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EIAR Volume 6: Onshore Infrastructure Technical Appendices Appendix 6.5.1-1: Carrickmines Substation Site Selection Report

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Dublin Array Offshore Wind Farm

Onshore Electrical Grid Connection

Carrickmines Substation Site Selection Report

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1. Project Overview

1.1. Introduction

In accordance with the Government's Climate Action Plan (CAP), 2019 and 2021 there is an ambitious plan for the connection of 5GW of offshore wind by 2030. The Department for Environment, Climate and Communications (DECC)'s "Policy Statement on the Framework for Ireland's Offshore Electricity System"[1] designated EirGrid as the Transmission System Operator (TSO) and asset owner for Ireland's offshore transmission grid.

The initial processing of offshore wind generation applications was undertaken by EirGrid following the CRU's direction (CRU/20/020). In October 2021, the CRU issued a Proposed Decision (CRU/21/112 – Offshore Grid Connection Assessment – Phase 1 Projects) concerning the allocation of grid capacity to offshore wind project. The preferred option identified by CRU was that where there is competition for one or more connection point locations, the progression of detailed assessment of method and cost of connection by EirGrid at the locations will facilitate a collaborative agreed outcome between the relevant competing applicants and EirGrid for the connection points.

EirGrid's publication "Offshore Phase 1 Projects – Grid Connections Assessment" (published accompanying CRU/21/112a) identified a number of nodes with potential capacity available which may be suitable for connection of the proposed Dublin Array project.

This report has been prepared to assess potential collector substation locations associated with the connection of 824 MW of offshore wind at Carrickmines 220kV substation. This report has been prepared by Bray Offshore Wind Limited and Kish Offshore Wind Limited on behalf of the Dublin Array project .

1.2. Dublin Array

Dublin Array (Kish Offshore Wind Limited and Bray Offshore Wind Limited) is a 50/50 joint venture between RWE Renewables and Saorgus Energy who are developing the proposed offshore wind farm on the Kish and Bray Banks between Dun Laoghaire and Greystones, County Wicklow.

The Dublin Array project was confirmed by the Department of Housing, Local Government and Heritage and the Department of the Environment, Climate and Communications as being one of the 'Relevant Projects' in May 2020 and are therefore included within the scope of Commission for the Regulation of Utilities Decision (CRU/2022/14) in relation to generation connection policy for the first phase of offshore electricity generating projects.

[1] gov.ie - Policy Statement on the Framework for Ireland's Offshore Electricity Transmission System (www.gov.ie)

1.3. Strategic Infrastructure

The Maritime Area Planning Act, 2021 (as amended) provides the legislative framework to put in place a comprehensive and coherent planning system for the entire Maritime Area and is the enabler for the long overdue reform of development management in the marine area. The Act legislates for 'Phase 1' offshore wind projects to proceed through a maritime area consent (the 'State Consent') and a development consent (with An Bord Pleanála as the consenting authority) process. The Act also includes the necessary amendments to the Planning and Development Act, 2000 as amended, to facilitate development consent applications for infrastructure in the maritime area.

Section 182A of the Planning and Development Act 2000, as amended, states that, where a person (the "undertaker") intends to carry out a "development comprising or for the purposes of electricity transmission", an application for approval of the development under Section 182B shall be made to An Bord Pleanála.

To this extent it is anticipated that the infrastructural requirements envisaged to connect the Dublin Array project to the electricity transmission network will be the subject of strategic infrastructure development consent application(s) to An Bord Pleanála for each project. The structure and number of such applications will be a matter to determined during the pre-application consultation phase of the project when this commences with An Bord Pleanála.

1.4. Health and Safety

Dublin Array are committed to the protection of health, safety and welfare of its staff and the general public as core values. Both projects are committed to safety in design, construction and operation and have appointed Project Supervisors for the Design Process in accordance with the Safety, Health and Welfare at Work (Construction) Regulations, 2013.

1.5. Project Study Area

The study area for the identification of a new collector substation is in the general environs of the existing Carrickmines 220 kV substation located adjacent the Ballyogan Road, Dublin 18. The project study area is indicated in the figure overleaf.

1.6. Structure of Report

The structure of this report is as follows;

Chapter 2 Purpose of this Report

This section of the report explains the need for the project and the project development process.

Chapter 3 Strategic Planning Context

This section of the report explains the strategic national, regional and local planning context for the project.

Chapter 4 Planning and Environmental Constraints

This section of the report explains the land-use planning and environmental features and factors used to characterise the study area.

Chapter 5 Technical Requirements

This section of the report summarises the technology considerations when developing the proposed substation and its associated connection to the existing Carrickmines 220 kV site.

Chapter 6 Technology Options and Short-Listing

This section of the report describes the key technology options available for the project and assesses the suitable options to deliver the project requirements.

Chapter 7 Summary of Project Consultation

This section of the report documents the consultation feedback received from stakeholders in the selection of the preferred project configuration and location.

Chapter 8 Criteria for Identifying the Best Performing Option

This section of the report describes the criteria for assessing the project options.

Chapter 9 Evaluation of Short-Listed Options

This section of the report evaluates the short-listed options using the criteria identified.

Chapter 10 Description of Best Performing Option

This section of the report describes the best performing option of the project configuration.

2. Purpose of this Report

2.1. Justification and Need for Project

The Dublin Array offshore wind farm project is expected to have a maximum electrical export capacity (MEC) of approximately 824 MW subject to further commercial, technical and environmental analysis. This figure equates to 16% of the 2030 climate action target of 5,000 MW (5 GW) of offshore wind as set out in the Climate Action Plan 2021.

Table 2.1 Range of Project Maximum Export Capacities

Project	Approximate MEC
Dublin Array	824
% 5GW Target	16%

To determine how to connect this quantity of electricity to the electricity transmission network, EirGrid completed an analysis of the connection method options available to the projects (Offshore Phase 1 Projects – Grid Connection Studies, EirGrid, March 2021). This report identified Poolbeg 220 kV substation and Carrickmines 220 kV substation as potential connection points for the Dublin Array project. Further engagement with EirGrid during 2022 identified Carrickmines 220kV substation as the preferred connection point for Dublin Array.

The connection of 824 MW of electricity at the existing Carrickmines 220 kV substation would result in a need for the construction of two 220 kV subsea export cables from the offshore wind farm projects, two 220 kV circuits onshore to a collector substation (including both an Eirgrid GIS and ESBN GIS) and an onward connection to the existing spare bays in the Carrickmines 220 kV substation.

2.2. Offshore Wind Farm Development Process

The Dublin Array project was identified in May 2020 as a 'Relevant Project' by the Department of Housing, Local Government and Heritage and the Department of Environment, Climate and Communications.

Having regard to the Maritime Area Planning Act, 2021, 'Relevant Projects' were invited by the Minister to apply for a Maritime Area Consent ('the State Consent'). When a Maritime Area Consent is secured, projects are qualified to participate in the Offshore Renewable Energy Support Scheme auction ('O-RESS 1') and to submit a Development Consent application(s) to An Bord Pleanála.

2.3. Grid Connection Process

In accordance with the CRU's Final Decision Paper (CRU/2022/14) EirGrid will issue a Grid Connection Assessment (GCA) to each eligible Phase 1 applicant (which includes Dublin Array amongst others). The GCA will detail the method and cost of connecting a Phase 1 project to the transmission system at its onshore connection point. Following receipt of a GCA a project can qualify for a full grid connection offer subject to meeting the relevant Terms and Conditions.

3. Strategic Planning Context

3.1. Introduction

This section of the report addresses the Project in the context of relevant national, regional and local planning policies and objectives. Through the identification of key spatial, economic and social policies, subsequent analysis demonstrates how the project is consistent with, and will contribute towards, the achievement of planning policies and objectives.

3.2. National Planning Policy Context

Climate Action Plan 2021

The Climate Action Plan 2021 (CAP) is the Government plan for decisive action to reduce Ireland's greenhouse gas emissions by 51% (compared with 2018 levels) between 2021 and 2030 and to reach net zero by 2050. These legally binding objectives are set out in the Climate Action and Low Carbon Development (Amendment) Act, 2021. Specifically in the context of electricity the CAP includes a target of increasing the share of electricity demand generated from renewable sources to up to 80% (from 33.7% in 2018). Action 115 from the CAP is to facilitate the development and connection of at least 5GW of offshore wind to the grid by 2030.

National Development Plan 2021-2030

As part of Project Ireland 2040 the National Development Plan sets out the Government's over-arching investment strategy and budget for the period 2021-2030. As highlighted by the Government's target of achieving 5 GW of installed offshore wind generation by 2030, meeting the ambitious goal of up to 80 per cent renewable electricity by 2030 the plan recognises that further future decarbonisation objectives will require development of significant offshore renewable energy and associated grid infrastructure over this period.

Project Ireland 2040-National Planning Framework and National Marine Planning Framework

The Department of Housing, Planning, and Local Government prepared a national planning framework called 'Project Ireland 2040 – the National Planning Framework' (hereafter referred to as the "NPF") in 2019 to provide context for planning development for the next subsequent decade and beyond. The Framework contains a series of National Strategic Outcomes.

NSO Transition to a Low Carbon and Climate Resilient Society

This national strategic outcomes identifies that new energy systems and transmission grids will be necessary for a more distributed, renewables-focused energy generation system, harnessing both the considerable on-shore and off-shore potential from energy sources such as wind, wave and solar and connecting the richest sources of that energy to the major sources of demand. Specifically the NPF includes the following as National Policy Objective 38.

Regional, metropolitan and local development plans will take account of and integrate relevant maritime spatial planning issues.

In the context of offshore renewable energy the NPF (Section 7.5) identifies that the development of offshore renewable energy is critically dependent on the development of enabling infrastructure, including grid facilities to bring the energy ashore and connect to major sources of energy demand. National Policy Objective 42 supports the progressive development of Ireland's offshore renewable energy potential including the necessary domestic grid connectivity enhancements.

The National Planning Framework sets out the key goals and objectives for the State, and an important element to this framework is the theme of integrating Ireland's land and maritime planning systems. European Directive 2014/89/EU and the subsequent European Union Framework for Maritime Spatial Planning adopted in 2016 required that all Member States enact individual Marine Spatial Plans across the Eurozone. Adopted in 2021, the National Marine Planning Framework (NMPF) is the statutory plan for Ireland's marine area. Sector specific offshore renewable energy policies (ORE Policy 1 and 2) support proposals which assist the State in meeting its target of achieving 5GW capacity of offshore wind, include a particular emphasis on Relevant Projects (which includes for example Dublin Array).

Shaping our Electricity Future

Shaping our Electricity Future (EirGrid, 2021) Roadmap Shaping Our Electricity Future Roadmap provides an outline of the key developments from an electricity networks, engagement, operations and market perspective needed to support a secure transition to the integration of renewables on the electricity grid in line with the greenhouse gas emissions reduction targets for 2030 and 2050. The roadmap includes 5GW of offshore renewable energy. The report also states that '…it is not expected that the technology for offshore wind will be developed maturely enough to facilitate large scale offshore wind on the west coast in the short term. The East Coast of Ireland has shallower waters, making offshore a more viable option in the short term'. The Dublin Array project is located in the shallower waters off the East Coast of Ireland.

3.3. Regional Planning Policy Context

Regional Spatial and Economic Strategy, 2019-2031

The elected members of the Eastern and Midland Regional Assembly (EMRA) agreed to make the Regional Spatial and Economic Strategy (RSES) 2019-2031, on June 28th 2019. The Region covers nine counties containing twelve local authorities namely – Longford, Westmeath, Offaly, Laois, Louth, Meath, Kildare, Wicklow, Fingal, South Dublin and Dún Laoghaire-Rathdown County Councils and Dublin City Council.. The strategy recognises that the Region will need to shift from its reliance on using fossil fuels and natural gas as its main energy source to a more diverse range of low and zero-carbon sources, including renewable energy and secondary heat sources. It recognises the importance of generating electricity supply from indigenous renewable sources and that this requires facilitating the provision of renewable energy infrastructure. The Strategy supports an increase in the amount of new renewable energy sources in the Region which includes amongst other renewable technologies – offshore wind in accordance with National Policy. The strategy identifies that local authorities should harness the potential of renewable energy in the Region and that the provision of infrastructure should be supported in order to facilitate a more distributed, renewables-focused energy generation system (including offshore wind) connecting sites of optimal energy production to the major sources of demand. Key policy objectives include RPO 7.36 (local authorities adhering to guidance from the Departments on wind energy development) and 10.24 (Support for the sustainable development of Ireland's offshore renewable energy resources in accordance with the Department of Communications, Energy and Natural Resources 'Offshore Renewable Energy Development Plan' and any successor thereof).

3.4. .Local Planning Policy Context

Having regard to purpose of this report the relevant plan is the Dún Laoghaire Rathdown County Development Plan.

