawings
- EPA Geo Portal (<https://gis.epa.ie/EPAMaps/>)
- 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;
- Glenamuck District Distributor Road, Constraints Study, 2007, RPS.
- Factual and Interpretive Reports. Site Investigation for Glenamuck District Roads Scheme, 2018, Priority Geotechnical.

13.2.2 Site Walkover Assessment

A number of site walkover surveys were undertaken from November 2017 to March 2018 with the purpose of identifying / verifying site characteristics.

The site walkover surveys encompassed the whole site area, with emphasis placed upon areas likely to be affected by proposed earthworks in order to fully assess potential issues with regards to lands and soil:

13.2.3 Scoring Matrix for Impact Assessment

Impact assessment has been carried out with reference to the EPA's "Guidelines On The Information To Be Contained In Environmental Impact Assessment Reports (Draft August 2017)" & the TII "Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes".

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.

Receptor Sensitivity

- The sensitivity of the receiving environment has been categorised on a scale from “high” to “negligible” as defined in

Table 13.3. Sensitivity criteria has been based on:

- Vulnerability of a receptor to a particular pressure (degree of environmental response to any particular impact); and
- The ‘value’ of the receptor (e.g. an area of international importance should be considered more sensitive to the impact than an area of little or no conservation value.

Table 13.3: Receptor Sensitivity

Sensitivity of Environment	Criteria	Examples
High	Attribute has a high quality and rarity	Geological Feature rare on a regional or national scale (NHA) Large existing quarry / pit or landfill Active peat
Medium	Attribute has a medium quality and rarity	Geological Feature rare on a local scale (County Geological Site) Proven extractible resource rare on local level Well drained and Highly Fertile Soils
Low	Attribute has a low quality and rarity	Moderately drained and moderately fertile soils Small existing commercial quarry/pit/landfill
Negligible	Attribute resilient to environmental change	Poorly Drained and/or low fertility soils Common soils and bedrock

Impact Magnitude

The Impact Magnitude has been categorised on a scale from “high” to “negligible” as defined in Table 13.4.

Table 13.4 Impact Magnitude Criteria

Magnitude of Impact	Criteria	Examples (non-exhaustive)
High	Results in permanent loss of attribute	An impact that obliterates sensitive characteristics of the soil/geological feature
Medium	Results in temporary or minor impact to attribute and/or quality and integrity of attribute.	Impact on regional geological / soil characteristics
Low	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity.	Local impacts to geological / soil characteristics not affecting overall integrity of receptor
Negligible	An Impact without measurable or noticeable consequences or	No measurable impacts on ground conditions

Factors which influence the Impact magnitude include the type of impact and duration. These aspects are considered in line with TII and EPA guidance below

Table 13.5 Types of Impact

Potential Impact	Description
Direct Impact	The existing geological, hydrological or hydrogeological environment is altered in whole or in part as a consequence of road construction or operations
Indirect Impact	The existing geological, hydrological or hydrogeological environment beyond the proposed route corridors is altered by activities related to road construction and/or operation
No predicted impact	The proposed route corridor has neither a negative nor a positive impact on the geological, hydrological or hydrogeological environment

Table 13.6 – Impact Duration (EPA 2017)

Duration	Description
Momentary	Lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting less than a year
Short-Term	Effects lasting one to seven years.
Medium Term	Lasting seven to fifteen years.
Long Term	Lasting fifteen to sixty years.
Permanent	Lasting over sixty years
Reversible	Impacts that can be undone, for example through remediation or restoration

Impact Significance

The significance of the identified potential impacts is acknowledged by the combination of the magnitude of the potential impact (Table 13.4) and sensitivity of the receptor (

Table 13.3). The generalised significance terms used in this assessment is in line with the EPA guidance reproduced in Figure 13-1 below

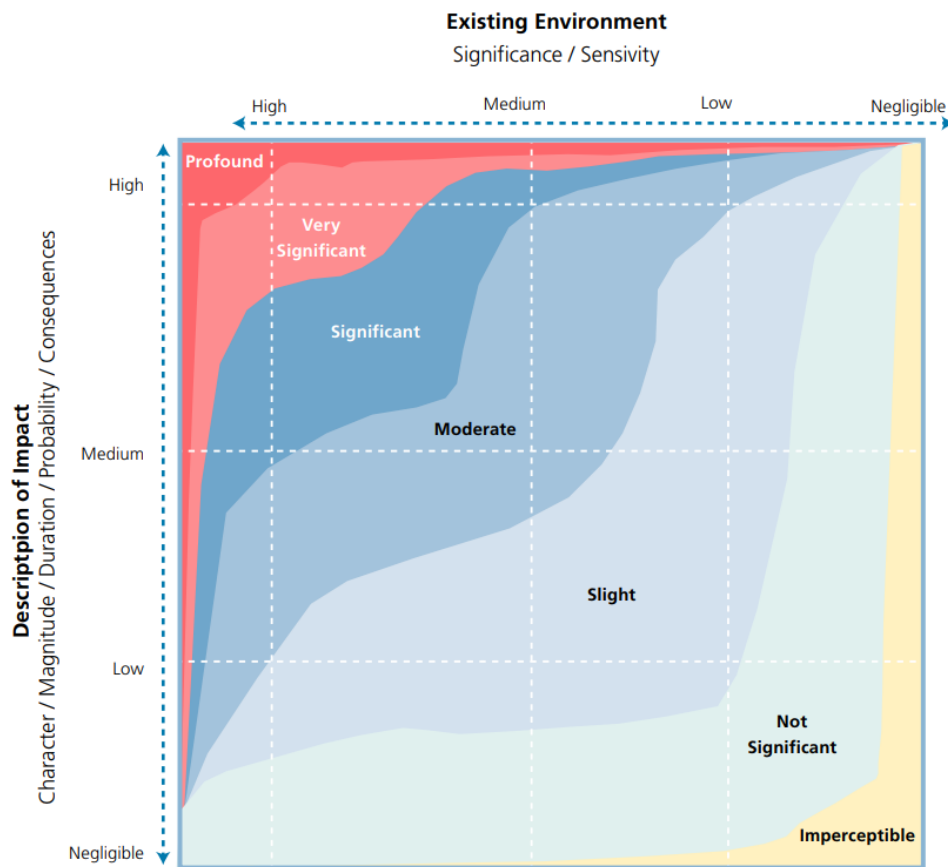


Figure 13.1: Significance Effect Matrix

In addition to significance, the effect on the receiving environment may be Positive, Neutral or Adverse.

13.3 Baseline Environment

13.3.1 Bedrock Geology

The 1:100,000 GSI bedrock Geology Map (Sheet 16) indicates that the Glenamuck District Roads Scheme (GDRS) is underlain in its entirety by Granite Bedrock. The bedrock is described in geological mapping as a Caledonian Age Granite and is part of a formation known as the Northern and Upper Liffey Valley Plutons. This formation is present from the Blessington Lakes area in Wicklow to the coast at Dun Laoghaire. The rock description is a granite with muscovite phenocrysts. The rock classification within the site extents is a Type 3 muscovite porphyritic. An extract from GSI mapping is presented in Figure 13.2

In general the rock encountered during the ground investigation is consistent with the published geology for the area. 7 boreholes were installed across the site to a maximum depth of 8.0m. No bedrock was encountered in 3 of the boreholes and it was encountered, at depth ranging from 2.8m - 4.8m in the remainder. Where encountered, rock was described as a strong white granite with some fracturing.

A number of bedrock outcrops in the vicinity of the site were noted on geological mapping and during site walkovers.

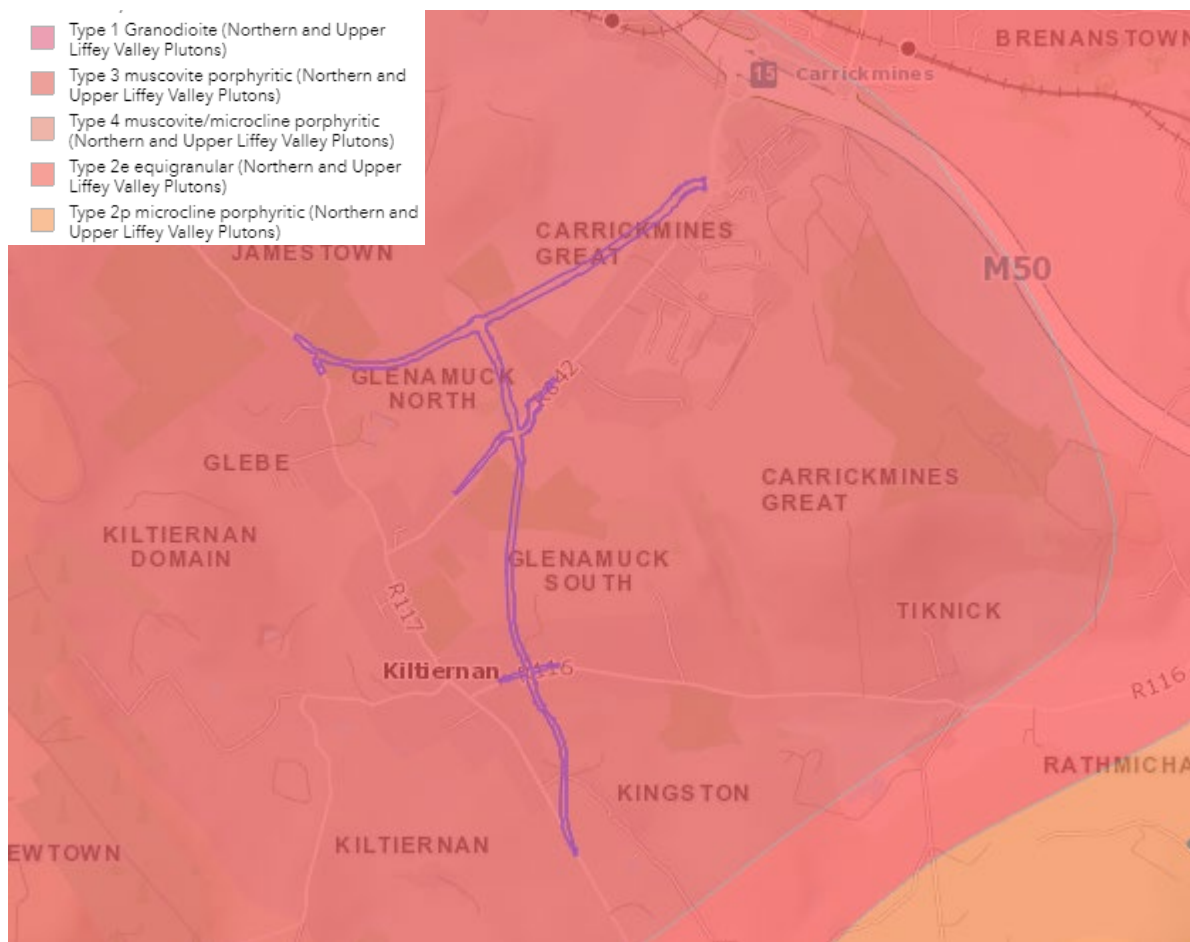


Figure 13.2: Bedrock Geology

13.3.2 Superficial Geology (Soils)

The subsoils underlying the road route are comprised of variable sediments and thickness of Quaternary aged Glacial Till (boulder clay). GSI Quaternary sediment mapping indicates the route to be underlain by tills of either limestone or granite origin along with isolated areas of exposed bedrock.

Site investigation was generally in accordance with geological mapping. Typically soil stratas encountered were 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.

Infiltration testing in accordance with BRE digest 365 methodologies was carried out as part of site investigations. Most areas on site did not exhibit measurable infiltration rates indicating that the ground may be prone to waterlogging. It is however noted that testing was carried out in Spring 2018 which followed an unusually wet and cold winter which had led to widespread ground saturation across the country.

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



Figure 13.3: Quaternary Sediments

13.3.3 Contaminated Ground

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. No asbestos was detected in any locations. Samples from all trial pits indicate that soils would be classed as inert under the EPA Waste acceptance Criteria. Within slit trenches in existing roads, two locations recorded levels marginally above Waste Acceptance criteria recommended values for Inert Waste (but below the threshold for hazardous waste).

13.3.4 Unstable Ground & Geohazards

The GSI holds a database of historical landslides in Ireland. No records in this database lie in the vicinity of the roads scheme

The underlying bedrock is granite which is not a soluble rock and therefore no Karst features are anticipated or recorded in the area.

There is no evidence in mapping or site investigation of significant peat deposits in the area.

13.3.5 Waste Facilities

The EPA holds database of waste facilities. 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

13.3.6 Quarries / Mines

There are no Quarries or mines affected by the proposed roads scheme. A small sand pit is shown on historical mapping adjacent to the Glenamuck stream within the road route however no surface features of the pit remain. The historic Ballycorus leadmines are outside the scheme extents and are unaffected by proposed works

13.3.7 Geological Heritage Sites

The GSI hold a database of Geological Heritage Sites. No heritage sites are within the proposed road scheme extents. The closest identified site is Ballycorus Leadmines which is located outside the scheme extents

13.3.8 Designated sites

Table 13.7 below details designated sites within 5km of the proposed scheme.

Table 13.7: Designated Sites

Station ID	Name	Designation	Distance	Commentary
001207	Dingle Glen	Proposed NHA	0.6 km	Dry valley formed by a glacial lake overflow channel. Proposed designation based on variety of habitats within a small area. Not within scheme extents or sensitive to soils/geological impacts at the site.
001202	Ballybetagh Bog	Proposed NHA	1.3 km	Fen area with proposed designation based primary based on fossil remains. Not within scheme extents or sensitive to soils/geological impacts at the site.
000725	Knocksink Wood	Proposed NHA, SAC	4.6 km	Designation based on petrifying Spring and Alluvial Forest habitat. Located within separate hydrological catchment to the scheme. Not within scheme extents or sensitive to soils/geological impacts at the site.
000713	Ballyman Glen	Proposed NHA, SAC	2.8 km	Designation based on petrifying Spring and Alkaline Fen habitat. Not within scheme extents or sensitive to soils/geological impacts at the site.
001211	Loughlinstown Woods	Proposed NHA	3.0 km	Proposed designation based on mixed woodland species and habitat of natural character. Site primarily used for amenity purposes. Not within scheme extents or sensitive to soils/geological impacts at the site.

001768	Powerscourt Woodland	Proposed NHA	4.3km	Proposed designation based on mixed woodland species and habitat. Not within scheme extents or sensitive to soils/geological impacts at the site.
001206	Dalkey Coastal Zone And Killiney Hill	Proposed NHA	4.4 km	Coastal site spanning from Dun Laoghaire Harbour to Shankhill. Proposed designation based on varied habitats from sub-littoral to coastal heath. Also supports variety of bird and crustation species and contains rock exposures of geological interest. Not within scheme extents or sensitive to soils/geological impacts at the site.

Based on the above review no designated sites are considered to be sensitive to soils/geological impacts at the subject site.

13.3.9 Baseline Summary and Sensitivities

The baseline assessment indicates a number of land & soils receptors that have the potential to demonstrate sensitivity to the development proposed at the site. These are:

- Soils/Subsoils ;
- Bedrock

Sensitivity of the receptors identified is determined in accordance with the rationale described in 'Determination of Magnitude and Significance Criteria'.

Table 13.8 Baseline Summary

Type	Receptor	Sensitivity	Rationale
Geological	Granite Bedrock	Negligible	Common bedrock formation which underlies over 400km ² of Dublin. Resilient to significant change without effect to the overall receptor value
Geological	Soils / Subsoils	Low	Moderate Fertility moderately drained soils. Common soil type across Ireland

13.4 Predicted Impacts

13.4.1 Construction Phase

The construction phase impacts are those associated with the significant excavations, soil movement, aggregate import and construction plant usage. Reference should be made to Chapter 5 “Description of Scheme” where the construction activities have been outlined in detail. The lists below represent the likely potential impacts in the absence of mitigation. Mitigation measures to reduce the impact are discussed in Section 13.5. Construction activities can pose a significant risk to the watercourse receptors identified. The main impacts arising from construction activities are listed in Table 13.9:

It is noted that there is interaction and interrelationships with land and soils impacts discussed in other chapters of this assessment

Table 13.9: Predicted Impacts - Construction Phase

Impact	Source	Consequence
Chemical Pollution of geological receptors	<ul style="list-style-type: none"> Temporary presence of chemicals, fuels, and other oils associated with construction activities on the site have potential to enter subsurface environment through accidental spillages, improper transport and refuelling, or inappropriate storage and disposal procedures, by gradual leakage or single failure of storage tanks or refuelling mechanism. 	<ul style="list-style-type: none"> Contamination of soils may result in the requirement for extensive remediation or offsite disposal of contaminated materials Contamination of soils may create pathways for contaminants to affect other environmental receptors
Loss of soil value	<ul style="list-style-type: none"> Temporary construction activities would require excavations, ground disturbance, stripping of soils, and temporary spoil deposition. Exposed soils have potential to be eroded by wind and water Soil may be compacted degraded by constructions works Construction dewatering may affect slope stability 	<ul style="list-style-type: none"> Loss of soils value and potentially affecting air or water receptors Construction works may affect soils value and suitability for future use
Material generation	<ul style="list-style-type: none"> Excessive excavations or material import may occur Poor soil handling may result in mixing of higher value soils types such as topsoil or gravels with lower value material 	<ul style="list-style-type: none"> Poor soil handling may prevent reuse of materials within the scheme. Excessive material import/export may affect complementary assessments such as traffic or waste receptors

13.4.2 Unmitigated Significance -Construction Phase

Magnitudes of identified impacts, and associated unmitigated significance of those impacts, are determined in accordance with the rationale previously described and are presented in the following table.

Mitigated significance is presented in Table 13.14

Table 13.10: Unmitigated Significance - Construction Phase

Receptor	Receptor Sensitivity	Potential Impact	Impact Magnitude	Impact Significance (pre mitigation)
Soils/Subsoils	Low	Chemical Pollution of geological receptors	Low – Potential for local impacts to soil value and distribution	Slight
Granite Bedrock	Negligible	Chemical Pollution of geological receptors	Low – Potential for local impacts to rock value and distribution	Not Significant
Soils/Subsoils	Low	Loss of soil value	Low – Potential for local impacts to soil value and distribution	Slight
Soils/Subsoils	Low	Material Generation	Low – Potential for local impacts to soil value and distribution	Slight
Granite Bedrock	Negligible	Material Generation	Low – Potential for local impacts to rock value and distribution. Extent of works to extending to bedrock layers anticipated to be minor	Not Significant

13.4.3 Operational Phase

The operational impacts are those associated with the completed road including final surface treatments, conveyance of traffic flows and all operation and maintenance activities of the road and associated works. The main impacts arising from construction activities include:

Table 13.11: Predicted Impact - Operational Phase

Impact	Source	Consequence
Loss of soil value	<ul style="list-style-type: none"> Any exposed soils or those which remain unplanted and have potential to be eroded by wind and water Potential of soil slippage or settlement on poorly constructed or damaged slopes/retaining walls 	<ul style="list-style-type: none"> Loss of soils value and potentially affecting air or water receptors Unmitigated impacts may affect soils value and suitability for future use

13.4.4 Unmitigated Significance -Operation Phase

Magnitudes of identified impacts, and associated unmitigated significance of those impacts, are determined in accordance with the rationale previously described and are presented in the following table.

Mitigated significance is presented in Table 13.14.

Table 13.12: Unmitigated Significance - Operation Phase

Receptor	Receptor Sensitivity	Potential Impact	Impact Magnitude	Impact Significance (pre mitigation)
Soils/Subsoils	Low	Loss of soil value	Low – Potential for local impacts to soil value and distribution	Slight

13.5 Mitigation Measures

13.5.1 Mitigation Measures – Preamble

From the assessment of potential impacts during construction & operation, the following key issues have demonstrated potential impact significance and so require particular attention for mitigation and management:

- Chemical Pollution of Geological Receptors
- Loss of Soil Value
- Material Generation

The greatest risk to the environment is during the construction period, coinciding with the greatest amount of activity on site. In addition, effects unmitigated during construction have the potential to extend into the operational phase.

13.5.2 Mitigation Through Design

The site layout has evolved in order that the design minimizes impact on the land and soil environment. Design evolution to minimise environmental impact has been prioritised throughout the various design stages. This is detailed in the Environmental Report which supported the LAP road route selection and has been continued throughout the planning stage design.

The vertical and horizontal alignment of the road has been optimized to minimize cut and fill requirements and seek to obtain a balance of cut and fill materials (within constraints of road design criteria and landscape considerations).

Sufficient space has been provided within the works area for segregated spoil storage.

Preconstruction soils testing has been carried out to determine if any contamination exists

13.5.3 Mitigation Through Procedures

In order to facilitate the integration of environmental issues into road scheme planning, construction and operation, an Environmental Operating Plan (EOP) shall be produced, implemented and maintained by the contractor. This represents a best practice guide for considering the environment for the construction life cycle of a national road scheme project.

The EOP shall be designed to assist the main contractor in preventing, managing and/or minimising significant environmental impacts during the construction phase. To achieve this objective the EOP shall:

- Comprehensively incorporate all Environmental Commitments set out in the Contract documents, Planning Documents (including EIAR), any conditions and/or modifications imposed by An Bord Pleanála or the local authority
- Provide a method of documenting compliance with these Environmental Commitments and conditions/modifications;

- Itemise relevant environmental legislative requirements and best practice guidance. The EOP should also provide a method of documenting compliance with these requirements, and
- Outline methods by which construction work will be managed to prevent, reduce or compensate for potential adverse impacts on the environment
- Incorporate procedures for communicating with the public, statutory consultees, local authority and relevant site-personnel;
- Incorporate procedures for Environmental Awareness Training for the main contractor's staff;
- Incorporate monitoring procedures and responses to monitoring results, where contractually required, and
- Provide for a system of audit with regard to the effectiveness of the EOP during the construction life cycle of the project.
- Include an Emergency Response Plan (ERP) detailing the procedures to be undertaken in the event of a spillage of chemical, fuel or hazardous wastes, fires or flood events.

TII have published "Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan" which should be used as a basis for the creation of the EOP.

The EOP shall be co-ordinated with all other environmental procedural documents required which may include a Construction Management Plan, Construction And Demolition Waste Management Plan and a Pollution Prevention Plan.

13.5.4 Specific Mitigation Measures – Chemical Pollution

- Foul Drainage from all site offices and facilities will be contained and disposed of in an appropriate manner to prevent pollution in accordance with the relevant statutory bodies.
- Refuelling of construction machinery shall be undertaken in designated areas located away from surface water drainage in order to minimise potential contamination impacts. Spill kits shall be kept in these areas in the event of spillages.
- Oil and fuel stored on site for construction should be stored in designated areas. These areas shall be bunded (to min 110% of chemical volume).
- Pouring of concrete including wash down and washout of concrete from delivery vehicles to be controlled in an appropriate facility to prevent contamination
- Regular samples to be taken from soils affected by earthworks which shall be analysed for contamination

13.5.5 Specific Mitigation Measures – Loss of Soil Value

- Vegetation should be established as soon as possible on all exposed soils
- Due consideration will be given to the prevailing ground and weather conditions when programming the execution of the works.
- Suds features to be in place prior to the main construction works. Suds features to be designed to limit soil erosion
- Construction machinery shall minimise tracking over soils to minimise compaction
- Exposed soil should be covered or seeded as soon as possible
- Topsoil should be stripped and stockpiled separately for reuse and landscaping material
- All disturbed areas to be reinstated with suitable soils to ensure future growth. All verges and boulevard areas to have sufficient topsoil depths

13.5.6 Specific Mitigation Measures – Material Generation

A significant earthworks element is inevitable for new road construction to achieve the required geometry and foundation conditions. A preliminary indication of material quantities associated with the proposed scheme is presented in Table 13.13. It is noted that these volumes are based on preliminary design and will be further refined and optimized through a future detailed design process.

Table 13.13: Preliminary Material Volumes

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

Many of the measures outlined in Sections 13.5.2 - 13.5.5 are relevant to material generation. Additional measures to be implemented to reduce the impact of material generation include

- Areas of stripped soils to be minimised to those required for the project earthworks
- All soil handing to be in line with best practice guidance and in line with mitigation measures to protect the water environment
- Excavated soils to be adequately separated to maximise reuse as embankment material, landscape fill or road construction material
- Imported materials to be suitably separated to avoid contamination or mixing

- The use of soil screening on 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.
- For imported materials, the use of local quarries or locally available material should be prioritised.
- 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). If any material is to be reused on another site as a by-product (and not a waste), this will be done in accordance with Article 27 of the Waste Directive Regulations.

13.5.7 Mitigated Significance

Magnitudes of identified impacts, and associated significance of those impacts following adoption of the preceding mitigation have been determined. This assessment is in accordance with the rationale previously described is presented in the following table.

Table 13.14: Mitigated Significance

Receptor	Receptor Sensitivity	Potential Impact	Impact Magnitude	Impact Significance (post mitigation)
Soils/Subsoils	Low	Chemical Pollution of geological receptors	Low / Negligible: Implementation of best practice measures to control hazardous substances mitigates impact. Measures include controls on use and storage of hazardous materials, controls on construction works.	Not Significant
Granite Bedrock	Negligible	Chemical Pollution of geological receptors	Low / Negligible: Implementation of best practice measures to control hazardous substances mitigates impact. Measures include controls on use and storage of hazardous materials, controls on construction works.	Not Significant
Soils/Subsoils	Low	Loss of soil value	Low / Negligible: Implementation of best practice measures for to protect soil value mitigates impact. Measures include best practice soil handling and construction practices and reinstatement of affected areas.	Not Significant
Soils/Subsoils	Low	Material Generation	Low / Negligible: Implementation of best practice measures for material generation mitigates impact. Measures include optimisation of	Not Significant

			road geometry, reuse of materials and use of local quarries/waste receivers.	
Granite Bedrock	Negligible	Material Generation	Low / Negligible: Implementation of best practice measures for material generation mitigates impact. Measures include optimisation of road geometry, reuse of materials and use of local quarries/waste receivers.	Not Significant

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

13.6 Residual Impacts

As a consequence of compliance with the construction and operation mitigation there will be not be a significant residual impact on the identified land and soil receptors

13.7 Difficulties Encountered

No significant difficulties were encountered during the assessment.

13.8 References

- Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009);
- Environmental Impact Assessment of National Road Schemes – A Practical Guide (NRA, 2008);
- Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan (TII);
- The Management Of Waste From National Road Construction Projects (TII);
- Design of Earthworks Drainage, Network Drainage, Attenuation & Pollution Control (DN-DNG-03066) (TII);
- Guidelines On The Information To Be Contained In Environmental Impact Assessment Reports (Draft August 2017) (EPA);
- EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) Sept. 2003;
- Geo Portal (<https://gis.epa.ie/EPAMaps/>) (EPA);
- The SUDS Manual (CIRIA C753) (CIRIA);
- Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (CIRIA C532);
- Control of Water Pollution from Linear Construction Sites (CIRIA C648);
- Environmental Good Practice on Site (C692) (2010) (CIRIA);
- Dun Laoghaire and Rathdown County Council Planning (<http://dlrcoco.ie/en/planning>);
- Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements. (2013) Institute of Geologists of Ireland (IGI);
- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects, Dept of the Environment Heritage and Local Government;
- Construction Code of Practice for the Sustainable Use of Soils on Construction Sites, Department for Environment, Food and Rural Affairs (UK); and
- Geological Survey Ireland Spatial Resources
<https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4coab2fbde2aaa-c3c228> .

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14 Water and Hydrology

14.1 Introduction

This chapter describes the scope of works and methods applied in the identification and assessment of the potential effects of the construction and operation of the Glenamuck District Roads Scheme (GDRS) upon the receiving water environment and its effects on hydrology, hydrogeology and water quality.

The assessment techniques used are aimed at identifying constraints on the layout, design and construction methods of the proposed development as a result of the water environment, including areas in which development should be avoided and areas in which mitigation measures are required.

The objectives of this assessment are to:

- Undertake a field and desktop study to describe existing surface water & groundwater features within the study area;
- Assess the surface water drainage system proposals with regard to adequate capacity to collect, treat and discharge run-off generated by the proposed GDRS project;
- Assess the impact of climate change in the drainage design;
- Review the drainage system design such that it will protect both human health and the aquatic environment by minimising adverse impact on the quality of natural waters;
- Assess potential flood risk within the study area and ensure the proposals and its drainage system will not increase the risk of flooding;
- Establish the predicted effect of the works on groundwater quality and quantity; and
- Identify and incorporate appropriate mitigation measures, where required.

14.1.1 Impact Assessment - Scope of Works

The report identifies and assesses the potential effects on the following:

- Existing natural drainage patterns;
- Runoff rates and volumes;
- Flooding and impediments to flows;
- Water quality of receiving waters;
- Aquifer systems and their vulnerability.

To quantifiably assess the preceding, this chapter will:

- Outline relevant policy and legislation relating to the water environment.

- Summarise consultation responses in relation to this assessment.
- Provide baseline information and identify sensitive receptors.
- Identify potential effects, including potential cumulative effects.
- Assess the significance of any adverse impacts and resulting effects based on the magnitude of the impact and the sensitivity of the receptors.
- Outline detailed mitigation measures where required.
- Provide a residual impact assessment.

14.1.2 European, National and Regional Policy

Key European and National legislative policy relating to the water environment have been considered within this assessment and are contained within Table 14.1.

Table 14.1: Key Legislation

Policy	Legislation
EU	Water Framework Directive (2000/60/EC)
	Freshwater Fish Directive (2006/44/EC, replacing 78/659/EEC)
	Environmental Liability Directive (2004/35/EC)
National	Local Government (Water Pollution) Acts 1977 and 1999 - 2007
	European Communities Environmental Objectives (Surface Waters) Regulations 2009
	Local Government (Water Pollution) Act, 1977 (Water Quality Standards For Phosphorus) Regulations, 1998
	European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations, 2009

Further to the above legislation, Irish National bodies including Transport Infrastructure Ireland (TII, formally National Roads Authority), the Office of Public Works (OPW) and the Environmental Protection Agency (EPA) provide detailed guidance to the preparation and content required for an EIAR in relation to the water environment. In addition, other regional and leading supplementary industry guidance referred to as part of this assessment are as outlined in Table 14.2.

Table 14.2: Key Supplementary Guidance

Body	Guidance
Transport Infrastructure Ireland (TII)	Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009)
	Environmental Impact Assessment of National Road Schemes – A Practical Guide (NRA, 2008)
	Guidelines for The Crossing of Watercourses During the Construction of National Road Schemes (NRA, 2008)

	Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan (NRA 2007)
	Road Drainage and the Water Environment (DN-DNG-03065)
	Design of Earthworks Drainage, Network Drainage, Attenuation & Pollution Control (DN-DNG-03066)
	Drainage Design For National Road Schemes - Sustainable Drainage Options (RE-CPI-07001)
	Drainage Systems For National Roads [DN-DNG--03022]
Office of Public Works (OPW)	The Planning System and Flood Risk Management (OPW, 2009)
	OPW Flood Maps (http://www.floodinfo.ie/)
Environmental Protection Agency (EPA)	Guidelines On The Information To Be Contained In Environmental Impact Assessment Reports (Draft, EPA, August 2017)
	EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (EPA, Sept. 2003)
	Geo Portal (https://gis.epa.ie/EPAMaps/)
Department of Housing Planning and Local Government	River Basin Management Plan for Ireland 2018 – 2021
Inland Fisheries Ireland (IFI)	Guidelines on protection of fisheries during construction works in and adjacent to waters (Inland Fisheries Ireland 2016)
CIRIA	The SUDS Manual (CIRIA C753)
	Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (CIRIA C532)
	Control of Water Pollution from Linear Construction Sites (CIRIA C648)
	Development and Flood Risk – Guidance for the Construction Industry (CIRIA 624)
	The Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (C532) (2001)
	Environmental Good Practice on Site Guide (C741) (2015)
Dublin City Council (DCC)	The Greater Dublin Strategic Drainage Study [GSDSDS] (Dublin City Council et al., 2005)
DLRCC	Dun Laoghaire and Rathdown County Council Planning (http://dlrcoco.ie/en/planning)
Institute of Geologists Ireland (IGI)	Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements (2013)
Environment Agency (UK) EA	PPG1: General Guide to the Prevention of Pollution (UK Guidance Note)
	GPP 5 Works and Maintenance in or near Water (UK Guidance Note)
	PPG6 Working at Construction and Demolition Sites (UK Guidance Note)

14.2 Assessment Methodology

This assessment has been undertaken using a qualitative assessment based on experienced professional judgement and assessment of compliance with statutory and industry guidance, including several site visits.

14.2.1 Desktop Study

The desktop study involved collation and assessment of the relevant information from the following information sources.

- Consultation responses.
- Mapping and aerial photography to assess land usage on the site and its environs and to identify water features and watercourse catchments.
- Site surveys including topographic, underground utilities, orthophotography and site geotechnical investigations.
- Utility and Local Authority infrastructure record drawings.
- EPA Geo Portal (<https://gis.epa.ie/EPAMaps/>).
- Office of Public Works National Flood Hazard Mapping (<http://www.floodinfo.ie/>).
- Water Quality Monitoring Databases and Reports.
- Information of the hydrology and drainage of the study area from EPA www.epa.ie.
- 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;
- Glenamuck District Distributor Road, Constraints Study, 2007, RPS.
- Geological Survey Ireland Data Viewer (<https://www.gsi.ie>).

14.2.2 Site Walkover Assessment

Several site walkover surveys were undertaken from November 2017 to March 2018 with the purpose of identifying / verifying existing site drainage characteristics and water features.

The site walkover surveys encompassed the whole site area, with emphasis placed upon areas likely to be affected by proposed access road alignments in order to fully assess potential issues with regards to:

- Water crossings (culverts / bridges) required;
- Flooding;

- Existing runoff patterns;
- Existing groundwater levels and flow paths;
- New outfalls (discharges) required;
- Potential for impact on surface water quality due to construction and operation of the new carriageway.

14.2.3 Scoring Matrix for Impact Assessment

Impact assessment was carried out with reference to the EPA’s Guidelines On The Information To Be Contained In Environmental Impact Assessment Reports (Draft August 2017) and the TII “Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes”.

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.

Receptor Sensitivity

The sensitivity of the receiving environment has been categorised on a scale from “high” to “negligible” as defined in Table 14.3.

Sensitivity criteria is based on:

- Vulnerability of a receptor to a particular pressure (degree of environmental response to any particular impact); and
- The ‘value’ of the receptor (e.g. an area of international importance should be considered more sensitive to the impact than an area of little or no conservation value).

Table 14.3: Receptor Sensitivity

Sensitivity of Environment	Criteria	Examples
High	Attribute has a high quality and rarity	Surface waterbody supporting aquatic site/species protected under EC and Irish legislation. Watercourse with High water quality supporting very sensitive aquatic resource. Principal aquifer providing a regionally important drinking water resource. Aquifer in drinking water protection area.
Medium	Attribute has a medium quality and rarity	Surface waterbody with Good/Moderate water quality supporting a locally important fishery resource or ecosystem. Principal aquifer providing a regionally important drinking water resource. Locally Important Aquifer. Surface waterbody supporting salmonid resource.

Low	Attribute has a low quality and rarity	Surface waterbody with Low water quality. Surface waterbody supporting low value aquatic resource. Poor Aquifer which is Generally Unproductive except for Local Zones. Surface waterbody whose environmental equilibrium copes well with all natural fluctuations but cannot absorb some changes greater than this without alteration of its present character.
Negligible	Attribute resilient to environmental change	Surface waterbody with poor water quality. Surface waterbody whose environmental equilibrium is resilient to changes greater than natural fluctuations without detriment to its natural hydrological morphology and water quality characteristics. Heavily engineered or artificially modified; may dry up during dry spells (no base flow). Poor Aquifer which is Generally Unproductive.

Impact Magnitude

The Impact Magnitude has been categorised on a scale from “high” to “negligible” as defined in Table 14.4.

Table 14.4 Impact Magnitude Criteria

Magnitude of Impact	Criteria	Examples (non-exhaustive)
High	Results in permanent impact to attribute and/or quality and integrity of attribute.	Loss or extensive change to a water body or water dependant habitat. Large change in Predicted Flood Level (>100mm). Impact to designated groundwater dependant habitat. Large change in regional aquifer properties. Reduction in quality or amenity value. Extensive loss of fishery. Changes to stream morphology preventing fish/mammal movement.
Medium	Results in temporary or minor impact to attribute and/or quality and integrity of attribute.	Change in predicted peak flood level >50mm. Impact to locally important groundwater dependant habitat. Temporary reduction in quality or amenity value. Temporary impact to fishery.
Low	An impact that causes slight measurable changes to the environment or temporary	Minor change in predicted peak flood level <50mm. Minor deterioration in environmental water quality unlikely to affect the most sensitive receptor.

	changes to small portion of attribute	Local changes to groundwater levels.
Negligible	An Impact without measurable or noticeable consequences	Negligible Change in predicted peak flood level (<10mm). Temporary insignificant change in hydrological/hydrogeological and water quality conditions not exceeding those expected due to naturally occurring fluctuations

Factors which influence the Impact magnitude include the type of impact and duration. These aspects are considered with reference to the TII and EPA guidance as detailed in Table 14.5 below.

Table 14.5 Types of Impact

Potential Impact	Description
Direct Impact	The existing geological, hydrological or hydrogeological environment is altered in whole or in part as a consequence of road construction or operations.
Indirect Impact	The existing geological, hydrological or hydrogeological environment beyond the proposed route corridors is altered by activities related to road construction and/or operation.
No predicted impact	The proposed route corridor has neither a negative nor a positive impact on the geological, hydrological or hydrogeological environment.

Table 14.6 – Impact Duration (EPA 2017)

Duration	Description
Momentary	Lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting less than a year
Short-Term	Effects lasting one to seven years.
Medium Term	Lasting seven to fifteen years.
Long Term	Lasting fifteen to sixty years.
Permanent	Lasting over sixty years
Reversible	Impacts that can be undone, for example through remediation or restoration

Impact Significance

The significance of the identified potential impacts is acknowledged by the combination of the magnitude of the potential impact (Table 14.4) and sensitivity of the receptor (Table 14.3). The generalised significance terms used in this assessment is in line with the EPA guidance reproduced in Figure 14.1 below

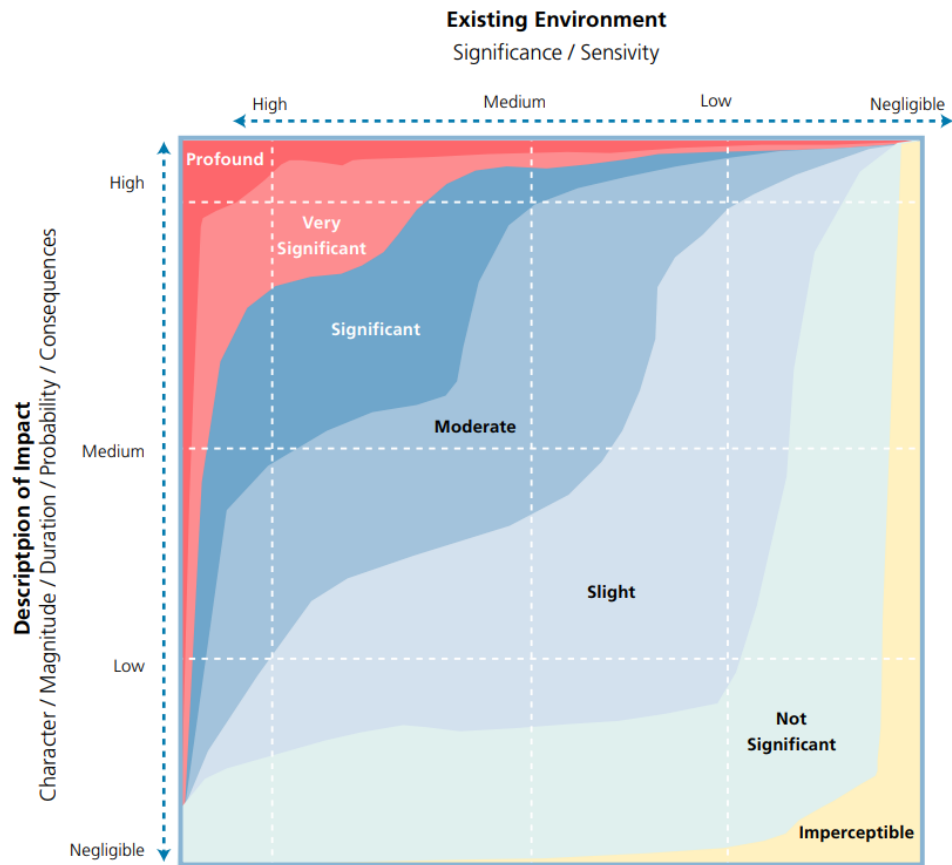


Figure 14.1: Significance Effect Matrix

In addition to significance, the effect on the receiving environment may be Positive, Neutral or Adverse.