Dún Laoghaire Rathdown County Development Plan 2022-2028

The Dún Laoghaire Rathdown County Development Plan 2022-2028 was adopted by the elected members and came into effect on 21st April 2022.EirGrid in their submission in respect of the Pre-Draft County Development Plan (26th February 2020) has identified that the Carrickmines 220 kV electricity substation (which is located within the functional area of Dún Laoghaire Rathdown County Council) is a strategically important node on the national electricity transmission network. The EirGrid submission also emphasises the importance of ensuring the holistic integration of the RSES Regional Policy Objective 10.24 within the County Development Plan.

Key policies in the current plan include;

Policy Objective CA11: Onshore and Offshore Wind Energy and Wave Energy

It is a Policy Objective to support in conjunction with other relevant agencies, wind energy initiatives, both on-shore and offshore, wave energy, onshore grid connections and reinforcements to facilitate offshore renewable energy development when these are undertaken in an environmentally acceptable manner. (Consistent with NSO 8 and NPO 42 of the NPF and RPO 7.36 and 10.24 of the RSES).

Policy Objective EI18: Energy Facilities

It is a Policy Objective to encourage the provision of energy facilities in association with the appropriate service providers and in accordance with 'Government Policy Statement on the Strategic Importance of Transmission and Other Energy Infrastructure' (2012). In addition, the Council will facilitate, subject to the proper planning and sustainable development of the area, the expansion of the services and infrastructure of existing service providers, notably Bord Gáis, Eirgrid, the Electricity Supply Board (ESB), other strategic electricity infrastructure developers and statutory undertakers, in order to ensure satisfactory levels of supply and to minimise constraints for development.

3.5. Conclusions

As set out above there is clear national, regional and local planning policy support for the delivery of 5GW (5,000 MW) of offshore wind. This includes not only policy support for the development of this quantity of offshore wind but also the necessary enabling grid infrastructure to facilitate its connection to the national electricity transmission infrastructure. They key role of the existing Carrickmines 220 kV substation as a connection point for 824 MW of this electricity is recognised in the EirGrid publication-Offshore Phase 1 Projects – Grid Connection Studies, EirGrid, March 2021 (refer section 2.1 of this report).

4. Identification of Planning and Environmental Constraints

4.1. Introduction

Based on EirGrid's conclusion that the existing 220 kV substation at Carrickmines was a suitable connection point for up to 824 MW of offshore wind, the project team electrical engineering specialists defined the essential requirements for the onshore substation site based on its experience in the delivery of similar infrastructure internationally. One of the main functions of the proposed onshore substation is to regulate 'power quality' factors of the electricity being connected to the electricity transmission network in compliance with EirGrid's Grid Code at the intended grid connection point. Long lengths of cable create an imbalance of active and reactive power, so the maximum connection distance between the proposed onshore substation and the intended external substation for connection to the existing electricity transmission network was determined to be a maximum of 4 kilometres with a preference to be as close as possible. Figure 4.1 below depicts a 4 kilometre radial search area from the existing 220 kV substation at Carrickmines . This area is referred to as the 'Wider Study Area'.

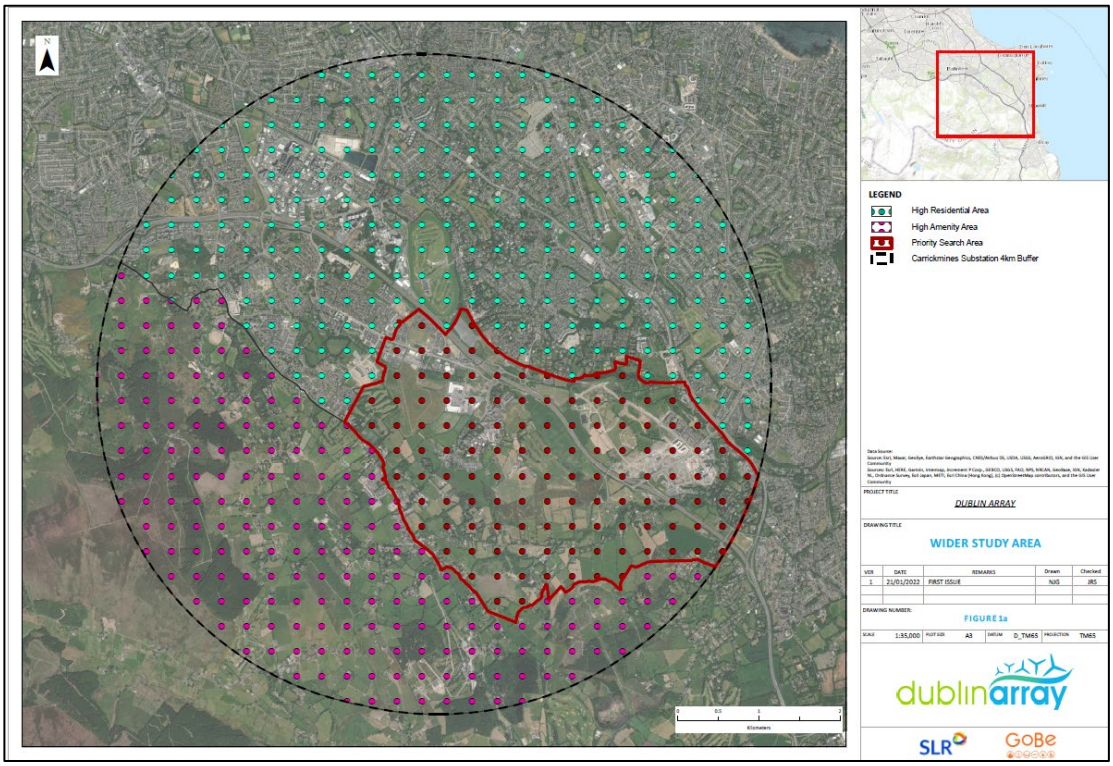


Figure 4.1: A 4km radial search area (the Wider Study Area) from the existing 220kV substation at Carrickmines

A substation for a 2-circuit grid connection (2 circuits being required to deliver approximately 824 MW) requires a site area of between 4 acres (1.6 ha) to 6 acres (2.4 ha) depending on layout, to accommodate the necessary structure, plant, equipment and ancillary infrastructure. To identify

suitable sites within the initial search area, an initial screening assessment of the study area was undertaken to identify sites or areas of significant constraint/opportunity. This initial screening process included a review of existing land-uses, assessment of potential site access and availability of sites for acquisition.

Existing Land-Uses within Wider Search Area

Having due regard to the above search area it can be generally sub-divided into three core zones which can broadly be described as; (a) Dublin Mountains/high amenity area (b) high density suburban area and (c) mixed opportunity area.

In the case of the Dublin Mountains/High Amenity Area, this is generally located to the west/south west of the Wider Study Area, typically to the west of the R117 regional road between its junction with the R113 Blackglen Road/Hillcrest Road and the Scalp. This was not considered to be an area of opportunity due to the primary land-use zoning objectives from the Dun Laoghaire-Rathdown County Council Development Plan, 2016-2022 being Objective F 'To preserve and provide for open space with ancillary active recreational amenities' and Objective G 'To protect and improve high amenity areas'.

In the case of the High-Density Suburban Area, this is generally located either in close proximity to the M50 national motorway or north of the motorway corridor from Carrickmines. This area includes several south Dublin suburbs including Stepaside, Loughlinstown, Sandyford, Foxrock Cabinteely and Deansgrange which have a high density of residential development and some urban centres with retail/commercial development concentrated therein. This was not considered to be an area of opportunity due to the primary land-use zoning objectives from the Dun Laoghaire Rathdown County Development Plan, 2016-2022 being Objective A ' To protect and improve residential amenity', Objective A1 'To provide for new residential communities in accordance with approved local area plans' and Objective A2 'To provide for the creation of sustainable residential neighbourhoods and preserve and protect residential amenity', Objective F 'To preserve and provide for open space with ancillary active recreational amenities' and Objective NC 'To protect, provide for and-or improve mixed-use neighbourhood centre facilities'.

Having regard to the Mixed Opportunity Area, this includes a combination of land-uses varying between residential, commercial, amenity and utility with potential areas of opportunity being identified in the wider Cherrywood Strategic Development Zone and adjacent lands and the Ballyogan/Carrickmines area and adjacent lands. This area was identified as the Priority Search Area (hereafter referred to as PSA) for the purposes of potential substation site identification.

The land-use objectives set out in the Dun Laoghaire Rathdown County Development Plan 2016 - 2022 that apply to the PSA are set out below and shown below on Figure 4.2:

- A – To protect and-or improve residential amenity;
- A1 – To provide for new residential communities in accordance with approved Local Area Plans;
- B – To protect and improve rural amenity and to provide for the development of agriculture;
- DC – To protect, provide for and-or improve mixed-use district centre facilities;

- E – To provide for economic development and employment;
- F – To preserve and provide for open space with ancillary active recreational amenities;
- G – To protect and improve high amenity areas;
- MH – To improve, encourage and facilitate the provision and expansion of medical-hospital uses and services; and
- NC – To protect, provide for and-or improve mixed-use neighbourhood centre facilities.

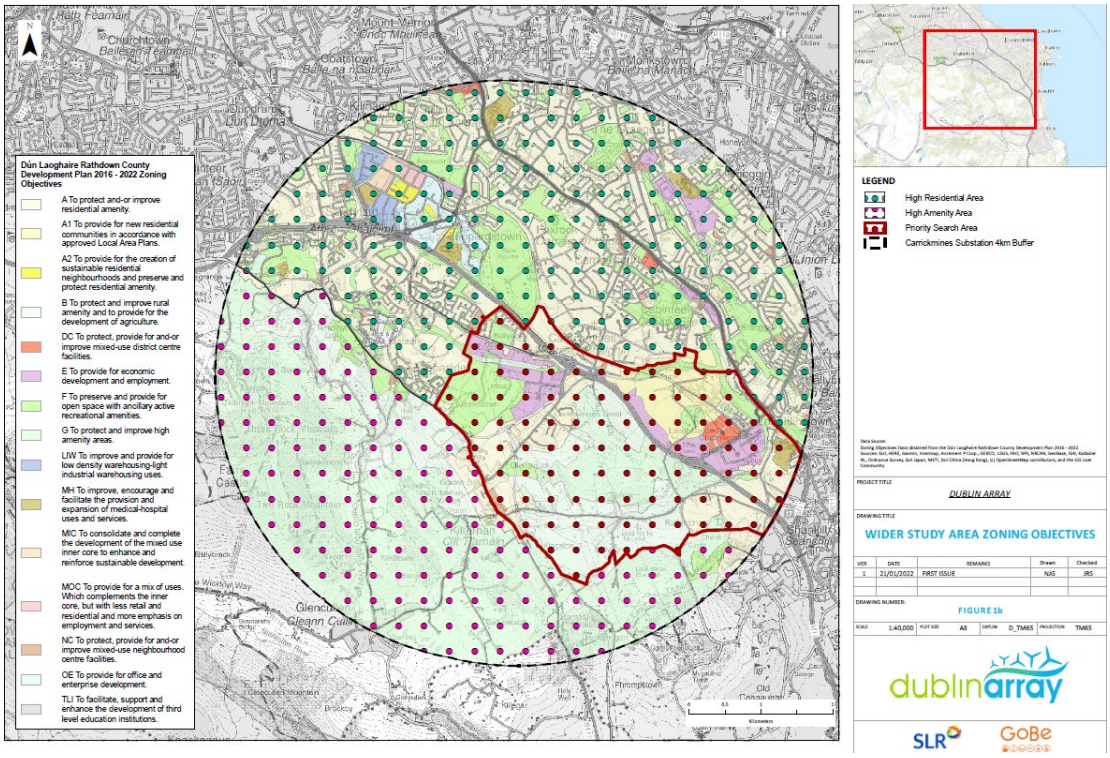


Figure-4.2 Wider Study Area Zoning Objectives from Dun Laoghaire Rathdown County Development Plan 2016-2022

Constraints Identification

The proposed substation development has the potential to impact upon the receiving environment within which it will be located, including the local population and communities. To this extent it is recognised that relevant land-use planning policy and known technical and environmental constraints relevant to PSA needed to be identified to inform the identification of preliminary substation site locations. The search has been characterised under the following key themes:

- Socio Economic, Population, and Land Use;
- Biodiversity Flora and Fauna;
- Landscape and Visual;
- Archaeology, Architectural and Cultural Heritage;

- Water and Flood Risk;
- Soils and Geology; and
- Noise and Air.

A summary of each of the themes is presented below. Relevant constraints are mapped on the drawing set out in the table below and contained in Appendix 1 Constraints Drawings.

Table 4.1 Drawing Register

Drawing Title	Drawing Reference
Wider study area	Figure 1A
Wider study area zoning objectives	Figure 1B
Socio Economic Population and Land Use - Electoral divisions	Figure 2A
Planning applications	Figure 2B
Corine land cover	Figure 2C
Community-Residential Facilities Tourism Recreation and Amenities	Figure 2D
Electricity Networks Traffic and Transportation	Figure 2E
Designated sites	Figure 3A
Landscape Character Areas and Constraints	Figure 4A
Archaeology Architectural and Cultural Heritage Constraints	Figure 5A
Surface water bodies and CFRAM Constraints	Figure 6A
Hydrogeology	Figure 6B
Geology	Figure 7A
Subsoils	Figure 7B
Sensitive noise receptors	Figure 8A

4.2. Socioeconomic, Population and Land-Use

This section provides a consideration of population, settlement patterns and land use within the PSA. An understanding of these spatial and land use constraints allows feasible route options and site locations for the proposed substation to be fully considered. The key constraints are discussed in detail under the following broad headings:

- Population and Economic Profile;
- Land Use Patterns;
- Traffic and Transport; and
- Tourism and Recreation.

Resources

The material sources consulted as part of this desktop study are as follows:

- Dun Laoghaire Rathdown County Development Plan 2016 – 2022
- Draft Dun Laoghaire Rathdown County Development Plan 2022-2028
- Cherrywood Strategic Development Zone Planning Scheme
- Ballyogan and Environs Local Area Plan 2019-2025
- Kiltiernan / Glenamuck Local Area 2013-2019 (as extended)
- A review of planning applications granted within the last five years within Dun Laoghaire Rathdown County Council;
- An examination of Central Statistics Office 2016 Census data;
- A review of Geo-Directory databases as supplied by An Post;
- A review of Environmental Protection Agency Corine 2012 land-use dataset;
- EirGrid provided information on the existing transmission electricity network;
- Utility providers for the information on any existing or proposed services within the PSA;
- A review of Failte Ireland tourism data as well as websites and local tourism organisations and enterprises within the PSA.

Existing Constraints

Population and Economic Profile

The PSA primarily extends over the administrative area of Dun Laoghaire Rathdown (DLR), specifically the electoral divisions of Cabinteely-Loughlinstown, Shankill-Rathmichael and Glencullen as shown on Figure 4.3

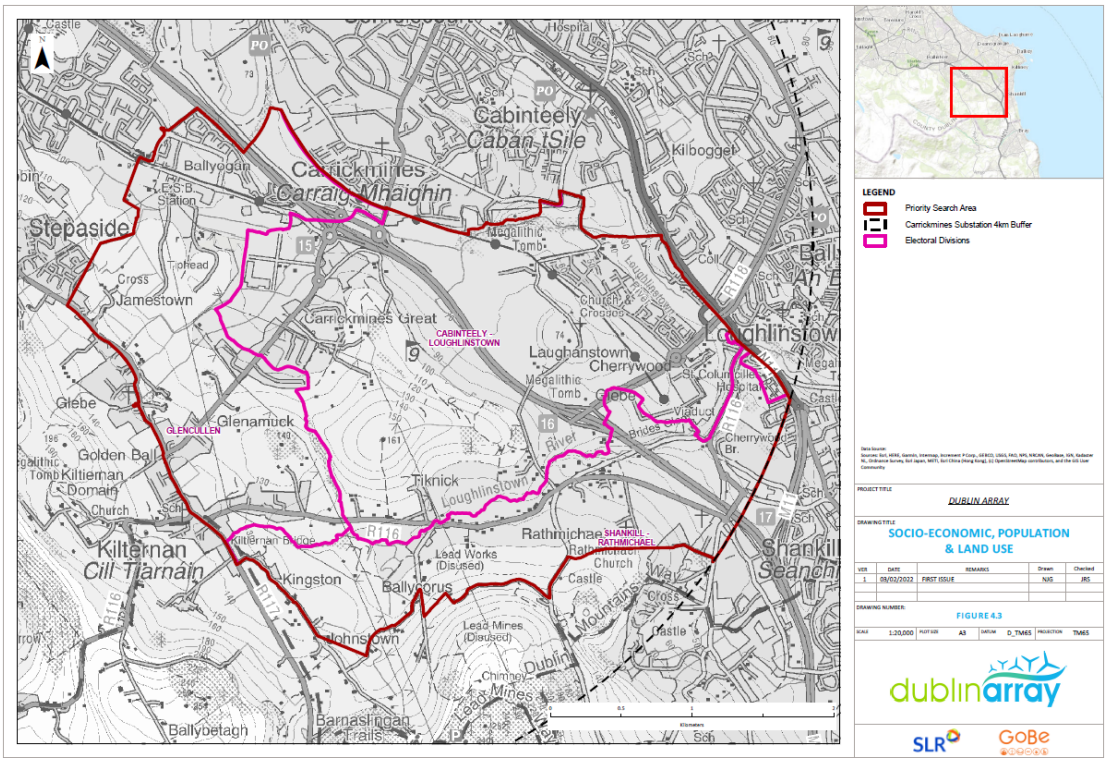


Figure 4-1 Electoral Divisions within the Administrative Area of Dun Laoghaire Rathdown and the PSA

The 2016 census indicates a population increase when compared with the 2011 census of 5.7% in Dun Laoghaire-Rathdown (DLR) to a total population of 218,018. The electoral division of Glencullen has a population of 19,773 or 9% of the total population of DLR. Shankill – Rathmichael has a population of 5,623 (2.5% of the population of DLR) followed by Cabinteely – Loughlinstown with a population of 4,280 (1.9% of the population of DLR). The relevant population figures for the Electoral Divisions found within the PSA are set out in Table 4.2 below.

Table 4.2 Electoral Divisions within the PSA

County	Population Number
Dun Laoghaire-Rathdown	*218,018*
Electoral Division	
Cabinteely - Loughlinstown	*4,280*
Shankill - Rathmichael	*5,623*
Glencullen	*19,773*

The PSA is predominantly divided into three categories. To the east and north, the area is characterised by existing built-up residential and commercial development. To the west and south, the area is characterised by upland areas which are largely undeveloped but do contain residential

receptors and ribbon development. The south and east are characterised by the Cherrywood SDZ which is partially developed.

Within the Draft Dun Laoghaire-Rathdown County Development Plan 2022-2028, the county settlement hierarchy identifies the majority of the urban footprint of DLR (including Cabinteely – Loughlinstown and Shankill – Rathmichael) as Tier 1 – Dublin City and Suburbs. Tier 1 areas play a key role in supporting the wider local economy and are described as an 'international business core with a highly concentrated and diversified employment base'. Glencullen is identified as Tier 6 – Rural.

According to the Census 2016, Dun Laoghaire has a labour force at work rate of 93.9% percent.

Planning Applications

A desktop search was undertaken of Dun Laoghaire Rathdown Council's online planning enquiry system to review valid within the PSA within the last five years. The majority of the planning applications within the PSA related to residential and agricultural development. However, the Cherrywood SDZ area is characterised by residential and commercial developments which are currently under construction.

The following planning applications are of relevance to the PSA:

- Cherrywood
    - A Strategic Housing Development of c. 482 residential units (ABP Ref. ABP-309026-21)
    - A planning application for 192 residential units (submitted 2021, no planning reference available)
    - A mixed use developments comprising 404 apartments, 41 houses as well as the provision of various retail, commercial, a creche and community facilities, offices, a gym, a park and various open spaces (submitted 2021, no planning reference available)
- Carrickmines
    - A mixed-use neighbourhood centre developments including commercial offices build to rent residential developments, recreational and liege development and ancillary uses (submitted 2021, no planning reference available)
- Kiltiernan
    - Glenamuck District Roads Scheme connecting the R1 1722 Ballycorus Road and Glenamuck Road (ABP ref. ABP-303945-19)
    - 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 infrastructure (DLR Ref. D18A/0257)

The majority of other planning applications within the PSA are comprised of residential, commercial, and agricultural uses. At the time of this writing, there are 159 total planning applications not listed above within the PSA which are either granted permission, or currently in the planning system. Figure 4-2 notes the large planning applications of relevance to the study area.

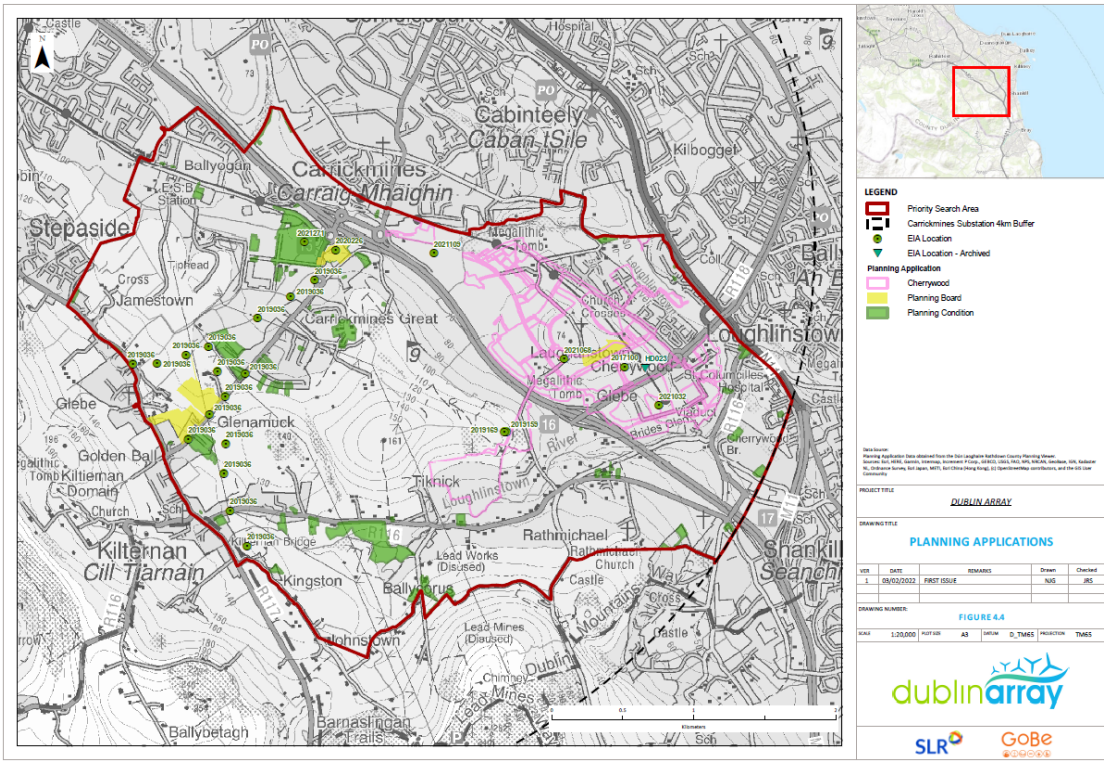


Figure 4-2 Selected Planning Applications within the Study Area

Land Use Patterns

The land-use objectives set out in the Dun Laoghaire Rathdown County Development Plan 2016 - 2022 that apply to the PSA are set out below and shown on Figure 4.5.

Corine Landcover data relating to existing land uses in the PSA indicate that the area contains a number of different land uses as illustrated in Figure 4.5. The vast majority of the area comprises agricultural land (shown as 'pastures' on the figure) with occasional golf courses 'sports and leisure facilities'. The centre of the search area is dominated by the M50 motorway corridor whilst the northern and eastern fringes comprise urban fabric much of which is currently subject to construction activities, particularly around Cherrywood.

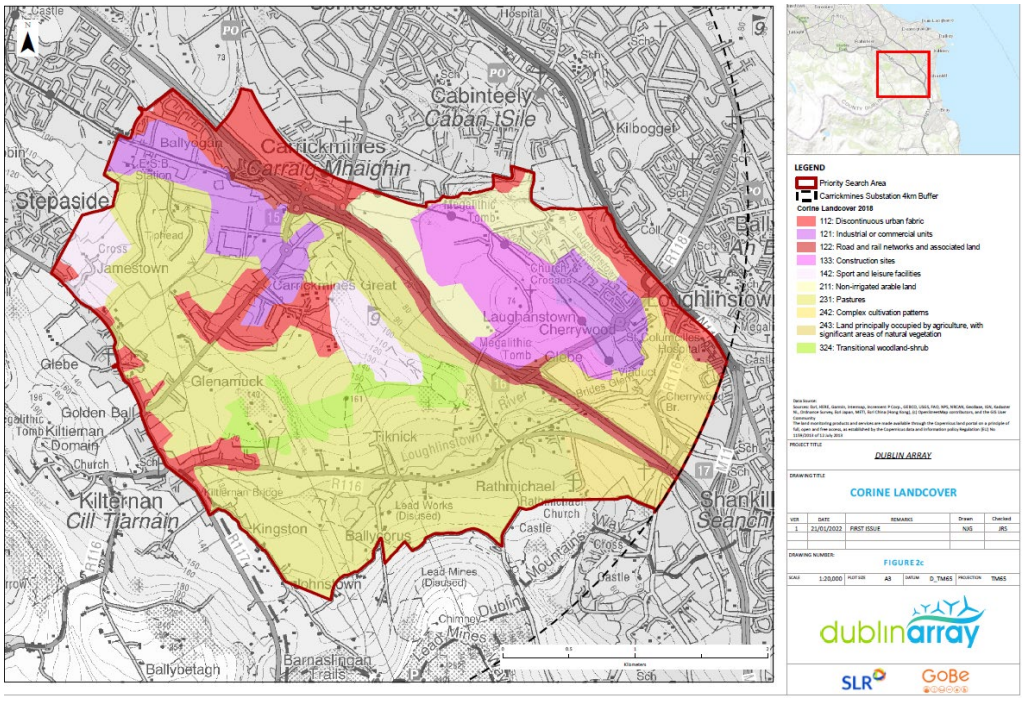


Figure 4.5 Corine Landcover

It is important to note that the land use zonings as shown above in **Error! Reference source not found.** are subject to additional development planning as a result of the Ballyogan / Glenamuck Local Area Plan. In addition to the provision of the new Glenamuck Road District Roads Scheme there is also some mixed-use development planned to be located towards the western end of the new Glenamuck Road. This area is currently in pasture/agricultural use but is expected to significantly change over the lifetime of the LAP.