14.3 Baseline Environment

14.3.1 Hydrological Setting

The Glenamuck District Roads Scheme (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 (*EPA Ref: IE/EA/10S010600*) and northern portions are within the “Carrickmines Stream” sub-catchment (*EPA Ref: IE/EA/10C040350*). The Carrickmines Stream merges with the Loughlinstown River upstream of its discharge to the Irish Sea at Shanganagh (Figure 14.2).

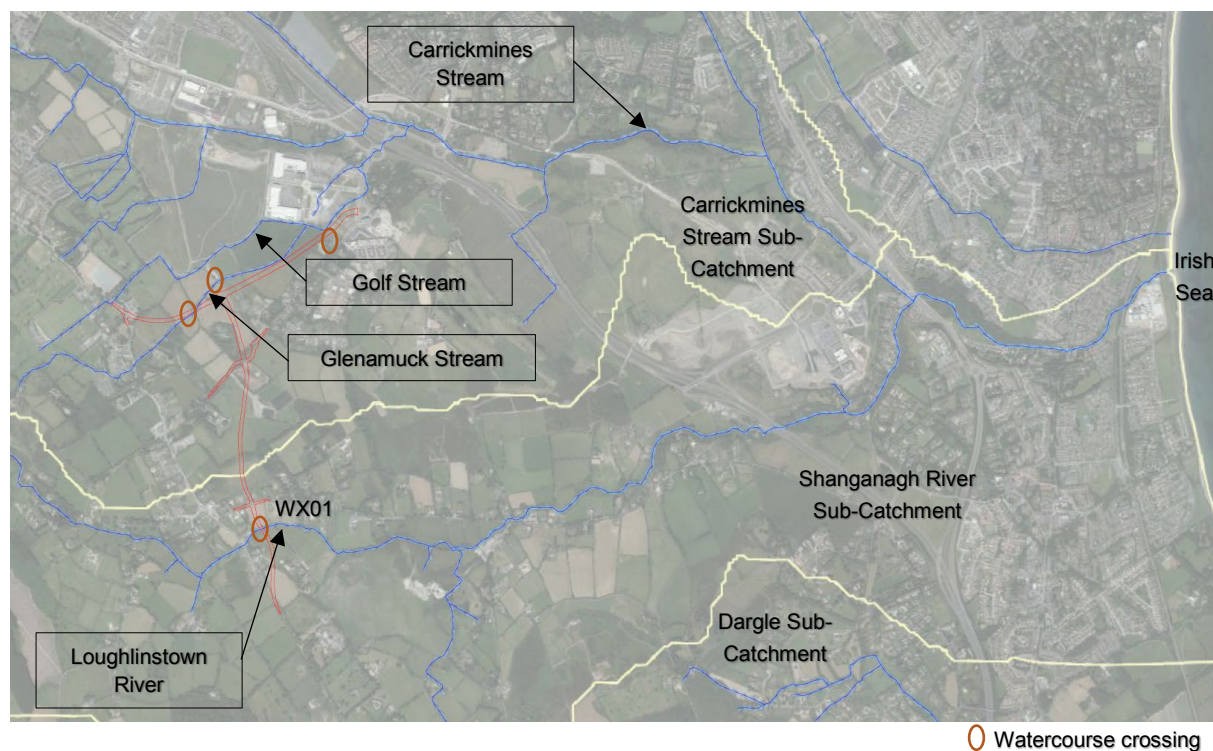


Figure 14.2: Hydrological Catchments

14.3.2 Watercouses

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. The main local hydrological features are presented in Figure 14.2 and Figure 14.1 (in Volume 3). Local watercouses generally rise on the eastern slopes of Two Rock and Three Rock Mountains to the west of the development and generally flow in an easterly direction in the vicinity the proposed development. The tributaries merge to supply Carrickmines Stream / Loughlinstown/Shanganagh River before eventually discharging to the Irish Sea.

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 Figure 14.2 and as per Table 14.7 Details are also shown in Volume 3 Figures 14-1 to 14-5.

Table 14.7: Watercourse Crossing Schedule

Crossing Ref	Type	Watercourse	Status
WX-01	Box Culvert	Glenamuck Stream	New
WX-02	Box Culvert	Glenamuck Stream	Replacement
WX-03	Box Culvert	Unnamed Drain	New
WX-04	Bridge	Loughlinstown Rover	New

All new culverts are required to facilitate road construction and have been designed in accordance with the mitigation measures in Section 14.5 to ensure impacts are minimised and stream morphology / wildlife passage are maintained. WX-03 is required to replace an existing culvert on the access road to Bective Rangers RFC grounds, this access road will be subject to accommodation works. The existing culvert is a poorly constructed series of pipes with varying levels and lengths and replacement of this culvert with a suitably designed new structure will have positive effects on the local hydrological environment.

EPA mapping indicates that the Shanganagh and Carrickmines Stream catchments are not designated Salmonid watercourses. Previous aquatic surveys (outlined below) have however identified that the streams support trout. The Dargle River Sub-Catchment (EPS Ref: 040/10Do10300) which is located to south-east of the proposed road development is the nearest waterbody governed by salmonid regulations – no portion of the proposed scheme is within the Dargle Sub-catchment.

14.3.3 Hydrogeological Setting

Granite Bedrock underlies the entire scheme. The bedrock is described in geological mapping as a Caledonian Age Granite with muscovite phenocrysts. This is part of a formation known as the Northern and Upper Liffey Valley Plutons. 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”*.

Site investigation information and anecdotal local information indicates that subsurface flows can occur within local zones of fractured bedrock at the bedrock/soil interface in the vicinity of the site. These shallow flows typically follow topographical gradients and are typically intercepted by surface/agricultural drainage at topographic low points.

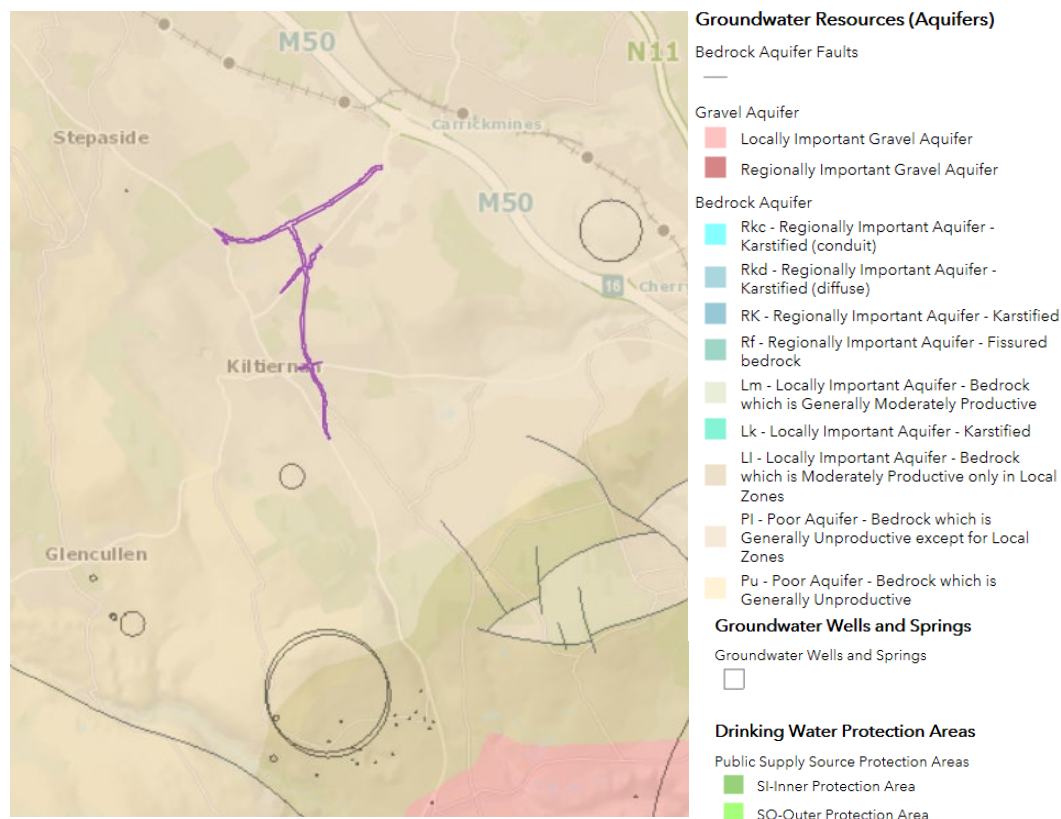


Figure 14.3: Hydrogeological Setting

Groundwater Vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. Groundwater vulnerability is classed as “High” or greater across the entire project extents due to the shallow depth to bedrock and relatively permeable soils. Areas of highest vulnerability correspond to areas of near surface bedrock and thin soil depths. It is noted that the aquifer vulnerability classification does not consider the nature of the underlying ‘receiving’ aquifer with respect to resource value or significance of pollution occurring and is only a reflection on the protection afforded to the aquifer by overlying deposits.

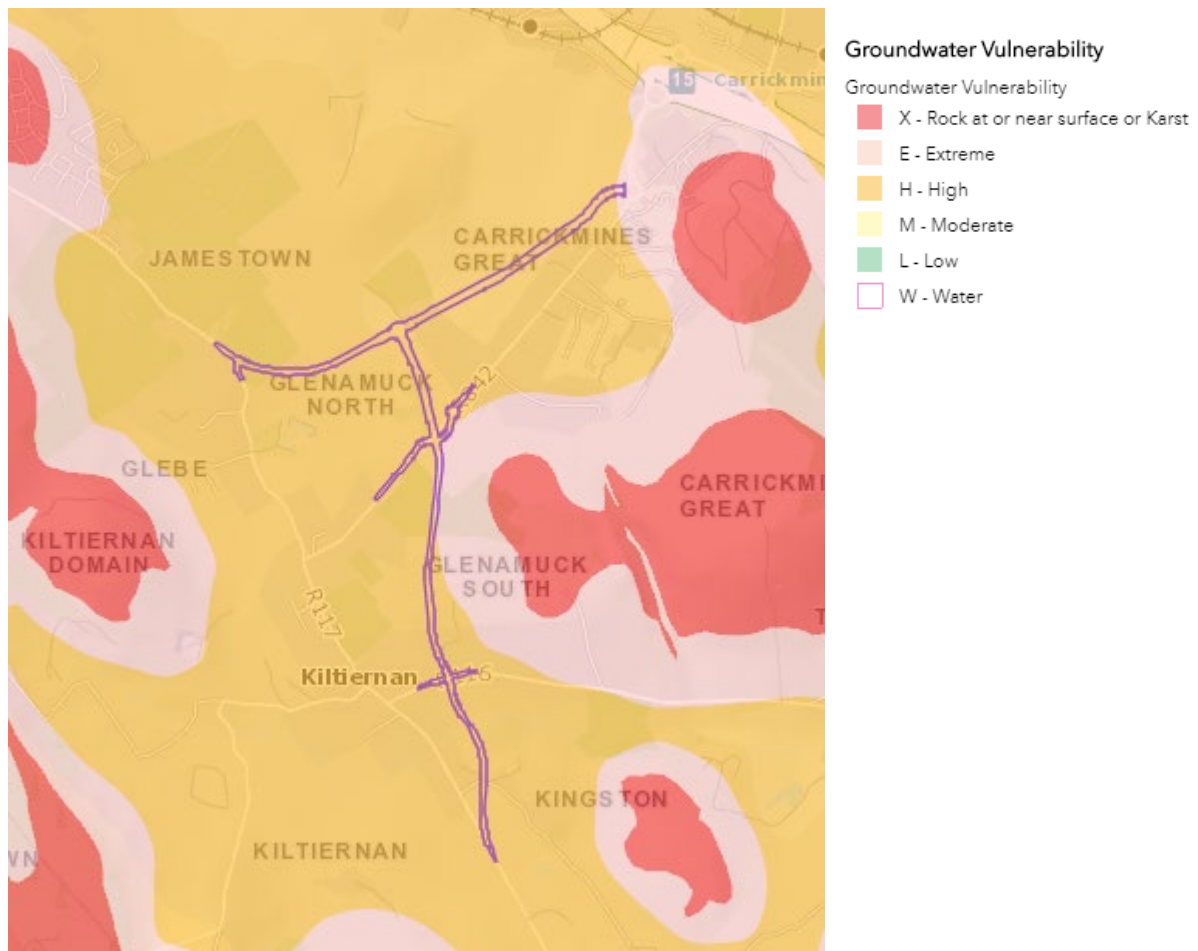


Figure 14.4: Groundwater Vulnerability

14.3.4 Water Quality

EPA Q Rating

The EPA operate a biological river quality (Q or biotic index) classification system based on biological sampling at water monitoring stations. These values are based primarily on the relative proportions of pollution sensitive to pollution tolerant macroinvertebrates resident at a river site, refer to Table 14.8.

Table 14.8 Q Biotic Indices - Interpretation

Q Value	WFD Status	Pollution Status
Q5, Q4-5	High	Unpolluted
Q4	Good	Unpolluted
Q3-4	Moderate	Slightly polluted
Q3, Q2-3	Poor	Moderately polluted
Q2, Q1-2, Q1	Bad	Seriously polluted

Q-rating data is available for the Loughlinstown River upstream and downstream of the proposed road development. and for the Carrickmines Stream downstream of the proposed development, refer to Table 14.9 for results.

Table 14.9 EPA Water Quality Monitoring Q-Rating Values

Waterbody	Station	Location E/N	EPA Q-Rating
Loughlinstown / Shanganagh River	RS10S010440 (upstream-160m)	320889 / 221871	3-4 (Moderate)
Loughlinstown / Shanganagh River	RS10S010450 (Downstream - 1.5km)	322348 / 222008	4 (Good)
Carrickmines Stream	RS10C040200 (Downstream -800m)	322006 / 224095	3 (Moderate)

WFD Classification -Surface Water

The Glenamuck Stream lies within the “Carrickmines Stream” waterbody and has been assigned as “Moderate” status under WFD classifications. The Loughlinstown River is in the Shanganagh sub-catchment and is classified as “Good” status.

WFD Classification -Groundwater

The groundwater body underlying the scheme extents is the Wicklow East waterbody which is classed as “Good” status under the Water Framework Directive (WFD).

Independent Water Quality Assessment

In addition to a review of water quality data held by statutory agencies, additional independent water quality sampling was undertaken as part of the project to determine baseline water quality standards prior to any development at the site.

The objective of the baseline sampling was to collect and assess representative samples of water from rivers and streams in the vicinity of the site to enable affected downstream catchments to be monitored. Upstream control points have also been sampled of part of the monitoring regime.

Sampling was undertaken at five sites and all samples were subject to physico-chemical analysis to establish baseline water quality. These sites will continue to be monitored at regular intervals during the project for a period of at least one year to establish seasonal variations.

Locations of surface water monitoring points are presented in Figure 14.1 in Volume 3. Results received to date have indicated that the measured parameters are generally within guideline values for surface water.

Ballyogan Landfill

Ballyogan landfill is situated to the north of Golf Stream to the north of the proposed scheme extents. Although no portion of the scheme is within the landfill footprint there may be potential for an impact

on surface water quality upstream of the proposed development as a result of landfill leachate. It is noted that Ballyogan Landfill no longer operates as a landfill and is no longer accepting landfill waste.

Monitoring results on the Golf Stream downstream of the landfill are available from the EPA associated with EPA license W0015-01. Most recent results (2018) indicate elevated readings of Ammoniacal Nitrogen in the Golf stream and Biological assessment delivered a Q rating of Q3 (Poor).

Independent Aquatic Surveys

A previous environmental study (RPS 2007) for the scheme included an aquatic ecology assessment of affected watercourses (Conservation Services 2006). The assessment covered the affected portions of the Glenamuck Stream and the Loughlinstown River. A summary of the study is presented in Table 14.10 below.

Table 14.10: Summary of Previous Aquatic Ecology Study (2007)

Location	Q-rating	Pollution Status in Vicinity of Potential Impact Location	Salmonid Habitat Recorded at Impact Point	Salmonids Recorded at Sampling Site	Best Salmonid Habitat Recorded and Distance Downstream
Glenamuck Stream	3-4	Slightly Polluted	Good	Brown Trout	Good at location
Shanganagh River	4	Unpolluted	Very Good	Brown Trout (possible juvenile sea trout)	Very Good at location

14.3.5 Meteorological Data Summary

Rainfall data for the area has been extracted from Met Eireann Data Charts, the annual rainfall data from 1981-2010 indicates the long term average annual rainfall in the vicinity of the scheme is between 900-1000mm.

The site is in a transitional zone between higher rainfall areas in the Dublin mountains and lower rainfall in lower elevation areas alongside the east coast.

14.3.6 Flooding

Historical Flood Data

As part of the desktop study, historic and predicted flood risk mapping published by the OPW on the Flood Hazard Mapping Website <http://www.floodinfo.ie/> was reviewed.

The Eastern CFRAM (Catchment Flood Risk Assessment and Management) study details the predicted risk for a variety of fluvial and coastal flood scenarios. The mapping does not include the watercourse reaches affected by the proposed scheme and only maps downstream flooding.

Historical flood maps/data indicate there are no recorded flood events within the proposed road corridor. There is a recorded 2002 flood event associated with the Carrickmines River however this is well outside the road corridor on the eastern side on the M50. Further records exist of a recurring flood

event on the Glenamuck Road outside the scheme extents. This flooding appears to be associated with local road drainage deficiencies rather than fluvial or coastal flood risk

There are no areas within the site or immediately downstream of it mapped as “Benefiting Lands”. These are defined by the OPW as lands that might benefit from the implementation of Arterial (Major) Drainage Schemes (under the Arterial Drainage Act 1945) and can indicate areas of land subject to flooding or poor drainage.

To adequately assess the potential impact of the scheme on flood risk a separate site specific flood risk assessment (SSFRA) has been prepared for the scheme and is included in Appendix 14-1. The SSFRA determined the following;

- The proposed road main footprint is outside the Q100 and Q1000 flood extents and is therefore in Flood Zone C (low risk of flooding) except for at localised stream crossings where flood risk is bridged.
- The proposed culverts/bridges have capacity to convey the required design flows without increasing flood risk. (Detailed design of watercourse crossings will be subject to future agreement with OPW as part of a Section 50 agreement).
- Subject to mitigation measures outlined in the report, the proposed scheme will not increase flood risk.

River Flows

River flows at the proposed crossing locations were derived as part of the SSFRA. The derived flows at the proposed watercourse crossings are detailed in Table 14.11 below.

Table 14.11: River Flows

Location	Q100 Flow (m ³ /s)	Q1000 Flow (m ³ /s)
Glenamuck Stream Crossing	1.46	1.93
Un-named Drain Crossing	1.13	1.50
Loughlinstown River Crossing	5.73	7.60

14.3.7 Surface Water Abstractions

As part of the desktop study for this assessment EPA mapping indicates there are no registered surface water abstractions within the downstream hydrological catchment of the site.

The EPA holds information relating to private water supplies registered in accordance with the European Communities (Drinking Water) (No.2) regulations 2007. The online maps available indicate no private water supplies abstracting downstream of the scheme.

14.3.8 Groundwater Abstractions

GSI hold datasets on Drinking Water Protections areas and National Federation Group Water schemes, neither dataset showed records in the vicinity of the site. The GSI dataset for groundwater wells and springs indicates one borehole which is potentially downgradient of the site (3221NWW003). This dates from 1994 and its use is recorded as unknown. The borehole appears to be within the Cherrywood SDZ which is serviced by mains supply and is considered unlikely to be used as a drinking water source.

14.3.9 Topography

The proposed road route traverses an area of undulating lands generally falling from west to east from the Dublin mountains towards the coast.

A detailed topographical survey of all lands, watercourses, and existing infrastructure affected by the proposed works has been carried out to inform the design for the scheme. In addition to this, LIDAR topographical data has been used to determine the topography beyond the proposed road corridor.

Survey data indicates the highest elevations on the scheme are at the southern tie in to the Enniskerry Road (approx. 138mAoD) and lowest elevations at the tie in to the Glenamuck Road South Roundabout at Carrickmines (approx. 85mAoD)

14.3.10 Designated sites

Designated sites (sites designated as conservation areas under Irish or EU legislation) within 5km of the proposed scheme or within the hydrological catchment of the scheme are indicated in Table 14.12 below.

Table 14.12: Designated Sites

Station ID	Name	Designation	Distance	Commentary
001207	Dingle Glen	Proposed NHA	0.6 km	Dry valley formed by a glacial lake overflow channel. Proposed designation based on variety of habitats within a small area. Located east of the subject site within the Loughlinstown stream catchment however does not have a direct hydrological connection to the site. Therefore not sensitive to hydrological/ hydrogeological impacts from the subject site.
001202	Ballybetagh Bog	Proposed NHA	1.3 km	Fen area with proposed designation primarily based on fossil remains. Located within separate hydrological catchment to the scheme and not sensitive to hydrological/ hydrogeological impacts from the subject site.
000725	Knocksink Wood	Proposed NHA, SAC	4.6 km	Designation based on petrifying Spring and Alluvial Forest habitat. Located within separate hydrological catchment to the scheme and not sensitive to hydrological/ hydrogeological impacts from the subject site.
000713	Ballyman Glen	Proposed NHA, SAC	2.8 km	Designation based on petrifying Spring and Alkaline Fen habitat. Located within separate hydrological catchment to the scheme and not sensitive to hydrological/ hydrogeological impacts from the subject site.
001211	Loughlinstown Woods	Proposed NHA	3.0 km	Proposed designation based on mixed woodland species and habitat of natural character. Site primarily used for amenity purposes. The pNHA is downstream of the proposed site and the Loughlinstown River flows through it. Given the designation is based on woodland species present it is not considered sensitive to hydrological/ hydrogeological impacts from the subject site.
001768	Powerscourt Woodland	Proposed NHA	4.3km	Proposed designation based on mixed woodland species and habitat. Located within separate hydrological catchment to the scheme and not sensitive to hydrological/ hydrogeological impacts from the subject site.
001206	Dalkey Coastal Zone And Killiney Hill	Proposed NHA	4.4 km	Coastal site spanning from Dun Laoghaire Harbour to Shankhill. Proposed designation based on varied habitats from sub-littoral to coastal heath. Also supports variety of bird and crustation species and contains rock exposures of geological interest. Located within separate hydrological catchment to the scheme and not sensitive to hydrological/hydrogeological impacts from the subject site.

Based on the above review no designated sites are considered to be sensitive to hydrological hydrological/hydrogeological impacts at the subject site.

14.3.11 Baseline Summary and Sensitivities

The baseline assessment identified several of hydrological receptors that have the potential to demonstrate sensitivity to the development proposed at the site. These are:

- Glenamuck Stream and tributaries ;
- Loughlinstown/Shanganagh River
- Bedrock Aquifer

The Sensitivity of these receptors identified is determined in accordance with the rationale described in Section 14.2.3.

Table 14.13 Baseline Summary

Type	Receptor	Sensitivity	Rationale
Hydrological (Watercourse)	Glenamuck Stream and their tributaries	Medium	Water Framework Directive water quality classification of Moderate (C) Not governed by Salmonid Regulations, however has been identified as supporting brown trout
Hydrological (Watercourse)	Loughlinstown / Shanganagh River	Medium	Water Framework Directive water quality classification of Good (B) Not governed by Salmonid Regulations, however has been identified as supporting brown trout
Hydrogeological (Aquifer)	Bedrock Granite Aquifer	Low	Poor Aquifer which is Generally Unproductive. No significant abstractions

14.4 Predicted Impacts

14.4.1 Construction Phase

Construction activities can pose a significant risk to the watercourse receptors identified and comprise impacts associated with the significant excavations, soil movement, aggregate import and construction plant usage. (Reference should be made to Chapter 5 “Description of Project” where the construction activities have been outlined in detail.) Tables 14.14 and 14.15 below present the likely potential impacts of the construction activities on the Hydrological environment, in the absence of mitigation. Mitigation measures to reduce the impact of these are discussed in Section 14.6

Table 14.14: Predicted Impacts - Construction Phase

Impact	Source	Consequence
Chemical Pollution of Water Environment	<ul style="list-style-type: none"> • Temporary presence of chemicals, fuels, and other oils associated with construction activities on the site have potential to enter the water environment through accidental spillages, improper transport and refuelling, or inappropriate storage and disposal procedures, by gradual leakage or single failure of storage tanks or refuelling mechanisms • Temporary and permanent wastewater effluent from temporary construction phase welfare facilities and permanent substation building welfare facilities has potential to enter surface water or shallow groundwater. • Concrete, bentonite and other cement-based products will be used during construction activities. These materials are highly alkaline and corrosive and can have significant negative effects on surface water quality if improperly handled. Cement based products can also be detrimental to waterbody environs by altering the waters pH 	<ul style="list-style-type: none"> • Oils and chemicals entering water environment have the potential to adversely affect water quality, with associated effects to fish and aquatic ecology.
Pollution of watercourses by silt / suspended solids	<ul style="list-style-type: none"> • Temporary construction activities would require excavations, ground disturbance, stripping of soils, and temporary spoil deposition. Exposed soils have potential to release sediments in surface water • Construction of access tracks and other hard standing areas would require importing, handling, and placement of aggregate, with potential to release sediments in surface water • Construction plant movements across disturbed soils and access tracks have potential to release silts and sediments to surface water runoff • Temporary surface water or shallow groundwater gathering in significant excavations has potential to be significantly polluted due to contact with excavated surfaces and aggregates. Discharging of untreated water by pump or gravity would cause release of potentially heavily polluted effluent to watercourses • Construction of culverts and stream realignments can disturb stream sediments and increase turbidity 	<ul style="list-style-type: none"> • Sediments and debris entering watercourses have the potential to adversely modify stream morphologies, smother habitats, harm aquatic flora and fauna with particular risk to salmonid spawning areas; and increase risk of blockage to culverts and drainage channels.
Changes to Stream Channels	<ul style="list-style-type: none"> • Construction works will involve the construction of new watercourse crossings and realignment works. In-stream and bank side construction works can alter the morphology, river banks and in-stream ecology 	<ul style="list-style-type: none"> • Unsuitable culvert/channel sizing or installation can affect conveyance and flood risk • Unsuitable culvert/channel sizing or installation can affect movement of fish or mammals along the watercourse corridor

		<ul style="list-style-type: none"> Loss of habitat by direct disturbance
Changes to runoff, and flow patterns	<ul style="list-style-type: none"> Earthworks for the road will result in cuttings, embankments or spoil heaps that have the potential to modify drainage routes Changes in surfacing caused by vegetation stripping or gravel placement may also affect runoff or rates Changes in surfacing or drainage approach may affect groundwater recharge patterns Pumping or deep excavations may affect groundwater levels 	<ul style="list-style-type: none"> Increases in surface water runoff rates and volumes, leading to increased flood risk and increased effects of erosion and scour in down gradient watercourses. Diversion of flows from the natural catchment which could affect dependant habitats and flood risk. Changes to recharge patterns or groundwater levels may affect groundwater levels and yields

14.4.2 Unmitigated Significance -Construction Phase

Magnitudes of identified impacts, and associated unmitigated significance of those impacts, are determined in accordance with the rationale previously described and are presented in the following table.

Mitigated significance is presented in Table 14.18.

Table 14.15: Unmitigated Significance – Construction Phase

Receptor	Receptor Sensitivity	Potential Impact	Impact Magnitude	Impact Significance (pre-mitigation)
Glenamuck Stream / Loughlinstown River	Medium	Chemical Pollution of Water Environment	Medium – Potential for temporary reduction in water quality and fishery value	Moderate
Glenamuck Stream / Loughlinstown River	Medium	Pollution of watercourses by silt / suspended solids	Medium – Potential for temporary reduction in water quality and fishery value	Moderate
Glenamuck Stream / Loughlinstown River	Medium	Changes to Stream Channels	High – Unsuitable watercourse crossings have potential for large change in flood levels or loss of significant upstream habitat due to movement barriers	High

Glenamuck Stream / Loughlinstown River	Medium	Changes to runoff and flow patterns	Medium – Temporary or minor impact to local drainage or flood levels caused by earthworks and construction surfacing	Moderate
Bedrock Aquifer	Low	Chemical Pollution of Water Environment	Medium – Potential for temporary reduction in water quality	Slight
Bedrock Aquifer	Low	Changes to runoff and flow patterns	Low -Local change to groundwater levels	Not Significant

14.4.3 Operational Phase

The predicted impacts of the operational phase are those associated with the completed road including final surface treatments, conveyance of traffic flows and all operation and maintenance activities of the road and associated works including the road drainage system. The main impacts arising from operational activities include:

Table 14.16: Predicted Impact - Operational Phase

Impact	Source	Consequence
Chemical Pollution of Water Environment	<ul style="list-style-type: none"> Road Runoff can contain several contaminants. These arise from the degradation of road surfaces, tyres and vehicle emissions. The primary contaminants known to occur in routine runoff include hydrocarbons and heavy metals. The application of salt to road surfaces as part of winter road maintenance will result in an increase in salinity, conductivity and total dissolved solid concentrations to the receiving aquatic system. 	<ul style="list-style-type: none"> Oils and chemicals entering Water Environment have the potential to adversely affect water quality, with associated effects to fish and aquatic ecology.
Pollution of watercourses by silt / suspended solids	<ul style="list-style-type: none"> Erosion associated with the drainage network or unvegetated areas may have the potential to release suspended solids. The potential for silt/suspended solids is however greatly reduced when compared to construction phase. 	<ul style="list-style-type: none"> Sediments and debris entering watercourses have the potential to adversely modify stream morphologies, smother habitats, harm aquatic flora and fauna with particular risk to salmonid spawning areas; and increase risk of blockage to culverts and drainage channels.
Changes to Stream Channels	<ul style="list-style-type: none"> Any construction stage deficiencies with watercourse crossings and realignment works will continue throughout operation phase Outfalls to stream channels may cause erosion and deterioration of stream channel if improperly detailed 	<ul style="list-style-type: none"> Unsuitable culvert/channel sizing or installation can affect conveyance and flood risk Unsuitable culvert/channel sizing or installation can affect movement of fish or mammals along the watercourse corridor Erosion at stream outfalls
Changes to runoff and flow patterns	<ul style="list-style-type: none"> The Construction of a structure within a flood plain results in the loss of an area that could have been used to store water. This results in increased flows downstream and increased risk of flooding Increased hard surfacing combined with a piped drainage network can cause increases in surface water runoff rates and volumes Constructed drainage networks have the potential to modify drainage routes Increases in runoff and flows associated with climate change may lead to flows in excess of those designed for which overwhelm drainage infrastructure 	<ul style="list-style-type: none"> Increases in surface water runoff rates and volumes, leading to increased flood risk and increased effects of erosion and scour in down gradient watercourses. Diversion of flows from the natural catchment which could affect dependant habitats and flood risk. Changes to recharge patterns or groundwater levels may

	<ul style="list-style-type: none"> Changes to runoff patterns caused during construction will continue throughout operation phase 	affect groundwater levels and yields
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14.4.4 Unmitigated Significance -Operational Phase

Magnitudes of identified impacts, and associated unmitigated significance of those impacts, are determined in accordance with the rationale previously described and are presented in the following table.

Mitigated significance is presented in Table 14.18.

Table 14.17: Unmitigated Significance - Operational Phase

Receptor	Receptor Sensitivity	Potential Impact	Impact Magnitude	Impact Significance (pre mitigation)
Glenamuck Stream / Loughlinstown River	Medium	Chemical Pollution of Water Environment	Medium – Potential for temporary reduction in water quality and fishery value	Moderate
Glenamuck Stream / Loughlinstown River	Medium	Pollution of watercourses by silt / suspended solids	Medium – Potential for temporary reduction in water quality and fishery value	Moderate
Glenamuck Stream / Loughlinstown River	Medium	Changes to Stream Channels	High – Unsuitable watercourse crossings have potential for large change in flood levels or loss of significant upstream habitat due to movement barriers	High
Glenamuck Stream / Loughlinstown River	Medium	Changes to runoff and flow patterns	High – Unmitigated increases in runoff rates have potential to significantly affect flood levels	High
Bedrock Aquifer	Low	Chemical Pollution of Water Environment	Medium – Potential for temporary reduction in water quality	Slight

Bedrock Aquifer	Low	Changes to runoff and flow patterns	Low -Local change to groundwater levels	Not Significant
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14.5 Mitigation Measures

14.5.1 Mitigation Measures – Preamble

From the assessment of potential impacts during construction and operation and decommissioning, the following key issues have demonstrated potential impact significance and so require particular attention for mitigation and management:

- Chemical Pollution of Watercourses
- Pollution of watercourses by silt / suspended solids
- Changes to Stream Channels
- Changes to runoff and flow patterns

The greatest risk to the environment is during the construction period, coinciding with the greatest amount of activity on site. Furthermore, effects unmitigated during construction have the potential to extend into the operational phase.

Details of additional mitigation measures proposed are included in the following sections. It is noted that all identified effects have been mitigated via prevention and reduction, and that impact offsetting is not proposed

14.5.2 Mitigation Through Design

The project layout has evolved in order that the design avoids conflict with the water environment. Design evolution to minimise environmental impact has been prioritised throughout the various design stages. This is detailed in the Environmental Report which supported the LAP road route selection and has been continued throughout the planning stage and design phases.

The alignment of the road at watercourse crossings facilitate the shortest possible crossing lengths and facilitates the construction of the crossing structures outside the active stream channel either by utilising clear span crossing (bridge) or offline culverts which can be constructed in the dry in advance of stream diversions

The scheme also avoids areas identified as Flood Zone A and B to minimise impact on flood conveyance and floodplain storage.

The drainage system allows recharge to groundwater at all attenuation and open channel locations

The scheme design facilitates the retention of vegetated buffer strips at all locations other than crossing points and isolated pinch points. Retention of intact vegetated buffer zones between infrastructure and water features allows:

- Improved / protected water quality by filtering runoff within riparian vegetation before it enters the watercourse.

- Space for natural fluvial processes which help restore and maintain the natural dynamic balance of river systems and associated habitats.
- Vegetation stabilises banks and reduces soil erosion.
- Access for the maintenance and inspection of watercourses, and for dealing with pollution incidents.
- Habitat for plants and animals

14.5.3 Mitigation Through Procedures

In order to facilitate the integration of environmental issues into road scheme planning, construction and operation, an Environmental Operating Plan (EOP) shall be produced, implemented and maintained by the contractor. This represents a best practice guide for considering the environment for the construction life cycle of a road scheme project.

The EOP shall be designed to assist the main contractor in preventing, managing and/or minimising significant environmental impacts during the construction phase. To achieve this objective the EOP shall:

- Comprehensively incorporate all Environmental Commitments set out in the Contract documents, Planning Documents (including EIAR), any conditions and/or modifications imposed by An Bord Pleanála or the Local Authority.
- Provide a method of documenting compliance with these Environmental Commitments and conditions/modifications.
- Itemise relevant environmental legislative requirements and best practice guidance. The EOP should also provide a method of documenting compliance with these requirements.
- Outline methods by which construction work will be managed to prevent, reduce or compensate for potential adverse impacts on the environment.
- Incorporate procedures for communicating with the public, statutory consultees, Local Authority and relevant site-personnel.
- Incorporate procedures for Environmental Awareness Training for the main contractor's staff.
- Incorporate monitoring procedures and responses to monitoring results, where contractually required.
- Provide for a system of audit with regard to the effectiveness of the EOP during the construction life cycle of the project.
- Include an Emergency Response Plan (ERP) detailing the procedures to be undertaken in the event of a spillage of chemical, fuel or hazardous wastes, fires or flood events.

TII have published "Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan" which should be used as a basis for the creation of the EOP.

The EOP shall be co-ordinated with all other environmental procedural documents required which may include a Construction Management Plan and a Pollution Prevention Plan.

14.5.4 Specific Mitigation Measures – Pollution Control

This section outlines the mitigation measures that will be required to minimise pollution impact to the water environment during both the construction and operational phase of the development.

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. Drainage measures to include

- Maintaining existing overland flow routes and channels. All existing natural flow paths across the works area will be maintained through the use of interception drainage. Intercepted “clean” runoff will be captured upstream of works and conveyed to a suitable discharge point without being affected by flowing through the works area. Minimisation of offsite flows through the works area reduces the quantity of water which may require treatment
- All discharges from the works area will be routed through a “treatment train” of SuDS components to aid pollutant removal. No outflows or dewatering flows from the works area should discharge directly into watercourses
- Construction drainage ditches should take the form of wide, flat bottomed swales designed to convey flows at a low velocity
- Reducing surface water flow rates and volumes by providing check-dams in swales, whereby the flow velocity and rate of discharge is reduced to mimic natural properties and maximise filtration and settlement of suspended particles
- Providing settlement ponds where runoff from the works area areas is attenuated and treated prior to discharge to watercourses. Permanent ponds are proposed to cater for the operational phase drainage and the areas acquired for these areas can be used for temporary settlement ponds
- Discharges should travel over vegetated buffer strip at low velocities prior to discharge to maximise filtration and settlement
- All swales, crossings and other hydraulic features will be engineered to ensure that dimensions etc. are suitable to convey predicted flows and so prevent build-up of surface water and / or flooding.
- Silt fencing or other appropriate measures shall be put in place downstream of exposed soils or soil stockpiles
- Vegetation should be established as soon as possible on all exposed soils

Other measures to be employed throughout the construction and operational phases to minimise pollution risk include;

- Due consideration will be given to the prevailing ground and weather conditions when programming the execution of the works.
- Foul Drainage from all site offices and facilities will be contained and disposed of in an appropriate manner to prevent pollution of rivers and local watercourses in accordance with the relevant statutory bodies.
- Operational (permanent) drainage design shall comply with the requirements of the Greater Dublin Strategic Drainage Study (GSDSDS)
- Suds features to be in place prior to the main construction works
- Ponds which incorporate a permanent water volume shall be put in place on all outfalls where space permits. A treatment volume shall be provided in which dilution and partial treatment (by physical, chemical and biological means) of runoff can take place. These will serve to both retain and treat contaminants generated during construction and operational phases
- A shut off valve shall be incorporated into the permanent drainage at all outfalls so that oil spills can be contained and collected before discharge to watercourses
- SuDS features shall be designed in general conformance with best practice guidance in the SuDS Manual (Ciria C753)
- Refuelling of construction machinery shall be undertaken in designated areas located away from surface water drainage in order to minimise potential contamination impacts on the water environment. Spill kits shall be kept in these areas in the event of spillages.
- Oil and fuel stored on site for construction should be stored in designated areas. These areas shall be bunded (to min 110% of chemical volume) and should be located away from surface water drainage.
- Pouring of concrete including wash down and washout of concrete from delivery vehicles to be controlled in an appropriate facility to prevent contaminating run-off and groundwater.
- All batching and mixing activities shall be located in areas well away from watercourses and drains.
- Any surface water abstracted from a river for use during construction will have an applicable licence agreement in place and will be fitted with a filter to prevent the intake of fish.

For any construction work within or directly adjacent to the water the following mitigation measures will apply

- Use of precast elements to be maximised to avoid wet concrete works in vicinity of water
- Works to be carried out in the dry (offline of outside the river channel) where possible. Suitable bunding, over-pumping, or temporary cofferdams to be put in place where required

- Relevant fisheries authorities shall be informed of all in-stream construction work scheduled to take place. Any in-stream or culverting works shall be undertaken in consultation and with the agreement of the relevant statutory body and during the permitted times of the year.
- Hydrophilic grout / quick setting mixes / rapid hardener additives shall be used to promote the early set of any wet concrete required. Other materials such as biodegradable shutter oils should be considered.
- There shall be no use of persistent pesticides, herbicides or artificial fertilisers in any landscaping or subsequent maintenance within a 10m buffer of a watercourse.