Community and Residential Facilities

The PSA comprises a number of distinct communities which include Loughlinstown to the east; Carrickmines, Ballyogan and Jamestown to the north and north-west; and Kiltiernan to the south-west. The location of properties was a consideration in the process of defining feasible site locations for the substation. For the purpose of this constraint evaluation process, a minimum set back buffer of 100m around each property was used.

A total of seven healthcare facilities, one church, two schools, one further religious building, and two societies and clubs are located within the PSA. These facilities are concentrated within the aforementioned communities but mostly centred around Ballyogan and Loughlinstown as illustrated on Figure 4.6.

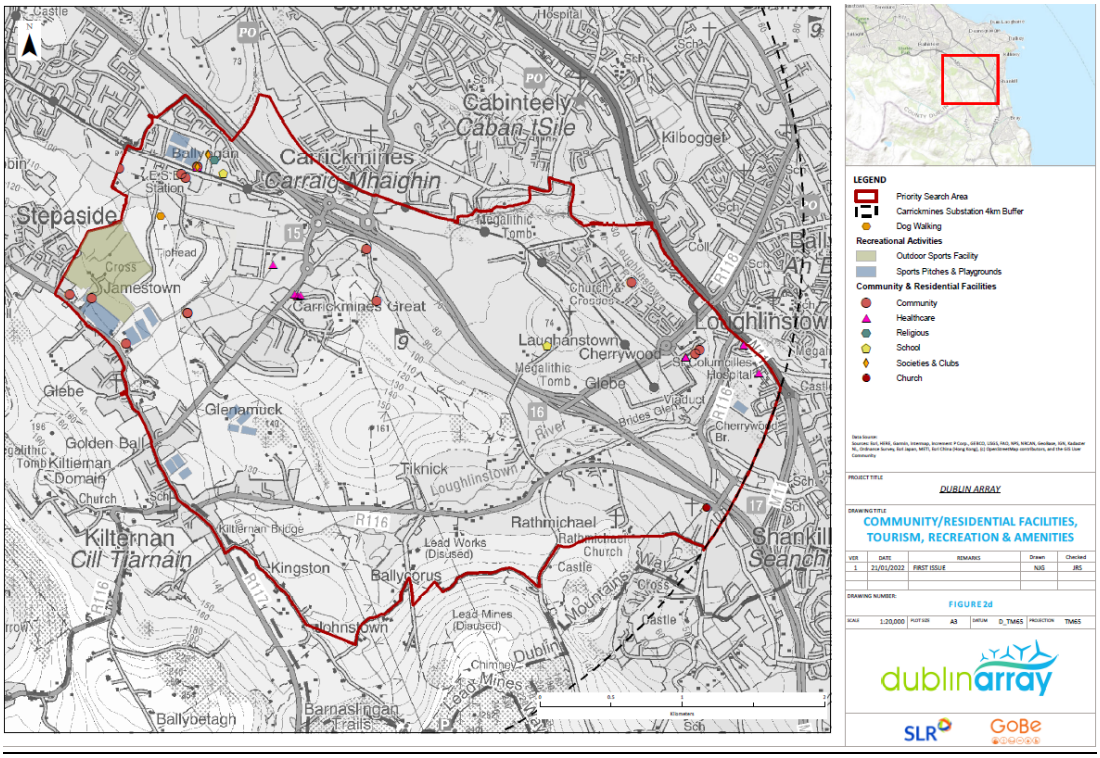


Figure 4.6 Community / Residential Facilities, Tourism, Recreation & Amenities

Existing Utilities

Existing utilities and infrastructure in the PSA were considered within this constraint evaluation process. these were considered as a constraint as their presence can restrict the developability of sites. Existing utilities are shown on Figure 4.7.

As illustrated on Figure 4.7 the majority of existing electricity infrastructure in the PSA connects to the existing high voltage ESB substation at Carrickmines. Existing 110 kV high voltage infrastructure is located through the west of the search area towards Carrickmines and extends northward towards Cabinteely and east to Cherrywood. Existing 220kV electricity infrastructure runs north south through the western part of the search area crossing from Ballycorus to the existing ESB substation at Carrickmines with onward connection in a northerly direction.

The presence of existing high voltage transmission lines (110 kV, 220 kV) can affect the route of another OHL; for example, where crossing of lines would be required or where diversion of an existing line might be necessary to facilitate a new line. However, any connections to and from the proposed substation will be in the form of underground cable infrastructure and therefore rerouting is less likely to be necessary. Due to the number and extent of overhead line infrastructure of varying voltages around the existing ESB high voltage substation at Carrickmines, minor diversions or undergrounding of existing transmission assets may be necessary.

There are two areas of spare ducting within the PSA. One running in a north east / south west direction at Cherrywood, and one running along Ballyogan road in the north west.

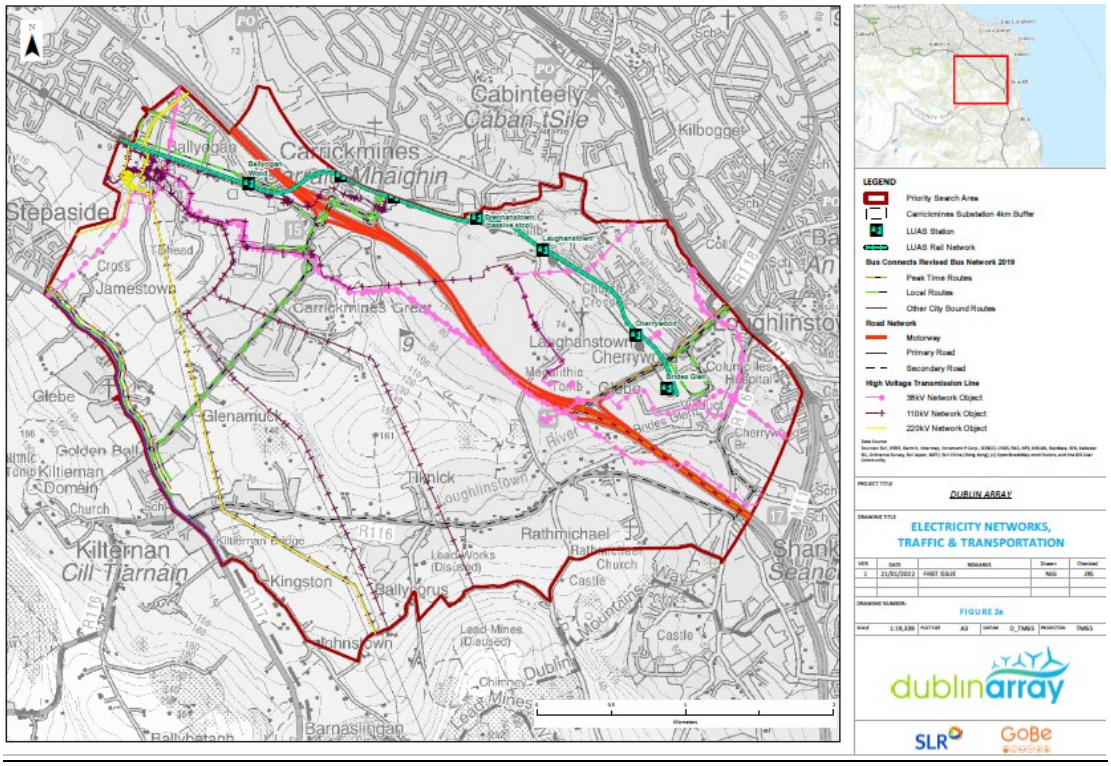


Figure 4.7 Existing Utilities and Traffic/Transport within the PSA

Traffic and Transport

There are two major transportation infrastructure networks within the search area namely the M50 and the LUAS Rail Network, both of which extend from the south eastern part of the search area to the north west, continuing on past Ballyogan. A total of seven LUAS stations sit within the search area. Commercial bus routes cover most of the regional and national roads in the PSA.

The Glenamuck Road District Roads Scheme will lead to significant changes to the road network in the PSA once it is completed. The DLRCC road scheme is routed northward from the R117 at Barnaslingan crossing the R116 Ballycorus Road and Glenauck Road before forming a new road junction to the east of Glenamuck. The scheme will provide access to development sites along Glenamuck Road and help provide direct access between the R117 and Carrickmines/M50. The project is due to commence construction in 2022.

Traffic and transport constraints are shown on Figure 4.7 (it should be noted that the Glenamuck District Roads Scheme is not shown on the figure).

Tourism Recreation and Amenities

A review of tourism and recreation facilities within the PSA was also undertaken.

Sports pitches are located to the east of Glenamuck Road and are used by Bray Wanderers Football Club for training and Wayside Celtic Football Club. The former Wayside pitch is located to the south east of The Golden Ball, although this has not been used for some time and has fallen into disrepair. Football pitches are also located in Ballyogan, Loughlinstown and in Jamestown to the south of

Stepaside Golf Course. To the east of the Golf Course is a sports complex run by De La Salle Palmerstown Rugby Club.

Tourism, recreation and amenities constraints are shown on Figure 4.6.

Key Constraints

The key constraints associated with the Project within the PSA in terms of impact on socio economic and land use are summarised below in Table 4.3.

Table 4.3 Key Socio-Economic Related Constraints

Key Constraints
Settlement Patterns: Proximity to communities and sensitive receptors present challenges for site selection The project will have regard to the zoning objectives set out in the Dun Laoghaire Rathdown County Development Plan 2016 – 2022 and the Draft Dun Laoghaire Rathdown County Development Plan 2022 – 2028 ; the approved Cherrywood Strategic Development Zone Planning Scheme and the Local Area Plans for Ballyogan and Environs 2019-2025 and Kiltiernan / Glenamuck Road 2013-2019 (as extended).
Land use pattern: The Project could potentially result in changes to land use and character in the search area. Landcover types based on the Corine land cover dataset across the project PSA have been identified. There is potential for pasture lands in particular to be affected by the Project given that it is the dominant land use in the search area. The development of the Project will have regard to the existing land uses.
Traffic and Transport: The development of the Project has the potential to impact on the existing transport network. The construction of the Project has the potential to result in temporary adverse impacts on the road network (i.e. road closure or diversions). The presence of planned road infrastructure projects will be considered.
Tourism, recreation and amenities: The development of the Project has the potential to impact known recreation sites, in particular the Project may cause temporarily disruption to the use and enjoyment of facilities which could result in adverse impacts to the area's recreational amenity with potential economic drawbacks.

4.3. Biodiversity Flora and Fauna

Resources

The material sources consulted as part of this desktop study are as follows:

- Data.gov.ie for search of designated sites
- Dun Laoghaire Rathdown County Council (2016). County Development Plan 2016-2022
- Draft Dun Laoghaire Rathdown County Development Plan 2022 – 2028

- SEA Environmental Report for the Dún Laoghaire-Rathdown County Development Plan 2016-2022
- SEA Environmental Report for the draft Dun Laoghaire Rathdown County development plan 2022 – 2028
- Cherrywood SDZ Local Area Plan
- Ballyogan and Environs Local Area Plan 2019-2025
- Kiltiernan / Glenamuck Local Area 2013-2019 (as extended)

Existing Constraints

There are no SACs, SPAs [2]or other sites designated for nature conservation within the PSA. There are no non-designated sites of nature conservation interest within the search area.

Small areas of woodland, scrub and grassland together with a number of watercourses are also present. Some of these watercourses have previously been modified through canalisation, deepening and culverting.

There is one pNHA located within the south-western part of the search area: Dingle Glen pNHA and is shown on Figure 4.8.

Dingle Glen pNHA (site code: 1207): This is a dry valley formed as a glacial lake overflow channel. While this Glen was formerly cleared of vegetation, a woodland cover is now regenerating. The importance of this site lies in the variety of habitats contained within a relatively small area. The site is secluded and not subject to significant disturbance (Kiltiernan/Glenamuck Local Area Plan 2013).