Routine monitoring of water quality will be carried out at appropriate upstream and downstream locations prior, during and post construction. The baseline surface water monitoring points (per 14.3.4) shall be used at a minimum. The water monitoring will be compared against the baseline results and current Environmental Quality Standards (EQS). Threshold levels should be identified during the construction phase and additional mitigation measures should be employed if exceeded.

14.5.5 Specific Mitigation Measures – Channel/Culvert Works

To minimise the impact of culvert, bridge and channel works on hydrological receptors and flood risk, the following mitigation measures will be implemented.

- 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).
- All watercourse crossings shall be subject to OPW Section 50 agreement
- Mammal passage through all culverts will be maintained whether via retention of riparian banks (bridge) or provision of a mammal ledge (culverts)
- Culvert inverts will be set below the channel bed level to facilitate a natural bed of river material along the culvert base
- Culverts have been designed so that they can be constructed offline in the dry and with the shortest possible length. Short lengths of stream diversion will then be constructed to route the stream through the completed culvert
- Construction of watercourse crossings and stream works shall be programmed to coincide with periods of predicted low flow in the affected channel, and shall take notice of other working period restrictions imposed. Construction will be strictly as per the design for each identified watercourse crossing, and will fully implement all SuDS and additional mitigating measures proposed at detailed design stage
- All watercourse realignment work shall be designed with input from the project ecologist to achieve maximum ecological benefits and improve on the existing hydrological environment.
- All Culverts and bridges will be designed to convey the Q1000 flood flows
- Suitable excavated bed material and riparian vegetation shall be stockpiled for use in the reformed/new channel

14.5.6 Specific Mitigation Measures – Runoff and Flow Patterns

To minimise the impact of the development on runoff, flow patterns and flood risk, the following mitigation measures will be implemented;

- Surface water system shall incorporate SuDS and designed in accordance with the supplementary industry guidance as detailed in Table 14.18 to reduce impact of the development on the existing environment.
- Surface water discharge rates shall be limited to existing greenfield run-off rates as a minimum to prevent increased flood risk. Associated attenuation storage shall be provided upstream of flow controls. Information on surface water controls and attenuation measures are included in Chapter 5.

- The drainage system shall allow recharge to groundwater at all appropriate attenuation, interception drainage and open channel locations
- Pumping of groundwater shall be limited in duration and volume
- Permanent excavations (for ponds or areas of cut) should not be deeper than local watercourses to limit impact on local groundwater levels
- A regular maintenance and inspection programme of the flow control devices, attenuation storage facilities, gullies and SuDS features will be required during the Operational Phase to ensure the proper working of the development's networks and discharges.
- Collection networks should be regularly monitored, maintained and serviced within the context of an overall development and environmental management plan.
- Drainage design for permanent drainage to incorporate a 10% allowance for the effects of climate change
- Boulder riprap to be added at outside of bends in realigned stream channels
- Diversion channels shall generally match the width and gradient of the existing stream channel
- Existing catchment boundaries to be maintained in all stages of development (no diversion of flows to adjacent catchments)

14.5.7 Mitigated Significance

Magnitudes of identified impacts, and associated significance of remaining Construction and Operational impacts, following adoption of the preceding mitigation measures have been determined. This assessment is in accordance with the rationale previously described and is presented in the following table.

Table 14.18: Mitigated Significance

Receptor	Receptor Sensitivity	Potential Impact	Impact Magnitude	Impact Significance (post mitigation)
Glenamuck Stream / Loughlinstown River	Medium	Chemical Pollution of Water Environment	Low / Negligible: Implementation of best practice measures to control hazardous substances mitigates impact. Measures include controls on use and storage of hazardous materials, controls on construction works and materials in watercourses and SuDS Treatment train.	Not Significant
Glenamuck Stream /	Medium	Pollution of watercourses by	Low / Negligible: Implementation of best practice measures to control silt pollution mitigates impact. Measures include implementation of robust	Not Significant

Loughlinstown River		silt / suspended solids	construction stage SuDS measures, treatment off all surface water discharges from site and implementation of ponds with treatment volume	
Glenamuck Stream / Loughlinstown River	Medium	Changes to Stream Channels	Low / Negligible: Implementation of best practice measures for watercourse crossing and stream works mitigates impact. Measures include clear span or offline crossings, consideration of fish and mammal passage and design for conveyance of extreme floods.	Not Significant
Glenamuck Stream / Loughlinstown River	Medium	Changes to runoff and flow patterns	Low / Negligible: Implementation of best practice measures for drainage design mitigates impact. Measures include flow controls to greenfield rate, attenuation storage, consideration of climate change and maintenance of existing catchments.	Not Significant
Bedrock Aquifer	Low	Chemical Pollution of Water Environment	Low / Negligible: Implementation of best practice measures to control hazardous substances mitigates impact. Measures include controls on use and storage of hazardous materials, controls on construction works and materials in watercourses and Suds Treatment train	Not Significant
Bedrock Aquifer	Low	Changes to runoff and flow patterns	Low / Negligible: Implementation of best practice measures to maintain flow patterns mitigates impact. Measures include facilitation of recharge from drainage system and controls on depths of excavations .	Not Significant

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

14.6 Residual Impacts

It is considered that by implementing the proposed construction and operational phase mitigation measures above, that the significance of the identified impacts will be reduce to a “Not significant” residual impact on the identified hydrological/ hydrogeological receptors.

14.7 Difficulties Encountered

No significant difficulties were encountered during the assessment.

A small area consisting of a single grassed field north of the Loughlinstown River was unable to be accessed due to landowner restrictions, the land was however visible from both boundaries and LIDAR, mapping and orthophotography data was available so an adequate assessment of the baseline conditions was possible.

14.8 References

- Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA , 2009);
- Environmental Impact Assessment of National Road Schemes – A Practical Guide (NRA, 2008);
- Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan (TII);
- Design of Earthworks Drainage, Network Drainage, Attenuation & Pollution Control (DN-DNG-03066) (TII);
- Drainage Design For National Road Schemes - Sustainable Drainage Options (TII);
- Guidelines for The Crossing of Watercourses During the Construction of National Road Schemes (NRA, 2008);
- Drainage Systems For National Roads [NRA HD 33/15] (TII);
- The Planning System and Flood Risk Management (OPW, 2009);
- Draft River Basin Management Plan 2018 – 2021. Department of Housing Planning and Local Government;
- Guidelines on protection of fisheries during construction works in and adjacent to waters 2016. Inland Fisheries Ireland (IFI);
- Guidelines On The Information To Be Contained In Environmental Impact Assessment Reports (Draft August 2017) (EPA);
- EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) Sept. 2003;
- Geo Portal (<https://gis.epa.ie/EPAMaps/>) (EPA);
- The SUDS Manual (CIRIA C753) (CIRIA);
- Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (CIRIA C532);
- Control of Water Pollution from Linear Construction Sites (CIRIA C648);
- Development and Flood Risk – Guidance for the Construction Industry (CIRIA 624);
- PPG01: General Guide to the Prevention of Pollution (UK Guidance Note);
- GPP 5 Works and Maintenance in or near Water (UK Guidance Note);
- PPG06 Working at Construction and Demolition Sites (UK Guidance Note);
- Environmental Good Practice on Site (C692) (2010) (CIRIA);
- Dun Laoghaire and Rathdown County Council Planning (<http://dlrcoco.ie/en/planning>);
- Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements. (2013) Institute of Geologists of Ireland (IGI);

- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects, Dept of the Environment Heritage and Local Government;
- Construction Code of Practice for the Sustainable Use of Soils on Construction Sites, Department for Environment, Food and Rural Affairs (UK); and
- Geological Survey Ireland Spatial Resources
<https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4coab2fbde2aaa-c3c228> .

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15 Resource and Waste Management

15.1 Introduction

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

This chapter has been prepared by Richard Hamilton, a chartered Town Planner with over 20 years experience, a member of the Irish Planning Institute and the Royal Town Planning Institute. He is a Director in Future Analytics Consulting (FAC) which provides consultancy services in Planning, Research and Economics. Relevant EIA experience includes the M1 Motorway Service Areas-EIS for the NRA 2011; Profile Park, Grangecastle Masterplan and EIS, South Dublin (2005 – 2006), Lidl Regional Distribution Centre, Newbridge, Kildare – Planning Application and EIS (2015/2016), College Green Plaza EIAR (2017), Dublin Airport, Northern Parallel Runway EIS (2005 – 2007), and Luas light rail Dublin (lines A and B) EIA.

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. To achieve resource efficiency there is a need to move from a traditional linear economy to a circular economy (see Figure 15-1: Circular Economy).

However, where residual waste is generated, it should be dealt with in a way that follows the waste hierarchy (see Figure 15-2: Waste Hierarchy) and actively contributes to the economic, social and environmental goals of sustainable development.

This chapter of the EIAR examines the potential environmental effects of the generation and management of solid waste streams arising from the Proposed Scheme, in the context of the existing local and national resource and waste management environment. The Proposed Scheme is located within the Local Authority of Dún Laoghaire-Rathdown County Council (DLRCC).

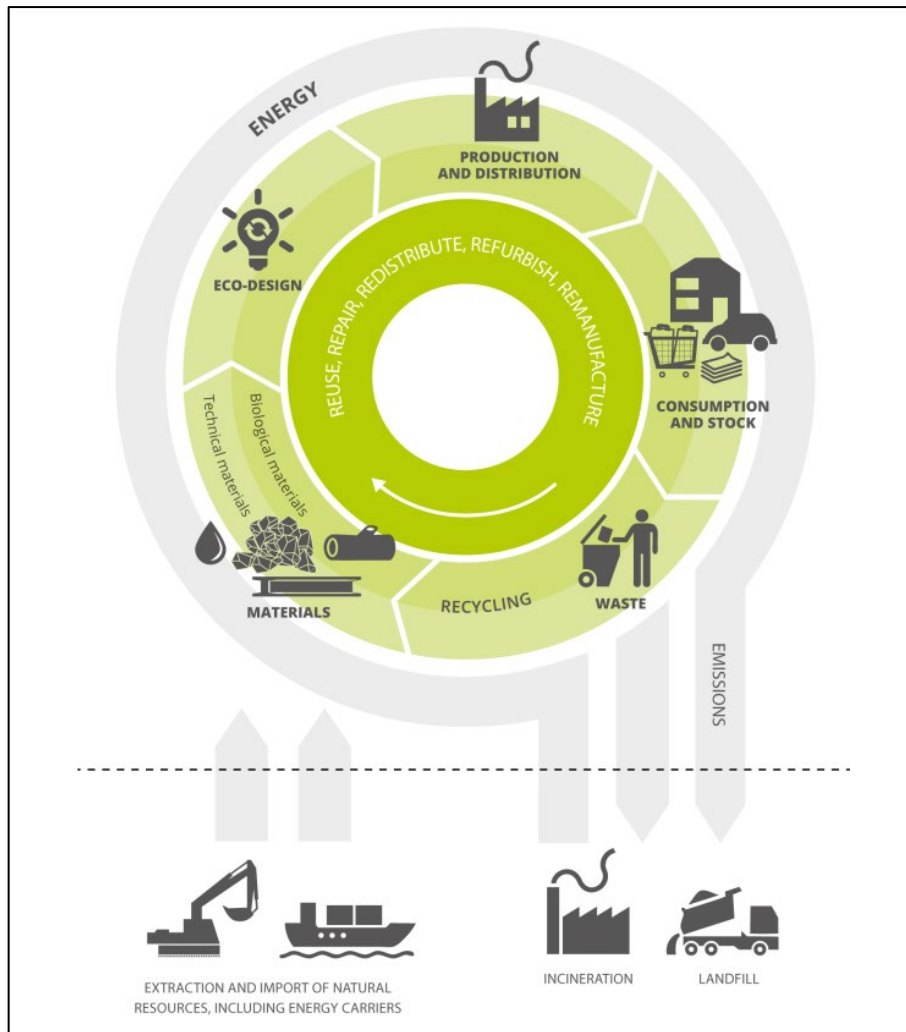


Figure 15-1: Circular Economy

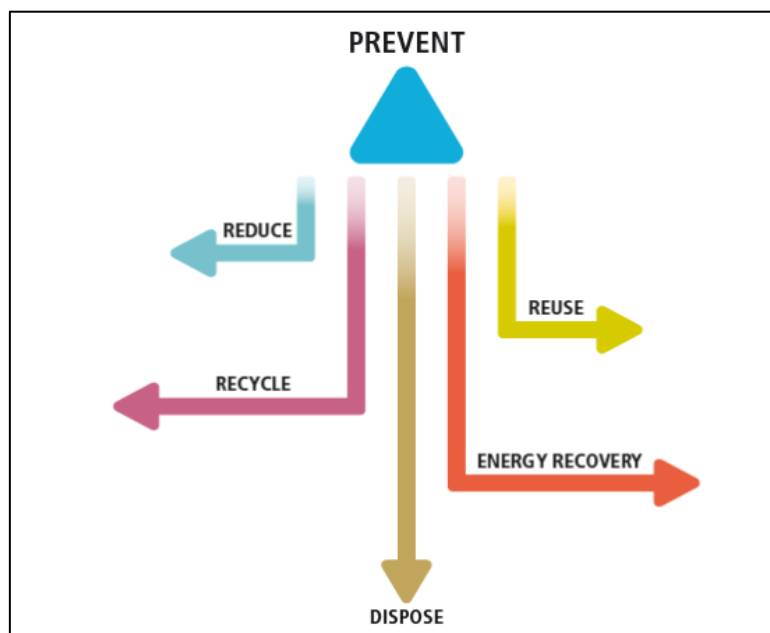


Figure 15-2: Waste Hierarchy

15.2 Assessment Methodology

15.2.1 General

This Chapter is based on the Proposed Project, as described in Chapter 5 'Description of Scheme' and Chapter 6 'Construction Strategy'. This section sets out the methodology followed in carrying out this resource and waste impact assessment. This resource and waste management assessment considers the following aspects;

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

A review was undertaken which included the following tasks;

- Review of relevant policy and legislation which creates the legal framework for resource and waste management in Ireland, including the Eastern-Midlands Regional Waste Management Plan 2015-2021;
- Description of waste generation during the construction and operational phases; and
- The Proposed Project was systematically reviewed to identify mitigation and move waste management up the waste hierarchy through implementation of best practice (refer to the aforementioned Figure 15-2).

15.2.2 Guidance and Legislation

Resource and waste management takes place in a policy and legislative framework. A review of relevant legislation, policy and best practice guidance was undertaken to inform the impact assessment and recommended mitigation.

The key components of EU, national and local policy, legislation and guidance relevant to the Proposed Project are summarised as follows;

- Prevention of waste is the preferred option such that the value of products, materials and resources are maintained in the economy for as long as possible and the generation of waste minimised;
- Where construction waste is generated it should be source separated to facilitate reuse, recycling and maximise diversion of waste from landfill;
- Where waste may not be prevented, reused or recycled it should be transported and disposed of in accordance with applicable legislation and without causing environmental pollution;
- Waste may only be transferred from the Proposed Project by a waste collection permit holder and delivered to an authorised waste facility (a facility which holds a certificate of registration, waste facility permits or waste license); and

- Businesses must keep footpaths, pavements and gutters adjacent to premises litter free. Organisers of major events also have responsibilities in relation to collection and management of litter resulting from events.

The following Legislation, Policy and Guidance documents were used to inform this chapter;

European Legislation

Directive 2008/98/EC of the European Parliament and the Council of 19th November 2008 on waste and repealing certain Directives.

Directive 2008/98/EC came into force on 12th December 2008 and Ireland had two years from this date to implement it into national law. The Directive lays down the five-step hierarchy of waste management options, with waste prevention as the preferred option, followed by re-use, recycling, recovery and safe disposal, in descending order.

In addition, the Directive also deals with the issue of 'end of waste' and clarifies the definitions of recovery, disposal and by-product. The Directive states that, "the recovery of waste and the use of recovered material as raw materials should be encouraged in order to conserve natural resources."

National Legislation

Waste Management Acts, 1996-2008 and Regulations Made under the Acts

The Waste Management Act, 1996 was enacted in May, 1996 and sets out the responsibilities and functions of various persons in relation to waste. This was subsequently amended by a number of acts including the Waste Management (Amendment) Act 2001 and the Protection of the Environment Act 2003. As of the 2nd April 2018, the Waste Management Acts 1996-2011 is now a collective group of Acts included in this collective citation to be construed together as one (Environment (Miscellaneous Provisions) Act 2011 (20/2011), s. 1(3)). The acts included in this group are as follows;

- Waste Management Act 1996 (10/1996);
- Waste Management (Amendment) Act 2001 (36/2001), other than s. 14;
- Protection of the Environment Act 2003 (27/2003), Part 3;
- Waste Management (Electrical and Electronic Equipment) Regulations 2005 (S.I. No. 290 of 2005), Part 5;
- Waste Management (Environmental Levy) (Plastic Bag) Order 2007 (S.I. No. 62 of 2007);
- Waste Management (Registration of Brokers and Dealers) Regulations 2008 (S.I. No. 113 of 2008);
- Waste Management (Landfill Levy) Order 2008 (S.I. No. 168 of 2008); and
- Environment (Miscellaneous Provisions) Act 2011 (20/2011), Part 4.

The Act;

- Prohibits any person from holding, transporting, recovering or disposing of waste in a manner which causes or is likely to cause environmental pollution;
- Requires any person who carries on activities of an agricultural, commercial or industrial nature to take all such reasonable steps as are necessary to prevent or minimize the production of waste;
- Prohibits the transfer of waste to any person other than an authorized person (i.e. a holder of a waste collection permit or a local authority);
- Requires the Environmental Protection Agency (EPA) to make a national plan in relation to hazardous waste;
- Requires local authorities to make waste management plans in relation to non-hazardous waste;
- Imposes certain obligations on local authorities to ensure that a service is provided for collection of household waste and to provide facilities for the recovery and disposal of such waste;
- Enables the Minister for Housing, Planning and Local Government to make Regulations for various purposes to promote better waste management; and
- Provides for substantial penalties for offences including fines, imprisonment and/or liability for clean-up measures.

Waste Management (Collection Permit) Regulations, 2007 as Amended

Waste from the proposed development may only be collected by the holder of a waste collection permit or a local authority. Waste collection permits are granted in accordance with the Waste Management (Collection Permit) Regulations, 2007 as amended. Waste storage and collection areas on site should be designed to prevent environmental pollution.

Waste Management (Shipments of Waste) Regulations 2007, S.I. No. 419

Where waste from the proposed development is exported outside of Ireland for recovery or disposal the National Trans frontier Shipment (TFS) Office within Dublin City Council must be notified. Certain financial guarantees must be in place and a certificate issued by the National TFS Office prior to the waste movement taking place.

SI 126 of 2011 – European Communities (Waste Directive) Regulations 2011

These regulations which were adopted in 2011 significantly changed the provisions of the Waste Management Acts, 1996 to 2011. The regulations detail “waste disposal” and “waste recovery” as well as setting out tests which must be complied with in order for material to be described as a “by-product” or achieve “end of waste” status.

The regulations formally set out the following waste hierarchy (as illustrated in **Figure 15-2: Waste Hierarchy**) which shall apply as a priority order in waste prevention and management legislation and policy;

- a) Prevention;
- b) Preparation for re-use;
- c) Recycling;
- d) Other recovery (including energy recovery); and
- e) Disposal.

The regulations require that all waste management plans and hazardous waste management plans in existence at the commencement of the Regulations shall be evaluated by 31st December 2012 and where appropriate be revised to be brought into line with Directive 2006/12/EC on waste.

The regulations also require the Environment Agency to establish a waste prevention Programme by December 2013.

European Policy

The following documents have been viewed as part of the European Policy side for waste management;

- European 2020 Strategy, European Commission (EC) (2010);
- Roadmap to a Resource Efficient Europe, EC (2011); and
- EC Circular Economy Strategy (2015).

National Policy

The first national waste policy statement was published by the Department of Environment and Local Government in 1998. A number of statements have been published since, each of which builds on the objectives of the previous plans to improve how waste is managed in Ireland, move waste away from landfill and towards a more sustainable option. The statements published to date include:

- Department of the Environment and Local Government (1998). 'Waste Management – Changing Our Ways' – A Policy Statement.
- Department of the Environment and Local Government (2002). Preventing and Recycling Waste – Delivering Change – A Policy Statement.
- Department of the Environment, Heritage and Local Government (2004). Waste Management - Taking Stock and Moving Forward.
- Department of the Environment, Heritage and Local Government (2006). National Strategy on Biodegradable Waste Management.

- Department of the Environment, Heritage and Local Government (2012). A Resource Opportunity – Waste Management Policy in Ireland.

From 2012 a number of policy documents and reports have been published which are named below;

- Department of the Environment, Heritage and Local Government (2012). A Resource Opportunity – Waste Management Policy in Ireland;
- EPA (2013 and 2014) National Waste Reports 2011 and 2012;
- EPA (2014) National Municipal Waste Recovery Capacity. An Assessment for the Department of the Environment, Community and Local Government; and
- Environmental Protection Agency (2014). National Hazardous Waste Management Plans, 2014-2020.

Regional & Local Policy

The Eastern Midlands Region Waste Management Plan 2015-2021

For the purposes of waste management planning, Ireland is now divided into three regions: the Eastern and Midlands Regional Assembly, the Southern Regional Assembly and the Northern and Western Regional Assembly. The Eastern and Midlands Region includes the Dún Laoghaire-Rathdown County Council area.

The Eastern Midlands Region Waste Management Plan 2015-2021 was launched in 2015. The strategic approach of the plan places a stronger emphasis on preventing wastes and material reuse activities. Three strategic targets have been set in the plan which include;

- Achieve a recycle rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill in favour of higher value pre-treatment processes and indigenous recovery practices.

This plan looks to 2030 and includes a goal of reaching a recycling rate of 60%.

Guidance

- European Waste Catalogue (EWC) and Hazardous Waste List (EPA, 2002);
- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects (Department of the Environment, Heritage and Local Government (DoEHLG), 2006);
- Construction and Demolition Waste Management – A Handbook for Contractors & Site Managers (FÁS and The Construction Industry Federation, 2002);
- A Resource Opportunity – Waste Management Policy in Ireland (Department of the Environment, Community and Local Government, 2012); and
- Guidelines for the Management of Waste from National Road Schemes (TII, 2008).

15.2.3 Impact Assessment Methodology

Impacts significance and rating is as set out in the EIAR guidance documents described in Chapter 1 'Introduction'.

15.3 Baseline Environment

The Proposed Project is located within the Local Authority of DLRCC – located just south of the M50 in the Metropolitan area of Glenamuck/Kiltiernan.

In order to establish a baseline and review capacity in relation to construction wastes a review of published data and statistics was undertaken.

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 C&D 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.

The quantity of C&D waste managed in Ireland is indicative of economic activity. At the peak of the economic and construction boom in 2007, approx. 17.8 million tonnes of C&D waste was collected for treatment. This fell to 3 million tonnes in 2011. From viewing the 2014 data, an increase in construction and demolition waste generation since 2011, most likely as a result of economic growth. 3.31 million tonnes of construction and demolition waste was generated in 2014 according to EPA data.

Under the Waste Framework Directive (2008/98/EC) there is a target for Member States to achieve 70% material recovery of non-hazardous, non-soil and stones C&D wastes by 2020. Ireland achieved 68% recovery in 2014. The Waste Framework Directive target only applies to a portion of all C&D wastes generated, as hazardous wastes and soil and stones wastes are excluded from the calculation.

An indicative breakdown of the composition of construction and demolition waste is set out in Table 15-1 below. These figures should be considered as a guide only – as construction and demolition waste can vary depending on the nature of the development and waste can vary significantly from one project to another, depending on the nature of the development and the waste management practices employed on-site.

Table 15-1 Material Categories of C&D Waste Treated

Material from C&D sources	Quantity (tonnes)	% of material stream in reference to total
Metal waste	173,810	5.24%
Glass waste	2,904	0.09%
Paper and cardboard waste	211	0.01%
Plastic waste	348	0.01%
Wood waste	52,155	1.57%
Waste containing PCBs	2	0.00%
Mixed waste	2,504	0.08%
Mineral waste	401,409	12.11%
Asbestos waste	6,246	0.19%
Soil and stones	2,463,749	74.35%
Residue from treatment of mixed waste	210,520	6.35%
Total	3,313,858	100.00%

The construction sector also generates hazardous waste such as lead-acid batteries, waste electrical and electronic equipment, asbestos solvent-based paints and varnishes, pesticides and waste oils which can be seen in the above Table 15-1.

15.3.1 Operational Wastes

Wastes generated during the operational phase typically comprise municipal waste.

15.4 Predicted Impacts

15.4.1 Do Nothing Scenario

The resource and waste management impact assessment assumes that under the “Do Nothing” scenario the Proposed Project will not be developed. Consequently, there will be a neutral impact on resource and waste management.

15.4.2 Construction Phase

An estimated 57,500m³ material will be excavated for roads and an estimated 51,600m² material will be excavated for ponds in the course of the works. A summary of excavated material is included in Table 15-2 below.

Table 15-2 Preliminary Material Volumes

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

A significant proportion of the surplus excavation material from the project is likely to consist of soil and stones which may be accepted for recovery or recycling at waste licensed and permitted facilities. The contractor will reuse 39,500m³ of excavated material in road construction. This means that there will be a surplus of 69,600m³. Measures to minimize surplus soil generation and maximise the sustainable reuse of this material is outlined within the mitigation measures for land and soils in Chapter 13.

All excavated material which cannot be reused within the proposed development will be removed from the site. Where contaminated soil is encountered this will be delivered to appropriately licensed waste facilities for recovery/disposal as appropriate. The predicted impacts of excavation waste prior to implementation of mitigation measures is expected to be not significant.

Construction works, site offices and temporary works facilities are likely to generate construction waste. Construction waste is defined as waste which arises from construction and renovation activities. Also included within the definition are surplus and damaged products and materials arising in the course of construction work or used temporarily during the course of on-site activities.

Construction waste can vary significantly from site to site but typically would include the following non-hazardous fractions;

- Soil and stone;

- Concrete, brick, tiles and ceramics;
- Asphalt/tar;
- Metals
- Wood; and
- Other.

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 the case of the Proposed Project the most likely type of construction waste will be surplus concrete and unusable or damaged construction materials such as paving slabs.

The predicted impact of construction waste prior to implementation of mitigation measures is expected to be slight, negative and short-term.

15.4.3 Operational Phase

It is expected that there will be negligible waste generation on completion of the proposed road development. Wastes generated from maintenance of the proposed road development will be removed and managed by local authority staff and any contractors undertaking the work.

15.5 Mitigation Measures

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 seen in Figure 15-1 i.e. prevent, reduce, re-use, re-cycling, energy recovery and disposal.

The contractor will minimise waste disposal so far as is reasonably practicable.

15.5.1 Proposed Mitigation Measures-Excavation, Construction and Demolition Phases

Proposed mitigation measures for the excavation, construction and demolition phases of the Scheme are as follows;

- **Construction and Demolition Waste Management Plan:** Preparation of a Construction and Demolition Waste Management Plan which meets the requirements of the DoEHLG Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (DoEHLG, 2006a) is recommended.

Where waste generation cannot be avoided this will maximise the quantity and quality of waste delivered for recycling and facilitate its movement up the waste hierarchy away from landfill disposal and reduce its environmental impact.

- **ICE Demolition Protocol:** In addition to the general measures outlined above a demolition audit in accordance with the ICE Demolition Protocol 2008 or similar guidance will be considered at detailed design stage for those structures which will be demolished as part of the proposed development.
- Possibilities for re-use of clean non-hazardous excavation material as fill on the site or in landscaping works will be considered following appropriate testing to ensure material is suitable for its proposed end use. Where excavation material may not be re-used within the proposed works the Contractor will endeavor to send material for recovery or recycling so far as is reasonably practicable. The contractor will ensure that any off-site interim storage facilities for excavated material have the appropriate waste licenses or waste facility permits in place.
- **Source Segregation:** Waste produced will be segregated. Where possible metal, timber, glass and other recyclable material will be segregated during demolition works and removed off site to a permitted/licensed facility for recycling. Waste stream colour coding and photographs will be used to facilitate segregation.
- **Material Management:** 'Just-in-time' delivery will be used so far as is reasonably practicable to minimize material wastage.
- **Supply Chain Partners:** The contractor will engage with the supply chain to supply products and materials that use minimal packaging, and segregate packaging for reuse.

- **Waste Auditing:** The contractor will record the quantity in tonnes and types of waste and materials leaving the development site during the construction phase. The name, address and authorization details of all facilities and locations to which waste and materials from the construction phase are delivered will be recorded along with the quantity of waste in tonnes delivered to each facility. Records will show material which is recovered and disposed of.

15.5.2 Proposed Mitigation Measures – Operational Phase

There are no impacts envisaged during the operational phase of the proposed scheme. Therefore, no operational mitigation measures are required.

15.6 Residual Impacts

The resulting residual impacts of excavation waste will be neutral, slight and short term.

The resulting residual impact of construction and demolition waste will be slight, neutral and short term.

Based on the scheme description the residual impact of operational waste will be neutral.

There is likely to be significant available capacity within existing Irish waste management infrastructure to manage the excavation, construction and operational waste from the Glenamuck District Roads Scheme.

15.7 Difficulties Encountered

No difficulties were experienced during the process in regards to waste management.

15.8 References

- Department of Environment, Community and Local Government (1998) Waste Management Changing our Ways. DoECLG, Dublin, Ireland;
- Department of Environment, Community and Local Government (2006) Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects. DoECLG, Dublin, Ireland;
- Department of the Environment and Local Government (2002) Preventing and Recycling Waste – Delivering Change – A Policy Statement. Dublin, Ireland;
- Department of the Environment, Heritage and Local Government (2004) Waste Management – Taking Stock and Moving Forward. Dublin, Ireland;
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- EPA (2018) Construction and Demolition Waste Statistics for Ireland-EPA Waste Data Release, 22 March 2018. Latest Reference Year 2014. Johnstown Castle Estate, Wexford, Ireland;
- EPA (2017) Ireland-Progress towards EU waste targets-November 2017, Johnstown Caste, Wexford;
- EPA (2014) National Waste Report 2012, Johnstown Castle, Wexford, Ireland;
- EPA (2014) National Municipal Waste Recovery Capacity. An Assessment for the Department of the Environment, Community and Local Government. Johnstown Castel, Wexford;
- EPA (2014) National Hazardous Waste Management Plans, 2014-2020. Johnstown Castle, Wexford;
- EPA (2014) National Municipal Waste Recovery Capacity. An Assessment for the Department of the Environment, Community and Local Government. Johnstown Castle, Wexford, Ireland;
- EPA (2015) Waste Classification-List of Waste and Determining if Waste is hazardous or Non-Hazardous. Johnstown Castle, Wexford, Ireland;
- EPA (2015a) Revised Guidelines on the Information to be contained in Environmental Impact Statement Draft. EPA, Johnstown Castle Estate, Wexford, Ireland;
- EPA (2015b) Advice Notes for Preparing Environmental Impact Statements Draft. EPA. Johnstown Castle Estate, Wexford, Ireland;
- EPA (2017) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, Draft August 2017. Johnstown Caste Estate, Wexford, Ireland;

- FÁS and Construction Industry Federation (CIF) (2002) Construction and Demolition Waste Management-A Handbook for Contractors and Site Managers. FÁS Environmental Unit, Upper Baggot Street, Dublin 4;
- Guidelines for the Management of Waste from National Road Schemes (TII, 2008).

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16 Population and Human Health

16.1 Introduction

This chapter addresses potential impacts of the Proposed Project on population and human health. This chapter was written by the following.

James Sweeney is a GIS and Analytics specialist and a Director of Future Analytics Consulting (FAC) with over 7 years' experience. His work involves detailed socio-economic analysis, spatial analysis and economic research. He has worked on strategic plans for cities and undertaken numerous socio-economic studies, utilising the use of demographic analysis in forecasting future population projections. He also has a Master of Science in Health Informatics. As part of Future Analytics' professional service provision, he is experienced in the provision of: Housing needs analysis; Retail analysis; Urban economic studies; GIS visualisation, modelling, and web application development. Relevant experience includes Socio-Economic Assessment of the Greater Dublin Area Drainage Scheme for Fingal County Council (2016); Socio-economic and environmental assessment for the Local Economic and Community Plan for Dublin City Council (2016) and the Dublin City Council Housing Strategy for DCC (2015).

Rachel Gleave O'Connor is a Chartered Town Planner with over 12 years' experience in private and public sectors in Ireland and the UK, specialising in development management and with particular expertise in large scale urban regeneration development. Rachel has managed an extensive portfolio of large scale planning applications for both residential and non-residential developments, including student housing, build-to-rent, co-living, office, retail and academic floorspace. Rachel has managed a number of high profile planning applications in the UK through the assessment and approval stages at the London Legacy Development Corporation, working on high density housing, tall building and extensive public realm/landscape redevelopment. She is experienced in Environmental Impact Assessment (EIA), EIA Screening and EIA Scoping.

The purpose of this assessment is to identify and assess the potential health and wellbeing effects of the Proposed Project on the surrounding population, and to deliver evidence-based recommendations that maximise health benefits and reduce or remove potentially negative impacts.

The requirement to carry out an assessment of potential impacts on Population and Human Health is set out in the EIA Directive (2014/52/EU). The recitals to the 1985 and 2011 Directives refer to 'Human Health' and include 'Human Beings' as the corresponding environmental factor. The 2014 Directive changes the title of this factor to 'Population and Human Health'.

According to the Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2017) 'in an EIAR, the assessment of impacts on population and human health should refer to the assessment of those factors under which human health effects might occur, as addressed elsewhere in this EIAR e.g. under the environmental factors of air, water, soil etc.

Potential impacts of the Proposed Glenamuck District Roads Scheme (GDRS) on population and human health arise from traffic and transportation, air quality and climate, noise and vibration, townscape and

visual, material assets: utilities and the risk of major accidents and/or disasters. These aspects are dealt with in the specific chapters in this EIAR dedicated to those topics.

This chapter refers to the findings of those assessments included elsewhere in this EIAR which human health effects might occur.

16.2 Assessment Methodology

This chapter has been prepared having regard to the following guidelines:

- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency, Draft August 2017);
- Advice Notes for Preparing Environmental Impact Statements, Draft September 2017;
- Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002); and
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2002).

16.3 Baseline Environment

The Proposed Project is located in the administrative area of Dún Laoghaire-Rathdown in County Dublin. The extent of works associated with the new road scheme will be in close proximity to a number of residential and commercial receptors, stretching from Jamestown to Carrickmines in the north, to Kingston and Kiltiernan in the south. The site also neighbour's recreational uses, including Stepside Golf Course, De La Salle Palmerstown Rugby Club, Wayside Celtic and Bective Rangers Grounds and local park/open spaces. There is potential for negative impacts during both the construction and operational stage, with the end-use operational stage bringing opportunity for socio-economic and community benefits to the surrounding area.

The Proposed Project concerns the construction of the Glenamuck District Distributor Road, which will connect the existing R117 Enniskerry Road to the Glenamuck Road and Golf Lane Roundabout. The GDRS will also involve the construction of the Glenamuck Link Distributor Road, which will connect the new distributor road with the existing Glenamuck Road and Ballycorus Road providing an alternative to the Enniskerry Road for north-south travel.

Those Electoral Division (ED) areas that intersect with the GDRS area have been chosen as the logical study area for the report. This includes EDs in the Glencullen, Cabinteely-Loughlinstown and Shankill-Rathmichael areas. Figure 16- 1 below illustrates this study area in more detail with the LAP area shown.

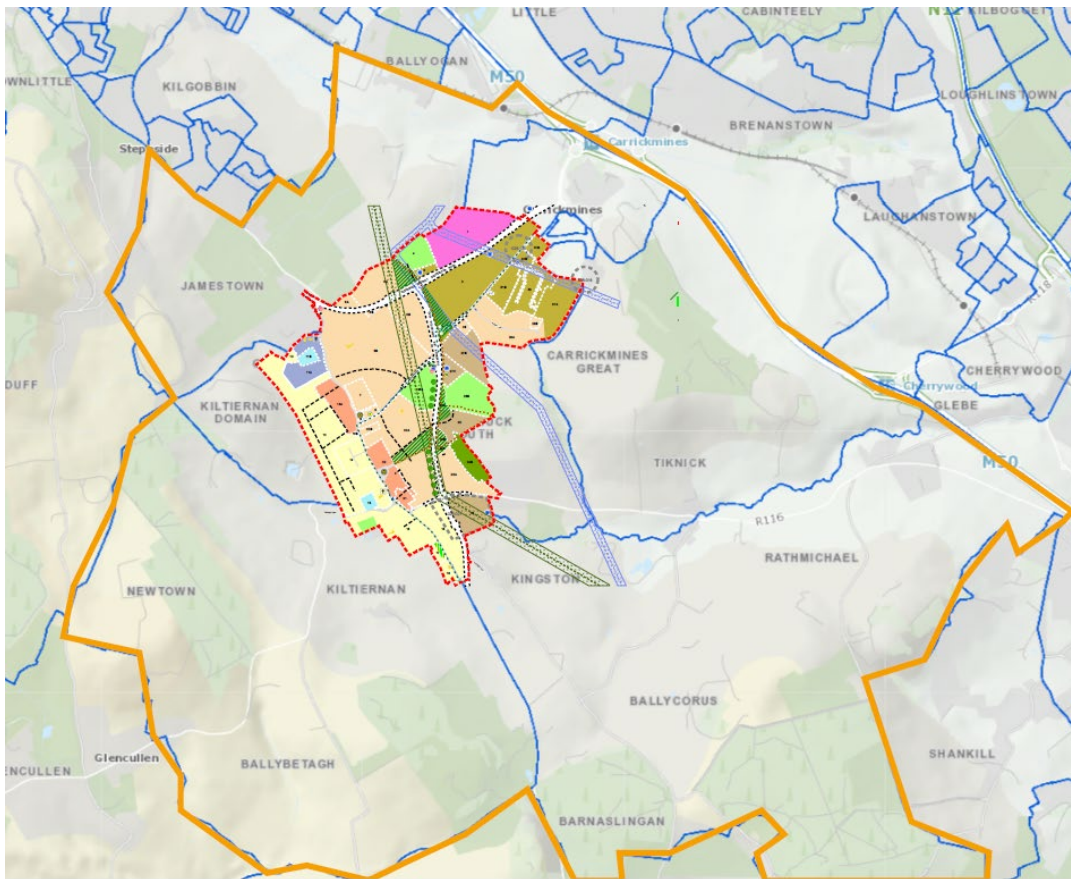


Figure 16- 1 Study Area

The report also includes an examination of facilities within the wider Dún Laoghaire-Rathdown area, which are relevant from a connectivity perspective when considering the Project in operational phase.

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.

A description of the Baseline Environment and Predicted Impacts for each of these assessment themes is also described below. This informs the professional conclusions reached as to whether impacts will be negative or beneficial, and of low, medium or high significance as detailed in section 16.4 and the overall conclusion regarding population and human health impacts in Section 16.6.

This section provides an overview of the existing baseline conditions under each of the assessment themes identified above. The study area comprises ten Small Areas across three Electoral Divisions

that intersect with the proposed GDRS area. The findings of the 2016 census have been used to determine the current population characteristics of the study area with a comparison to Dún Laoghaire-Rathdown as a whole to benchmark the data. Through understanding the characteristics of the existing population residing in the study area, it is possible to assess the potential impacts that the proposed development will have upon the population.



Figure 16-2 Location of Settlements in Dún Laoghaire-Rathdown

It should be noted that the description of the baseline environment of those factors under which human health effects might occur has also been addressed elsewhere in this EIAR, under the environmental factors of traffic and transportation, air quality and climate, noise and vibration, townscape and visual and material assets: utilities.

The 'No Development' Scenario

For each of the characteristics assessed below, it is predicted that in the absence of the development proposal or the 'no development' or 'do-nothing' scenario, each theme would continue to develop in line with identified trends. For example, it is expected that the population in the study area will grow in the absence of the development and that the characteristics of the population would continue to reflect the breakdown identified as part of a review of 2016 census data. However, the extent of population growth would be constrained because of infrastructural limits resulting from the 'no development' scenario. The location of amenities, attractions, facilities and employment hubs will remain unchanged and open spaces will also remain as described in the baseline characteristics. It is possible that individual businesses and attractions might discontinue operation in the 'no development'

scenario, but this is not expected to be directly related to the absence of the proposed development. The health of the population would also be expected to continue to reflect findings described in the baseline in the event of a 'no development' scenario.

A. Population Demographic

The connectivity of an area will have significant influence upon the numbers of people attracted to live there, as well as the sustainability of future growth as the population expands. Comparing findings for the study area to Dún Laoghaire-Rathdown as a whole, can also provide insight into the performance of an area in facilitating future population growth.

According to the 2016 census the study area had a population of 2,944 people in a catchment of 1,230 properties. This was an increase of 286 people (or 10.8%) from the findings of the 2011 census. 85% of the current population reported their place of birth as Ireland or nationality as Irish. Figure 16-3 provides a breakdown of the population by nationality.

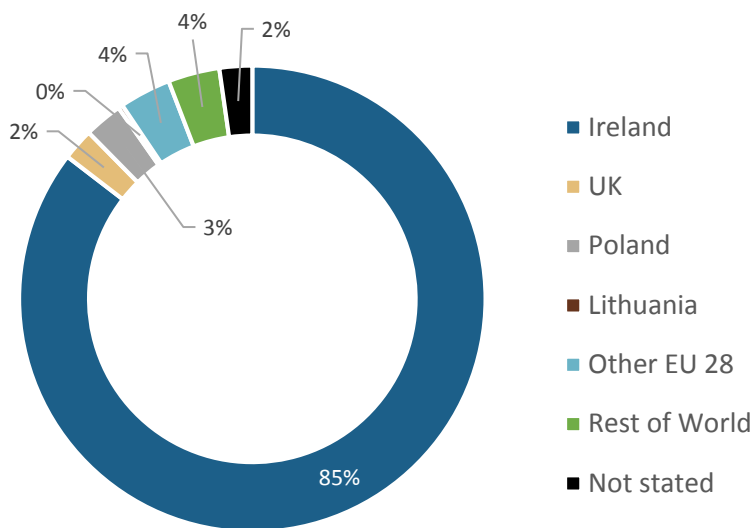


Figure 16-3 Population of Study Area by Nationality

In Dún Laoghaire-Rathdown as a whole, 81% of the population recorded their nationality as Irish, indicating a slightly more diverse population in the wider area when compared to the study area.

In the study area, the working population (15-64 years) accounts for 64.8% of the total population. This broadly compares to Dún Laoghaire-Rathdown as a whole at 65.7%. However, overall the population in the study area is slightly younger than in the County as a whole, as described in the table below:

Table 16-1 Age Profile

Average Age			
Area	Male	Female	Total
Study Area	34.6	35.7	35.2
Dún Laoghaire Rathdown	37.3	39.6	38.5

In terms of households in the study area, 83.5% of the population form part of a family household. Of these family households, 46.5% have children, 35.8% have young children (pre-adolescent) and 16.6% of households are formed of retired persons or empty nesters. Figure 16-4 illustrates this breakdown of the population in more detail below.

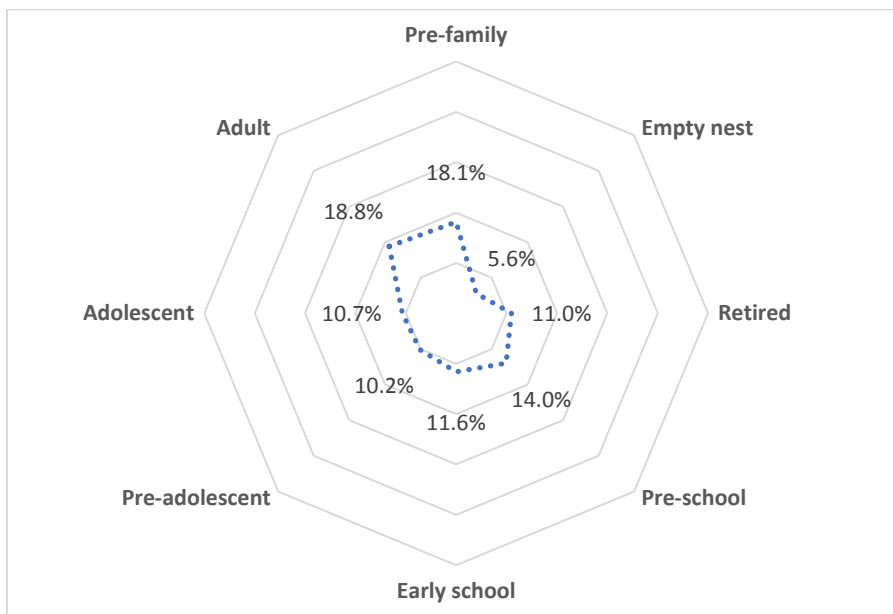


Figure 16-4 Family Household Types in Study Area

The majority of households within the study area are formed of two persons at 31.3% and 62.1% of households residing in family houses (compared to 36% in apartments).



Figure 16-5 Number of Persons per Household

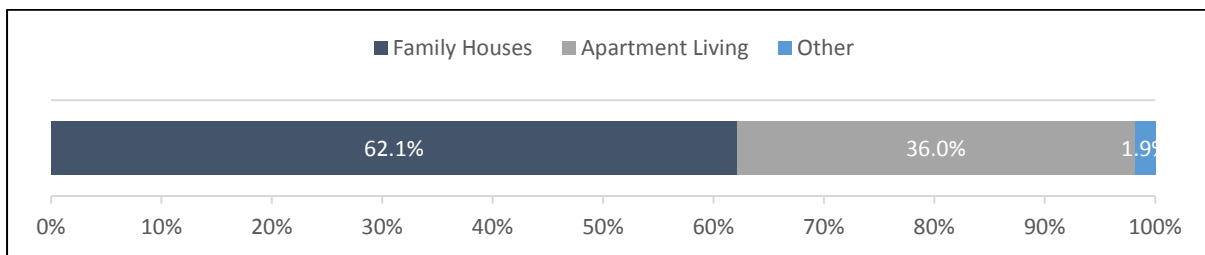


Figure 16-6 Household Accommodation Type

The household composition for the study area is broadly in keeping with Dún Laoghaire-Rathdown as a whole, with the exception of the number of persons within the ‘pre-family’ category, which amounts to 11.1% of the population in the County, as well as empty nesters at 8.5% and retired persons at 13.4%. This reflects the slightly younger age of the population overall than in the study area, evidenced by the number of persons 0-14 years at 18.4% in Dún Laoghaire-Rathdown compared to 22.4% in the study area. This will impact the types of services and facilities more frequently accessed by the population.

B. Settlement Patterns

As the population in an area grows, it is necessary to enhance infrastructure to sustain the requirements of the community. A review of settlement patterns in an area indicates the locations where need for additional infrastructure may be greatest.

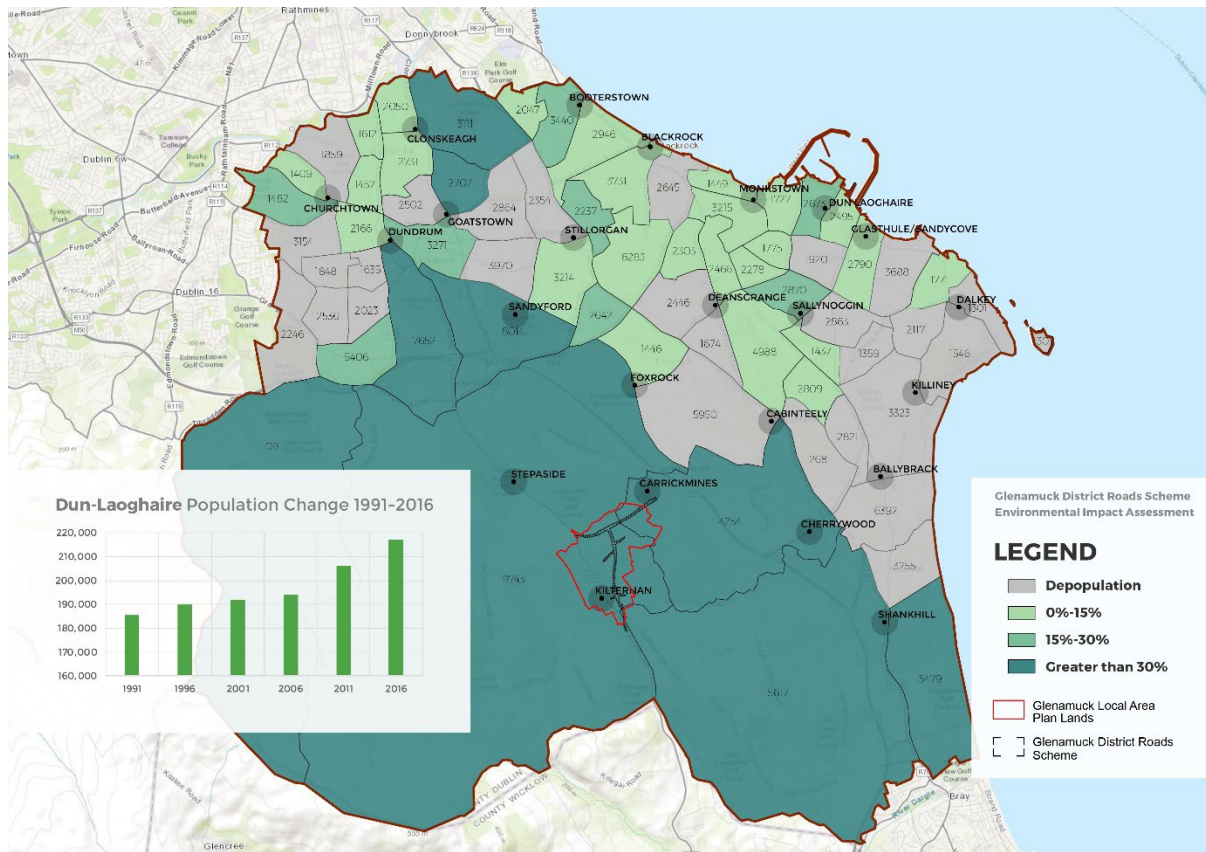


Figure 16-7 Population Growth Across Settlements in Dún Laoghaire-Rathdown

The figure evidences the extensive population growth that has been experienced in the study area, as well as surrounding that area. This increase in the population residing in the study area will require additional infrastructural support.

C. Economic Activities and Employment

Within the study area, 61.4% of people work (are employed). Figure 16-8 below provides a breakdown of the population according to economic status.

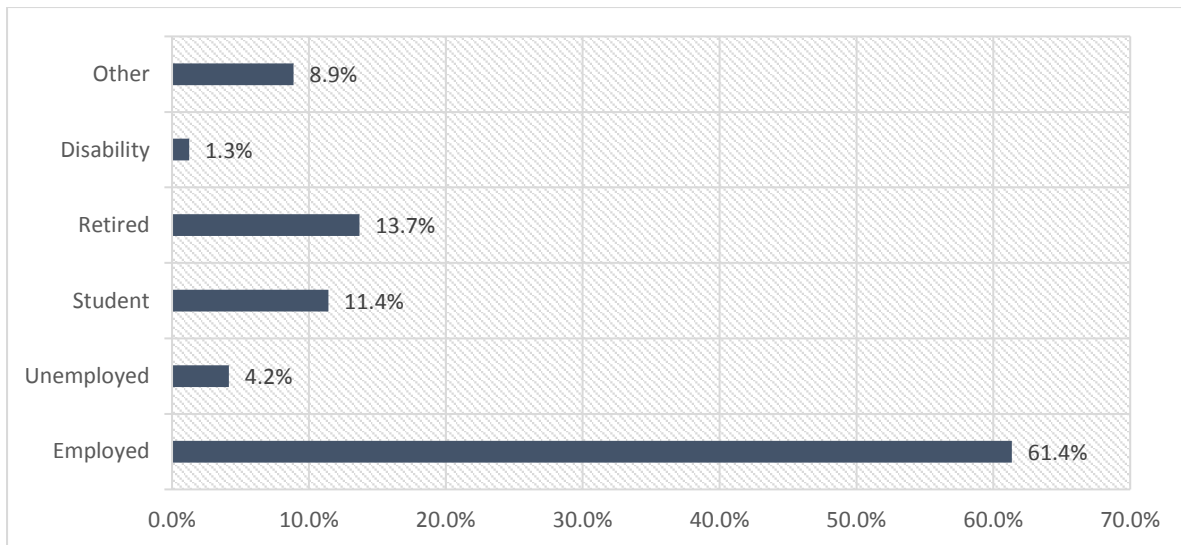


Figure 16-8 Population Breakdown by Economic Status

In the County as a whole, 53.9% of the population are employed, indicating the relative positive economic performance of the study area when compared to Dún Laoghaire-Rathdown as a whole. However, this should be noted in light of the relative high number of the population that is retired in the County as a whole at 17%, compared to the study area at 13.7%. The County also demonstrates a higher number of people out of work with a disability at 2.3% when compared to the study area at 1.3%. The number unemployed in Dún Laoghaire-Rathdown is 4.3% and therefore in keeping with the study area at 4.2%.

D. Amenity

The assessment considers the baseline amenity conditions in the study area and Dún Laoghaire-Rathdown as a whole. This allows an assessment of the potential impacts on amenities of a recreational nature in the locality of the Proposed Project, which includes the populations enjoyment of the area. Access to amenities and recreational facilities in the area is of particular significance in this regard.

There are a number of attractions and amenities that bound the study area (see Figure 16-9).

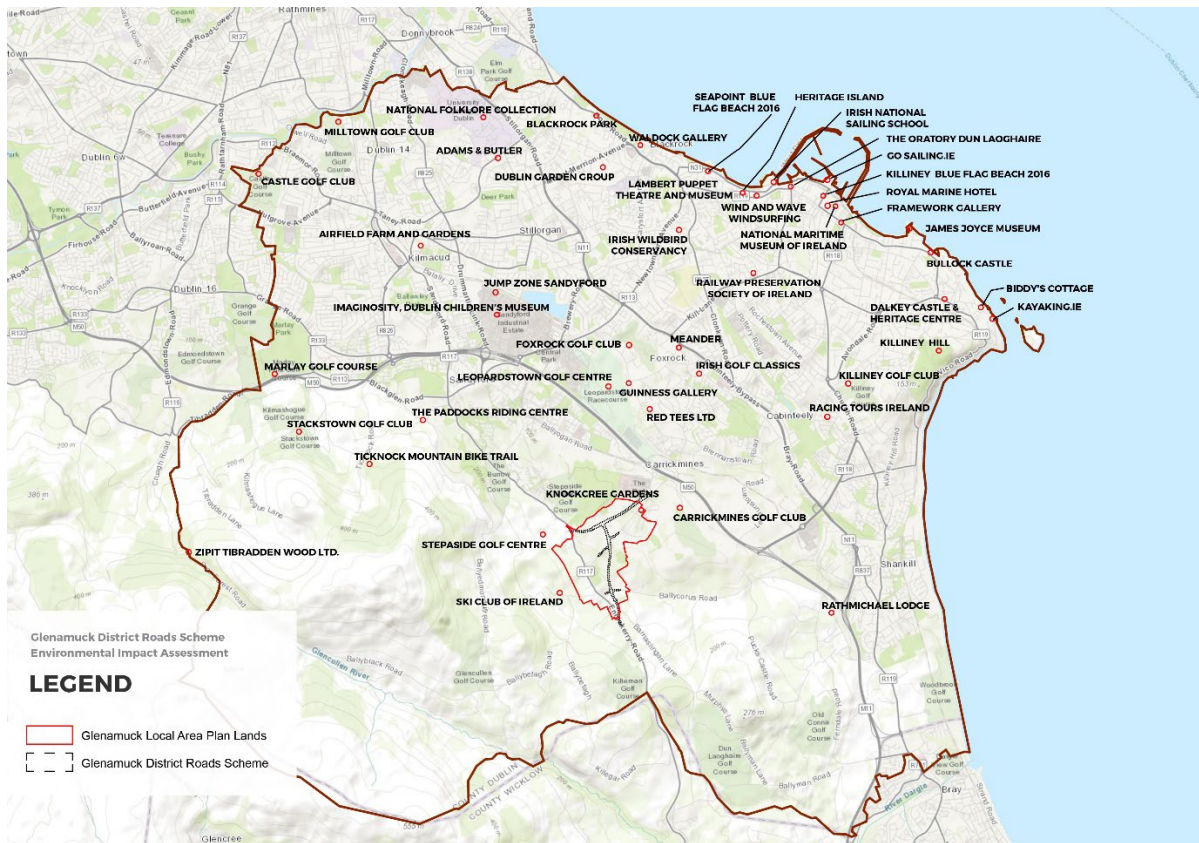


Figure 16-9 Amenities and Attractions in Dún Laoghaire-Rathdown

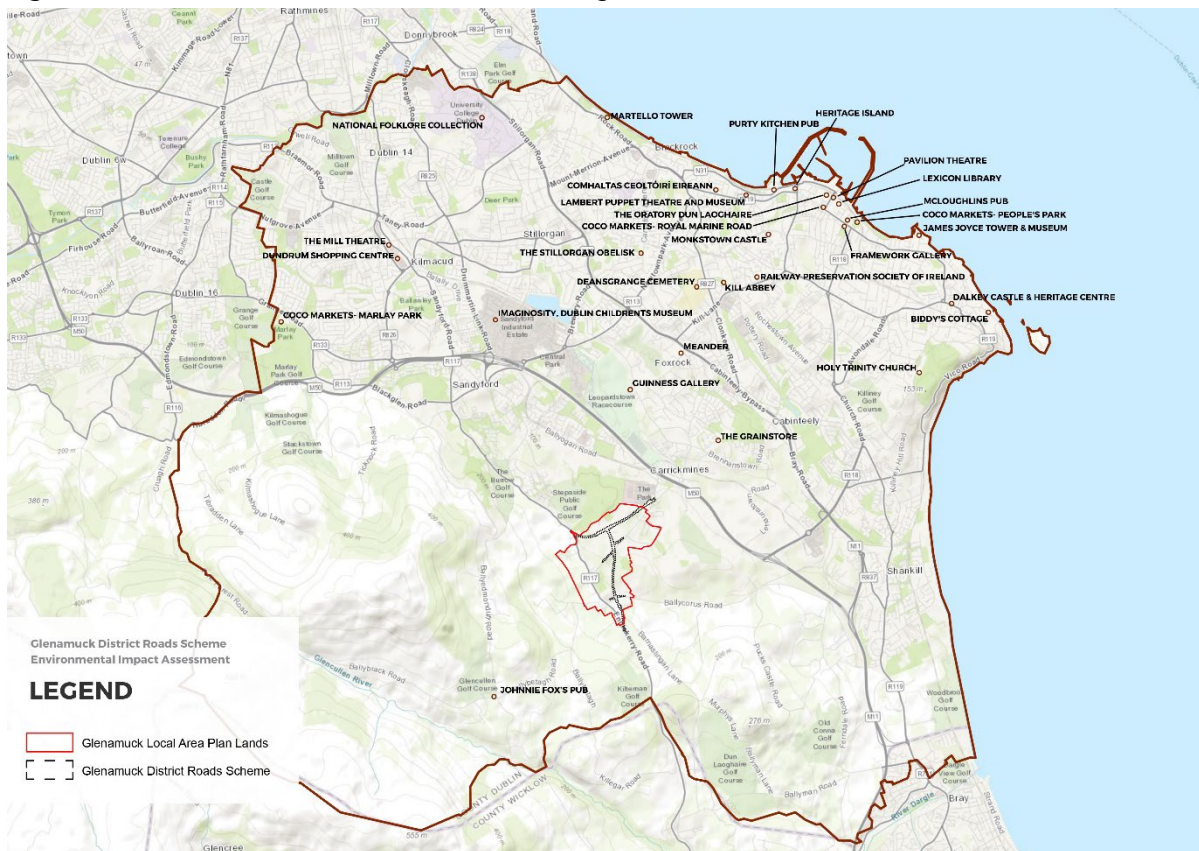


Figure 16-10 Cultural Attractions in Dún Laoghaire-Rathdown

There are a large number of major cultural attractions for the County area, most of these are less proximate to the study area itself.

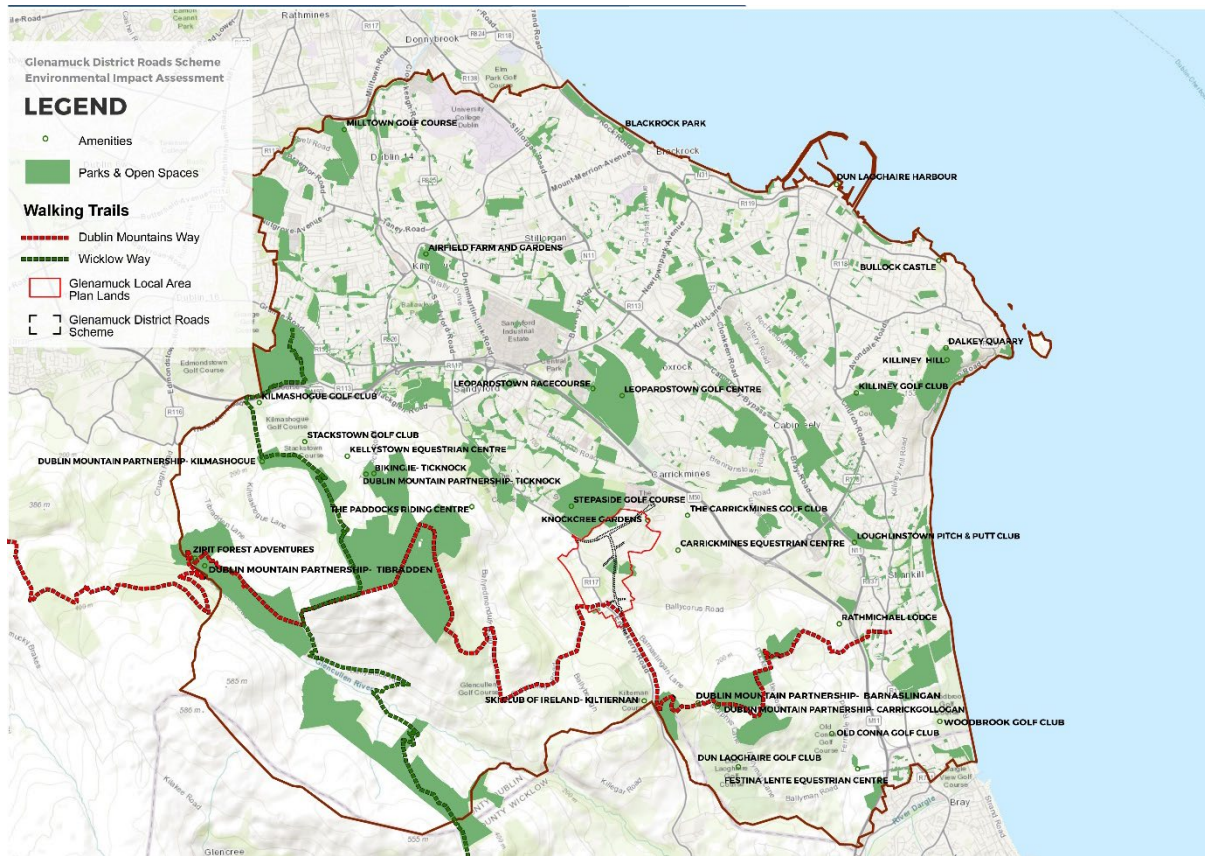


Figure 16-11 Location of Amenity Spaces/Parks/Outdoor Recreation in Dún Laoghaire-Rathdown

There are significant areas of outdoor amenity spaces and a number of leisure facilities located proximate to the study area, specifically the Stepside Golf Course, De La Salle Palmerstown Rugby Club, Wayside Celtic, Bective Rangers Grounds, Knockree Gardens, Carrickmines Equestrian Centre and Golf Club.

E. Roads and Traffic

The ability of the population to utilise services in and facilities in the area will be dependent upon access arrangements to those services. The assessment considers the provision of roads in the locality, any congestion on this network and the proportion of the population relying upon the road system.

In the study area, travel by car for commuting purposes is by far the most popular form of transport according to the 2016 census with 65% of the population in the study area commuting by car as either a driver or passenger.

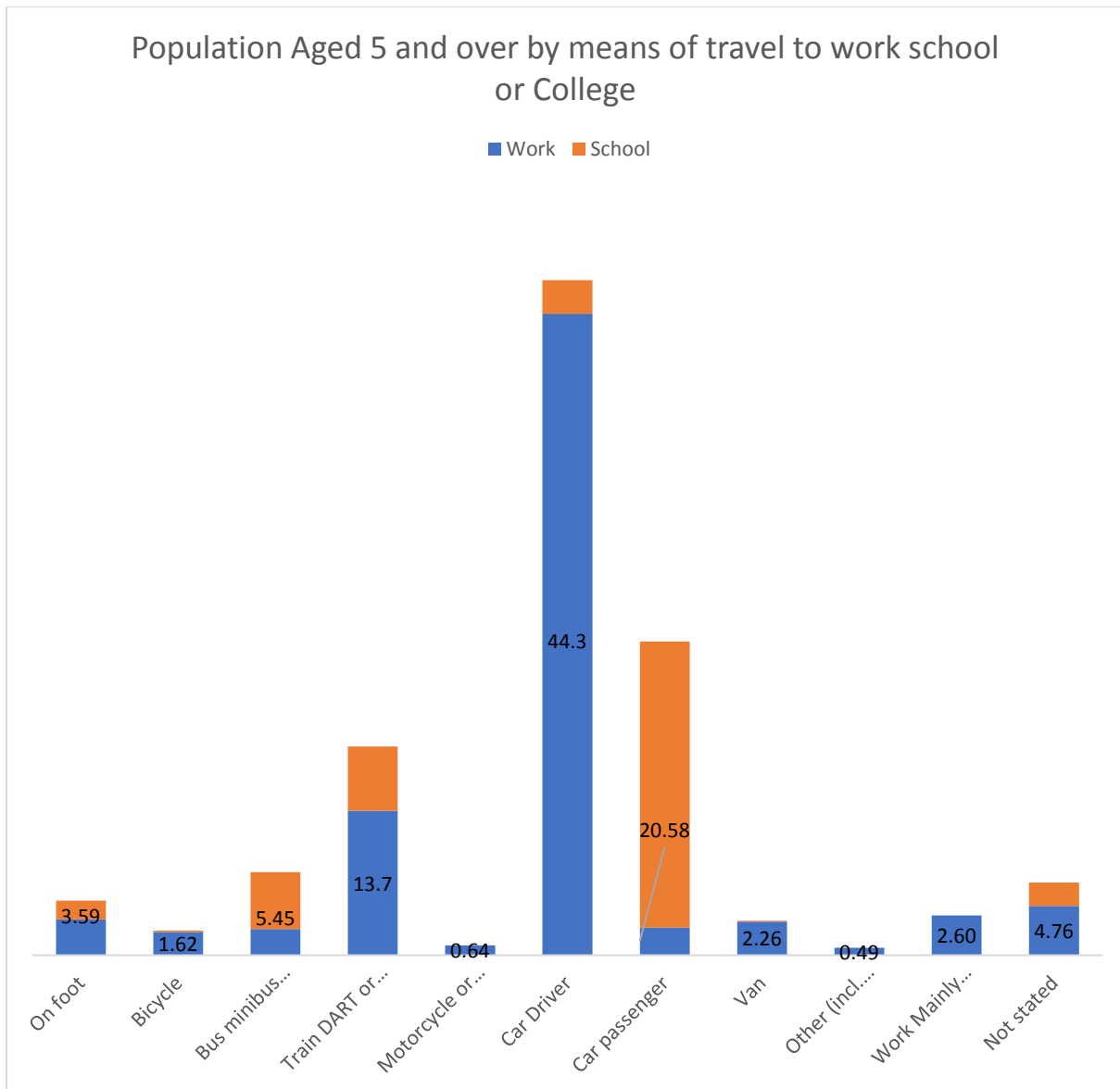


Figure 16-12 Mode of Transport to Work, School or College

The proportion of the population commuting by car is significantly more than the County as a whole, with 49% travelling to work, school or college by car in Dún Laoghaire-Rathdown. This should be compared to the larger proportion of the population utilising buses at 10.6% in Dún Laoghaire-Rathdown, compared to the study area at 5.5%. The ability to access alternative forms of transportation will be a key influencing factor for determining mode of transport. It is clear that in the study area there is a strong reliance upon the road network as a result of the number of the population commuting by car.

F. Property

Of the total population, 48.8% of persons reside in property built between 2001-2010. This follows the data demonstrating the rapid growth in population within the study area in recent years.

In the study area, 7.2% of persons reside in social housing, 23.2% privately rent and 64.5% are owner occupiers. This compares to the County as a whole, with a larger proportion of the population recorded as owner occupiers at 69.8% and less private renters at 20.2% and social renters at 6.8%. A correlation between the means of the population and their occupancy type can be drawn and will be influenced by the type of employment they are able to access.

According to the 2016 census, 87.4% of dwellings are occupied in the study area (12.6% are vacant). This compares to a higher occupancy rate on a County basis at 94.5%. The connectivity of an area will impact its desirability from an occupancy basis.

G. Access to Public Transport

Figure 16-13 below illustrates the location of public transport hubs as well as the road network through the Dún Laoghaire-Rathdown area.

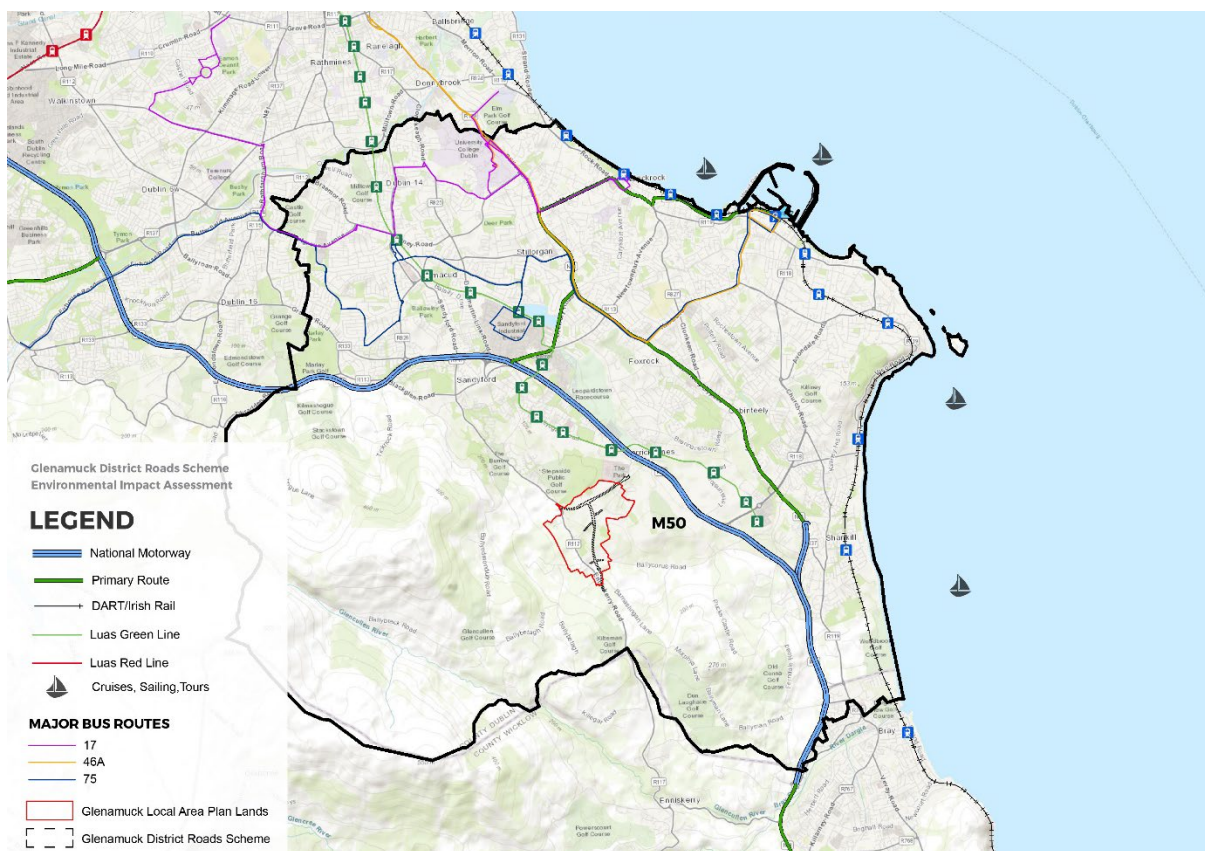


Figure 16-13 Location of Roads and Public Transport Routes in Dún Laoghaire-Rathdown

The location of public transport hubs, are focused generally outside of the study area, with road connections forming the dominant transport connections through and around the area. The Luas Green Line is however located on the edge of the study area with a station in Carrickmines.

H. Health Demographics

90.6% of the population in the study area reported themselves to be in good health according to the 2016 census, whilst conversely 1.2% reported themselves to be in bad health. This compares closely to a County wide figure of 89.9% in good health and 1.2% in bad health. A breakdown of the findings for general health in the study area is illustrated in Figure 16-14 below.

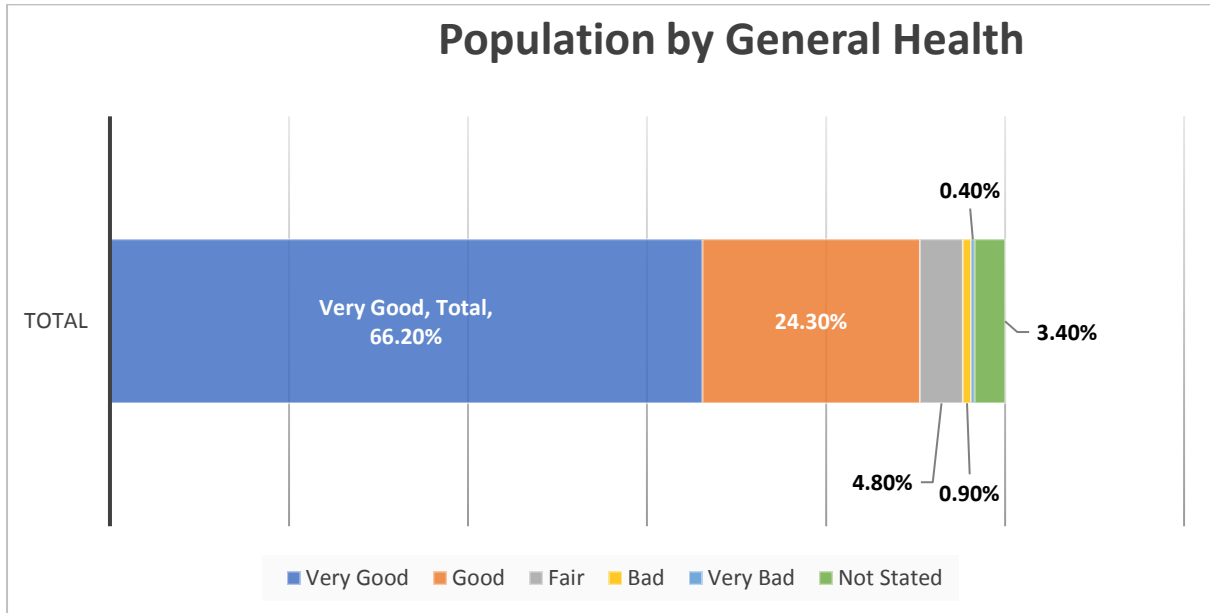


Figure 16-14 Proportion of the Population in Good Health

In the study area, 10.6% of the population reported themselves as having a disability and 3.66% of the population classified themselves as a carer in the 2016 census.

16.4 Predicted Impacts

This section provides assessment of all the potential and predicted impacts of the Proposed Project on population and human health. As outlined in Section 16.1, in accordance with the draft EPA guidelines, the assessment of impacts on population and human health refer to the assessment of those factors under which human health effects might occur, this is also as addressed elsewhere in this EIAR e.g. under the environmental factors of air, water, soil etc.

The analysis comprises 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 as described above. The characteristics of this impact assessment are defined below, as per the EPA Guidelines on the Information to be Contained in Environmental Impact Statements (EPA March 2002 and draft guidelines for consultation, EPA 2015):

- Quality of Effects
 - Positive Effects: An improvement in the quality of the environment or characteristic;
 - Neutral Effects: No effect or imperceptible effects;
 - Negative/Adverse Effects: A change that reduces the quality of the environment or characteristic.
- Significance of Effects
 - Imperceptible: The change is measurable but without consequence;
 - Not Significant: An effect that causes change but without noticeable consequence;
 - Slight Effect: Noticeable changes are caused to the character of the environment or characteristic, without affecting sensitivities;
 - Moderate Effects: Alterations to the character of the environment or characteristic, in a format that is consistent with existing and emerging baseline trends;
 - Significant Effects: A change that is of a magnitude that will alter the sensitive aspects of an environment or characteristic;
 - Very Significant Effects: A change that is of a magnitude that will significantly alter the sensitive aspects of an environment or characteristic;
 - Profound Effects: A change that obliterates sensitive environments or characteristics.

Construction Phase

It is considered the following impacts will be of significance to population and human health during the construction phase:

- 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.

These impacts are described in more detail in the specialist chapters for each topic area within this 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.

Negative and significant – short-term.

A. Population Demographic

The population demographics of the study area will be 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.

Positive Moderate Effect.

B. Settlement Patterns

A study of settlement patterns in Dún Laoghaire-Rathdown, demonstrates significant population increases in the study area when compared at wider County level. 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.

In addition, and similar to the impact described above in relation to demographics, 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.

Positive Moderate Effect.

C. Economic Activities and Employment

The GDRS will improve connections through the study area and its immediate locality, providing enhanced connection to employment opportunities for the population. Figure 16-15 below shows the location of employment centres relative to the proposed road network. This clearly demonstrates the connections created locally to Carrickmines and Kiltiernan, but in addition to this, wider connectivity will also be enhanced. With improved access to the M50 a much wider area of employment opportunity can be accessed by the population.

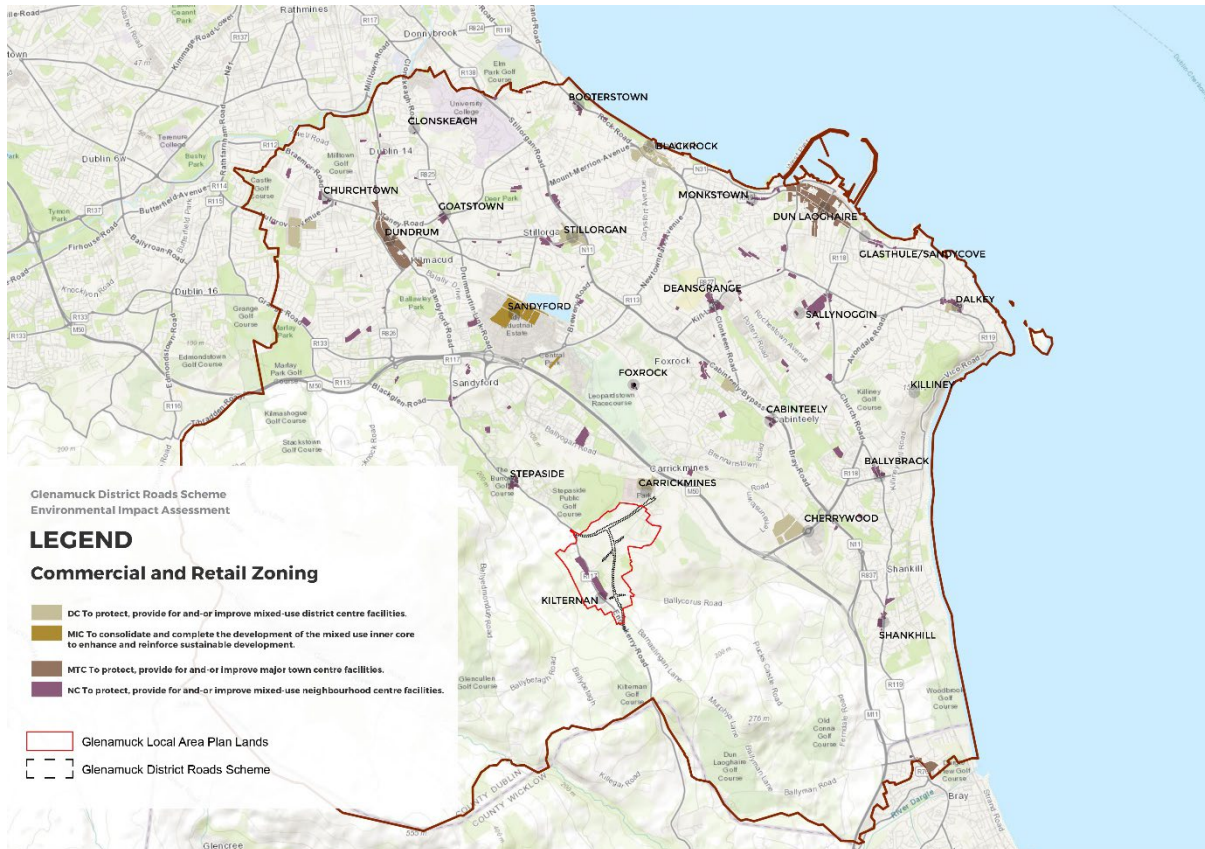


Figure 16-15 Location of Employment Hubs in Dún Laoghaire-Rathdown

The affluence and deprivation data for the County (Figure 16-16 below) demonstrates that the study area is in keeping with most of the area which is considered affluent. It bounds areas to the south that are considered to be marginally above average. Improved access to economic opportunities for a population will have a direct correlation to the affluence and deprivation experience in that area.