[2] Special Area of Conservation (SAC), Special Protection Area(SPA): Designated sites under Natura 2000 legislation,

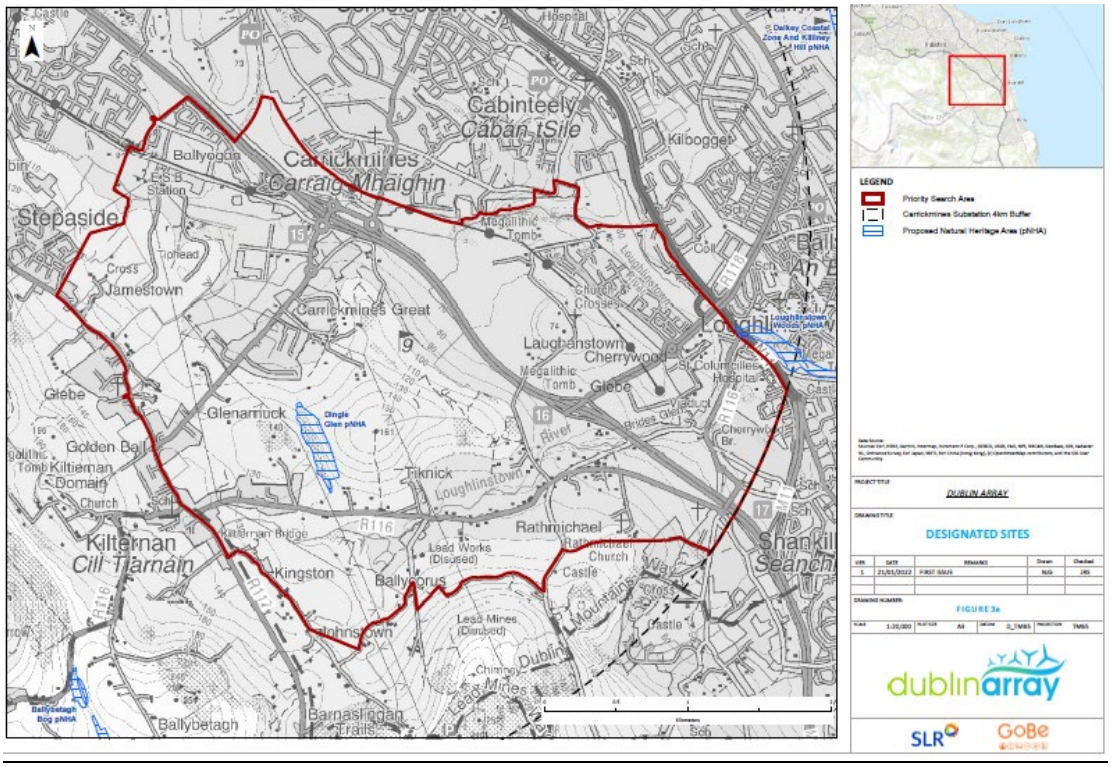


Figure 4.8 Designated Sites

The SEA Environmental Report for the Dún Laoghaire-Rathdown County Development Plan 2016-2022 highlights that there are three areas of High Ecological Value which include a number of high diversity habitats. One of these sits within the search area and is referred to as the Kiltiernan / Loughlinstown Area of High Ecological Value.

This area is located to the east of Kiltiernan and is surrounded by an area dominated by agricultural grassland and comprises a large pocket of dry meadows and grassy verges. This habitat is particularly rich in species diversity comprising a large strip of wet grassland, mixed broadleaved woodland, wet pendulate oak-ash-hazel woodland and riparian woodland.

Ecological networks are composed of linear features, such as treelines, hedgerows, rivers and streams, which provide corridors for wildlife species moving within their normal range. They are particularly important for mammals, especially for bats and small birds. The SEA Report highlights that such ecological networks are present within the PSA including Loughlinstown River together with the Cabinteely, Ballyogan, and the Glenamuck Streams and their tributaries and banks. The SEA also note that woodlands, parks, gardens and hedgerows are also species rich. These networks provide habitats for flora and fauna and facilitate linkages to the surrounding countryside.

A Habitats Survey undertaken for the SEA show that the search area is largely categorised as improved grassland with areas of non-native woodland, scrub, spoil and bare ground, recolonising bare ground and mixed deciduous woodland.

Key Constraints

The key constraints associated with the development of the Project within the PSA in terms of potential of biodiversity related impacts to sensitive receptors are summarised in Table 1.4.

Table 1.4 Key Biodiversity Related Constraints

Key Constraint
Damage / Loss of pNHA Habitat: There is potential for loss or damage to pNHA habitats and species within the project search area however is unlikely due to the secluded location of Dingle Glen.
Fragmentation and degradation of Habitats: There is potential for the degradation of habitats and connectivity between habitats due to the provision of the Project particularly where ecological networks are present and where areas are of high ecological value. This includes potential loss or damage to hedgerows and tree lines which are important wildlife corridors for numerous species, particularly bats and mammals. There is potential for the Project to obstruct or impair mammal movements during the construction stage. The identification of ecological corridors and important habitats will ensure the movement of species between identified sites are not impaired by the project.
Disturbance: Potential impacts during the construction phase include the displacement of species from roosting /resting / breeding and foraging areas. Avoidance of important ecological features will be prioritised where possible. In the event where works are located within or in proximity to designated sites and ecological features appropriate mitigation measures will be implemented.

4.4. Landscape and Visual

Resource*s*

- Dun Laoghaire Rathdown County Council (2016). County Development Plan 2016-2022
- Draft Dun Laoghaire Rathdown County Development Plan 2022 – 2028
- Ordnance Survey of Ireland (2021). GeoHive Map Viewer. Available at: http://map.geohive.ie/mapviewer.html
- Google (2021). Google Maps and Street View. Available at: https://www.google.com/maps
- Cherrywood SDZ Local Area Plan
- Ballyogan and Environs Local Area Plan 2019-2025
- Kiltiernan / Glenamuck Local Area 2013-2019 (as extended)

Existing Landscape Constraints

Landscape Policies and Objectives

The landscape and visual policies and objectives for Dun Laoghaire-Rathdown County Council (DLRCC) are set out in the 'Dun Laoghaire-Rathdown County Development Plan 2016-2022' and are summarised below:

- Policy LHB2: 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

- Policy LHB4: It is Council policy to conserve and enhance existing High Amenity zones and to seek to manage these and other areas to absorb further recreational uses and activity without damaging the amenities that affords them their special character

- Policy LHB6: It is Council policy to protect and encourage the enjoyment of views and prospects of special amenity value or special interests

- Policy EI27: It is Council policy to seek the undergrounding of all electricity, telephone and television cables wherever possible, in the interests of visual amenity and public health

Dun Laoghaire-Rathdown County Council Landscape Character Assessment

The DLR County Development Plan 2016-2022 contains a Landscape Character Assessment (in Appendix 7) of the primarily rural areas of the county. It identifies 14 Landscape Character Areas (LCAs), the majority of which are located to the south/west of the M50 motorway. The vast majority of the urban areas of DLR are not included in the Landscape Character Assessment and a separate townscape character assessment or similar is not available.

The PSA traverses LCA6 – Ballycorus, LCA 13 – Carrickmines and LCA 14 – Cherrywood/Rathmichael.

LCA 6 – Ballycorus

The description of LCA 6 – Ballycorus includes:

'*This enclosure encompasses the valley along which runs the Ballycorus Road and is bounded by the disused lead mines to the south and Ticknick and the Glenamuck Road to the north, Barnaslingan to the west with Three Rock in the background. This enclosure displays past and also present industrial/extractive works. The past is in the form of the old leadworks especially the lead mine's chimney. Quarrying/extraction has continued into the present with the activities of Cement Roadstone in the valley. The north western portion of this enclosure has altered considerably since the original Landscape Character Assessment. Considerable development has occurred along the Glenamuck Road in accordance with the Kiltiernan/Glenamuck Local Area Plan 2013.*'

The sensitivity/strategy information for LCA 6 – Ballycorus includes:

- 'Recognition of the important role of Ballycorus leadmines in the past.'

- 'Dingle Glen is a sensitive landscape and shall be afforded protection due to its rarity.'

- 'Maintenance and restoration of field patterns and boundaries.'
- 'To have regard to the recommendations and findings of the Historic Landscape Character Assessment for Kiltiernan.'
- '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.'

LCA 13 – Carrickmines

The description of LCA 13 – Carrickmines includes:

'*This enclosure encompasses the area east of the Stepaside Action Area and is bounded by the motorway to the north, the Glenamuck Road to the South and the Enniskerry Road to the west. The most dominant visual feature of this enclosure is the new 50 acre Retail Park at Carrickmines intersection of the M50. The former Ballyogan landfill which is ear marked for future development as a park is located at the edge of the built up area of Dún Laoghaire-Rathdown and functions as a buffer between the more densely built-up area of Leopardstown/Stepaside and the lower density suburban generated housing area of Kiltiernan. …*

The impact of the multitude of urban uses – the tiphead, retail park, pylons and houses on the landscape is evident.'

The sensitivity/strategy information for LCA 13 – Carrickmines includes:

- 'This enclosure sits between the urban and the rural landscapes and is capable of accommodating development.
- The future vision for this area offers an opportunity to enhance and restore a portion of the landscape as a public park (former Ballyogan tiphead). …

LCA 14 – Cherrywood/Rathmichael

The description of LCA 14 – Cherrywood/Rathmichael states that:

'*This area was originally outlined in the Landscape Character Assessment Study as it was an area undergoing significant change with the introduction of the Luas B1 line and the development of the Cherrywood Science and Technology Park. This area is now subject to the Cherrywood Strategic Development Zone (SDZ) Planning Scheme which was adopted by An Bord Pleanála in April 2014*.'

The Cherrywood SDZ site is described as follows in the Cherrywood Planning Scheme:

The Strategic Development Zone lands, of approx. 360 hectares which are located in the administrative area of Dún Laoghaire-Rathdown, … are the largest undeveloped land bank in the County and one of the most sizable undeveloped areas within the Dublin Metropolitan Area. The LCA notes that there is an historical connection to the Dublin Mountains, with Cherrywood originally being part of their hinterland, which has been severed somewhat by the completion of the South Eastern Motorway (M50) The lands have a varied landscape and topography, flanked by three valleys; Druid's

Glen, Bride's Glen and the Cherrywood/Loughlinstown River Valley, and the historical ruins of Tully Church identifying the high point of the Plan Area.

The boundaries of the area are characterised by housing along Cherrywood Road, the N11 and Brennanstown Road. The majority of the Plan Area is undeveloped and rural in context with dispersed housing along Lehaunstown Lane. There is some recent residential development in the form of housing and apartments and an emerging business park

Areas to the East of the M50

There are no designated and/or historic designed landscapes or townscapes within the search area. The topography of the area to the east of the M50, is generally flat, with levels at 70m OD along the M50. There are some local undulations, for instance along the section of the Loughlinstown River parallel to the N11, where the river is located in a distinct valley. However, these undulations do not influence the wider landscape in the same way as Dublin Mountains within the Mountain High Amenity area.

North eastern slopes of the Dublin Mountains

To the south west of the M50 the land becomes increasingly rural, as it gently rises, towards the R117, which runs approximately along the 130m contour between Stepaside and Kilternan. There are some local highpoints between the M50 and the R117, which locally enclose the landscape. One of these highpoints is the domed shape of the former Ballyogan landfill to the immediate south of the proposed substation site at Carrickmines. While the area between the M50 and R117 contains larger areas of agricultural grassland and several golf courses, there are also frequent housing estates and dense ribbon development along the R117, including Stepaside, and the Glenamuck Road.

Existing Visual Constraints

- *Areas to the East of the M50*

Views within the urban section of the search area are generally very restricted and of low scenic quality. This is due to a combination of the built-up environment, existing trees and hedgerows and the mostly flat topography. In the vicinity of public greenspaces, slightly more open views are available, however these are still typically restricted to the nearest treeline or building line.

Views towards the Dublin Mountains are primarily visible from the R116, R117 and R118, Cherrywood SDZ, Ballyogan Road and roads associated with the Carrickmines M50 interchange.

- *North eastern slopes of the Dublin Mountains*

Roadside vegetation, high ditches, walls or fencing restrict the views from many locations along the roads on the north eastern slopes of the Dublin Mountains. There are however intermittent uphill views along the R117. While these intermittent views are publicly accessible, since they are located along public roads formal viewing points are limited.

Sensitive receptors include residents, road users along the N11, M50 Cherrywood SDZ roads, workers at commercial / industrial premises along Ballyogan Road and recreational visitors to nearby tourism facilities.

There are no designated scenic routes or scenic views within the search area. There are however two sections of the R116 towards Kilternan and Rathmichael that are categorised as 'to preserve views'. a number of similar designations are located outside of the PSA as shown on Figure 4.9. Whilst these are outside of the PSA some of these are located on elevated ground and afford views into the PSA.