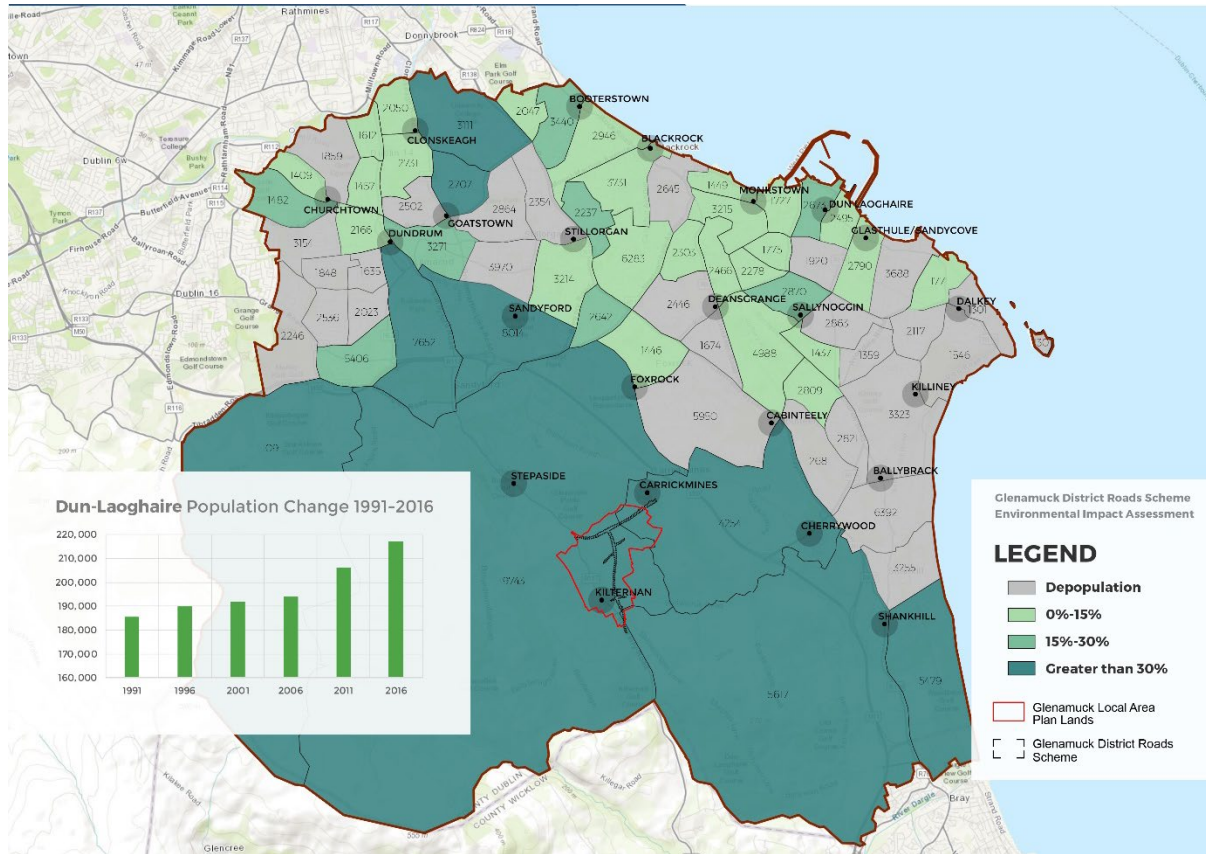


Figure 16-16 Affluence and Deprivation in Dún Laoghaire-Rathdown

Improvement in connectivity through the study area will be beneficial to those areas currently classified as marginally above average, providing enhanced connectivity into affluent areas and the associated economic advantages this presents. Improved access to employment in general or quality employment, such as increased wage strength, will be significantly influential in expanding areas of affluence south of the study area.

Employment and economic activity will be generated during the construction stage of the project.

Positive Significant Effect.

D. Amenity

The GDRS will provide direct connectivity enhancements to a number of open spaces, leisure facilities and attractions. This is both in the immediate locality of the study area, as well as through enhanced connectivity to the M50 and the wider access opportunities that this results in. The GDRS itself, does not pass directly through or immediately bound any of these amenities and as such will not alter the sensitivities or characteristics of these environments. The Kiltiernan/Glenamuck Local Area Plan 2013-2019 accounts for the provision of public open space and protection of significant habitats in the area, whilst taking account of the location and route alignment for the proposed road scheme. This ensures compatibility between open space protection/provision and the GDRS.

Positive Moderate Effect.

E. Roads and Traffic

Refer to Chapter 7 for detailed assessment of Traffic and Transport. The assessment presented in this chapter refers specifically to traffic impact on population and human health.

Car travel is by far the most popular form of transport in the study area. This is influenced by the relatively poor availability of public transport in the area. The GDRS will significantly improve the road network in the area, providing new links to facilities and quicker drive times to connect to the M50. This will contribute to a reduction in congestion in the area and its associated adverse impacts, including poor air quality, noise and general quality of life when considering commute times.

Whilst the road itself clearly facilitates car use, it is not expected to intensify the number of car journeys in the area in itself but will relieve congestion associated with the existing road network. The design of the roads scheme makes significant provisions to encourage sustainable travel modes.

Figure 16-17 below shows 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. It is clear that the GDRS provides enhanced connection directly to these institutions or indirectly with reduced journey times to the M50 and other road networks.

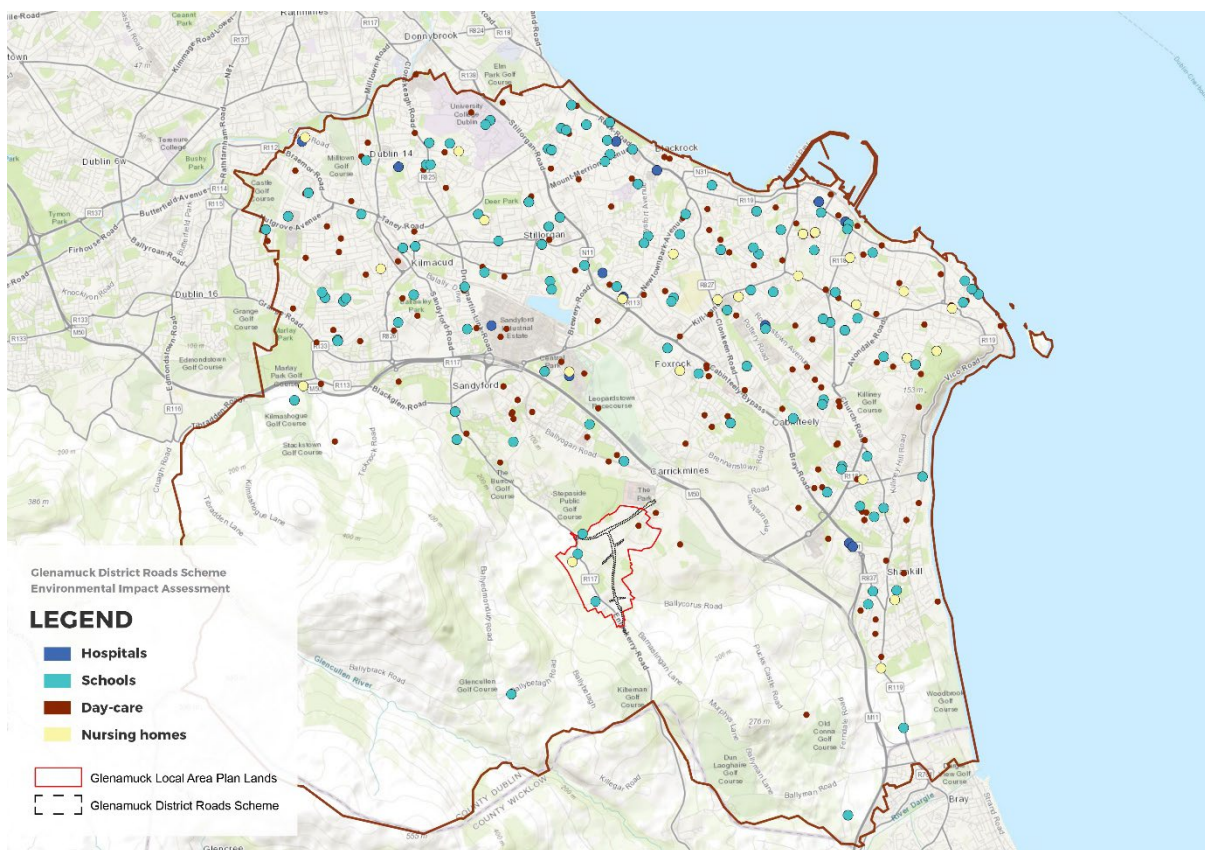


Figure 16-17 Location of Key Facilities (Schools, Nursing Homes, Hospitals and Day Care) in Dún Laoghaire-Rathdown

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.

Positive Significant Effect.

F. Property

It is not expected that the characteristics of the study area in relation to property type and occupancy will be impacted to any perceptible degree as a result of the GDRS. Whilst 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 Kiltiernan/Glenamuck Local Area Plan 2013-2019 identifies a number of development parcels surrounding the proposed road network and describes the appropriate future development potential of those sites.

Neutral Effects, Not of Significance.

G. Access to Public Transport

The proposed GDRS will enhance connectivity through the area and improve journey times to interconnected transport services, this will include intercity bus routes and rail routes, such as the Luas Green Line at Carrickmines. The design of the proposed new roads scheme enables provision of bus Gates/priority through two junctions (Glenamuck Junction and the Enniskerry Road Junction). This may influence the commuter patterns in the study area, with potential for increased use of public transport modes as a result. There are no public transport routes disrupted or removed as a result of the proposed GDRS (see Figure 16-13 above).

Positive Moderate Effect.

H. Health Demographics

The health of the population will be impacted by a wide range of determinants, this will include access to education, employment/income, transport, housing, social capital, opportunities for physical activity and services (health and social care), as well as exposure to air quality, neighbourhood quality, noise and vibrations. The sections above described the improved connectivity through and around the study area as a result of the GDRS. This will improve access of the population to those facilities that will have a direct influence upon quality of life and health. Figure 16-11, Figure 16-13 and Figure 16-17 illustrate the improved connectivity to facilities and open spaces associated with this.

In relation to exposure to air quality, the GDRS will have two impacts. Firstly, the road will attract poor air quality as a result of vehicular emissions associated with its use. Secondly, the road will assist in relieving existing congestion in the area, and the concentration of poor air quality that results from that congestion.. The proposed road network provides a tie in to Enniskerry Road to the north and south of Kiltiernan Village, effectively creating a bypass of Kiltiernan Village. This will remove the majority of extraneous through-traffic from the Village and facilitate a more pedestrian friendly, calmed street environment. There will be less exhaust emissions in the Village as a result and an improvement in the quality of the neighbourhood is expected to occur. Refer to Chapters 7, 8 & 9 for further detail on traffic and Air & Noise assessments

It is not expected that the road will create an intensification of car use that would increase overall levels of poor air quality, as it is intended to facilitate movements associated with existing traffic in the area and prioritise sustainable travel modes.

Impacts on severance and journey characteristics are addressed in Chapter 17

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. The encouragement of walking & cycling as a result of the scheme may have a slight positive effect.

Neutral Slight Effect.

16.5 Mitigation Measures

It should be noted that mitigation measures relating to those factors under which human health effects might occur have been addressed elsewhere in this EIAR, under the environmental factors of traffic and transportation, air quality and climate, noise and vibration, townscape and visual and material assets: utilities.

16.6 Residual Impacts

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 positive.

Conclusion on Overall Impact: Positive Moderate Effect.

16.7 Difficulties Encountered

There were no significant difficulties encountered in compiling the information contained in the Population and Human Health Chapter; however, census data (2016) is now two years old. It is not anticipated that any future revision of figures/data would result in a significant impact upon the findings of this assessment or the conclusions reached.

16.8 References

- Central Statistics Office (2011) Census 2011 Report. Dublin.
- Central Statistics Office (2016) Census 2016 Report. Dublin.
- Environmental Protection Agency (2002) Guidelines on the Information to be contained in Environmental Impact Statements. Wexford.
- Environmental Protection Agency (2003) Advice notes on current practice in the preparation of Environmental Impact Statements. Wexford.
- Environmental Protection Agency (2017) 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' Draft. Wexford.;
- Dún Laoghaire Rathdown County Council (2013) The Kiltiernan/Glenamuck Local Area Plan 2013-2019. Dublin.

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17 Material Assets-Land Use and Property

17.1 Introduction

This section describes the potential impacts of the proposed GDRS on land use at, and adjacent to, the proposed scheme footprint. This chapter describes the material assets of human origin that could be impacted upon. Material assets are defined in the Draft EPA Guidelines on information to be contained in an Environmental Impact Assessment report (EPA, 2017) as;

'The meaning of this factor is less clear than others. In Directive 2011/92/EU it included architectural and archaeological heritage. Directive 2014/52/EU includes those heritage aspects as components of cultural heritage. Material assets can now be taken to mean built services and infrastructure. Traffic is included because in effect traffic consumes road infrastructure. Sealing of agricultural land and effects on mining or quarrying potential come under the factors of land and soils.'

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.

This section has regard to the character and type of land use activities in the area and the location of any sensitive neighboring lands likely to be directly affected by the GDRS. Other lands or premises which although located elsewhere, may be the subject of secondary impacts are also considered in this assessment.

17.2 Assessment Methodology

The baseline environment is defined as the existing environment against which future changes can be measured. This section presents the methodology used in assessing the baseline land use environment. The scope for the assessment had been informed by consultation with statutory consultees, bodies with environmental responsibility and other interested parties at scoping stage and in consultation with residents in the area at pre-submission stage (see Chapter 4 Consultations).

The methodology has been devised in consideration of the following guidelines;

- Guidelines on the Information to be Contained in Environmental Impact Statements (Environmental Protection Agency (EPA));
- 2003, Advice Notes on Current Practice (in the Preparation of Environmental Impact Statements) (EPA);
- 2008, Environmental Impact Assessment of National Road Schemes – A Practical Guide, National Roads Authority
- 2015, Draft Revised Guidelines on the Information to be contained in Environmental Impact Statement;
- 2015, Draft Revised Advice Notes on Current Practise in the Preparation of Environmental Impact Statements; and
- 2017, Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA)

17.2.2 Research

The assessment involved desktop research and analysis of existing documentation to build up profiles of the communities which would be directly impacted upon by the Proposed Project. This was supported by site visits, and consultations with affected landowners/local residents. The principal data sources used in the study are described below;

- Census 2016, Central Statistics Office (CSO);
- GeoDirectory Maps;
- Dún Laoghaire Rathdown County Council online planning searches of recently submitted and granted planning applications for development in the area;
- Department of Education and Skills;
- Property Services Regulatory Authority (PSRA);
- Submissions and liaison with consultees, the public and affected landowners as described in Chapter 4 Consultations; and
- PRAI data at www.Landdirect.ie.

17.2.1 Study Area

For the purposes of this section a primary study area of the Kiltiernan/Glenamuck Local Area Plan 2013 boundary was analysed as the designated planning zone facilitated by the scheme. In addition, a broader area defined by a 1km buffer zone around the road scheme was also considered (see Figure 17-4 & Figure 17-5 below). This broader area was assessed to ensure a buffer area, and that land uses on the edge of the LAP zone are fully considered.

17.2.2 Receptor Sensitivity

The sensitivity of property and land uses will be influenced by a variety of factors including but not limited to;

- Existing Land Use (Agricultural, Residential, Commercial, Road bed etc);
- Land Zoning;
- Level of Usage (e.g. transport flows on existing road networks, enterprise type on agricultural lands); and
- Existing planning permissions.

17.2.1 Impact Categories

Journey Characteristics

Considers the effect of new road infrastructure on journey characteristics. New roads and traffic management measures have an inevitable impact on local journey duration, journey time reliability and journey patterns for all forms of transports (private vehicle, public transport, pedestrian, cyclist etc.). Impacts may be positive or negative. Impact magnitude will be influenced by changes to journey length or duration, transport modes affected and alternatives available.

Severance

Considers the effect of severance on existing land parcels and access to existing properties and land uses. Road infrastructure and associated land take may result in severance of land parcels or act as a physical barrier affecting access and usage of affected properties. There may also be a reduction in severance as a result of reduced traffic load on existing transport links. The magnitude of impact will be influenced by traffic load, the area of severed lands, their location relative to remaining lands and duration of impact.

Economic Impacts

Considers Economic impact of the proposed scheme on existing land parcels. Also considers scheme impacts on economic prospects and development in the area in line with development plans. Road infrastructure will require permanent and temporary acquisition of private lands. There may be accommodation works to boundaries, access to land parcels, or buildings may be required to be demolished. Impact magnitude will be influenced by the area of affected land portions, the extent of works involved and the viability of the remaining portions

17.3 Baseline Environment

This section addresses the land use context of the receiving environment only. The historical and cultural significance of the urban fabric is addressed under Chapter 11 'Archaeological, Architectural and Cultural Heritage'.

The following analysis presents an overview of baseline land use in the vicinity of the subject site at Glenamuck.

17.3.1 Study Area Overview

The core study area is along the proposed GDDR & 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.

The GDDR commences in the north east at Golf Lane Roundabout. 'The Park' (Phases 1 and 2) dominate the land-use in this area. It includes district level office and retail units just off the M50 motorway accessed off the Carrickmines Roundabout and Park Avenue. There are also significant residential developments in the area (Carrickmines Green and Carrickmines Manor) which have been constructed in the last 10-15 years.

The majority of the GDDR passes through greenfield lands north of Glenamuck Road. At its western extent it passes through the grounds of De La Salle Palmerstown Rugby club and ties into the existing Enniskerry Road.

The north of the GLDR passes through greenfield lands before its intersection with the Glenamuck Road. The Glenamuck Road currently has residential development along most of its length ranging from "one-off" properties fronting the road to residential developments such as Cairnbrook, Glenamuck Cottages and Brambledown. It is proposed to implement a bus gate on the eastern arm of the Glenamuck Road at its junction with the GLDR. The GLDR passes through the accesses to the existing traveller accommodation and Wayside Celtic and new accesses are proposed from the GLDR

As the GLDR continues south it intersects Ballycorus Road and Barnaslingan Lane, both are relatively rural roads with ribbon residential development. The GLDR ties into the Enniskerry Road at its southern extent. A bus gate is proposed on the Enniskerry road at this location to divert through traffic out of Kiltiernan Village and onto the proposed new road network.

Lands west of the scheme are characterised by residential communities in Kiltiernan and along the Enniskerry Road, focussed at Glebe Road, 'Golden Ball' junction with Glenamuck Road and Kiltiernan Village.



Figure 17-1: Study Area Context Plan

Beyond these concentrations of residential communities, the area is relatively rural in character. The Dingle Glen forms a strong environmental edge at the south east corner of the study area forming an edge to the urban expansion zone.

The majority of lands surrounding the scheme are zoned for development as set out in the Local Area Plan. Lands in the north east adjacent to “The Park” are zoned for employment use. The majority of

lands on both sides of the GLDR are zoned for residential development of varying density. There are some lands with open space/ Recreational Amenity zoning south of Glenamuck Road and some lands south east of the GLDR are zoned as agricultural or unzoned. An extract from the LAP map is presented in Figure 17-2 below.

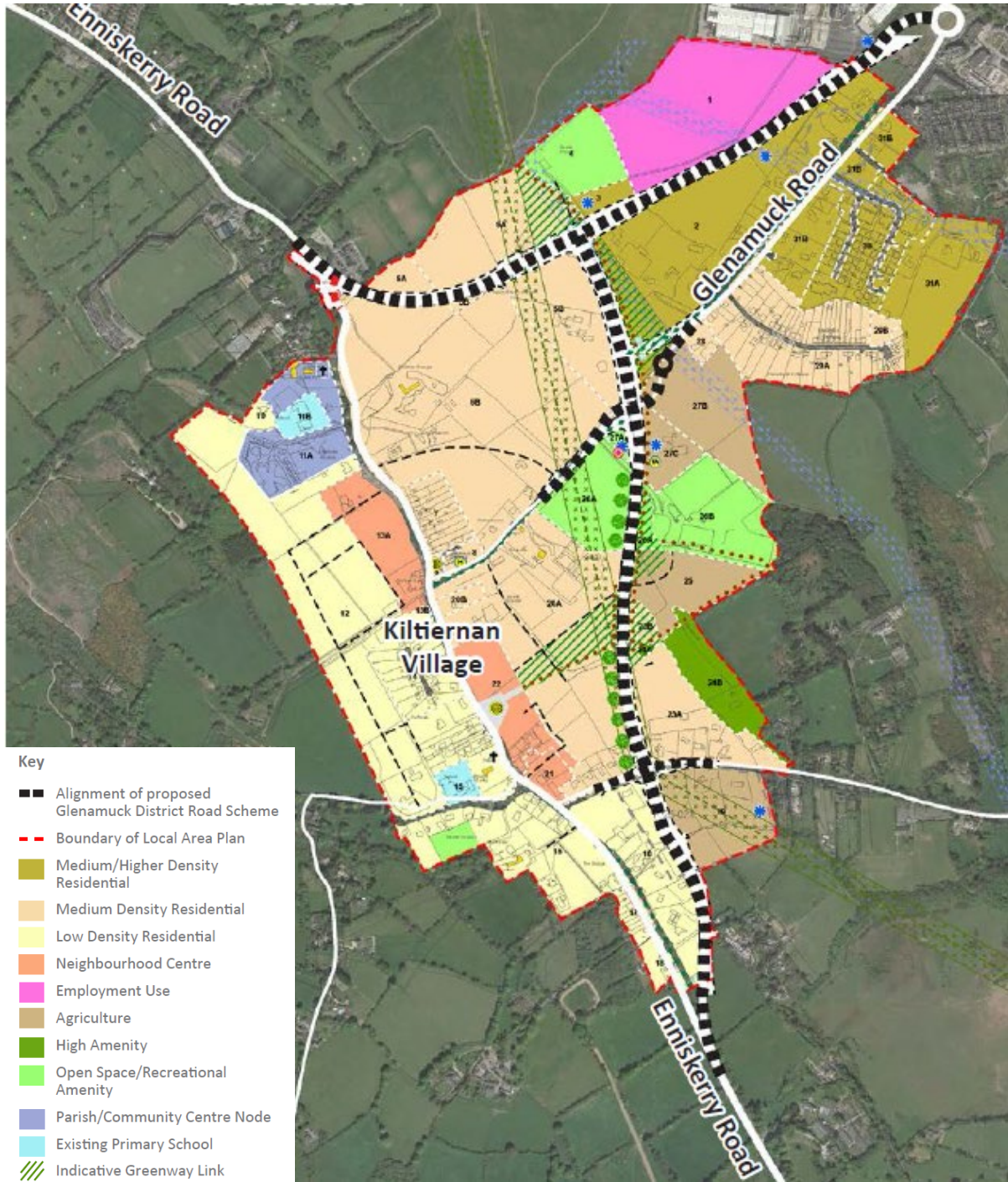


Figure 17-2: LAP Zoning Map Extract*

**The northern Neighbourhood Centre area was rezoned 'A' - To protect and or improve residential amenity - in the County Development Plan 2016 - 2022.*

17.3.3 Planning Permissions:

Table 17-1 below provides a list of planning permissions in the vicinity of the proposed GDRS the oldest pertinent planning decisions at the top of the list and most recent and current and the bottom of the table. This table does not include minor permissions such as domestic extensions. 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. Figure 17-3 indicates the general location of the permissions.

Table 17-1: Planning Permissions located along the new road development

According to the Dún Laoghaire Rathdown Planning Register (online application map).

Planning Reg. Ref.	Planning Reg. Ref.	Decision	Location
D02A/0558/ PL06D.201196	'The Park permission'. The development comprises a circa:- 22sqm single storey Gate House (Block 1); 2894sqm 3 storey Motor Sales and showrooms (Blocks 20, 30 & 40) 9,837sqm 3-5 storey Hotel (Block 50) 1,441sqm 2 Storey Commercial Centre Building incorporating a bar, local shop and restaurant (Block 60) 11,937sqm office based industry in 3 no 4 & 5 storey buildings (Blocks 70, 90 & 95) 7,763sqm 5 storey non public offices (Block 80) 913sqm single storey creche (Block 290) 14,998sqm retail warehousing in a single storey building (Block 300); 3,789 sqm 4 storey non public offices with ground floor showroom (Block 310) 147 sqm single storey restaurant (Block 320) vehicular and cycling access to the development will be via the construction of the western carriageway of the Glenamuck Link (which will be upgraded to a dual carriageway from the proposed roundabout at Glenamuck Road to the South East Motorway) whilst local bus, cycling and walking access will come via a new c.350m long dedicated road and bridge across the Ballyogan Stream to Ballyogan Road. Off street parking for c. 1215 cars and 208 cycles. No occupation pending the opening of the South Eastern Motorway.	Grant Permission/ Withdrawal of Appeal	The Park, Brookfield, Carrickmines Great and Jamestown, Dublin 18.
D03A/1022	Retention of 4 no. single storey prefabricated classroom buildings and will also consist of the erection of an additional single storey prefabricated meeting room building.	Grant Permission for Retention	Gaelscoil Thaobh Na Coille, De La Salle, Palmerstown R.F.C., Kiltiernan
D03A/1239	The Park, Carrickmines. Phase 2 development of retail warehousing, comparison retailing, office and hotel accommodation.	Grant Permission	The Park, Carrickmines
D05A/0075	The construction of four soccer pitches, two senior, one juvenile and one training pitch, a two storey clubhouse/community centre, a single storey equipment shed, clubhouse car parking and a distribution road with an access road to the clubhouse, all with associated siteworks.	Grant Permission	Rockville House, Glenamuck Road, Kiltiernan

D06A/1411	The Park, Carrickmines. Construct 123 apartments in 4 inter-connected blocks at northern section of the Park Site (access via Ballyogan Road and Park Avenue)/	Grant Permission	The Park, Carrickmines
D07A/0899/ PL06D.227440	Demolition of existing derelict cottage and out-buildings and provision of new residential development of 12 no. 3 storey detached dwellings and associated site works including new vehicular entrance, new stone boundary walls, incorporating existing local authority pumping station and landscaping works.	Refuse Permission/Grant Permission	The Bridge, Enniskerry Road, Kiltiernan
D07A/0936	The Park, Carrickmines. Amendments to Phase 2 Permission D03A/1239 comprising residential units (331), office floorspace and a neighbourhood centre.	Grant Permission	The Park, Carrickmines
D07B/0790	Single storey extension to the side of the existing dwelling and for the retention of free standing garage to the north east of the existing dwelling and associated site works.	Grant Permission	Mount Eden, Ballycorus Road, Kiltiernan, Dublin 18
D08A/0223	Permission for a floodlighting installation serving three existing playing pitches comprising of; Installation of generator to service lighting and site development works.	Grant Permission	De La Salle Palmerston FC, Kiltiernan.
D08A/1422	The Park, Carrickmines. Proposed modifications to Phase 2 Neighborhood scheme to provide for 8 screen cinema complex.	Refuse Permission	The Park, Carrickmines
D09A/0027	A new two storey four bedroom house and septic tank with percolation area including associated site works, adjacent to previously approve dwelling planning register reference No. D08A/0967.	Grant Permission	The Last Straw, Ballycorus Road, Kiltiernan, Co. Dublin

D09A/0315/PL06D.2 35268	Demolition of existing two-storey dwelling house known as Willow Glen; and ancillary outbuildings and sheds, and the construction of a residential development consisting of 8 x four bed 3.5 storey semi detached houses, 2 x four bed 3.5 storey detached houses, all with private rear gardens, roof terraces and two car parking spaces; 7x three bed lower level duplex with patio and balconies and 7 x three bed upper level two storey duplex with balconies and roof gardens all in one four storey block fronting Glenamuck Road; 13 x two bed apartments and 4 x one bed apartments with balconies fronting Glenamuck Road, with ancillary site works including vehicular access from Glenamuck Road via adjoining development site to the south known as Ashford Farm, Glenamuck, Co. Dublin, 2 surface car spaces and basement car parking for 48 spaces and bin store under blocks fronting Glenamuck Road, all on site of 0.66 Ha.	Grant Permission	Willow Glen, Glenamuck Road, Carrickmines.
D09A/0316/PL06D.2 34796	The demolition of 1 no. habitable dwelling (c. 141 sq.m Gross Floor Area (GFA)) and associated outbuildings (c. 2,898 sq.m GFA) and the construction of a residential scheme comprising 29 no. 3 storey houses: 11 no. 3 bed terraced units (each c. 147 sq.m GFA); 16 no. 4 bed semi-detached units (ranging from c.168 sq.m to c. 179 sq.m GFA); and 2 no. 4 bed detached units (ranging from c. 206 sq.m to c. 255 sq.m GFA).	Grant Permission/ Withdrawal of Appeal	Ashwood Farm, Glenamuck, Dublin 18.
D09A/0471/ PL 06D. 236630	For development on site of c. 5.97 hectares, comprising the former Wayside Celtic Football Club sports grounds and greenfield lands at Enniskerry Road, Kiltiernan, consisting of the demolition of the existing changing rooms building on site (c. 217 sqm Gross Floor Area (GFA)) and the construction of a mixed use scheme comprising 161 no. residential units, 4 no. retail units, 10 no. office units and 1 no. creche.	Refuse Permission	Wayside Celtic F.C. And, Greenfield Lands At, Enniskerry Road, Kiltiernan.
D09A/0842	Construction of one number, 2 storey, 400m ² , 5 bedroom dwelling with balcony facing south, 38m ² double garage, vehicular and pedestrian access via existing gate, along with drainage connection to local mains together with other site development works.	Grant Permission	Ballycorus Road, Kiltiernan
D09A/0920	Permission for the provision of floodlights to the international pitch and senior pitch with associated structure and roofed terrace area to the northern boundary of the International Pitch	Grant Permission	Wayside Celtic Football Club Ltd., Golden Ball, Glenamuck Road

D10A/0026/PL06D.2 36475	The demolition of one habitable house (c.141sq.m gross floor area) and associated outbuildings (c.2,898sq.m gross floor area) and the construction of a residential scheme consisting of 29 no.3 storey houses, 2 no. 3-5 storey blocks with 110 apartments over basement parking, 2 storey creche and single storey. ESB substation	Refuse Permission/G rant Permission	Ashwood Farm, Glenamuck Road, Dublin 18
D10A/0598	Change of use of part of horticultural nursery on land south of the Kiltiernan Gallery to residential use, erection of two storey house with integral single storey garage and south facing first floor terrace with external staircase, and realignment of wall to road frontage.	Grant Permission	Land South of The Kiltiernan Gallery, Enniskerry Road, Kiltiernan
D11A/0052	Retention of four existing prefabricated school buildings (total area 480.34 sq.m) for use for education and training including the retention of Unit C (124.6 sq.m) for use as a gym.	Grant Permission for Retention	De La Salle Palmerstown F.C., Kiltiernan
D12A/0163	Q3 The Park, Carrickmines. Mixed use district center with GFA of 58,863 sq.m.	Permission Refused	
D14A/0063	Demolition of an existing dwelling and the construction of a residential development comprising 11 no. detached two storey four bedroom houses	Refuse Permission	Lands at Brambledown, Glenamuck Road
D14A/0229	Permission for minor alterations to 10 no. permitted houses (Planning Permission D07A/0899 refers). The proposed changes comprise the following: Alterations to fenestration on front and rear elevations.	Grant Permission	The Bridge, Enniskerry Road, Kiltiernan
D14A/0766	Permission for the demolition of 1 no. habitable dwelling (c.186 sqm gross floor area (GFA)) and the construction of a residential scheme comprising 1 no. detached, 10 houses with access off Glenamuck road.	Grant Permission	Lands at Brambledown, Glenamuck Road
D15A/0406	Permission for the demolition of 36 no. incomplete terraced dwellings previously permitted under Reg. Ref. 02A/1061 and 05A/1631, the construction of 75 no. (21 no. 4 bed, 54 no. 3 bed) detached, semi-detached and terraced houses and all associated site works.	Grant Permission	Carrickmines Manor, Glenamuck Road

D15A/0443/PL06D.2 46270	Permission for the demolition of existing two-storey dwelling house known as Willow Glen and ancillary outbuildings and sheds and the construction of a residential development of 31 units; main vehicle access from Glenamuck road. Provision has been made for future access from adjoining site at Ashwood Farm.	Grant Permission	Willow Glen, Glenamuck Road, Carrickmines
D15A/0466	Outline Permission for the construction of a new, detached, two storey dwelling house, new vehicular entrance from the Ballycorus Road, new waste treatment systems and percolation areas and associated site works.	Grant Outline Permission	Derryclare, Ballycorus Road, Kiltiernan
D15A/0626	Permission for Retention for partially constructed house previously approved under D08A/0967.	Grant Retention	The Last Straw, Ballycorus Road, Kiltiernan
D16A/0025	Permission for amendments to House Types to an existing grant of Planning Permission (Ref: P/0820/15)	Grant Permission	Lands at Brambledown, Glenamuck Road
D16A/0054/ PL06D.247097	Permission for: 1. The demolition of 2 no. habitable dwellings on the site - Greenmount (195 sqm GFA) and Dun Oir (345 sqm GFA) inclusive of ancillary buildings. 2. The construction of a 139 no. unit residential development; ii) a 191.6 sqm crèche facility iii) construction of the link access road between Enniskerry Road and Glenamuck Road required under the Kiltiernan/Glenamuck Local Area Plan 2013 including vehicular access points onto Enniskerry Road and Glenamuck Road and provision for access to lands to the north of the site. iv. Three areas of landscaped public open space and all other site works required to facilitate the development. 3. Improvements to Glenamuck Road along the two sections adjacent to Cromlech Close to remove the existing bend and the provision of pedestrian and cycle paths.	Grant Permission & Refuse Permission/R efuse Permission	4.5 ha site at Glenamuck, Kiltiernan
D16A/0300/PL 06D.246941	Retention Planning Permission for partially constructed detached garage with habitable room to first floor and permission to complete construction of detached garage with habitable room to first floor, including the removal of roof windows and dormer window.	Refuse Permission for Retention/ Grant Permission	The Last Straw, Ballycorus Road, Kiltiernan, Co. Dublin

D16A/0488/PL06D.2 47300	Permission for: Construction of a total of 49 no. dwellings consisting of 37 no. detached, semi-detached and terraced 2/3 storey houses and 12no. apartments. The houses will consist of 4 no. 2/3 storey four-bedroom houses (House Types A1, A5 and A6), 33 no. 2/3 storey three bedroom houses (House Types A2, A3, A4, B1, B2, B3, B4, C1, C2, C3 and C4) and all with private open space and 2 no. car parking spaces per dwelling. House Type A2, A3, C1, C2 and C4 include an optional ground floor kitchen extension to the rear.	Refuse Permission/R efuse Permission	Rockville House, Glenamuck Road South, Kiltiernan
D16A/0582	Permission for the construction of a new detached two storey dwelling house, new vehicular entrance from the Ballycorus Road, new waste treatment systems, percolation areas and associated site works.	Grant Permission Consequent to Outline	Derryclare, Ballycorus Road, Kiltiernan
D16A/0583	Permission for Retention of existing prefabricated structure for use as playschool.	Refuse Permission for Retention	Da La Salle Palmerston Rugby Club, Kiltiernan
D16A/0792	Permission for Retention of temporary portable double classroom playschool for 2 years.	Grant Permission for Retention	Da La Salle Palmerston Rugby Club, Kiltiernan
D17A/0182	Retention for alterations to the boundary treatment of a previously granted Planning Permission (Ref. P/0839/16) dated 21 April 2016.	Grant Retention	Lands at Brambledown, Glenamuck Road
D17A/0546	Permission for: 1. Retention of all landscaping and planted areas for the entire development. 2. Retention of boundary walls, fence positions, car parking, road and footpath arrangements for the entire development. 3. Retention of bin storage locations for the entire development. The represents and alteration to previously granted planning permission Nos. D14A/0229 and D15A/0314.	Grant Retention	Struan Glen, Enniskerry Road, Kiltiernan
D17A/0793	Rockville House and Gatelodge (also known as Rockville Lodge), both protected structures under RPS Ref:1790. Demolition of existing agricultural outbuildings on site; Retention of Rockville House and Gatelodge with amendments to boundary treatment to provide for 2 no. separate residential dwellings with curtilage car parking and private open space, facilitated by the proposed removal of existing of the outbuilding to the rear of Rockville House; Construction of a total of 49 no. dwellings consisting of 37 no. detached, semi-detached and terraced 2/3 storey houses and 12 no. apartments.	Grant Permission	Rockville House, Glenamuck Road South, Dublin 18, and Gatelodge (also known as Rockville Lodge)

D18A/0257	Site of 105 ha at lands known as Quadrant 3, The Park, Brookfield, Glenamuck Link Road, Permission for a neighbourhood centre (including retail, retail services and restaurant/café uses), retail warehouses, cinema and other leisure space, residential units, crèche, office space, car showroom, medical centre, linear park and associated infrastructural works. he proposed development comprises a Gross Floor Area (GFA) of 83,996 sqm, excluding the basement car parks, in four blocks varying in height from two to six storeys. The maximum height of the proposed development is 29.4 metres. Blocks A, B & C include 130 no. residential units (GFA of 12,522 sqm), 7,983 sqm GFA of retail floor space, which includes 2 no. supermarkets [to include off-licence use] (GFA of 1,725 sqm and GFA of 1,390 sqm), 11,154 sqm GFA of retail warehousing floor space, 552 sqm GFA of retail services floor space, 3,210 sqm GFA of restaurant/café floor space, 4,667 sqm GFA of own door office floor space, 527 sqm GFA crèche, 446 sqm GFA car showroom, 720 sqm GFA medical centre, 336 sqm GFA management suite, 3,235 sqm GFA of leisure floor space, which includes a 590 sqm leisure unit for an indoor skydiving facility, 7 no. screen cinema with a GFA of 3,194 sqm, 3 no. kiosks with a GFA of 37 sqm and all associated service and circulation floor space.	Further Information submitted to DLRD Co. Co. Oct, 2018	The Park, Brookfield, Glenamuck Link Road
D18A/0623/ ABP-302572-18	Demolition of existing house, The Leys, and the construction of a residential development of 52 no. duplex apartment units, consisting of 26 no. 3 bedroom units over 26 no. 2 bedroom units in 3 no. 4 unit, 3 storey blocks and 5 no. 8 unit 3 storey blocks, 2 no. refuse and long term bicycle stores, 4 no. refuse and short term bicycle stores, new vehicular and pedestrian entrance, associated car parking and site works.	Refuse Permission/ Refuse Permission ABP	The Leys, Glenamuck Road South
D18A/0728	Permission sought for the construction of House Type A7 and minor alterations to site layout plan and associated site works within previously approved development D17A/0793.	Grant Permission	Rockville Square, Rockville, Glenamuck Road South
D18A/0940	Permission for a Phase 2B residential development. The site is located to the South-East of Phase 1 residential development permitted under Reg. Ref. D17A/0793 at Rockville House, Glenamuck Road South, which is currently under construction. The Phase 2B proposal relates to the construction of a four storey apartment block comprising of 57 no. residential units including 10 no. 1 beds, 41 no. 2 beds and 6 no. 3 beds.	Refuse Permission	Site to South-East of Glenamuck Road South, Kiltiernan
ABP-300731-18	SHD Development. 141 no. residential units (98 no. houses and 43 no. apartments/duplexes), provision of a creche, construction of link access road between Enniskerry Road and Glenamuck Road, and all associated site works.	Refuse Permission	Glenamuck, Kiltiernan, Dublin 18

<p>ABP-302336-18</p>	<p>SHD Development. 250 no. apartments, crèche, gym, residents amenity space and associated site works. 'Tintagel', 'Auburn', 'Keellogues', 'Villa Nova', 'Arda Lodge', and adjoining lands under the control of Dun Laoghaire Rathdown County Council, Golf Lane,</p>	<p>Refuse Permission</p>	<p>Golf Lane, Glenamuck Rd Sth, Carrickmines,</p>
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There are no existing planning permissions which are required to be revoked as part of the scheme



Figure 17-3: Planning permissions for developments in the Glenamuck area.

(Source: <https://dlrcouncil.maps.arcgis.com/apps/webappviewer>)

17.3.4 Residential Land Use

Using GeoDirectory database (Q2 2018) it has been established that there are 409 residential units located within the Local Area Plan area and 1,429 residential units located within a 1km buffer of the area. The locations of these houses are displayed on Figure 17-4 and Figure 17-5. This shows low concentrations of dwellings throughout the planned area for the road development.

In the north eastern portion of the study area, the residential community is based around the Rockville Drive, Brambledown, Cairnbrook, The Green, The Rise, Glenamuck Cottages, Willow Glen, Inglenook Wood and The Crescent off Glenamuck Road South. In the western part of the study area the residential community is focused around the village of Kiltiernan on the Enniskerry Road. The residential community extends eastwards from Kiltiernan in detached dwellings along Ballycorus Road and Barnaslingan Lane.

It is noted that there are two family units in the south of the scheme (south of Ballycorus Road) whose landholding spans both sides of the GLDR. There are a number of related residences spread over both landholdings (parents, siblings etc). As the GLDR bisect the landholdings, pedestrian movements between some of the residences will require crossing of the road and vehicular trips may be re-routed along the new infrastructure

The planning permission review in Table 17-1 above, highlights there is significant residential planning activity in the area. Major recent applications include

- A current residential application at the Leys for Residential development before An Bord Pleanála (ABP-302572-18).
- Strategic Housing Development (SHD) application which was recently refused by An Bord Pleanála for 141 units (ABP-300731-18).
- Strategic Housing Development (SHD) application which was recently refused by An Bord Pleanála for 250 apartments and ancillary uses units (ABP-302336-18). at Golf Lane, Glenamuck Road
- Residential development is included in the 'Q3' mixed use planning application at The Park, Carrickmines currently at Clarification of Further Information stage before Dun Laoghaire Rathdown County Council.
- Phase 2B development at Rockville House

17.3.5: Retail, Hospitality and Service Industry

Analysis of commercial use within the wider study area presents a more general overview of the nature of businesses within the entire study area. This analysis was utilising the GeoDirectory database which lists commercial activity and sectoral base/provisions of services in any given location at a specific point in time (Q2 2018). This high-level overview of the study area allows an appreciation of land use patterns and concentrations at a strategic scale. Figure 17-4 and Figure 17-5 highlight the relatively small number of businesses in the area. In regards to actual numbers in the area, within the 1 km buffer there are 60 commercial units at present in the area with 8 units both used for residential and commercial uses. Within the LAP boundary there are 17 commercial premises with 8 dwellings in the area used for both commercial and residential uses.

At present, most services and business are concentrated in the north east of the study area at The Park, Carrickmines business park providing both office and retail floor space. Commercial development is included in the 'Q3' mixed use planning application at The Park, Carrickmines currently at Further Information stage before Dún Laoghaire Rathdown County Council.

17.3.6: Healthcare Facilities

There are no General Practitioners practices located inside the study area. There is one Physio within the area providing services locally. Glebe House Nursing home is located on Glebe road off the Enniskerry Road

17.3.7 Educational Facilities

A list of schools situated within the wider study area is provided in Table 17-2 below, the locations of which are indicated on Figure 17-2. There are also a number of childcare/early education facilities in the study area.

Type	Name
Primary	Kiltiernan Church of Ireland
Primary	Our Lady of the Wayside National School
Private Higher Education Institutions	Kiltiernan Adult Education Centre

Table 17-2: List of schools and educational facilities in the area.

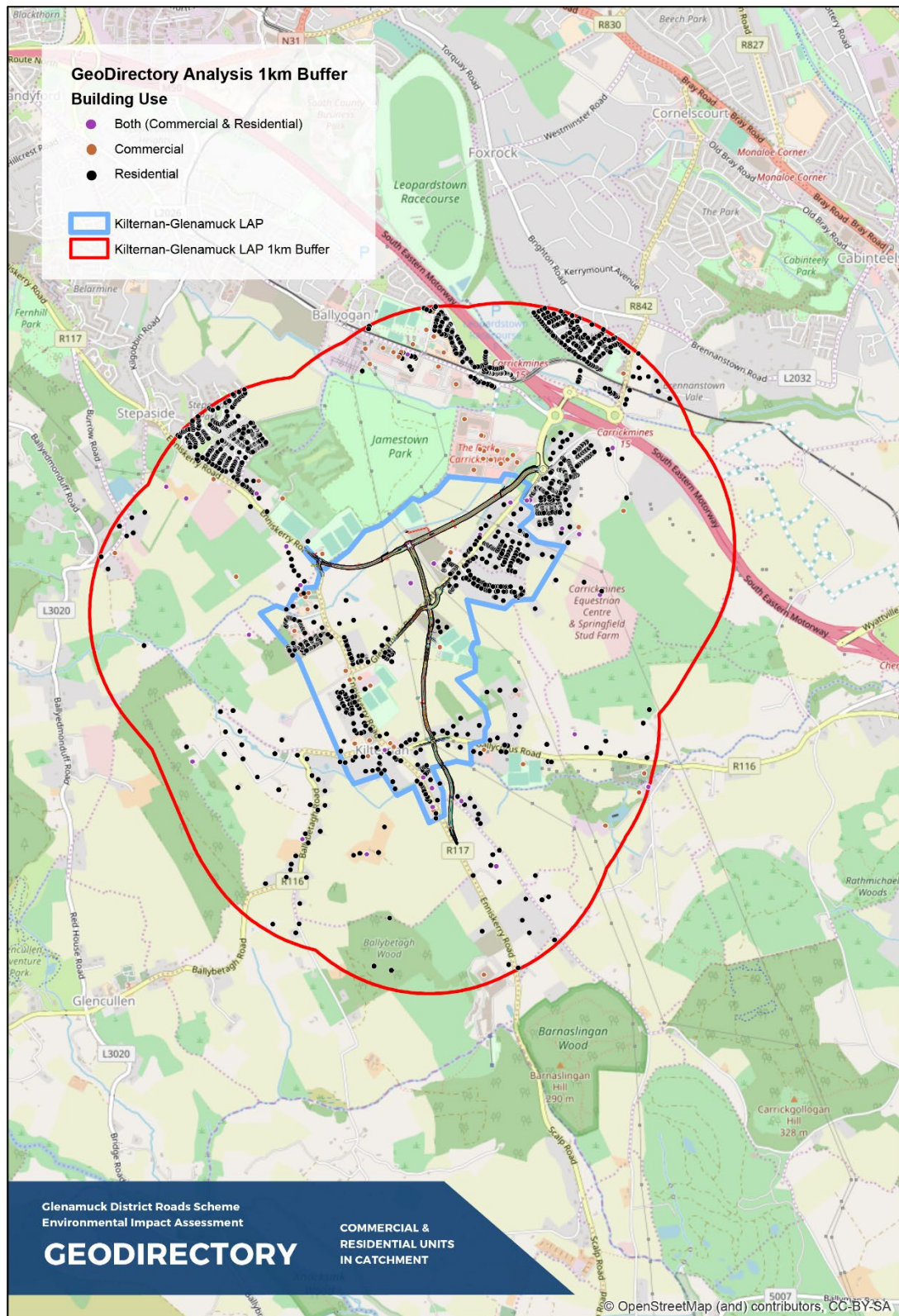


Figure 17-4: 1 km buffer surrounding the site
**including all residential and commercial properties in the area*

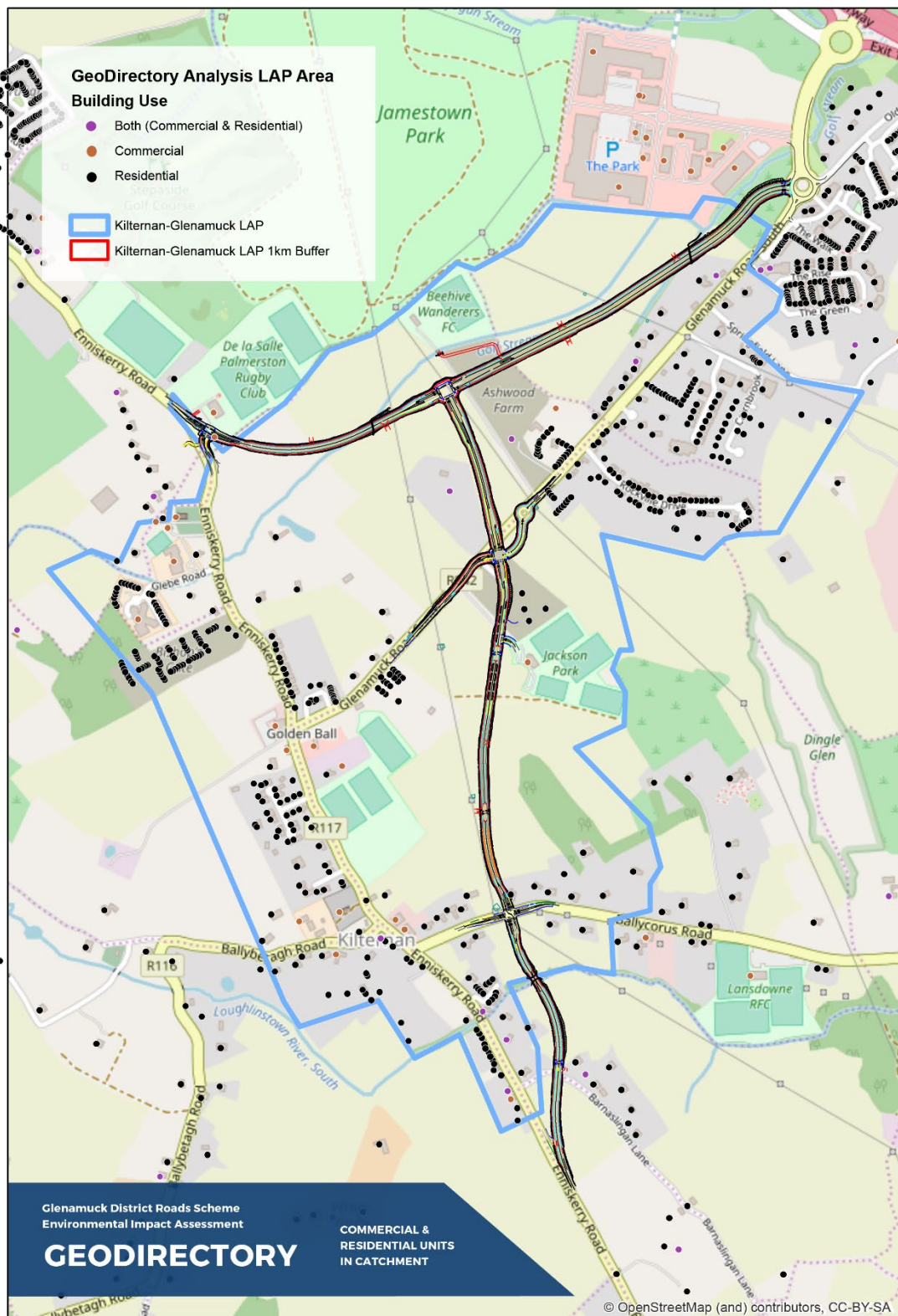


Figure 17-5: LAP area including all residential and commercial properties in the area.

17.4 Predicted Impacts

17.4.1 Construction Phase

Journey Characteristics

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. Although it is anticipated that all roads will be maintained open (except for short term essential closures) there is likely to be temporary traffic controls such as one way alternating traffic flows or temporary diversion routes which will increase journey times on these routes. Prior to mitigation this impact is considered to be significant, short-term and temporary in nature.

Severance

There will be some severance of land parcels during the construction phase. The properties directly affected by the proposed scheme are detailed in Figure 17-8. 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. Those parcels which will be affected by severance (isolation of land portions due to works) during the construction phase include (2,5,6,7,9,14,15,16,18,24,27,29). Prior to mitigation this is considered to be very significant, short-term and temporary in nature.

Economic Impacts

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 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 are addressed in Chapter 7 'Traffic and Transportation', Chapter 8 'Air Quality', Chapter 9 'Noise and Vibration', Chapter 12 'Landscape/Townscape and Visual' and Chapter 16 'Population and Human Health'.

An overview of the primary properties affected by the scheme is presented in Figure 17-8. A summary of impacts on each property is included in Table 17.3.

17.4.2 Operational Phase

Journey Characteristics

As described in Chapter 5, a bus gate is to be implemented on Glenamuck Road East to divert traffic from the currently narrow and congested Glenamuck Road and to prioritise a high quality public transport and pedestrian/cycle route. On implementation of the bus gate private vehicular traffic from/to Glenamuck Road East will be required to use alternative routes which will be available on the

GLDR and GDDR. The bus gate will facilitate bus movements through the junction and along Glenamuck Road East and will also facilitate all cycle and pedestrian movements.

A second bus gate is to be implemented on Enniskerry Road south of Kiltiernan to divert through traffic from Kiltiernan Village core. On implementation of the bus gate private vehicular traffic northbound on the Enniskerry Road will be diverted onto the GLDR and out of Kiltiernan Village. Traffic bound for the village can then enter the village from the GLDR via Ballycorus Road, Glenamuck Road or by other development driven links which may be put in place in the future. The bus gate will facilitate bus movements and will also facilitate all cycle and pedestrian movements.

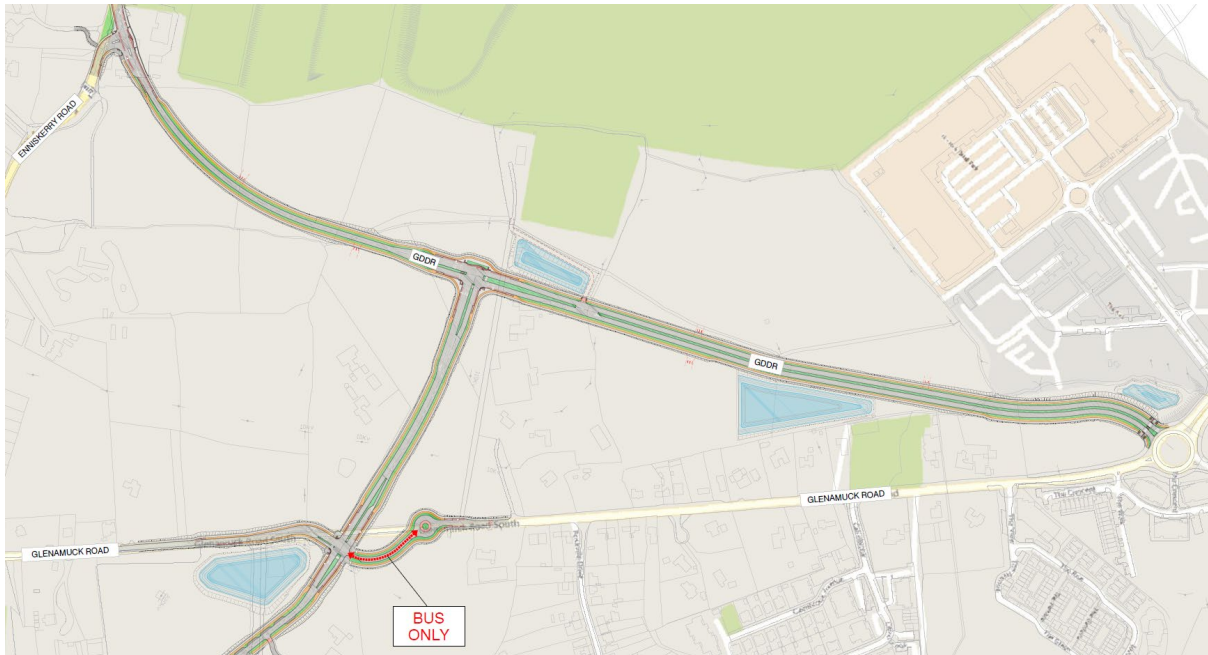


Figure 17-6: Bus Gate (Glenamuck Road)

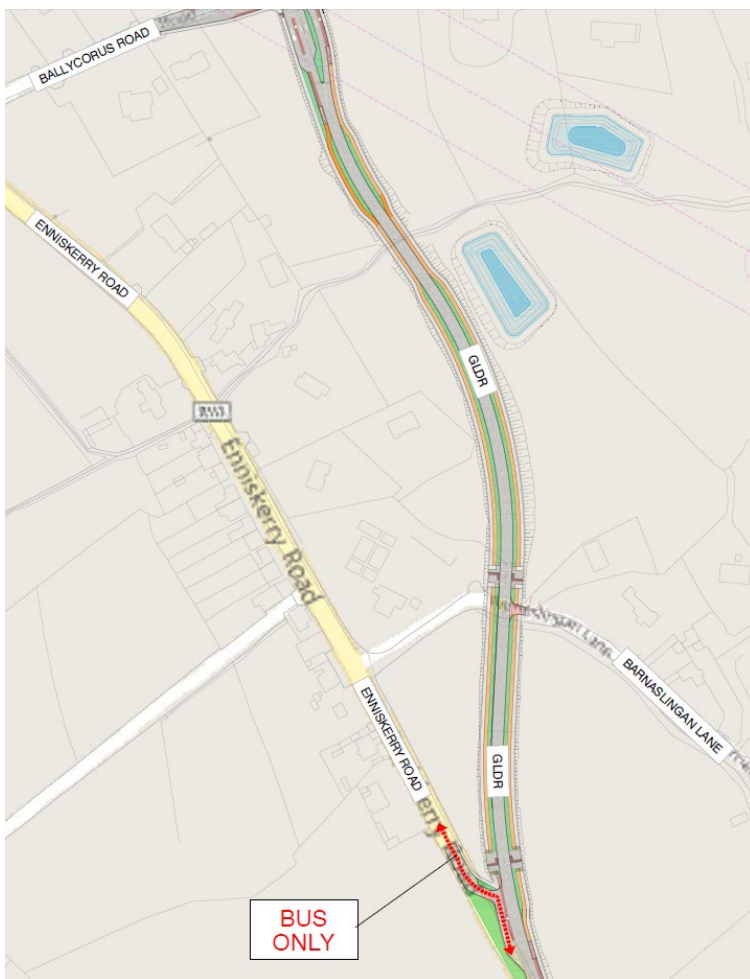


Figure 17-7: Bus Gate: Enniskerry Road

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. Overall however, as detailed in Chapter 7 Traffic and Transportation, the scheme contributes to significantly reduced delays and increases in vehicle speeds in the area when compared to the do nothing scenario. The scheme also provides upgraded infrastructure for all transport modes. The overall impact on journey characteristics is therefore considered to be a slight positive.

Severance

There will be some severance of land parcels during the operational phase. The properties directly affected by the proposed scheme are detailed in Table 17-3. 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. Those parcels which will be affected by severance (isolation of land portions due to works) include (2,5,6,7,9,14,16,18,23,26,28). 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. As detailed in Chapter 7, there are significant reductions in traffic load on these routes. 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 due to the road forming a physical barrier to pedestrian movements. Mitigation will be required to ensure sufficient pedestrian permeability is provided (see Section 17.5).

Economic Impacts

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.

There will be an effect on some property adjoining the works area. These impacts may be caused from a number of areas including noise, dust etc. and can cause affect residential properties that are already located in the area. These impacts are addressed in Chapter 7 '*Traffic and Transportation*', Chapter 8 '*Air Quality*', Chapter 9 '*Noise and Vibration*', Chapter 12 '*Landscape/Townscape and Visual*' and Chapter 16 '*Population and Human Health*'.

The scheme does not require the demolition of any existing permanent buildings.

The properties directly affected by works associated with the scheme are detailed in Table 17-3. A summary of impacts on each property is included in Table 17-3. It is noted that the figure and table do not represent the intended CPO boundaries and are intended as a context overview of significantly affected landholdings only. Properties with works to existing public roads/paths in front of their property (beyond their existing road boundary) are excluded from this list but may be subject to CPO.

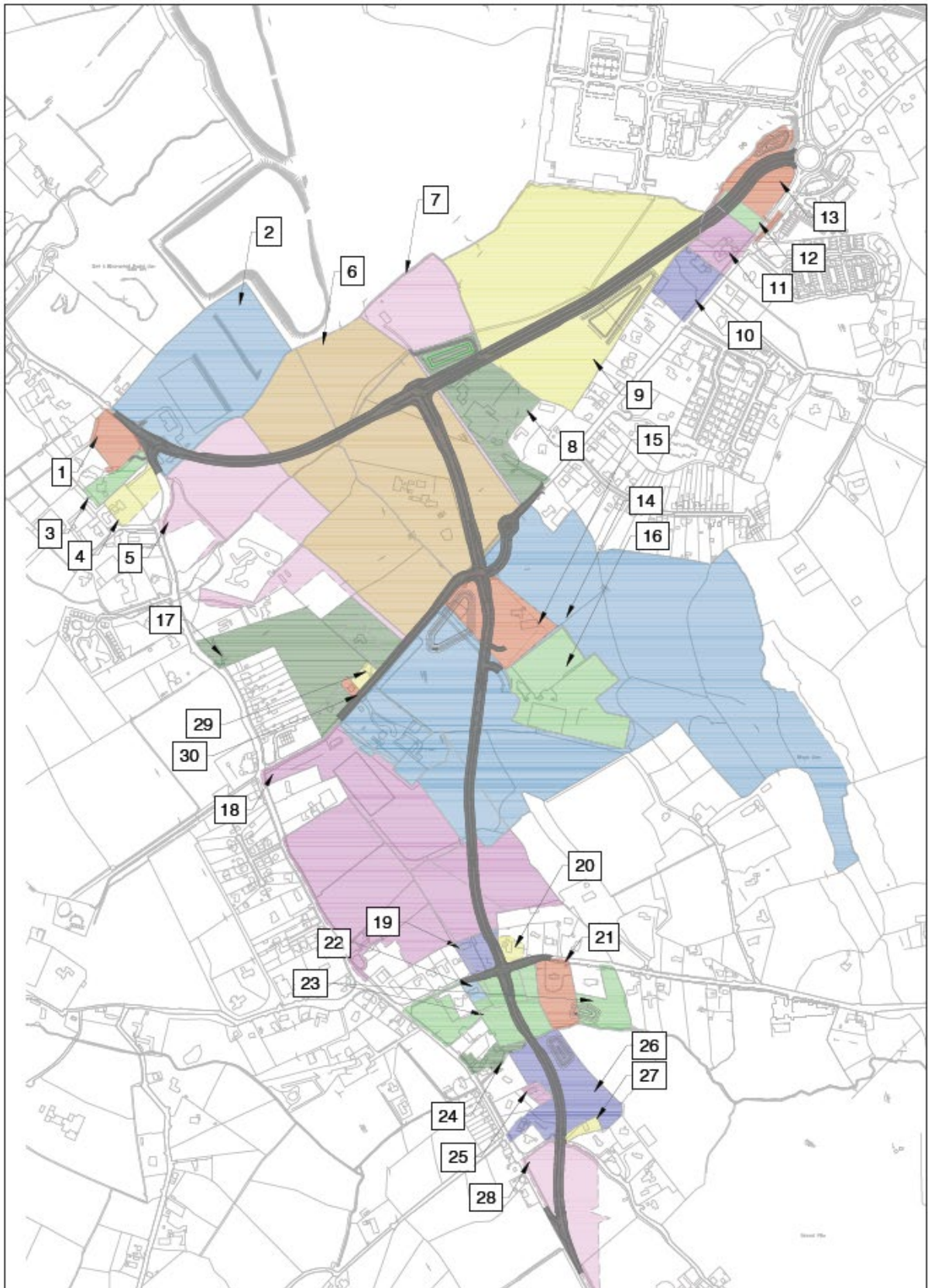


Figure 17-8: Overview of Directly Affected Properties

Table 17-3: Overview of Direct Property Impacts

Ref	Existing Land Use	Nature of Impact	Approx Land Take (ha)	Specific Mitigation Required
1	Agricultural	<ul style="list-style-type: none"> Minor land take along eastern boundary to facilitate Enniskerry road widening 	<0.1	<ul style="list-style-type: none"> New Boundary Treatment
2	Recreational (De la Salle Palmerstown Rugby Club)	<ul style="list-style-type: none"> Proposed scheme passes through entrance, car park and lands occupied by temporary cabin structures. Portion of parcel severed by scheme (severed portion zoned for residential development) 	0.2	<ul style="list-style-type: none"> Works to Access New Boundary Treatment
3	Residential	<ul style="list-style-type: none"> Existing Entrance (shared with adjacent property) required to be modified as a result of junction layout. New access to be provided 	<0.1	<ul style="list-style-type: none"> Works to Boundary Treatment New Access
4	Residential	<ul style="list-style-type: none"> Very minor works required to ensure level tie-in of entrance to new works 	<0.1	<ul style="list-style-type: none"> Minor Works to entrance
5	Agricultural / Residential	<ul style="list-style-type: none"> GDDR passes through property. Southern portion of parcel affected by widening of Glenamuck Road 	0.4	<ul style="list-style-type: none"> New Boundary Treatments where affected Agricultural Access to severed Portions
6	Agricultural / Residential	<ul style="list-style-type: none"> GDDR & GLDR pass through property. Southern portion of parcel affected by widening of Glenamuck Road 	2.3	<ul style="list-style-type: none"> New Boundary Treatments where affected Agricultural Access to severed Portions
7	Recreational (Bective Rangers Rugby Club)	<ul style="list-style-type: none"> Existing Access lane severed by GDDR. New access to be provided 	0.2	<ul style="list-style-type: none"> New access to be provided Access to be suitably located away from new junction. Any Access through third party lands to have sufficient right of way/ownership rights.
8	Agricultural (Permission granted for Residential Development in south)	<ul style="list-style-type: none"> GDDR passes through property. Attenuation pond located in remainder of parcel north of GDDR Southern portion of parcel affected by widening of Glenamuck Road 	1.0	<ul style="list-style-type: none"> New Boundary Treatments where affected
9	Agricultural	<ul style="list-style-type: none"> GDDR passes through property. Attenuation pond located in south east portion 	2.7	<ul style="list-style-type: none"> New Boundary Treatments where affected Agricultural Access to severed Portions
10	Residential	<ul style="list-style-type: none"> Temporary land take required to facilitate works to stream. 	N/A	<ul style="list-style-type: none"> Reinstatement

11	Residential / Agricultural	<ul style="list-style-type: none"> • GDDR affects northern portion of property. 	0.2	<ul style="list-style-type: none"> • New Boundary Treatments where affected • Minor severed areas to north to be included in CPO
12	Agricultural	<ul style="list-style-type: none"> • GDDR affects northern portion of property. 	0.1	<ul style="list-style-type: none"> • New Boundary Treatments where affected • Minor severed areas to north to be included in CPO
13	Agricultural	<ul style="list-style-type: none"> • GDDR affects northern portion of property. • Attenuation pond located north of GDDR. 	0.1	<ul style="list-style-type: none"> • New Boundary Treatments where affected • Minor severed areas to north to be included in CPO
14	Agricultural / Residential (Permitted residential developments under construction west of GLDR)	<ul style="list-style-type: none"> • GLDR passes through property. • Northern Areas affected by works to Glenamuck Road. • Attenuation pond located between GLDR and Glenamuck Road 	3.0	<ul style="list-style-type: none"> • New Boundary Treatments where affected • Agricultural Access to severed Portions
15	Residential (Traveller Accom)	<ul style="list-style-type: none"> • GLDR Passes through property. • Access Road severed by GLDR. • Northern portion of parcel affected by widening of Glenamuck Road • Attenuation pond in northwest portion 	1.0	<ul style="list-style-type: none"> • New Boundary Treatments where affected • New access to traveler accommodation
16	Recreational (Wayside Celtic)	<ul style="list-style-type: none"> • No Direct impact from works. Access to parcel is via road with right of way though adjacent lands (14) which is severed by GLDR 	N/A	<ul style="list-style-type: none"> • New access road • Some informal parking along access road displaced: On-street parking on GLDR to be provided to mitigate
17	Agricultural / Residential	<ul style="list-style-type: none"> • Minor impact on southern portion due to widening of Glenamuck Road 	<0.1	<ul style="list-style-type: none"> • New Boundary Treatments where affected
18	Agricultural	<ul style="list-style-type: none"> • GLDR passes through Southern areas of property 	0.4	<ul style="list-style-type: none"> • New Boundary Treatments where affected • Agricultural Access to severed Portion
19	Residential / Agricultural	<ul style="list-style-type: none"> • GLDR passes through western area of property (consisting of agricultural ground) 	0.1	<ul style="list-style-type: none"> • New Boundary Treatments where affected • Minor severed areas to north to be included in CPO
20	Residential	<ul style="list-style-type: none"> • GLDR passes through western portion of property 	<0.1	<ul style="list-style-type: none"> • New Boundary Treatments where affected
21	Residential	<ul style="list-style-type: none"> • Minor works to north of property associated with Ballycorus Road widening 	0.15	<ul style="list-style-type: none"> • New Boundary Treatments where affected

		<ul style="list-style-type: none"> • Attenuation pond partially located within southern portion of landholding • Wayleave for drainage pipes from road to pond required 		
22	Residential	<ul style="list-style-type: none"> • Works in north of property associated with Ballycorus Road widening 	<0.1	<ul style="list-style-type: none"> • New Boundary Treatments where affected
23	Residential / Agricultural	<ul style="list-style-type: none"> • Works to north of property associated with Ballycorus Road widening • GLDR passes through property • Attenuation pond in eastern portion of landholding • Wayleave for drainage pipes from road to pond required • Wayleave for maintenance access to pond required 	0.7	<ul style="list-style-type: none"> • New Boundary Treatments where affected • Agricultural Access to severed Portions
24	Residential (Struan Glen Development)	<ul style="list-style-type: none"> • Minor land take (agricultural ground) to facilitate construction of watercourse crossing 	<0.1	<ul style="list-style-type: none"> • New Boundary Treatments where affected
25	Residential	<ul style="list-style-type: none"> • Minor land take to facilitate earthworks drainage for GLDR 	<0.1	<ul style="list-style-type: none"> • New Boundary Treatments where affected
26	Residential / Agricultural	<ul style="list-style-type: none"> • GLDR passes through property • Secondary HGV access to property affected • Attenuation Pond located in northeast portion 	0.9	<ul style="list-style-type: none"> • New Boundary Treatments where affected • Access reinstated to facilitate HGV access • Agricultural Access to severed Portions
27	Residential	<ul style="list-style-type: none"> • GLDR affects eastern portions of property • Very minor works required to ensure level tie-in of entrance to new works 	<0.1	<ul style="list-style-type: none"> • New Boundary Treatments where affected • Minor Entrance works
28	Agricultural	<ul style="list-style-type: none"> • GLDR passes through property • Western portions of property affected by works at Enniskerry Road/GLDR junction 	0.6	<ul style="list-style-type: none"> • New Boundary Treatments where affected • Agricultural Access to severed Portions
29	Residential	<ul style="list-style-type: none"> • Southern portion of parcel affected by widening of Glenamuck Road 	<0.1	<ul style="list-style-type: none"> • New Boundary Treatments where affected
30	Residential	<ul style="list-style-type: none"> • Southern portion of parcel affected by widening of Glenamuck Road 	<0.1	<ul style="list-style-type: none"> • New Boundary Treatments where affected

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.

17.5 Mitigation Measures

This section describes measures to mitigate the adverse impacts on land use and property. The assessment does not consider at this stage measures such as compensation for land acquisition and disturbance which will mitigate economic impacts on affected properties. These matters will be agreed with landowners or their representative(s) once approval for the development has been granted. In the event that agreement is not possible, such compensation will be decided upon by a property arbitrator. The TII/NRA's "Project Management Guidelines" and "Guide to Process and Code of Practice for National Road Project Planning and Acquisition of Property for National Roads" will be applied with respect to all lands potentially impacted by the proposed works.

During the construction phase, site management measures including the provision of high quality hoarding/temporary fencing and proactive communication with residents, business and public regarding phasing, extent and duration of works will be carried out. Traffic management at intersections with existing road will be proactively managed to mitigate disturbance to local traffic and transport movements. Access to all properties will be maintained during the construction phase with the exception of essential short term restrictions. Signage will be provided as necessary. Additional requirements for construction stage management are set out in Chapter 5.

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 severed agricultural land portions. Locations will be agreed with relevant landowners subject to engineering constraints
- Boundary treatments will typically be as per TII Standard Construction Details (SCDs) and as agreed with affected 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 proposed works.

- Any services that are interfered with as a result of the road development will be repaired / replaced without unreasonable delay.

Signal controlled pedestrian & cyclist crossings will be provided at regular intervals along the roads scheme to mitigate against community severance. Crossings provided include

- Push Button Crossing on GLDR (approx. Sta 1700) . Facilitates movements across GLDR at its link to Enniskerry Road South.
- Push Button Crossing at Barnaslingan Lane. Facilitates movements from Barnaslingan Lane to Kiltiernan Village and movements between family unit affected by roads scheme at this location
- Signalized Crossing at Ballycorus Road / GLDR Junction. Facilitates movements across all junction arms and movements between family unit affected by roads scheme at this location
- Push Button Crossing on GLDR (approx. Sta 950) . Facilitates movements across GLDR. Location aligned to LAP indicative greenway link and potential future connection to Kiltiernan Village center
- Push Button Crossing on GLDR (approx. Sta 600) . Facilitates movements across GLDR. Location aligned to assist pedestrian movements to Wayside Celtic Facility, traveller accommodation and open space zoning
- Signalized Crossing at Glenamuck Road/ GLDR junction. Facilitates movements across all junction arms
- Signalized Crossing at Glenamuck Road/ GLDR junction. Facilitates movements across all junction arms
- Signalized Crossing at GDDR/ GLDR junction. Facilitates movements across all junction arms
- Signalized Crossing at GDDR/ Enniskerry Road junction. Facilitates movements across all junction arms
- Push Button Crossing on GDDR at Golf Lane Roundabout . Facilitates movements across GDDR
- Push button crossing on Glenamuck Road West (approx. STA 200). Facilities crossing of Glenamuck Road

Specific mitigation measures identified in Table 17-3 will also be provided as part of the works.

17.6 Residual Impacts

17.6.1 Construction Phase

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.

17.6.2 Operational Phase

In the long term the Proposed Project is expected to have an overall significant positive effect for the area as detailed in this chapter and complementary chapters.

17.7 References

- Central Statistics Office (2016) Census 2016. Ireland. Available from: <https://www.cso.ie/en/census/census2016reports/>;
- Dún Laoghaire Rathdown County Council. (2016) Dún Laoghaire Rathdown County Development Plan 2016-2022. Dublin. Available at: <https://www.dlrcoco.ie/en/planning/county-development-plan/county-development-plan-2016-2022>;
- Dún Laoghaire Rathdown County Council (2018) Dún Laoghaire Rathdown Planning Search Map. Available at: <https://dlrcocouncil.maps.arcgis.com/apps/webappviewer/index.html?id=2e098c7da88e4831877d7e06de49b912#>;
- Dún Laoghaire Rathdown County Council (2018) Dún Laoghaire Rathdown Planning Search. Available at: <http://planning.dlrcoco.ie/swiftlg/apas/run/WCHVARYLOGIN.display>; and
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18 Material Assets-Land Use and Property

18.1 Introduction

This chapter describes the material assets in the form of utilities that could potentially be impacted by the Proposed Project.

Richard Hamilton is a chartered Town Planner with over 20 years experience, a member of the Irish Planning Institute and the Royal Town Planning Institute. He is a Director in Future Analytics Consulting (FAC) which provides consultancy services in Planning, Research and Economics. Relevant EIA experience includes the M1 Motorway Service Areas-EIS for the NRA 2011; Profile Park, Grangecastle Masterplan and EIS, South Dublin (2005 – 2006), Lidl Regional Distribution Centre, Newbridge, Kildare – Planning Application and EIS (2015/2016), College Green Plaza EIAR (2017), Dublin Airport, Northern Parallel Runway EIS (2005 – 2007), and Luas light rail Dublin (lines A and B) EIA.

Material assets are defined in the EPA Draft Guidelines on Information to be contained in Environmental Impact Assessment Reports (EPA, 2017) as:

‘The meaning of this factor is less clear than others. In Directive 2011/92/EU it included architectural and archaeological heritage. Directive 2014/52/EU includes those heritage aspects as components of cultural heritage. Material assets can now be taken to mean built services and infrastructure. Traffic is included because in effect traffic consumes road infrastructure. Sealing of agricultural land and effects on mining or quarrying potential come under the factors of land and soils.’

The purpose of this section is to assess the impacts of the proposed utilities on the existing utility network which includes the following infrastructure;

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

Other material assets of human origin are addressed in Chapter 17 ‘Material Assets: Land Use and Property’.

Material assets of natural origin are addressed in other chapters of this EIAR namely, Chapter 11 ‘Archaeological, Architectural and Cultural Heritage’, Chapter 13 ‘Land and Soils’ and Chapter 15 ‘Resource and Waste Management’.

The Proposed Project is described in detail in Chapter 5, ‘Description of the Proposed Scheme’, and indicative construction methodology is also outlined in Chapter 5.

18.2 Assessment Methodology

18.2.1 Study Area

A description of the existing environment of the study area is given in Chapter 5 'Description of the Proposed Scheme'.

18.2.2 Identification of Utilities

FAC were commissioned by Dún Laoghaire-Rathdown County Council (DLRCC) to carry out a utilities investigation of the main proposed area of works.

The scope of the investigation consists of mapping underground infrastructures, by analysing utilities maps from all service providers in the area. A detailed underground utility and ground penetrating radar survey was also carried out along the proposed road route to verify mapped services and identify any unmapped services. Slit trenches were excavated along all roads intersected by the scheme to physically identify and survey utilities encountered.

18.2.3 Significance Criteria

Significance criteria for impacts on utilities are set out in Chapter 1 'Introduction'.

18.3 Baseline Environment

There is an extensive network of utilities of a variety of companies, which provide services to domestic, commercial and industrial customers across this relatively rural area. The majority of utilities are buried beneath public roads with numerous local connections branching from the main trunk services. There are also significant overhead utilities in the area.

The following sections describe the general utility network infrastructure in the area.

18.3.1 Electricity

There is both high voltage transmission lines and local distribution infrastructure in the area with a mix of overhead and underground cables. The following cables are located throughout the overall area with a smaller map provided below in Figure 18.1;

- Black-38KV and Higher Voltage Overhead Lines;
- Green-MV (10KV/20KV) Overhead Lines;
- Blue-LV (400V/230V) Overhead Lines;
- Cyan-38KV and Higher Voltage Underground Cable Routes; and
- Red-MV/LV (10KV/20KV/400V/230V) Underground Cable Routes.

High voltage overhead infrastructure consists of the Arklow – Carrickmines 220kV Double Circuit Route and the Carrickmines – Fassaroe 110 kV line.

In general distribution infrastructure follows existing roads and will therefore be affected primarily at the junctions with the proposed scheme.