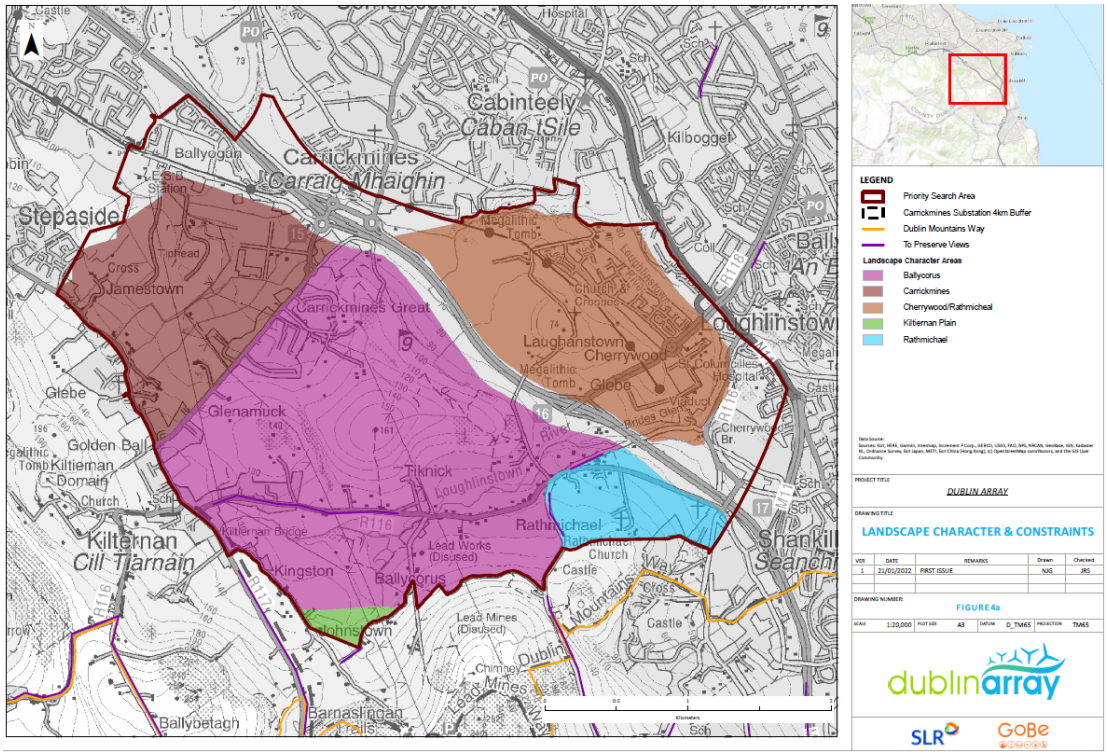


Figure 4.9 Landscape Character & Constraints

Key Constraints

The key constraints associated with the development of the Project within the PSA in terms of potential landscape and visual related impacts to sensitive receptors are shown above in **Error! Reference source not found.** and summarised below in **Error! Not a valid bookmark self-reference.**.

Table 4.2 Key Landscape and Visual Constraints

Key Constraint
Effects on sensitive receptors in particular road users along the N11, M50 Cherrywood SDZ roads, workers at commercial / industrial premises along Ballyogan Road and users of recreational assets. In addition the 'to preserve views' constraint along the R116 and similar designations outside of the PSA but affording views into it.

4.5. Archaeology, Architectural and Cultural Heritage

Resources

The material sources consulted as part of this desktop study are as follows:

- Ordnance Survey Ireland for historic mapping
- Dublin Archaeological Data Viewer
- Dun Laoghaire Rathdown County Council (2016). County Development Plan 2016-2022
- Draft Dun Laoghaire Rathdown County Development Plan 2022 – 2028Dublin City Conservation Area Appraisals and Management Plans; Annual Archaeological Excavations Bulletins
- topographic, cartographic and hydrological data
- available LiDAR data (Digital Surface Model (DSM), Digital Terrain Model (DTM) and point cloud)

Existing Constraints

There are several archaeological constraints within the search area, shown on Figure 5A and include:

- National Monuments
- Monuments in State Care
- Architectural Heritage Buildings / Recorded Protected Structures
- SMR Zone of Notification (surrounding some National Monuments within an area of 'records of Monuments and Place')

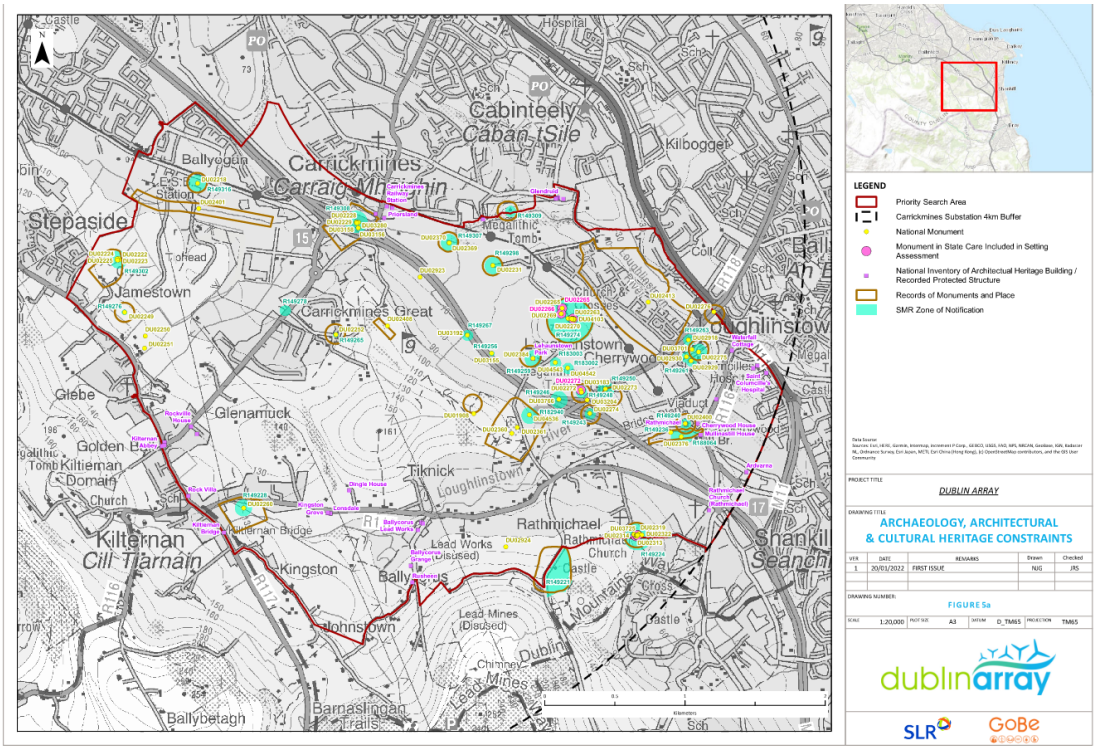


Figure 4.10: Archaeological, Architectural and Cultural Heritage Constraints

The majority of the archaeological assets are located around the outer perimeter of the search area however some are present within Carrickmines and Cherrywood. Monuments in State Care are only located in Cherrywood. In total there are 56 National Monuments, 21 Architectural Heritage Buildings / Recorded Protected Structures and 3 Monuments in state care.

Table 4.6 below shows a summary of the archaeological constraints.

Table 4.6 Archaeological, architectural, and cultural heritage constraints

Type of Archaeological / Cultural Heritage Constraint	ID / Name		
National Monument	DU02218	DU02260	DU02923
	DU02401	DU02228	DU02369
	DU02224	DU02229	DU02231
	DU02225	DU03158	DU03192
	DU02222	DU03280	DU03155
	DU02223	DU03156	DU01908
	DU02249	DU02252	DU02360
	DU02250	DU02408	DU02361
	DU02251	DU02370	DU02924
	DU02319	DU02322	DU02276
	DU02930	DU02313	DU04542
	DU03701	DU03725	DU02272
	DU02413	DU02314	DU03766
	DU02265	DU02376	DU04536
	DU02269	DU02400	DU03183
	DU02263	DU02929	DU02273
	DU04103	DU02275	DU03204
	DU02270	DU02918	DU02274
	DU02384	DU04543	
National Inventory of Architectural Heritage Building / Recorded Protected Structure	Waterfall Cottage	Glendruid	Ballycorus Lead Works
	Saint Columcille's Hospital	Lehaunstown Park	Ballycorus Grange
	Rathmichael	Carrickmines Railway Station	Rusheen
	Cherrywood House	Priorsland	Rockville House
	Mullinastill House	Dingle House	Kilternan Abbey
	Ardvarna	Kingston Grove	Rock Villa
	Rathmichael Church	Lonsdale	Kiltiernan Bridge
Monuments in State Care	DU02272	DU02265	DU02266

Key Constraints

The key constraints associated with the development of the Project within the PSA in terms of potential of archaeological, architectural and cultural heritage constraints related impacts are summarised in Table 4.7.

Table 4.3 Key Archaeological, architectural, and cultural heritage constraints

Key Constraint
Impacts on identified cultural heritage sites: All cultural heritage constraints (archaeology and architecture)identified within the PSA should be avoided where possible. The identification of theses constraints within the PSA will allow feasible site locations for the Project to be fully

considered. In the event that the cultural heritage constraints cannot be avoided appropriate archaeological investigations will be required.
Visual impacts on cultural heritage: Project infrastructures could have adverse effects on the setting of archaeologic monuments and sites, on built heritage features and protected structures. The significance of the effects on the historic environment depends on the monument / building type, the extent of development and the potential for screening and mitigation measures. The identification of these constraints within the PSA will allow site locations for the Project to be fully considered.
Impacts on previously unrecorded archaeological features: The works have the potential of uncovering unrecorded cultural heritage features. This cannot be mapped and would require further site specific investigations to confirm presence or absence.

4.6. Water and Flood Risk

Resources

The material sources consulted as part of this desktop study are as follows:

- Ordnance Survey of Ireland (OSi) mapping to establish former channel courses and any diversion/culvert works in streams and rivers
- Teagasc / Environmental Protection Agency (EPA) / GSI Soil and subsoils mapping for Ireland
- Office of Public Works (OPW) stream flow, fluvial and tidal flood risk data and flood modelling information including proposals under the OPW Catchment Flood Risk Assessment and Management (CFRAM) for a flood relief scheme along the Shanganagh River at Loughlinstown
- Dún Laoghaire-Rathdown County Council (DLRCC) County Development Plan (2016-2022) Appendix 13 Strategic Flood Risk Assessment (SFRA)
- Dún Laoghaire-Rathdown Flood Relief Scheme for Deansgrange (Kill-O-The-Grange) Stream
- Draft Dun Laoghaire Rathdown County Development Plan 2022 – 2028
- Geological Survey of Ireland (GSI) website groundwater information; geological information (accessed January 2022)
- EPA website to view consented abstractions, discharges and licences (accessed January 2022)
- EPA website to view water quality results and WFD surface water and groundwater status (accessed January 2022)
- River Basin management Plans (RBMP) within the Cherrywood, Loughlinstown and Kiltiernan areas
- Inland Fisheries Ireland (IFI) survey and water quality information

- Local authorityDun Laoghaire Rathdown monitoring results (surface water and groundwater) for Kilboggett Park (historic landfill) and Ballyogan (former local authority landfill).

Existing Constraints

Land Use

In addition to these existing land uses detailed previously there are two areas of former landfills within Ballyogan and Kilbogget both which sit inside the PSA. The former Ballyogan landfill and the current recycling centre (W0015-01) have an extensive clean and foul storm surface water management system with treatment measures in place. The treated stormwater discharges to the Carrickmines Stream. There is one Integrated Pollution Prevention Control (IPPC) licenced facility (International Coatings Limited, P0122-01) located in the Shanganagh River catchment in Ballycorus and is c. 3.8 km upstream of the crossing point of the Shanganagh River.

Surface Water Features

There are a number of surface water courses, which have formed the valleys through the search area. These river valleys are generally broad and flat, particularly along the upper section of the Carrickmines Stream from Carrickmines to Ballyogan. However, the section of the Carrickmines stream from Carrickmines to the Shanganagh River at Loughlinstown flows through a relatively steep sided valley, compared with the aforementioned broad and flat channels. At Cherrywood and Loughlinstown the valley opens out into a relatively wider section with a flat wide valley floor but with steep valley sides.

The search area is located within the Dargle River sub catchment of WFD hydrometric Area No. 10, which includes the Avoca, Vartry and Dargle Rivers. The EPA Water maps show the following primary surface watercourses to run through the PSA:

- Shanganagh River (sections of which are also known locally as the Loughlinstown River);
- Carrickmines Stream; and
- Cabinteely Stream;

A number of smaller tributaries flow into these watercourses particularly around Jamestown and Glenamuck.