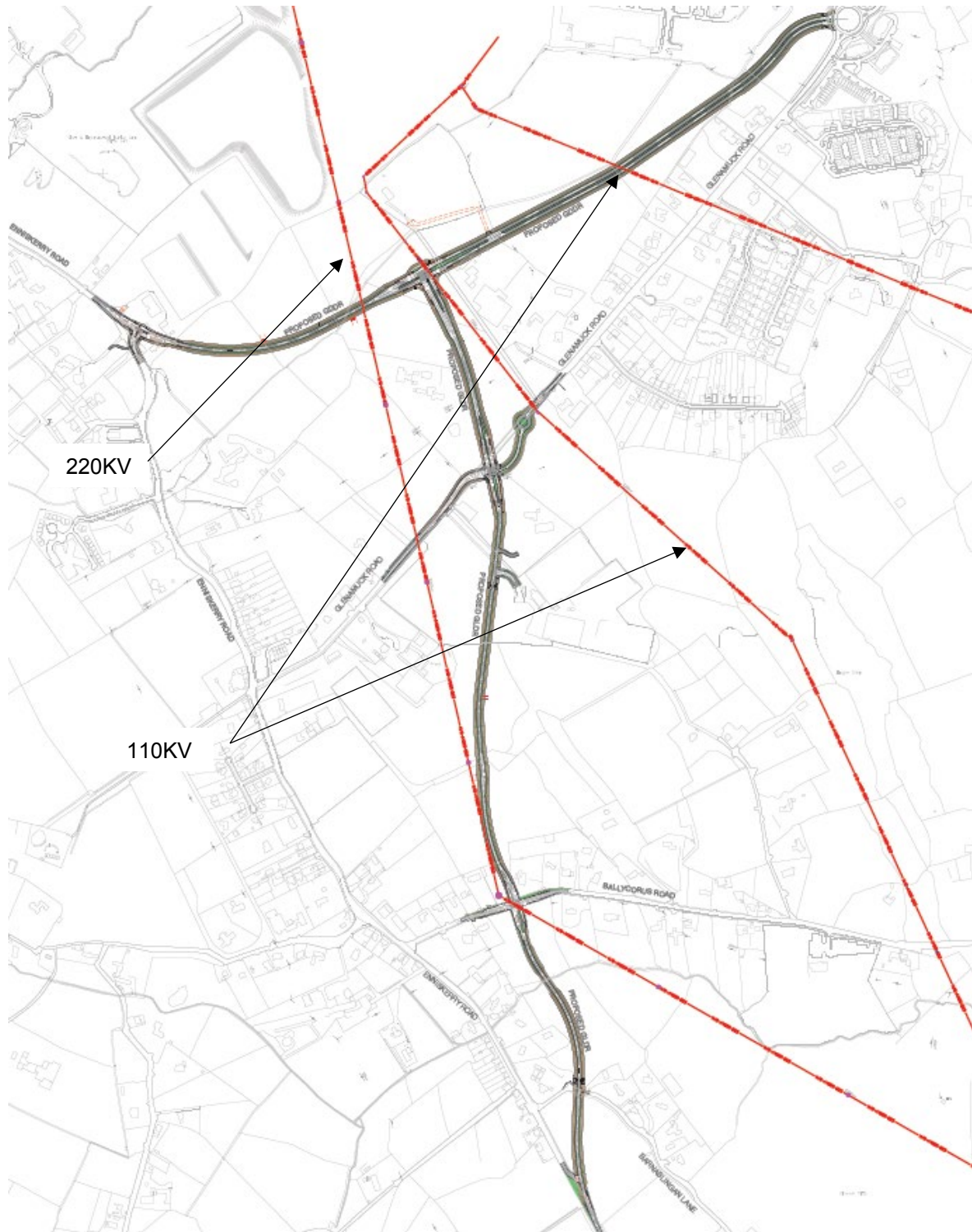


Figure 18-1 High Voltage ESB infrastructure in the vicinity of the GDRS

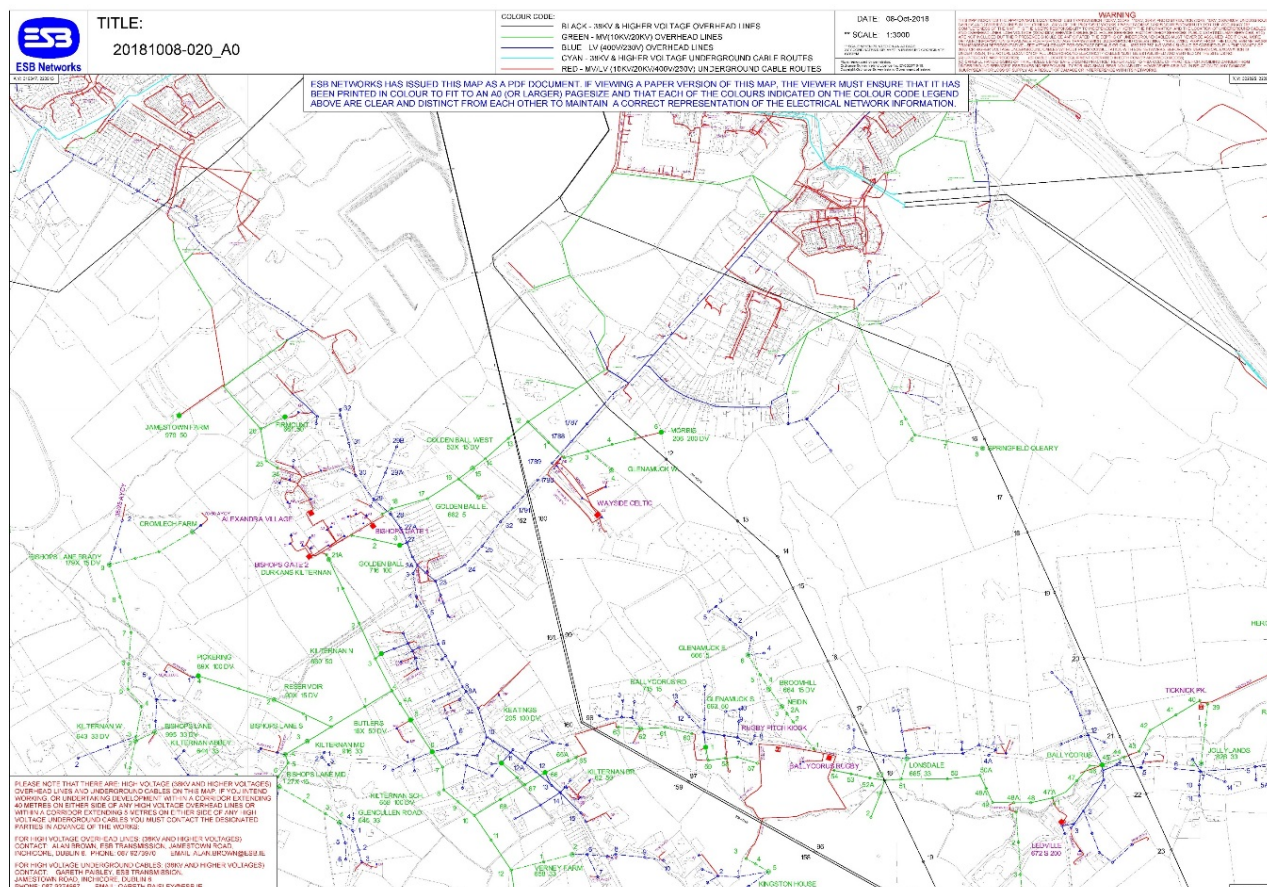


Figure 18-2 Overall ESB infrastructure in the vicinity of the GDRS
 (Source: ESB Networks)

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.

Diversion of the 220kV line at Ballycorus Road was proposed as part of the original scope of the roads scheme. This would require the addition of at least two new 220kV angle pylons and would result in significant cost and visual impact as well as serious disruption to the regional electrical transmission network.

A solution has been developed which delivers the road while maintaining the existing pylons in place. This is subject to final agreement with Eirgrid (Transmission System Operator), ESBN (Transmission Asset Owner) and ESBI (Consultant to Eirgrid and ESBN) however it has been confirmed that the preliminary design is acceptable.

The feasibility of undergrounding 110kV in the vicinity of the scheme has been explored with relevant stakeholders. It has been confirmed that current policy is for 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 would facilitate the future undergrounding of the line(s) along the route of the proposed roads.

18.3.2 Water

There are a number of Irish Water watermains in the vicinity of the proposed scheme with an extract provided below. Watermain infrastructure potentially affected by the scheme include;

- Two watermains (200mm & 300mm) on Enniskerry Road North;
- 300mm watermain (laid as part of Serviced Land Initiative [SLI]) which roughly parallels the GDDR;
- Watermain infrastructure along the Glenamuck Road (size varies);
- 75mm Watermain along the Ballycorus Road; and
- 200mm watermain along the Enniskerry Road South.

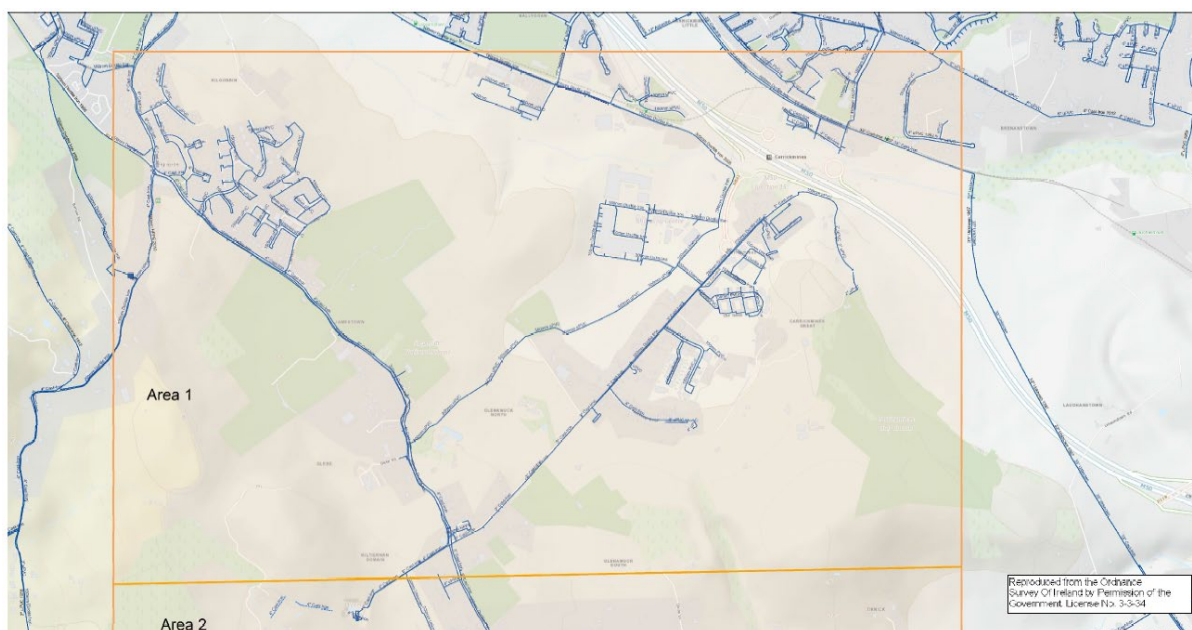


Figure 18-3 Existing Watermain Infrastructure in the vicinity of the GDRS (North)

(Source: DLRCC)

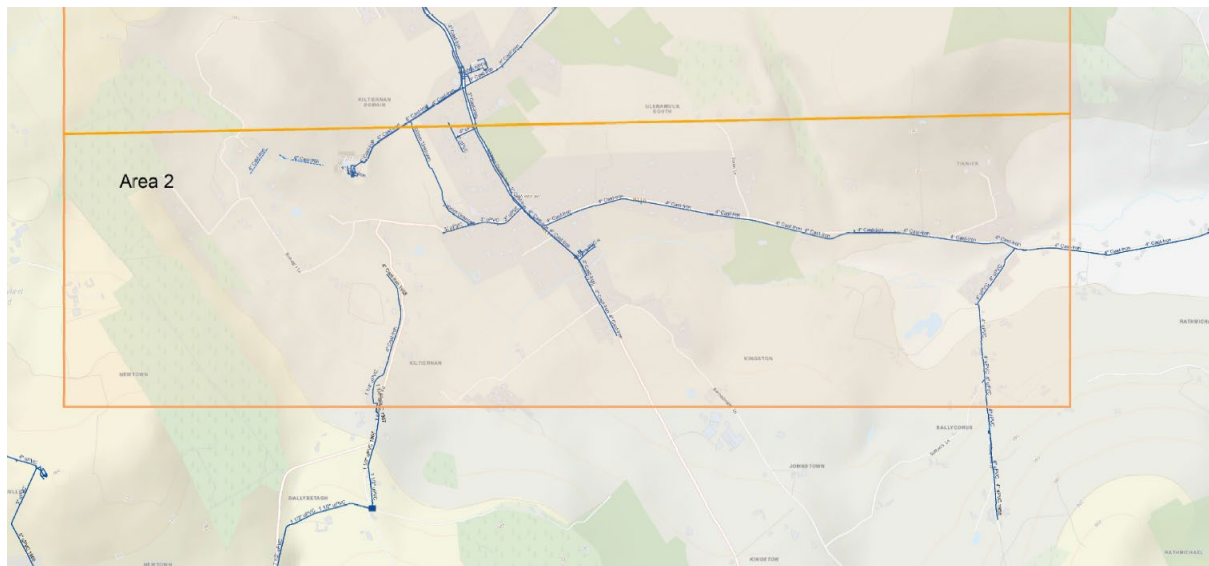


Figure 18-4 Existing Watermain Infrastructure in the vicinity of the GDRS (South)
(Source: DLRCC)

18.3.3 Storm Water Drainage

There are existing storm water networks in the vicinity of the proposed scheme with an extract provided below. It is noted that much of the local area is drained by existing watercourses, refer to Chapter 14 for details on local watercourses and hydrology. Storm Drainage infrastructure potentially affected by the scheme include;

- Existing piped and open roadside ditches on Glenamuck Road;
- Existing ditches and surface flow paths along other affected roads; and
- Existing unmapped agricultural drainage.

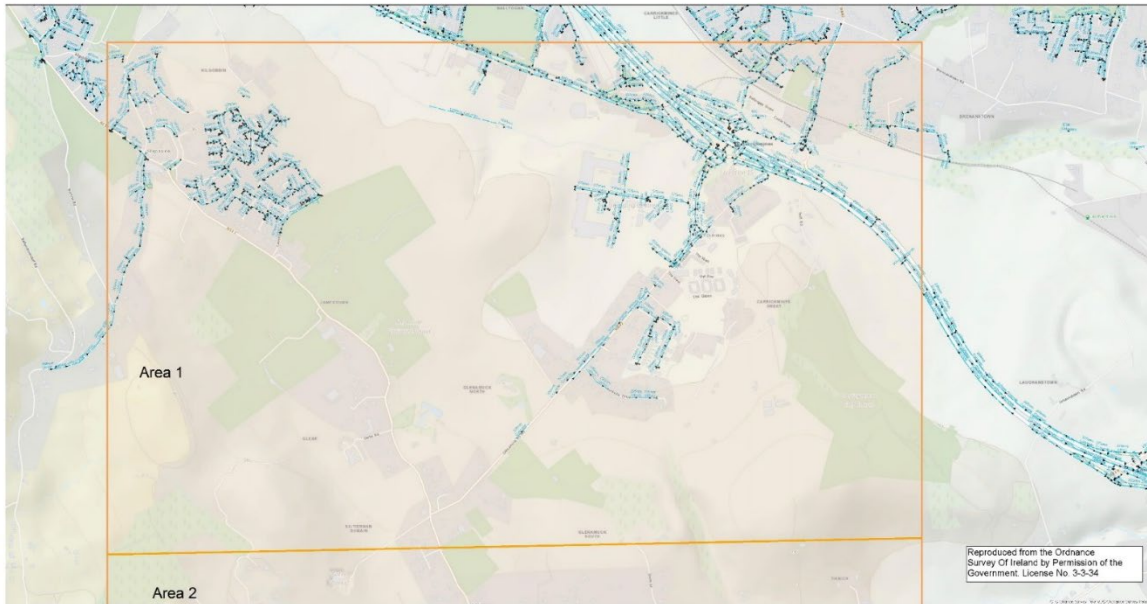


Figure 18-5 Existing Stormwater Infrastructure in the vicinity of the GDRS (North)
(Source: DLRCC)

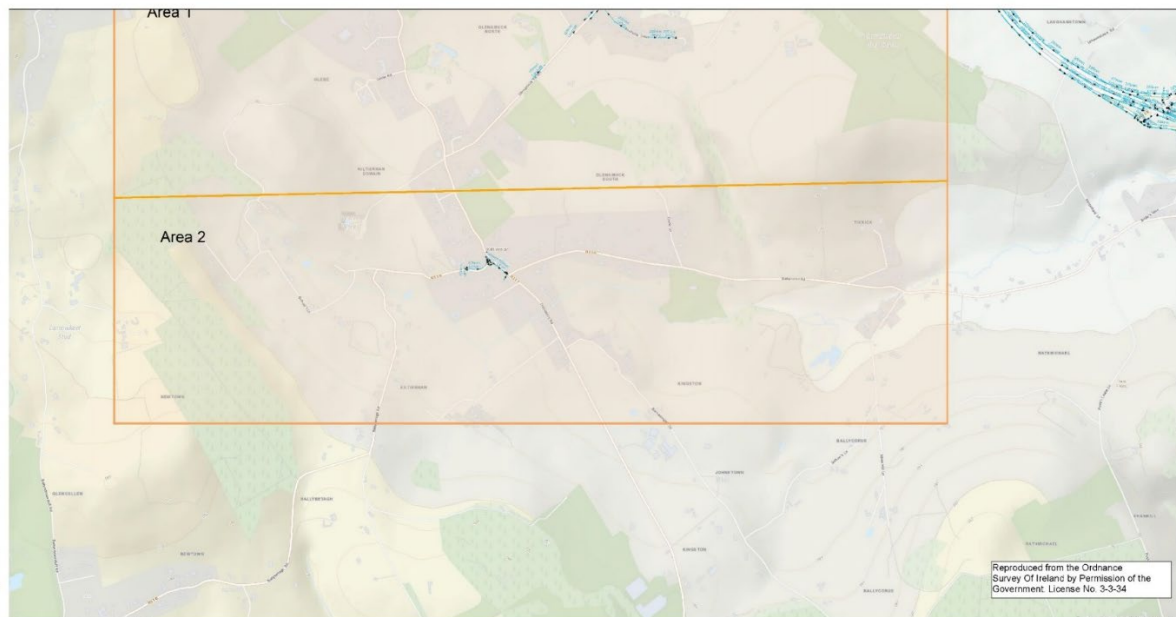


Figure 18-6 Existing Stormwater Infrastructure in the vicinity of the GDRS (South)
(Source: DLRCC)

18.3.4 Foul Sewers

There are a number of Irish Water foul sewers in the vicinity of the proposed scheme with an extract provided below. Foul Sewer infrastructure potentially affected by the scheme include;

- 375mm-525mm sewer (laid as part of Serviced Land Initiative (SLI)) which roughly runs in parallel to the GDDR;
- 300mm-375mm sewer along the Glenamuck Road;
- 225mm sewer at Golf Lane Roundabout; and
- 525mm sewer along the Enniskerry Road South.

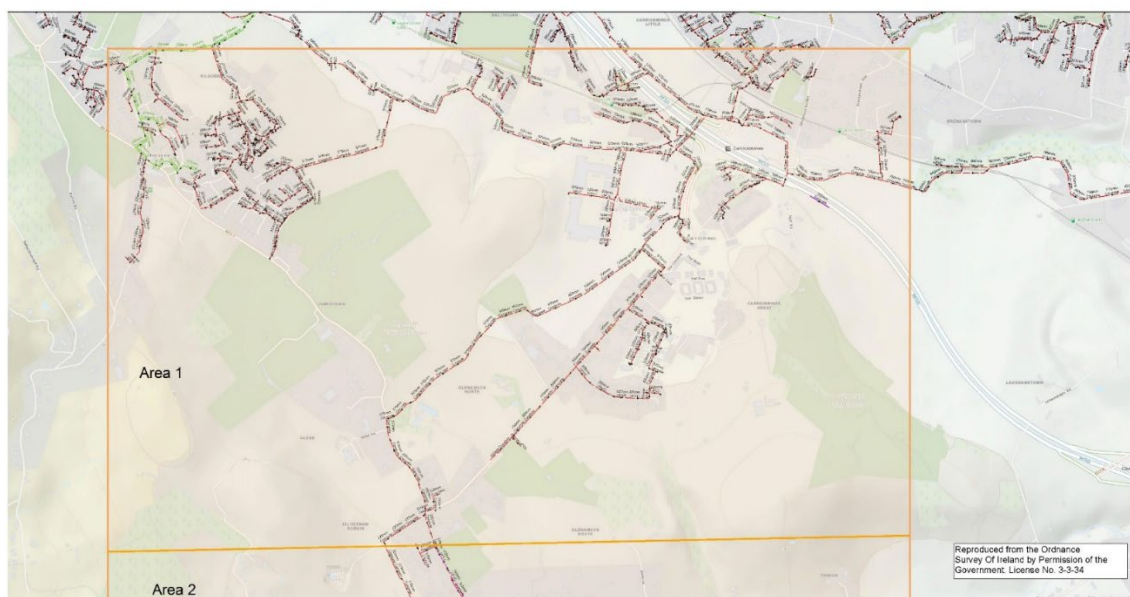


Figure 18-7 Existing Foul Sewer Infrastructure in the vicinity of the GDRS (North)

(Source: DLRCC)



Figure 18-8 Existing Foul Sewer Infrastructure in the vicinity of the GDRS (South)
(Source: DLRCC)

18.3.5 Gas

According to the utilities map from Gas Networks Ireland, there is a medium pressure distribution pipe along the Glenamuck Road and Enniskerry Road South in addition to feeds to various local developments.

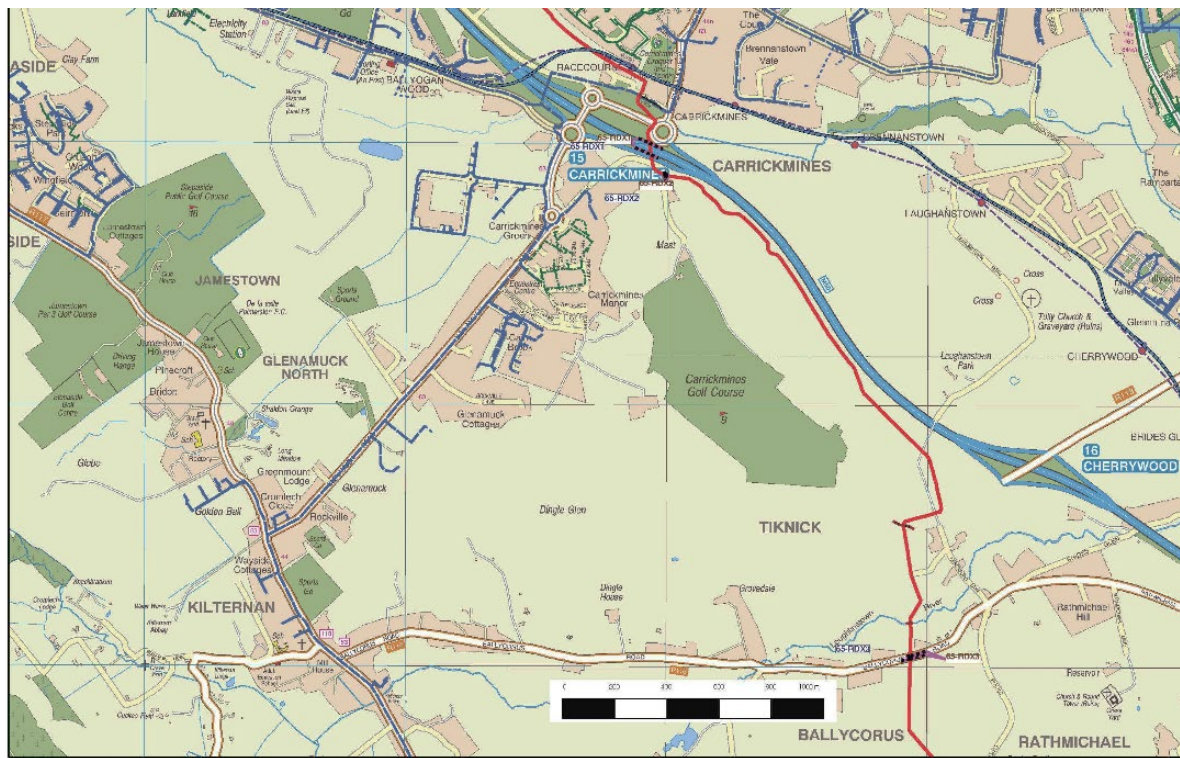


Figure 18-9 Existing Gas Infrastructure in the vicinity of the GDRS
(Source: Gas Networks Ireland)

18.3.6 Telecommunications

Eir and Virgin Media both have infrastructure in the vicinity of the scheme. There is significant infrastructure in the vicinity of the roundabout at Carrickmines and additional services along the existing Enniskerry Road, Glenamuck Road, Ballycorus Road and Barnaslingan Lane. Figure 18-7 and 18-8 below highlight infrastructure in the vicinity of the scheme.

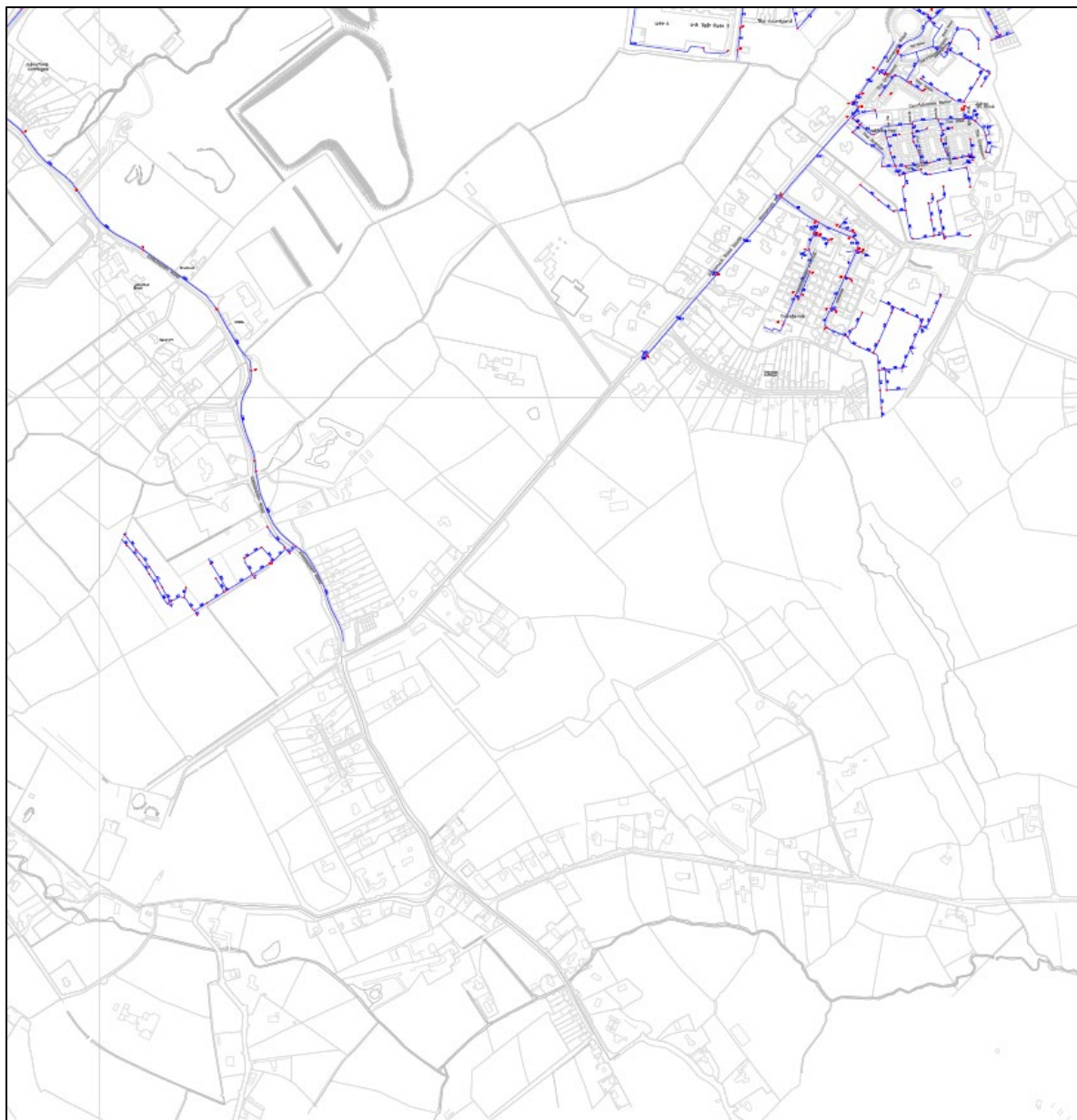


Figure 18-10 Virgin Media Infrastructure in the vicinity of the GDRS
(Source Virgin Media)

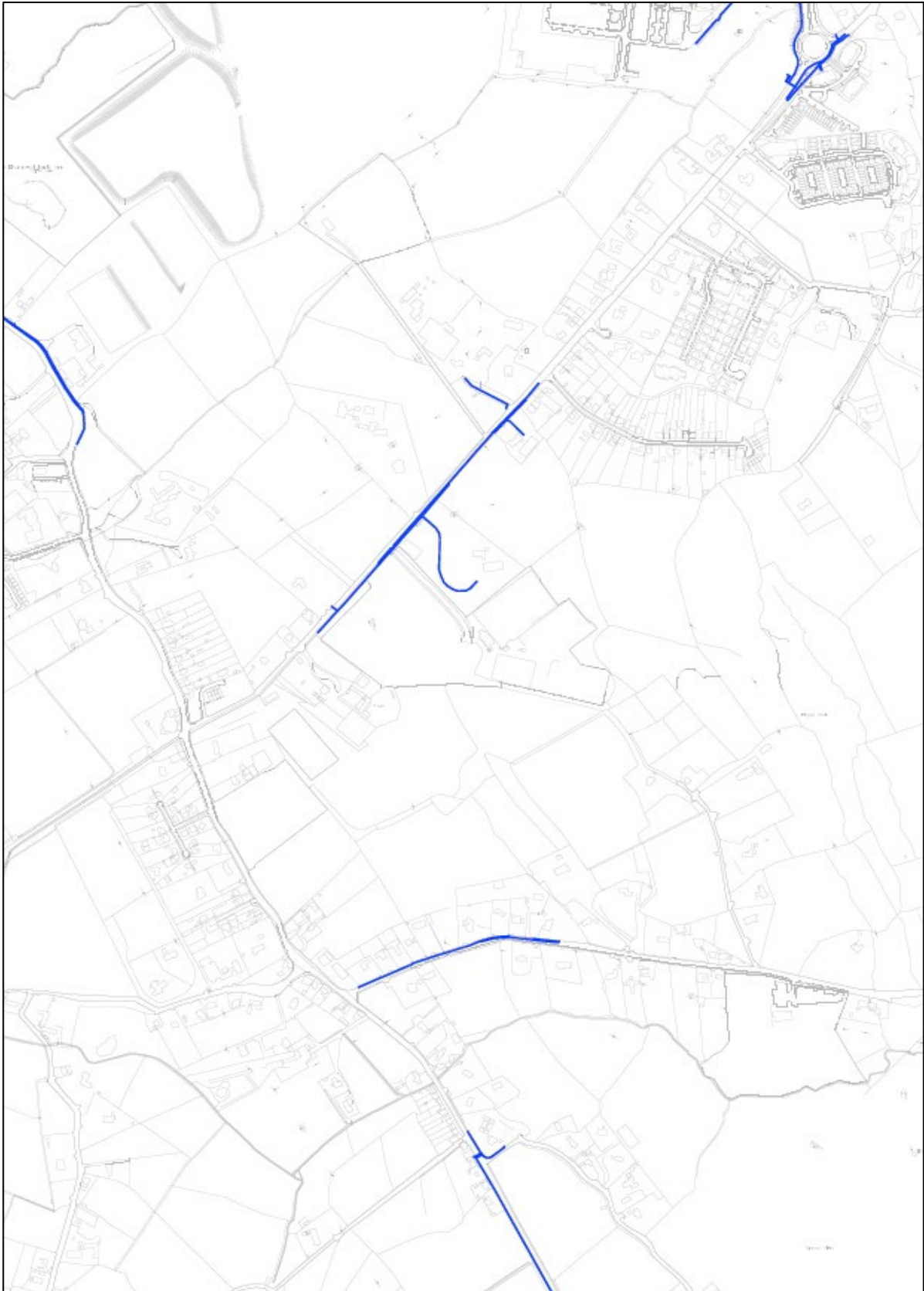


Figure 18-11 Eir Infrastructure in the vicinity of the GDRS
(Source Eir - Infrastructure only shown at Interface Points)

18.4 Predicted Impacts

18.4.1 Electricity

Some local diversions may be required to power supplies to accommodate the construction works which may require temporary outages. This is anticipated to result in a slight, negative and short-term impact.

Power will be required for the construction activities, for temporary lighting and temporary signals required during construction works. The power demands during the construction phase on the existing electricity network are considered to be a slight, negative and short-term impact.

Power will be required to provide public lighting, information displays, traffic signals etc. for the operational phase of the road. The power demands during the operational phase on the existing electricity network are considered to be imperceptible.

The scheme will facilitate utility providers installing new and upgraded infrastructure within the scheme corridor which will provide a moderate positive impact to the local utility network.

18.4.2 Water

Some local diversions may be required to water supplies to accommodate the construction works which may require temporary outages. This is anticipated to result in a slight, negative and short-term impact.

The Contractor will require a separate water supply connection for the construction activities. The water demands during the construction phase on the existing water supply network are considered to be slight, negative and short-term impact.

The scheme will facilitate Irish Water installing new and upgraded infrastructure within the scheme corridor which will provide a moderate positive impact to the local network.

18.4.3 Foul Sewers

Existing networks may require local works to accommodate the construction of the scheme. The Contractors operations have the potential to result in the generation of effluent and sanitary waste from facilities provided for the workforce on site. This is anticipated to result in a slight, negative and short-term impact.

The scheme will facilitate Irish Water installing new and upgraded infrastructure within the scheme corridor which will provide a moderate positive impact to the local network.

18.4.4 Surface Water Drainage

Existing networks may require local works to accommodate the construction of the scheme. This is anticipated to result in a slight, negative and short-term impact. Construction impact on the overall surface water environment is addressed in Chapter 14.

The scheme will provide new and upgraded infrastructure with regional attenuation measures within the scheme corridor which will provide a moderate positive impact to the local network.

18.4.5 Gas

Some local diversions may be required to gas supplies to accommodate the construction works which may require temporary outages. This is anticipated to result in a slight, negative and short-term impact.

No new gas mains or additional gas supply is required during the construction phase of the Proposed Project.

The scheme will facilitate utility providers installing new and upgraded infrastructure within the scheme corridor which will provide a moderate positive impact to the local utility network.

18.4.6 Telecommunications

Some local diversions may be required to telecommunication supplies to accommodate the construction works which may require temporary outages. New telecommunications services will be required for the construction phase and operational phase (for traffic signals etc). This is anticipated to result in a slight, negative and short-term impact.

The scheme will facilitate utility providers installing new and upgraded infrastructure within the scheme corridor which will provide a moderate positive impact to the local utility network.

18.5 Mitigation Measures

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 into the new road construction. The majority of major utility 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.

Due to the measures already incorporated in the design, no mitigation measures for utilities will be necessary during the operational phase.

18.6 Residual Impacts

Following implementation of mitigation measures outlined in Section 18.5, the residual impact on utility services is considered to be imperceptible.

18.7 Difficulties Encountered

There were no significant difficulties encountered with the exception of local access issues detailed elsewhere in this report.

18.8 References

- EPA (2017) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, Draft August 2017. Johnstown Castle estate, Wexford, Ireland;
- ESB (2018) ESB Networks Utilities Map. Dublin Ireland;
- Gas Networks Ireland (2018) Gas Networks Ireland Utilities Map. Dublin, Ireland;
- Irish Water (2018) Irish Water (Dún Laoghaire-Rathdown County Council) Utilities Maps-Water, Drainage and Foul Sewer. Cork/Dublin, Ireland;
- Eir (2018) Eircom/Eir Utilities Map in relation to Broadband. Dublin, Ireland;
- Virgin Media (2018) Utilities Map in relation to Broadband. Dublin, Ireland.

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19 Interactions and Cumulative Effects

19.1 Introduction

In addition to the assessment of impacts on individual topics presented in the previous chapters of this Environmental Impact Assessment (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.

19.2 Assessment Methodology

19.2.1 Statutory Requirements

The requirements to address interactions of effects and cumulative impacts is set out in Council Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment. This Directive has been amended by Council Directive 97/11/EC, Directive 2003/35/EC and Directive 2009/31/EC and is now codified in Directive 2011/92/EU which has now been amended in 2014 by Directive 2014/52/EU.

Article 3 of the EIA Directive outlines the information to be contained in an EIAR as follows;

"The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

(a) population and human health;

(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;

(c) land, soil, water, air and climate;

(d) material assets, cultural heritage and the landscape; and

(e) the interaction between the factors referred to in points (a) to (d)."

The aforementioned Directive are transposed into Irish Legislation through the Planning and Development Regulations 2018.

19.2.2 Guidance

This chapter has been prepared in accordance with the following guidelines;

- EPA (2017) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, Draft, August 2017.
- EPA (2015) Revised *Guidelines on the Information to be contained in Environmental Impact Statements*, Draft, 2015;
- EPA (2015) *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements*, Draft, 2015; and
- EPA (2002) Guidelines on the Information to be contained in Environmental Impact Statements, 2002;
- EPA (2003) *Advice Notes on Current Practise in the Preparation of Environmental Impact Statements*, 2003.
- European Commission Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions.

19.2.3 Assessment Methodology

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.

19.3 Interaction of Effects

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 interactions between the various parameters outlined in this EIAR from Chapters 7 to 18, inclusive.

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							✓					✓

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 significant potential for an effect, or if the interaction is more relevant to a different issue pair, the box will be left blank.

The purpose of the effects matrix is to identify potential significant effects on different environmental issue. Actual effects and their significance are dealt with in the most relevant chapter.

This assessment was based on information contained within this EIAR, the outcome of workshops and consultation with the relevant sub-consultants. The main environmental interactions anticipated as they relate to the Proposed Project are also summarised in the following sections.

Interaction of Traffic and Transportation & Air Quality And Climatic Factors

The interaction between air quality and traffic is considered important. The proposed development will result in a change in traffic levels causing a change in ambient air pollution levels in certain areas along the scheme. The proposed scheme will divert traffic away from some heavily congested areas and thus have a beneficial impact on air quality. However, ambient pollutant concentrations will increase in areas that did not experience high volumes of traffic prior to the scheme resulting in a negative impact. Overall, the impact of the interaction between air quality and traffic is considered long-term, slight negative and not significant. Refer to the relevant chapters for additional information.

Interaction of Traffic and Transportation & Noise and Vibration

The noise emission sources from the proposed road development during the operational phase will be from traffic. The noise impact assessment has been prepared in consultation with the design team and traffic engineers. Noise emissions have the potential to negatively impact on human beings, population and human health. Traffic noise levels have been calculated at noise sensitive buildings along the length of the proposed road development and mitigation has been identified for a number of properties. The mitigation measures required to reduce traffic noise levels are specified based on the predicted noise levels for the Design Year of 2035. Refer to the relevant chapters for additional information.

Interaction of Traffic and Transportation & Biodiversity

The presence of the road infrastructure and traffic flows can have impacts on biodiversity including physical land take of habitat, severance of commuting or feeding routes and direct mortality. Chapter 10 Biodiversity sets out a range of mitigation measures which include preconstruction surveys, mammal crossings at key wildlife corridors, mammal shelves at watercourse crossings, habitat compensation, bat sensitive lighting and bat roosting boxes. Refer to the relevant chapters for additional information.