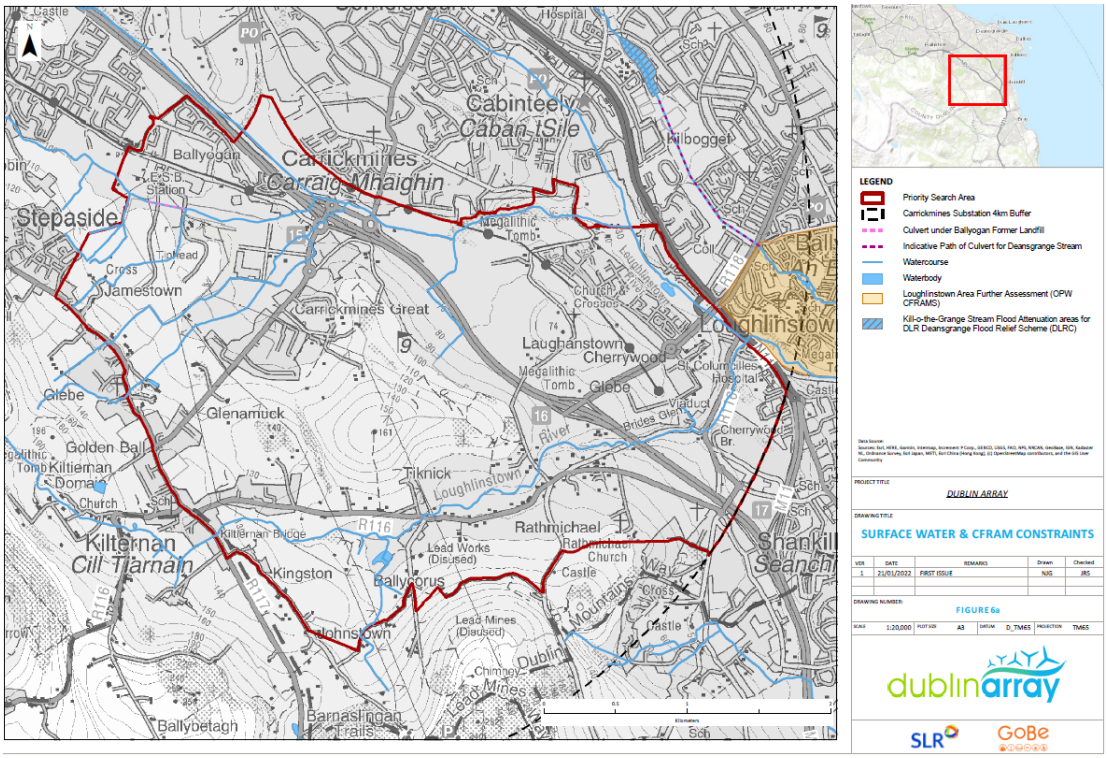


Figure 4.11 Surface water Bodies and CFRAM Constraints

Surface Water Abstraction

The available EPA online maps do not indicate the presence of any surface water abstractions in at or downstream of the search area, either for drinking water purposes or any other uses.

Shanganagh River is designated as a drinking water river under Article 7 - Abstraction for Drinking Water, of the Water Framework Directive, and the river was delineated as a drinking water river in accordance with European Communities (Drinking Water) (No. 2) Regulations 2007 (SI no. 278/2007).

The Shanganagh River is designated for drinking water abstraction under DLRCC Drinking Water Zones 3 & 5 which covers Ballyedmonduff and Kiltiernan Water Treatment Plants local supplies only however these are understood to no longer be in use. The Shanganagh River remains designated for drinking water abstraction.

Surface Water Quality

The EPA latest surface water quality (Q) monitoring at monitoring points along the rivers and streams in the PSA date from 2018. The water quality monitoring indicates that the Shanganagh River in the vicinity of the PSA has a water quality of Low – Moderate. There are no water quality monitoring points on the Carrickmines Stream near Ballyogan.

The EPA Water maps indicate that the Carrickmines has river urban runoff pressures. Urban runoff pressures are often due to combined sewer overflows between foul and surface water lines where foul water can enter the surface water drainage system and is discharged to surface watercourses.

EPA surface water quality data was obtained for the following locations on the Shanganagh River:

- Shanganagh River at Commons Road (sample location no. RS10S010600) and Brides Glen (sample location no. RS10S010460).

The surface water quality in the Shanganagh River is moderately hard (CaCO3) while the ortho-phosphate, Ammonia, Conductivity and BOD [3]are good and reflecting the predominantly rural nature of the catchment at Brides Glen, and to a lesser extent at Commons Road which includes more flow from areas of built up urban land use.

Groundwater Vulnerability

The GSI has developed a groundwater vulnerability classification for Ireland. The vulnerability depends on the nature of the subsoils (i.e. their permeability characteristics), the type of recharge (point or diffuse) and the thickness of the unsaturated zone (depth to groundwater).

Areas surrounding Tiknick and Carrickmines are categorised as having extreme groundwater vulnerability. Ballyogan and Jamestown in the north west, Ballycorus in the south and to the east of Cherrywood have moderate to high groundwater vulnerability. The very south eastern corner of the search area at Loughlinstown is the only area categorised as having low groundwater vulnerability.

The potential impact on groundwater quality arising from human activities increases as the groundwater vulnerability rating increases from Low to Extreme.

Flooding

Flooding can occur at any time of year and can be caused by a range of factors. While flows are higher during the autumn and winter, flooding can also occur during summer months due to intense storm events.

The OPW is the national agency with statutory responsibility for flood risk management in Ireland. The Catchment Flood Risk Assessment and Management (CFRAM) Programme produced a series of plans which, amongst other locations nationally, identified the flood risk along the lower Shanganagh River in the vicinity of Loughlinstown and Ballybrack. CFRAM constraints are shown on Figure 4.11.

The OPW website (www.floodinfo.ie) shows the modelled extent of land that might be flooded by rivers (fluvial flooding) during a range of floods. The OPW have modelled the following flood events along the Shanganagh River and the Carrickmines Stream:Low Probability flood events which have an indicative 1-in-a-1000 chance of occurring or being exceeded in any given year. This is also referred to as an Annual Exceedance Probability (AEP) of 0.1%.

A Past Flood Event is defined by the OPW as the occurrence of recorded flooding at a given location on a given date or on a recurring basis. The flood event information was derived from available documentation including Flood Event Reports, news articles, archive information and photos and was compiled by the OPW. The OPW database does not however represent all Past Flood Events, but only those recorded, which were usually only when there was an impact of property or transport.

OPW identified Past Flood Events for the Shanganagh River include Flooding along Commons Road and at the R119 Bridge (noted by OPW as a recurring event at this location). Past Flood Events for the

[3] BOD: Biological Oxygen Demand -a measure of the amount of oxygen required to remove waste organic matter from water.

Carrickmines Stream include flooding at Carrickmines bridge on the 26/05/1993 (noted by OPW as single event at this location). Note that this event dated from 1993 and was pre the development of M50 road and current road alignments and drainage infrastructure.

Hydrogeology

The GSI classifies all aquifers in Ireland into three categories:

- Regionally important aquifers: good (100 to 400m3/day) to excellent (>400m3/day) productivity;
- Locally important aquifers: moderate (40 to 100m3/day) productivity; and
- Poor aquifers: poor (<40m3/day) productivity.

The majority of the search area is characterised as a poor aquifer with bedrock that is generally unproductive except for local zones. A small section in the south east part of the search area towards Shankill is categorised as a locally important aquifer where bedrock is moderately productive only in local zones.

Groundwater bedrock aquifers are shown on Figure 4.12.

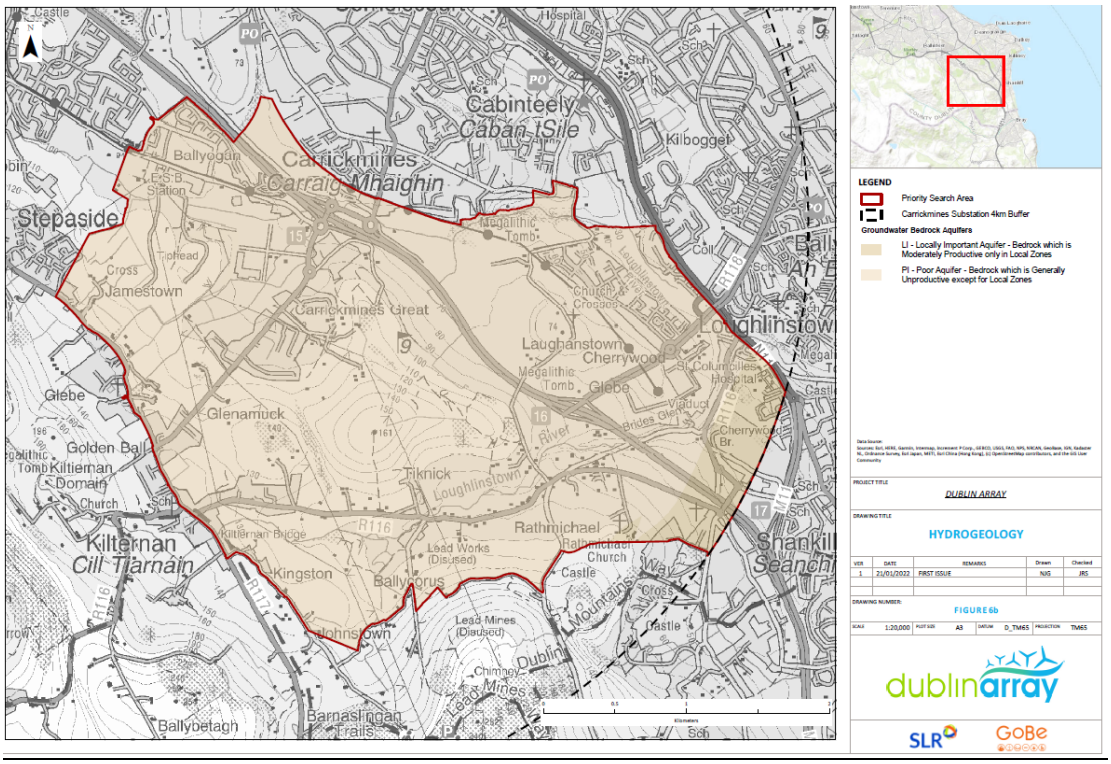


Figure 4.12 Groundwater Bedrock Aquifers

Key Constraints

The key constraints associated with the development of the Project within the PSA in terms of potential of water and flood risk related impacts to sensitive receptors are summarised in Table 4.4.

Table 4.4 Key Water and Flood Risk Constraints

Key Constraint
Proximity to CFRAM Area: Areas at risk of flooding can pose a risk to locating any structures. In addition, repeated flooding could lead to erosion of material at the base of transmission structures. The CFRAM Loughlinstown Area for further assessment borders the eastern side of the search area. The potential flood risk arising from water resources will be fully considered throughout the project development process.
Pollution potential for accidental spillage of fuel, ingress of sediments, chemicals or sewage causing pollution to surface or ground water (protected areas) during construction or maintenance activities. The groundwater vulnerability of the search area has been identified as part of this constraints identification exercise. Best practice measures incorporated into the physical design and construction would manage pollution risks.

4.7. Soils and Geology

Resources

The material sources consulted as part of this desktop study are as follows:

- Ordnance Survey of Ireland (OSi) mapping
- Teagasc / Environmental Protection Agency (EPA) / GSI soil and subsoils mapping for Ireland
- Dun Laoghaire Rathdown County Council (2016). County Development Plan 2016-2022
- Draft Dun Laoghaire Rathdown County Development Plan 2022 – 2028
- Geological Survey of Ireland (GSI) geological information including borehole records;
- Cherrywood SDZ Local Area Plan
- Ballyogan and Environs Local Area Plan 2019-2025
- Kiltiernan / Glenamuck Local Area 2013-2019 (as extended)
- Previous ground investigations

Existing Constraints

Bedrock Geology

There are four types of bedrock that are present within the PSA moving from west to east and are shown on Figure 4.13

- Type 3 muscovite porphyritic (granite)
- Type 2e equigranular (granite)

- Type 2p microcline porphyritic (granite)
- Maulin Formation

Type 2p Granite consists of Caledonian granite with microcline phenocrysts. Type 2p has in addition euhedral microcline phenocrysts up to 30mm. Accessory minerals are Fe-oxide, sphene, apatite, zircon, garnet and rutile. Type 2p Granite extends from the eastern side of Cherrywood down to Rathmichael in the south. Its eastern extent reaches where the R116 links the N11 and the M50.

Type 2e Granite consists of quartz, plagioclase, microcline, muscovite and biotite with grainsize 1-5mm. This can be found in the south at Ballycorus, around Cherrywood and up past the northern side of the M50.

Type 3 Granite is similar to Type 2e with muscovite phenocrysts in addition, and with accessory tourmaline and topaz. This is present across the majority of the search area and can be found at Ballyogan in the north, in the west at Glenamuck and at Kingston in the south. This bedrock extends just east of the Carrickmines Golf Club.