Interaction of Traffic and Transportation & Land & Soils

The volumes of surplus soils generated by the scheme and the earthworks import requirement will affect construction stage traffic generation. Measures to optimise design and minimise material

generation are detailed in Chapter 5, Chapter 13 & Chapter 15. Measures to mitigate against construction stage traffic impacts are detailed in Chapter 5 and Chapter 7.

Interaction of Traffic and Transportation & Water and Hydrology

Construction and operational stage traffic have the potential to impact on water quality via hydrocarbon spills and leaks and via increased sediment/particle loading on trafficked surfaces. Measures to mitigate against impacts are detailed in Chapter 5 and Chapter 14.

Interaction of Traffic and Transportation & Resource and Waste Management

Construction and operational stage traffic have the potential to be impacted by waste generation and resource management on site. Measures to mitigate against impacts are detailed in Chapter 5, Chapter 14 and Chapter 15.

Interaction of Traffic and Transportation & Population and Human Health

Construction and operational stage traffic and traffic management measures have the potential to affect journey amenity or economic activity as a result of increased congestion or access restrictions. Interactions on human health as a result of traffic generated air and noise pollution are detailed above and within the relevant chapters

The upgraded infrastructure provided as part of the scheme can facilitate growth in population and increased infrastructure for sustainable travel modes can contribute towards modal shift in travel patterns and increased physical activity. The scheme provides increased access to local attractions by virtue of reduced congestion. Employment and economic activity will be generated during the construction stage of the project. Refer to the relevant chapters for additional information.

Interaction of Traffic and Transportation & Material Assets – Land Use and Property

Construction and operational stage traffic and traffic management measures have the potential to affect local journey duration, journey time reliability and journey patterns for all forms of transports (private vehicle, public transport, pedestrian, cyclist etc.). Impacts may be positive or negative. Impact magnitude will be influenced by changes to journey length or duration, transport modes affected and alternatives available

The presence of new roads may physically sever land parcels or access routes. Changes to traffic loads may tend to either increase or decrease severance caused by traffic loading. For example the significant reduction in traffic flows on Glenamuck Road east of the Bus gate and Enniskerry Road through Kiltiernan will reduce the severance caused by the heavy traffic load on these existing routes. The land take of the road and any associated works will also have an economic impact on affected properties.

Refer to the relevant chapters for additional information.

Interaction of Air Quality And Climatic Factors & Land and Soils

Exposed soils during the construction stage have the potential to generate nuisance dust during dry periods. Chapter 13 and Chapter 8 set out mitigation measures for soils handling and for construction

stage dust management. The mitigation measures that will be put in place at the proposed development for the construction phase will ensure that the impact of construction dust emissions are short-term and negative but overall imperceptible.

Interaction of Air Quality And Climatic Factors & Population and Human Health

The mitigation measures that will be put in place at the proposed development for the construction phase will ensure that the impact of construction dust emissions in the form of nuisance dust soiling or human health effects are short-term and negative but overall imperceptible.

Air dispersion modelling of operational traffic emissions was undertaken to assess the impact of the scheme with reference to EU ambient air quality standards which are based on the protection of human health. As demonstrated by the modelling results, emissions as a result of the proposed scheme are compliant with all National and EU ambient air quality limit values and, therefore, will not result in a significant impact on human health.

Interaction of Noise and Vibration & Land & Soils

Earthworks activities associated with the scheme have the potential to affect Noise and vibration. Excessive earthworks can generate noise resulting from earth moving plant. Interactions with bedrock can introduce the requirements for pneumatic breaking of rock or blasting, based on site investigation results and the generally shallow depth of earthworks on the scheme there are only anticipated to be local construction interactions with bedrock which can be completed in line with mitigation measures set out in the relevant chapters. Measures to optimise design and minimise material generation are detailed in Chapter 5 and Chapter 13. Measures to mitigate against noise and vibration impacts are detailed in Chapter 9.

Interaction of Noise and Vibration & Population and Human Health

Earthworks activities associated with the scheme have the potential to affect Noise and vibration. Excessive earthworks can generate noise resulting from earth moving plant. Interactions with bedrock can introduce the requirements for pneumatic breaking of rock or blasting, based on site investigation results and the generally shallow depth of earthworks on the scheme there are only anticipated to be local construction interactions with bedrock which can be completed in line with mitigation measures set out in the relevant chapters. Measures to optimise design and minimise material generation are detailed in Chapter 5 and Chapter 13. Measures to mitigate against noise and vibration impacts are detailed in Chapter 9.

Interaction of Biodiversity & Landscape and Visual

Ecological mitigation measures entail planting of native species to mitigate any loss of trees from the scheme extents. Planting of these species can also be incorporated into the mitigation measures for Landscape and Visual by reducing impacts on the surrounding environment during the operational phase. Ecological mitigation measures will create a positive effect on the landscape and reduce visual impacts on sensitive receptors.

Interaction of Biodiversity & Water and Hydrology

Silts, suspended solids, oils and chemicals entering water environment have the potential to adversely affect water quality, with associated effects to fish and aquatic ecology. Unsuitable culvert/channel sizing or installation can affect movement of fish or mammals along the watercourse corridor. Mitigation measures are described in Chapter 14 and include pollution control methods, water quality treatment measures and compliance with best practice procedures. Culverts will be designed to be fish and mammal passable.

Interaction of Archaeological, Architectural and Cultural Heritage & Landscape/Townscape & Visual

These topics have some close relationships in that Architectural and Cultural Heritage elements influence the townscape and views experienced. Mitigation measures outlined in Chapter 11 and Chapter 12 are often therefore applicable to both topics.

Interaction of Landscape/Townscape & Material Assets: Land Use and Property

The landscape character and existing views in the area will change during both the construction and operational phases of the proposed road development. This impact has the potential to interact with people, both in terms of landscape and visual impacts where they live, work and their use and “experience” of surrounding amenities. Mitigation measures outlined in Chapter 12 will therefore also be applicable to Material Assets and Land use.

Interaction of Land and Soils & Water and Hydrology

The landscape character and existing views in the area will change during both the construction and operational phases of the proposed road development. This impact has the potential to interact with people, both in terms of landscape and visual impacts where they live, work and their use and “experience” of surrounding amenities. Mitigation measures outlined in Chapter 12 will therefore also be applicable to Material Assets and Land use.

Interaction of Land and Soils & Resource & Waste Management

The volumes of surplus soils generated by the scheme and the earthworks import requirement will affect waste generation. Measures to optimise design, minimise material generation and manage waste are detailed in Chapter 5, Chapter 13 & Chapter 15.

Interaction of Land and Soils & Material Assets Utilities

Earthworks associated with the scheme have the potential to affect existing underground and aboveground services. Various existing services will be required to be diverted as a result of the scheme. Measures to mitigate against impacts on utilities are described in Chapter 5, Chapter 13 & Chapter 18.

Interaction of Water and Hydrology & Population and Human Health

Contamination of the water environment has the potential to affect human health through impacts on downstream drinking water abstractions. The linkages from the local water environment to drinking water sources has been determined in chapter 14 and no significant downstream potable abstractions have been identified. Measures to mitigate against impacts on the water environment are described in Chapter 5 & Chapter 14.

Interaction of Population and Human Health & Material Assets: Land Use and Property

Primary impacts on population and human health due to material assets and land will entail landtake and impact on the property. Potential impacts on human beings as a result of material assets: land use and property will be mitigated by measures including the provision of new accesses and replacement boundaries to affected properties.

Monetary compensation will be subject to negotiation with all relevant parties from whom land or property is acquired for the proposed road development.

19.4 Cumulative Effects

The EU Guidelines define cumulative effects/impacts as:

“Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project. For Example;

- Incremental noise from a number of separate developments;*
- Combined effect of individual impacts, e.g. noise, dust and visual, from one development on a particular receptor; and*
- Several developments with insignificant impacts individually but which together have a cumulative effect.”*

The EPA draft guidelines on the information to be contained in EIAR’s mirrors this approach and 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 during the preparation of this EIAR. 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 landuse 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. In the absence of the GDRS scheme development in the area would be likely to progress on an ad-hoc basis without a coherent approach to sustainable mobility and transport. This cumulative assessment has considered cumulative impacts that are:

1. Likely;
2. Significant; and
3. Relating to an event which has either occurred or is reasonably foreseeable together with the impacts from this development.

A search in relation to plans and projects that may have the potential to result in cumulative impacts was carried out. Data sources included the following:

- Dún Laoghaire Rathdown County Council (planning and roads section);
- An Bord Pleanála website;

- Dún Laoghaire Rathdown County Development Plan 2016-2022;
- Kiltiernan-Glenamuck Local Area Plan 2013-2018 (extended for 5 years);
- EIAR Portal.

19.4.1 Road developments in the Area:

From the County Development Plan, the following relevant roads were identified as a six-year road development for the County;

- Cherrywood SDZ (necessary roads infrastructure as detailed in Cherrywood SDZ Planning Scheme);
- Cherrywood to Dún Laoghaire Strategic Route (R118, Wyattville Road to Glenageary Roundabout);
- Enniskerry Road (Stepaside to Glenamuck District Distributor Road);
- Glenamuck District Distributor Road;
- Glenamuck Local Distributor Road (including Ballycorus Link);
- Glenamuck Road South;
- Hillcrest Road;
- Kilgobbin Road (Mount Eagle to Ballyogan Road);
- Leopardstown Link Road Phase 1 and Roundabout Reconfiguration;
- M11 Upgrade (M50 to Fassaroe);
- Sandyford / Enniskerry Road (Coolkill to Aiken's Village);
- Shanganagh Road;
- The Park, Carrickmines to Ballyogan Road; and
- Woodbrook/Shanganagh Access Road.

The development process on each road is at different stages. There are a number of long term road developments which are referred to in Table 2.2.6 of the Development Plan. The Glenamuck Road is not dependent on road schemes outside the LAP area, and in turn does not restrict or limit other infrastructure investment outside the LAP area as a result of its implementation or non-implementation.

19.4.2 Other Road Plans located outside of Dún Laoghaire Rathdown

From all other documents available, the following plans and roads are undergoing Planning/Design/Construction within the area:

- N11/M11 Junction 4 to Junction 14 Improvement Scheme.

The scheme is located over 3.5km from the subject site and both schemes will only have a localized construction footprint. The M11/N11 scheme is at feasibility stage and construction stages of both would not be anticipated to overlap.

- Dublin BusConnects

The total estimated cost of this development is €2 billion euro with an estimated completion date of 2027. Dublin BusConnects will deliver a transformational redesign of the bus system in Dublin. It will comprise a network of 'next generation' bus corridors on the busiest routes with segregated cycling facilities, a complete redesign of the bus network, cashless and simpler fare structures, and state-of-the-art ticketing systems, account-based ticketing, new bus branding, integrating bus vehicles of different operators and types, new bus stops and shelters and use of low-emission vehicles. The development of this scheme will improve the overall GDRS scheme and vice versa. This plan is currently in planning stages and is not expected for completion for another 10 years.

19.4.3 Major Accidents and/or Disasters

As required in the Directive 2014/52/EU, this EIAR has looked at the effects on the environment in the event of major accidents and/or disasters relevant to the project, including those caused by climate change. It is considered that the main area of potential for major accidents and/or disasters relevant to the project are:

- Proximity to Seveso Sites;
There are no Seveso (COMAH) 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, is located approximately 15.0km north of the site. Therefore, there is no likely significant impact as a result.

19.4.4 Noise and Vibration

The cumulative traffic noise impacts associated with committed and proposed future developments have been assessed at each of the receptor locations considered as part of this assessment. During the Do-Nothing scenario, road traffic flows along the existing road network have been modelled and the cumulative traffic noise level calculated. For the modelled Do-Something scenarios, road traffic along the existing road network coupled with traffic along the proposed road development are combined to obtain a cumulative traffic noise level. The assessment takes account of any alignment alterations to the existing roads and junction and the re-distribution of traffic along the existing road network as a result of the proposed road development.

In this regard the cumulative road traffic noise impacts are incorporated into the calculated operational noise levels set out in Chapter 9, Table 9.8.

19.5 References

- European Commission (1999), guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions. European Commission, Luxembourg.
- Environmental Protection Agency (2017) Draft, Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. EPA. Wexford.
- Health and Safety Authority (2018) Notified Seveso Establishments. www.hsa.ie. Available from: https://www.hsa.ie/eng/Your_Industry/Chemicals/Legislation_Enforcement/COMAH/List_of_Establishments/.

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20 Summary of Mitigation Measures and Residual Impacts

20.1 Introduction

This chapter presents a summary of the key mitigation measures identified within Chapters 5 to 18 of this Environmental Impact Assessment Report (EIAR). Mitigation describes the measures proposed in order to avoid, reduce and where practicable remedy significant adverse effects. It is also a means by which design decisions for the Proposed Project are modified to avoid, reduce or remedy the adverse environmental effects that are identified.

Mitigation measures have been incorporated into the design of the Proposed Project and will be applied during the construction and operation of the Proposed Project. All mitigation measures are based on the Proposed Project as described in Chapter 5, 'Description of the Scheme. Individual chapters of the EIAR should be referred to for context and detail of specific mitigation measures however a summary has been presented in the tables below. The mitigation measures for both the construction and operational phases are detailed as appropriate.

The contractor appointed to construct the Proposed Project will be required to compile and maintain a Construction Management Plan.

20.2 Mitigation Measures

Table 20- 1: General Mitigation Measures (Chapter 5)

No.	Description
5.2.1	In order to ensure that the road design reflects DMURS guidance and 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" (Appendix 12.4). The analysis has resulted in variations in road cross sections, landscaping, and junction arrangement over the scheme to respond the surrounding characteristics and development types and better address pedestrian and cyclist integration with the road layout
5.2.2	A key aim of the scheme is to improve provisions for cyclists, pedestrians and other vulnerable road users. Generous pedestrian and cycle infrastructure has been provided In order to achieve a good 'modal share' for public transport and walking /cycling in the Plan area, appropriate priority measures at junctions are necessary. Bus gates have been provided which will provide priority and increased service quality and reliability for bus services within the area For the safety and convenience of vehicular road users, pedestrian and cyclists; road lighting will be provided along the proposed route Scheme signage will be provided to ensure that clear directional and regulatory messages are transmitted to drivers and other road users. The design of signage will be based on the Traffic Signs manual issued by the Department of the Environment

The infrastructure of a number of service providers is likely to be impacted by the Glenamuck District Roads Scheme. The provision of the proposed scheme shall ensure that there are no permanent disruptions to services provided by these bodies and that all temporary disruptions must be kept to a minimum. Utility providers will also be notified of the proposed works and offered the opportunity to incorporate new strategic infrastructure into the new road construction

Where an existing access is affected by the proposed road it will be modified to suit the road proposals or replaced with a suitable alternative

Prior to any demolition, excavation or construction, a Construction Management Plan (CMP) will be produced by the successful contractor to detail how the project is to be executed in accordance with all project, statutory and environmental requirements. The CMP should detail at a minimum;

- Working hours and days and construction schedule;
- Details of emergency plan - in the event of fire, chemical spillage, cement spillage, collapse of structures or failure of equipment or road traffic incident within an area of traffic management. The plan must include contact names and telephone numbers for: Local Authority (all sections/departments); Ambulance; Gardaí and Fire Services;
- Details of chemical/fuel storage areas (including location and bunding to contain runoff of spillages and leakages);
- Details of construction plant storage, chemical and fuel storage, temporary toilet
- Traffic management plan (to be developed in conjunction with the Local Authority Roads Section) including details of routing of network traffic; temporary road closures; temporary signal strategy; routing of construction traffic; programme of vehicular arrivals; on-site parking for vehicles and workers; road cleaning; other traffic management requirements;
- Site Compound locations & layouts.
- Erosion and Sediment Control Plan for surface water runoff and in stream works
- Truck wheel wash details (including measures to reduce and treat runoff);
- Dust management to prevent nuisance (demolition & construction);
- Noise and vibration management to prevent nuisance (demolition & construction);
- Landscape management;
- Stockpile locations;
- Temporary hoarding & lighting plans;
- Method Statements for diversion of services;
- Method Statements for Construction of pipelines;
- Method Statements for Storage, Treatment and transport of soft soils;

The production of the CMP will also detail areas of concern with regard to Health and Safety and any environmental issues that require attention during the construction phase.

Prior to the commencement of works the contractor will be required to prepare and submit a detailed site specific traffic management plan to be agreed with DLRCC and the appropriate emergency services. The scheme shall be constructed in a manner to minimise disruption to road users, local residents and businesses.

	In order to facilitate the integration of environmental issues into road scheme planning, construction and operation, an Environmental Operating Plan (EOP) shall be produced implemented and maintained by the contractor. This represents a best practice guide for considering the environment for the construction life cycle of a road scheme project. The EOP shall be designed to assist the main contractor in preventing, managing and/or minimising significant environmental impacts during the construction phase.
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Table 20- 2: Traffic and Transportation Mitigation Measures

No.	Description
7.2.1	Enforcement of a Construction Management Plan will ensure that construction traffic impacts are minimised through the control of site access/egress routes and site access locations and necessary temporary lane closure requirements.
7.2.2	Additional provisions for cyclists and pedestrian safety and enhanced connectivity with the local network were also integrated into the scheme designs.
7.2.3	Anticipated diverted traffic from the Village core of Kiltiernan, the bypassed section of the R117 Enniskerry Road and Glenamuck Road to provide considerable relief from traffic impacts and afford opportunities to provide new pedestrian and cycle facilities.
7.2.4	Further provisions for public transport (bus) were included in the designs of the proposed scheme with the inclusion of the bus gates which should provide priority and increased service quality and reliability for bus services within the Kiltiernan-Glenamuck LAP area.
7.2.5	During the traffic analysis, increased AADT flows were forecasted on the R116 Ballycorus Road and the R117 Enniskerry Road onto the proposed scheme. As a mitigation measure these flows would meet signalised junction on the proposed scheme (these being where the GDDR meets the R117 Enniskerry Road and where the R116 Ballycorus Road meets the GDLR). Traffic signal staging can be used at these locations to manage the demand of the affected arms.

Table 20- 3: Air Quality Mitigation Measures

No.	Description
8.2.1	<p>Pro-active control of fugitive dust will ensure the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released. The main contractor will be responsible for the coordination, implementation and ongoing monitoring of the dust management plan. The key aspects of controlling dust are outlined below;</p> <ul style="list-style-type: none"> • 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; and • The specification of effective measures to deal with any complaints received. <p>In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.</p>
8.2.2	<p>Prevention of on-site or delivery vehicles from leaving engines idling. Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.</p>
8.2.3	<p>Mitigation measures in relation to traffic-derived pollutants have focused generally on the improvements in both engine technology and fuel quality. EU legislation, based on the EU sponsored Auto-Oil programmes, has imposed stringent emission standards for key pollutants (Regulation (EC) No 715/2007) for passenger cars which was complied with in 2009 (Euro V) and 2014 (Euro VI).</p> <p>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).</p>
8.2.4	<p>Improvements in air quality are likely over the next few years as a result of the on-going comprehensive vehicle inspection and maintenance program, fiscal measures to encourage the use of alternatively fuelled vehicles and the introduction of cleaner fuels.</p>

Table 20- 4: Noise and Vibration Mitigation Measures

No.	Description
9.2.1	<p>The results of the modelling exercise show that the criteria for noise mitigation measures are met for 10 receivers (11 modelled locations) along the proposed route.</p> <p>Possible mitigation measures in the form of Acoustic barriers have been identified in 8 areas to reduce noise impacts on existing receivers. The provision and type of barrier used will be determined in conjunction with relevant landowners at accommodation works stage</p>
9.2.2	<p>The contract documents will clearly specify that the Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures and comply with the recommendations of BS5228-1 2009 +A1 2014. These measures will typically include</p> <ul style="list-style-type: none"> • No plant used on site will be permitted to cause an ongoing public nuisance due to noise. • The best means practicable, including proper maintenance of plant, will be employed to minimize the noise produced by on site operations • All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract • Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers • Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use • Any plant such as generators or pumps, which is required to operate before 07:00hrs or after 19:00hrs will be surrounded by an acoustic enclosure or portable screen. • During the course of the construction programme, supervision of the works will include ensuring compliance with the limits detailed in Section 9.5 using methods outlined in BS5228:2009 Part 1. • Erecting portable screens around noisy items of plant in noise sensitive areas, where required.
9.2.3	<p>Normal working times will be 07:00 to 19:00hrs Monday to Saturday. Works other than the pumping out of excavations, security and emergency works will not be undertaken outside these working hours without the written permission of the Contracting Authority.</p>

Table 20- 5: Biodiversity Mitigation Measures

No.	Description
10.2.1	<p>New areas are identified for habitat compensation after there will be loss of existing land. 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.</p> <p>The landscaping scheme will include the erection of 14 new bat roosting boxes which will provide new habitat for these species. These are intended to avail of existing semi-natural corridors (treelines and hedgerows) as well as new habitat compensation areas.</p> <p>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.</p>
10.2.2	Woody vegetation should not be cleared during the bird nesting season and all mature trees should be checked by a bat specialist prior to falling.
10.2.3	Construction Management Plan should be prepared which includes full details of all pollution prevention measures in order to protect Inland Fisheries and watercourses.
10.2.4	Appropriate measures should be taken to eradicate invasive species within the zone of influence of the project. The three-cornered Garlic should be treated with standard herbicide prior to the commencement of works.
10.2.5	<p><u>Bat Mitigation</u></p> <ul style="list-style-type: none"> • All mature trees shall be examined in advance of felling by a bat specialist. • 14 bat boxes are proposed in neighbouring trees to compensate for roost loss through tree removal and severance of the habitat • The culvert over the Loughlinstown River will be passable for Daubenton's Bats at it will have an aperture greater than 7sqm • A lighting plan will be prepared in consultation with the bat ecologist in order to minimize the negative impact of artificial lighting on bat foraging behaviour. Lighting must not increase the level of illumination of tree canopy level by greater than 3 lux

Table 20- 6: Archaeological, Architectural and Cultural Heritage Mitigation Measures

No.	Description
11.2.1	As part of the overall design of the proposed scheme, consideration should be given to the erection of stone marker, detailing the names of the associated townlands, at the locations of such boundaries adjacent the edges of the construction corridor.
11.2.2	A further programme of Archaeological Geophysical Survey should be undertaken under licence from the Department of Culture, Heritage and the Gaeltacht. This should include all suitable green-field areas within the development corridors, including the attenuation etc. but outside those areas previously subject to such survey.
11.2.3	Following completion of the programme of Geophysical Survey, a programme of Archaeological Testing should be undertaken within the extent of the Construction Corridor, under licence from the Department of Culture, Heritage and the Gaeltacht.
11.2.4	Following completion of both the Geophysical Survey and Programme of Archaeological Testing, a report describing the results of such should be prepared. The report should include impact statement with respect to any subsurface features of archaeological interest/potential.
11.2.5	A wade survey of the Loughlinstown River, within the extent of the Construction Corridor should be undertaken by an archaeologist, under licence from the Department of Arts, Heritage, Regional, rural and Gaeltacht affairs, followed by a metal detecting survey of the River stream bed, as well as the two areas of the Glenamuck Stream where it is intended culvers will be inserted.
11.2.6	No mitigation measures are required for the Architectural Heritage of the area.

Table 20- 7: Visual and Landscape Mitigation Measures

No.	Description
12.2.1	<p>The planting of new trees, boundary treatments and boundary hedgerows to create new and appropriate landscape structure and capacity to mitigate landscape changes. The design intent is to</p> <ul style="list-style-type: none"> • To provide a soft landscape structure with the flexibility to absorb and accommodate the formation of new neighbourhoods & attractive streetscapes. • To replace the quality rural landscape by a quality urban landscape that reflects the materials, character and natural and cultural heritage of the area • To provide integration with the established settlements and historic context • To provide a variety of character areas through tree selection and distribution along the proposed road scheme

Table 20- 8: Land and Soils Mitigation Measures

No.	Description
13.2.1	<p>The site layout has evolved in order that the design minimizes impact on the land and soil environment. Design evolution to minimise environmental impact has been prioritised throughout the various design stages. This is detailed in the Environmental Report which supported the LAP road route selection and has been continued throughout the planning stage design.</p> <p>The vertical and horizontal alignment of the road has been optimized to minimise cut and fill requirements and seek to obtain a balance of cut and fill materials (within constraints of road design criteria and landscape considerations).</p>
13.2.3	Sufficient space has been provided within the works area for segregated spoil storage.
13.2.4	Preconstruction soils testing has been carried out to determine if any contamination exists
13.2.5	An Environmental Operating Plan will be produced in order to facilitate the integration of environmental issues into road scheme planning, construction and operation.
13.2.6	<p>Specific Mitigation Measures – Chemical Pollution</p> <ul style="list-style-type: none"> • Foul Drainage from all site offices and facilities will be contained and disposed of in an appropriate manner to prevent pollution in accordance with the relevant statutory bodies. • Refuelling of construction machinery shall be undertaken in designated areas located away from surface water drainage in order to minimise potential contamination impacts on the water environment. Spill kits shall be kept in these areas in the event of spillages. • Oil and fuel stored on site for construction should be stored in designated areas. These areas shall be bunded (to min 110% of chemical volume) and should be located away from surface water drainage • Pouring of concrete including wash down and washout of concrete from delivery vehicles to be controlled in an appropriate facility to prevent contamination • Regular samples to be taken from soils affected by earthworks which shall be analysed for contamination
13.2.7	<p>Specific Mitigation Measures – Loss of Soil Value</p> <ul style="list-style-type: none"> • Vegetation should be established as soon as possible on all exposed soils • Due consideration will be given to the prevailing ground and weather conditions when programming the execution of the works. • Suds features to be in place prior to the main construction works. Suds features to be designed to limit soil erosion • Construction machinery shall minimise tracking over soils to minimise compaction • Exposed soil should be covered or seeded as soon as possible • Topsoil should be stripped and stockpiled separately for reuse and landscaping material • All disturbed areas to be reinstated with suitable soils to ensure future growth. All verges and boulevard areas to have sufficient topsoil depths

13.2.8	<p>Specific Mitigation Measures – Material Generation</p> <ul style="list-style-type: none">• Areas of stripped soils to be minimised to those required for the project earthworks• All soil handling to be in line with best practice guidance and in line with mitigation measures to protect the water environment• Excavated soils to be adequately separated to maximise reuse as embankment material, landscape fill or road construction material• Imported materials to be suitably separated to avoid contamination or mixing• The use of soil screening on 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.• For imported materials, the use of local quarries or locally available material should be prioritised.• All materials exported from site to be in accordance with the Waste Management Acts. <p>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).</p>
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Table 20- 9: Hydrology Mitigation Measures

No.	Description
14.2.1	<p>Mitigation Through Design</p> <ul style="list-style-type: none"> • The alignment of the road at watercourse crossing facilities the shortest possible crossing lengths and facilitates the construction of the crossing structures outside the active stream channel either by utilising clear span crossing (bridge) or offline culverts which can be constructed in the dry in advance of stream diversions. • The scheme also avoids areas identified as Flood Zone A & B to minimise impact on flood conveyance and floodplain storage. • The drainage system allows recharge to groundwater at all attenuation and open channel locations • The scheme design facilitates the retention of vegetated buffer strips at all locations other than crossing points and isolated pinch points. Retention of intact vegetated buffer zones between infrastructure and water features allows for improved/protected water quality.
14.2.1	<p>An Environmental Operating Plan will be produced in order to facilitate the integration of environmental issues into road scheme planning, construction and operation.</p>
14.2.3	<p>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. Drainage measures to include</p> <ul style="list-style-type: none"> • Maintaining existing overland flow routes and channels. All existing natural flow paths across the works area will be maintained through the use of interception drainage. Intercepted “clean” runoff will be captured upstream of works and conveyed to a suitable discharge point without being affected by flowing through the works area. Minimisation of offsite flows through the works area reduces the quantity of water which may require treatment • All discharges from the works area will be routed through a “treatment train” of SuDS components to aid pollutant removal. No outflows or dewatering flows from the works area should discharge directly into watercourses • Construction drainage ditches should take the form of wide, flat bottomed swales designed to convey flows at a low velocity • Reducing surface water flow rates and volumes by providing check-dams in swales, whereby the flow velocity and rate of discharge is reduced to mimic natural properties and maximise filtration & settlement of suspended particles • Providing settlement ponds where runoff from the works area areas is attenuated and treated prior to discharge to watercourses. Permanent ponds are proposed to cater for the operational phase drainage and the areas acquired for these areas can be used for temporary settlement ponds • Discharges should travel over vegetated buffer strip at low velocities prior to discharge to maximise filtration and settlement • All swales, crossings and other hydraulic features will be engineered to ensure that dimensions etc. are suitable to convey predicted flows and so prevent build-up of surface water and / or flooding.

	<ul style="list-style-type: none"> • Silt fencing or other appropriate measures shall be put in place downstream of exposed soils or soil stockpiles
14.2.4	<p>Other measures to be employed throughout the construction and operational phases to minimise pollution risk;</p> <ul style="list-style-type: none"> • Due consideration will be given to the prevailing ground and weather conditions when programming the execution of the works. • Foul Drainage from all site offices and facilities will be contained and disposed of in an appropriate manner to prevent pollution of rivers and local watercourses in accordance with the relevant statutory bodies. • Operational (permanent) drainage design shall comply with the requirements of the Greater Dublin Strategic Drainage Study (GSDSDS) • Suds features to be in place prior to the main construction works • Ponds which incorporate a permanent water volume shall be put in place on all outfalls where space permits. A treatment volume shall be provided in which dilution and partial treatment of runoff can take place. • A shut off valve shall be incorporated into the permanent drainage at all outfalls so that oil spills can be contained and collected before discharge to watercourses • Suds features shall be designed in general conformance with best practice guidance in the Suds Manual (Ciria C753) • Refuelling of construction machinery shall be undertaken in designated areas located away from surface water drainage in order to minimise potential contamination impacts on the water environment. Spill kits shall be kept in these areas in the event of spillages. • Oil and fuel stored on site for construction should be stored in designated areas. These areas shall be bunded (to min 110% of chemical volume) and should be located away from surface water drainage • Pouring of concrete including wash down and washout of concrete from delivery vehicles to be controlled in an appropriate facility to prevent contaminating runoff and groundwater. • All batching and mixing activities will be located in areas well away from watercourses and drains. • Any surface water abstracted from a river for use during construction will have an applicable licence agreement in place and will be fitted with a filter to prevent the intake of fish.
14.2.5	<p>For any construction work within or directly adjacent to water the following mitigation measures will apply;</p> <ul style="list-style-type: none"> • Use of precast elements to be maximised to avoid wet concrete works in vicinity of water • Works to be carried out in the dry (offline of outside the river channel) where possible. Suitable temporary works to be put in place where required • Relevant fisheries authorities shall be informed of all in-stream construction work scheduled to take place. Any in-stream or culverting works shall be undertaken in consultation and with the agreement of the relevant statutory body.

	<ul style="list-style-type: none"> Hydrophilic grout / quick setting mixes / rapid hardener additives shall be used to promote the early set of any wet concrete required. Other materials such as biodegradable shutter oils should be considered. There shall be no use of persistent pesticides, herbicides or artificial fertilisers in any landscaping or subsequent maintenance within a 10m buffer of a watercourse.
<p>14.2.6</p>	<p>To minimise the impact of culvert, bridge and channel works on hydrological receptors and flood risk, the following mitigation measures will be implemented;</p> <ul style="list-style-type: none"> 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) & “Guidelines For The Crossing Of Watercourses During The Construction Of National Road Schemes” (NRA). All watercourse crossings shall be subject to OPW Section 50 agreement Mammal passage though all culverts will be maintained whether via retention of riparian banks (bridge) or provision of a mammal ledge (culverts) Culvert inverts will be set below the channel bed level to facilitate a natural bed of river material along the culvert base Culverts have been designed so that they can be constructed offline in the dry and with the shortest possible length. Short lengths of stream diversion will then be constructed to route the stream through the completed culvert Construction of watercourse crossings and stream works shall be programmed to coincide with periods of predicted low flow in the affected channel, and shall take notice of other working period restrictions imposed. Construction will be strictly as per the design for each identified watercourse crossing, and will fully implement all SuDS and additional mitigating measures proposed at detailed design stage All watercourses realignment work shall be designed with input from the project ecologist to achieve maximum ecological benefits and improve on the existing hydrological environment. All Culverts and bridges will be designed to convey the Q100 flood level plus a 10% allowance for climate change Suitable excavated bed material and riparian vegetation shall be stockpiled for use in the reformed/new channel
<p>14.2.7</p>	<p>To minimise the impact of the development on runoff, flow patterns and flood risk, the following mitigation measures will be implemented;</p> <ul style="list-style-type: none"> Surface water system shall incorporate SUDS and designed in accordance with the supplementary industry guidance as detailed in Table 14.18 to reduce impact of the development on the existing environment. Surface water discharge rates shall be limited to existing Greenfield run-off rates at a minimum to prevent increased flood risk. Attenuation storage to be provided upstream of flow controls. Information on surface water controls and attenuation measures are included in Chapter 5.

- The drainage system shall allow recharge to groundwater at all appropriate attenuation, interception drainage and open channel locations
- Pumping of groundwater shall be limited in duration and volume
- Permanent excavations (for ponds or areas of cut) should not be deeper than local watercourses to limit impact on local groundwater levels
- A regular maintenance and inspection programme of the flow control devices, attenuation storage facilities, gullies and Suds features will be required during the Operational Phase to ensure the proper working of the development's networks and discharges.
- Collection networks should be regularly monitored, maintained and serviced within the context of an overall development and environmental management plan.
- Drainage design for permanent drainage to incorporate a 10% allowance for the effects of climate change
- Boulder riprap to be added at outside of bends in realigned stream channels
- Diversion channels shall generally match the width and gradient of the existing stream channel
- Existing catchment boundaries to be maintained in all stages of development (no diversion of flows to adjacent catchments)

Table 20- 10: Waste Management Mitigation Measures

No.	Description
15.2.1	Preparation of a Construction and Demolition Waste Management Plan which meets the requirements of the DoEHLG Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (DoEHLG, 2006a).
15.2.1	In addition to the general measures outlined above a demolition audit in accordance with the ICE Demolition Protocol 2008 or similar guidance will be considered at detailed design stage for those structures which will be demolished as part of the proposed development.
15.2.3	Possibilities for reuse of clean non-hazardous excavation material as fill on the site or in landscaping works will be considered following appropriate testing to ensure material is suitable for its proposed end use. Where excavation material may not be re-used within the proposed works the Contractor will endeavour to send material for recovery or recycling so far as is reasonably practicable. The contractor will ensure that any off-site interim storage facilities for excavated material have the appropriate waste licenses or waste facility permits in place.
15.2.4	Waste produced will be segregated and separated using colour coding and photographs.
15.2.5	'Just-in-time' delivery will be used so far as is reasonably practicable to minimise material wastage.
15.2.6	The contractor will engage with the supply chain to supply products and materials that use minimal packaging, and segregate packaging for reuse.
15.2.7	The contractor will record the quantity in tonnes and types of waste and materials leaving the development site during the construction phase.

Table 20- 11: Population and Human Health Mitigation Measures

No.	Description
16.2.1	It should be noted that mitigation measures relating to those factors under which human health effects might occur have been addressed elsewhere in this EIAR, under the environmental factors of traffic and transportation, air quality and climate, noise and vibration, Landscape townscape and visual and material assets.

Table 20- 12: Land Use and Property Mitigation Measures

No.	Description
17.2.1	Access will be maintained to all affected property
17.2.2	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 safety considerations, or it will be treated as a compensation issue.
17.2.3	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 proposed works
17.2.4	Any Services that are interfered with as a result of the road development will be repaired/replaced without unreasonable delay.
17.2.5	During the construction phase, site management measures including the provision of high quality hoarding and proactive communication with residents, business and public regarding phasing, extent and duration if works will be carried out.
17.2.6	Mitigation measures will be provided to property abutting the alignment to provide for the remediation of boundaries, permanent access measures, landscape and planting proposals and design in accordance with DMURS best practice materials and cross sections. Noise mitigation measures will be provided at specified locations.
17.2.6	Signal controlled pedestrian & cyclist crossings will be provided at regular intervals along the roads scheme to mitigate against community severance

Table 20- 13: Material Assets: Utilities Mitigation Measures

No.	Description
18.2.1	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.
18.2.2	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.
18.2.3	All relevant utility providers will be contacted and offered the opportunity to incorporate new strategic infrastructure into the new road construction. The majority of major utility providers have already been notified of the proposed scheme.
18.2.4	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.

20.3 Residual Impacts

Table 20- 14: Traffic and Transport Residual Effects

No.	Description
7.1	Traffic Impacts: Reduction in levels of overall traffic with the LAP environ for Kiltiernan-Glenamuck by diverting traffic onto the proposed scheme's network and enabling traffic to bypass less suitable and unsafe road traffic onto the proposed scheme's network.
7.2	Public Transport Impacts: Positive impacts on public transport in both the short and long term with the scheme reducing traffic volumes on the transport routes with the implementation of Bus Gates, thereby improving bus journey times and their reliability for existing and potential additional future bus services.
7.3	Pedestrian and Cyclist Impacts: Positive impacts in terms of enhancing the existing environment for pedestrians and cyclists, adding new amenity and cycling routes to the area.

Table 20- 15: Air Quality Residual Effects

No.	Description
8.1	When dust minimisation measures detailed in the mitigation section and Appendix 8.3 of this Section are implemented, fugitive emissions of dust from the site will be insignificant and pose no nuisance at nearby receptors.
8.2	Due to the size and nature of the construction activities with appropriate mitigation measures, CO ₂ and N ₂ O emissions during construction will have an imperceptible impact on climate
8.3	The results of the air dispersion modelling study indicate that the residual impacts of the proposed development on air quality and climate is predicted to be slight adverse with respect to the operational phase for the long and short term.

Table 20- 16: Noise and Vibrations Residual Effects

No.	Description
9.1	During the construction phase of the project there is potential for some temporary moderate to major impacts on a limited number of properties between 10m to 50m distance from construction works. The probability of effects from construction noise are considered and a description of the effects are Negative, Moderate/Major in the Short-term.
9.2	It can be concluded that the project complies with the appropriate guidance in relation to noise, hence the associated impact in the Operational Phase is Negligible, with the exception of one receiver on the Ballycorus road, where the significance will be moderate.

Table 20- 17: Biodiversity Residual Effects

No.	Description
10.1	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. These are assessed as Slight.
10.2	There will also be a Slight residual effect to water courses during the construction phases as it will not be possible to completely eliminate the likelihood of pollution entering the water.

Table 20- 18: Archaeological, Architectural and Cultural Heritage Residual Effects

No.	Description
11.1	It is considered that the adoption and implementation of the mitigation strategy and any further requirements arising from such, that no residual impacts, with respect to Cultural Heritage, will occur.

Table 20- 19: Landscape and Visual Impacts Residual Impacts

No.	Description
12.1	As a consequence of compliance with the construction and operation mitigation there will not be a significant residual impact on the identified Landscape and Visual receptors.

Table 20- 20: Land and Soil Residual Effects

No.	Description
13.1	As a consequence of compliance with the construction and operation mitigation there will not be a significant residual impact on the identified land and soil receptors.

Table 20- 21: Hydrology Residual Effects.

No.	Description
14.1	As a consequence of compliance with the construction and operation mitigation there will not be a significant residual impact on the identified hydrological/hydrogeological receptors.

Table 20- 22: Waste Management Residual Effects.

No.	Description
15.1	The resulting residual impacts of excavation waste will be neutral, slight and short term.
15.2	The resulting residual impact of construction and demolition waste will be slight, neutral and short term.
15.3	Based on the scheme description the residual impact of operational waste will be neutral.
15.4	There is likely to be significant available capacity within existing Irish waste management infrastructure to manage the excavation, construction and operational waste from the GDRS.

Table 20- 23: Population and Human Health Residual Effects.

No.	Description
16.1	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 positive. The overall impact is considered to be Positive Moderate Effect.

Table 20- 24: Material Assets Residual Effects

No.	Description
17.1	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.
17.2	In the long term the Proposed Project is expected to have an overall significant positive effect for the area as detailed in this chapter and complimentary chapters.

Table 20- 25: Material Assets Residual Assets

No.	Description
18.1	The residual impact on utility services is considered to be imperceptible.