The Maulin Formation consists of Ordovician dark blue-grey slate, phyllite and schist. This is described by the GSI as penetratively cleaved dark blue grey slates and phyllites which are commonly striped with pale siltstone laminae. Bands of garnetiferous quartzite that are 20m thick occur in the granite aureole. There are also thick lenses of orthoquartzite. The Maulin Formation is present in the very south eastern corner of the search area towards Shankill.

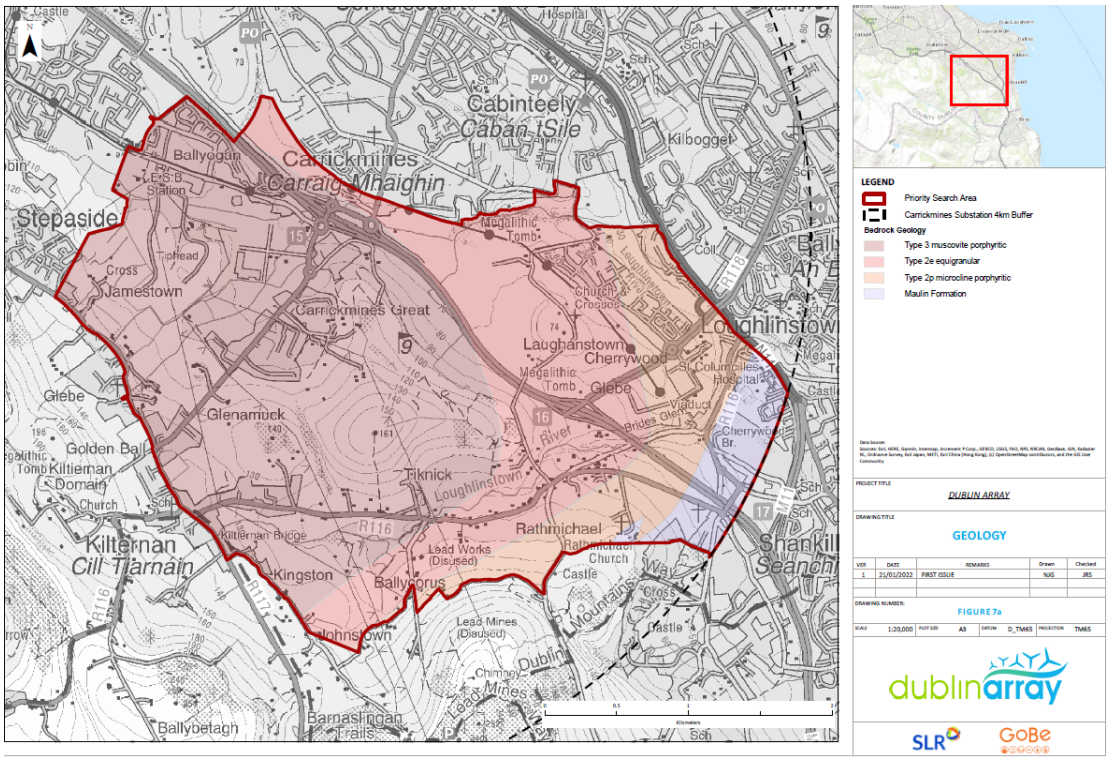


Figure 4.13 Bedrock Geology

Soils

The search area is underlain by four principal soil types: Urban; Alluvium along the watercourses; Clonroche Soil Association and Carrigvanagh Soil Association.

The urban areas within the search area are classified as Urban Soils where the urban development has occurred, and the natural soils have been disturbed. Along the watercourses Alluvial soils occur which host the channel water flows.

The remainder of the search area to the north and the east is underlain by soils from the Clonroche Soil Association which is a Brown Earth soil comprised from a predominantly fine loamy glacial till parent material primarily composed of sedimentary siliceous stones / geology. The areas of Clonroche soils within the PSA comprise open space or land designated for development and none of the areas are in active agricultural production.

Areas of Carrigavanagh soils are found in the south west of the search area at Ballycorus and the south of Glenamuck.

Subsoils

The search area comprises of a number of subsoils. The Quaternary (Subsoil) deposits were deposited during the last 2 million years, and essentially comprise the unconsolidated materials overlying bedrock. The two main types of quaternary subsoils in Ireland are glacial till, deposited at the base of ice sheets and sand & gravel deposits associated with the melting of the ice sheets which are generally termed glaciofluvial outwash sands and gravels.

The EPA online mapping website shows the PSA to be underlain five types of subsoil and are shown on Figure 4.14.

- Gravels Derived from Chert, Granite and Limestones
- Alluvium
- Bedrock Outcrop or Subcrop
- Till Derived from Granites
- Till derived from limestones

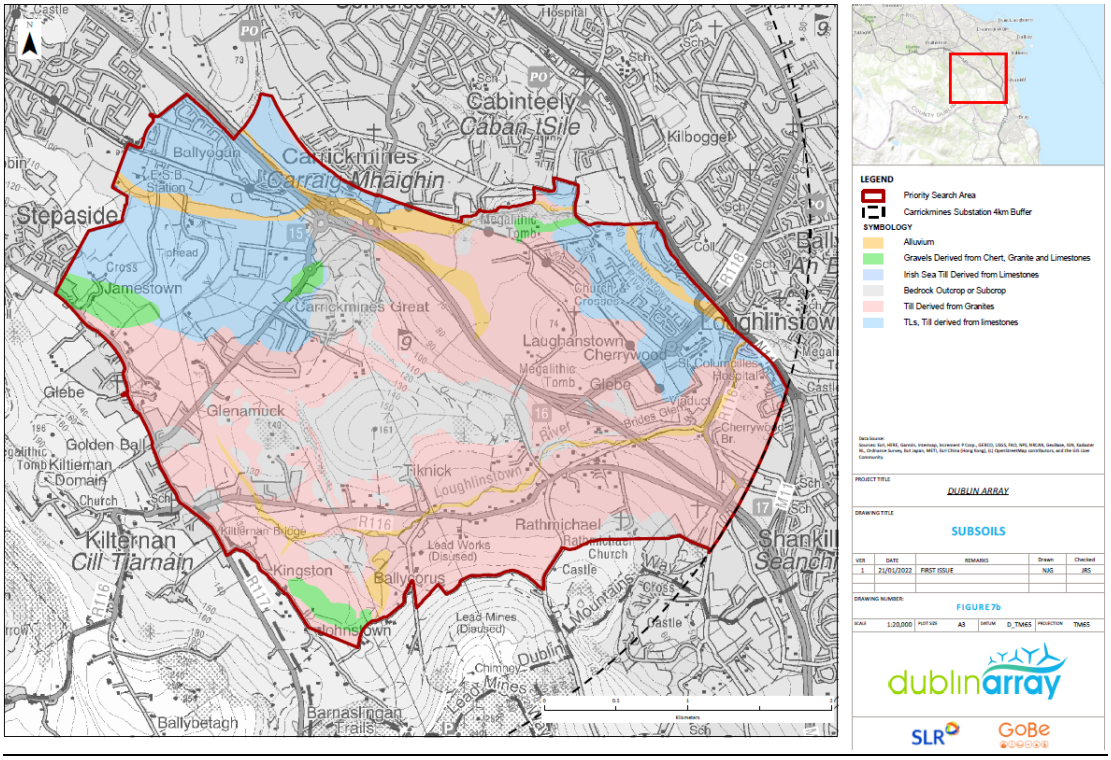


Figure 4.14 Subsoils

Till derived from limestones are extensive across Ireland in areas of limestone geology, and likewise till derived from granite is extensive across areas with granite geology. Alluvium subsoils are more recent and are found along watercourses as a result of natural erosion and sedimentation by rivers. There are also extensive areas of mapped 'made ground' through the PSA where urban development has occurred.

Gravels Derived from Chert, Granite and Limestones are present in four separate areas; to the north of Cherrywood, west of Ballycorus, Jamestown and Carrickmines.

Bedrock Outcrop or Subcrop subsoil is found at areas of higher elevation and predominantly in the centre of the search area at Tiknick.

Till Derived from Granites is the most abundant subsoil type surrounding Tiknick and extending east to Cherrywood, west to Glenamuck and south the Ballycorus.

Till derived from limestones is primarily found in the north western corner of the search area at Ballyogan and to the north east of Cherrywood.

Topography

From the Shanganagh River the ground topography rises gently to an elevation of c. 30 mOD at the N11 beside Kilbogget Park. The PSA then drops down into the valley of the Carrickmines Stream before rising up to c. 70 mOD at Laughanstown. From Laughanstown the PSA is relatively level to Carrickmines where it rises up to c. 90 mOD at Ballyogan.

Physical Features

There are a number of surface water courses, which have formed the valleys through the PSA. These river valleys are generally broad and flat, particularly along the upper section of the Carrickmines Stream from Carrickmines to Ballyogan. However, the section of the Carrickmines stream from Carrickmines to the Shanganagh River at Loughlinstown flows through a relatively steep sided valley, compared with the aforementioned broad and flat channels. At Cherrywood and Loughlinstown the valley opens out into a relatively wider section with a flat wide valley floor but with steep valley sides.

Land Use

In addition to these existing land uses detailed in Section 4.3, there are two areas of former landfill within Ballyogan and Kilbogget both which sit inside the PSA. The former landfill at Ballyogan has been extensively studied as part of previous ground investigations at the site. In addition, there is an ongoing monitoring regime of landfill gas, groundwater and ground gas monitoring at the site which is required as part of the site's waste licence Reg. No. W0015-01.

Key Constraints

The key constraints associated with the development of the Project within the PSA in terms of potential of soils and geology related impacts to sensitive receptors are summarised in Table 4.9.

Key Constraint
Unknown ground conditions, shallow groundwater: There is potential to encounter unstable or unknown ground conditions. Ground investigation will be carried out to confirm the ground conditions in advance of construction.
Removal of soils and bedrock: Permanent or temporary removal of soils / excavation of bedrock may be necessary during the construction of the Project and this could alter infiltration or drainage pattern. The identification of the constraints within the search area will allow feasible route options and site locations for the project to be fully considered.
Changes to local hydrology / geology: Local hydrology / hydrogeology drainage paths may be altered due to potential for increased runoff or blockages and excavation where groundwater is near the surface. The hydrogeology of the search area has been mapped, this will allow feasible route options and site locations for the Project to be considered at later stages of the constraint evaluation process.
Contamination of soils, geology and ground water: There is potential for the contamination of ground and water bodies through spills or leaks from hazardous substances used on site during construction or maintenance works, particularly at the former Ballyogan Landfill. Groundwater bedrock aquifers have been mapped within the search area.

4.8. Noise and Air

Resources

The material sources consulted as part of this desktop study are as follows:

- Dun Laoghaire Rathdown County Council (2016). County Development Plan 2016-2022
- Draft Dun Laoghaire Rathdown County Development Plan 2022 – 2028
- Review of current land use in the Dun Laoghaire Rathdown County Development Plan 2016-2022
- Review of EPA air monitoring stations at Station 34, Dun Laoghaire
- Cherrywood SDZ Local Area Plan
- Ballyogan and Environs Local Area Plan 2019-2025
- Kiltiernan / Glenamuck Local Area 2013-2019 (as extended)
- A review of Fáilte Ireland data in relation to tourism (Failte Ireland, 2020, Tourism Facts 2019)

Existing Constraints

Existing Noise and Air Constraints

The PSA is predominantly divided into three land use categories. To the east and north, the area is characterised by existing built-up residential and commercial development. To the west and south, the area is characterised by upland areas which are largely undeveloped but do contain residential receptors and ribbon development. The south and east is characterised by the Cherrywood SDZ which is partially developed. Existing noise levels are likely to be typical of these developed residential and upland areas. The M50 crosses the PSA and is likely to represent an elevated noise level.

The EPA's Air Quality Index for Health (AQIH) is a number from one to ten that the current air quality in a region or at a particular station. A reading of ten means the air quality is 'very poor' and a reading of one to three inclusive means that the air quality is 'good'.

The nearest air quality station to the PSA is in Dún Laoghaire (station 34). This station monitors PM10, PM2.5 and NO2. Dún Laoghaire station updates every 60 minutes with the calculated Air Quality Index for Health (AQIH). As of 18 January 2022, the air quality index characterised by this station was classified as 2-Good.

Existing Noise and Air Sensitive Receptors

An understanding of the land use constraints will inform the site selection for the Project in terms of potential noise impacts to sensitive receptors. Land use characteristics are discussed in detail in Section 4.3. A number of residential dwellings sit within the PSA contained within 12 communities in the vicinity of Loughlinstown to the east and Carrickmines, Ballyogan and Jamestown to the north

west. For the purpose of this constraints review, a buffer of 100m has been applied to potential site selection locations within the search area as shown on Figure 4.15.

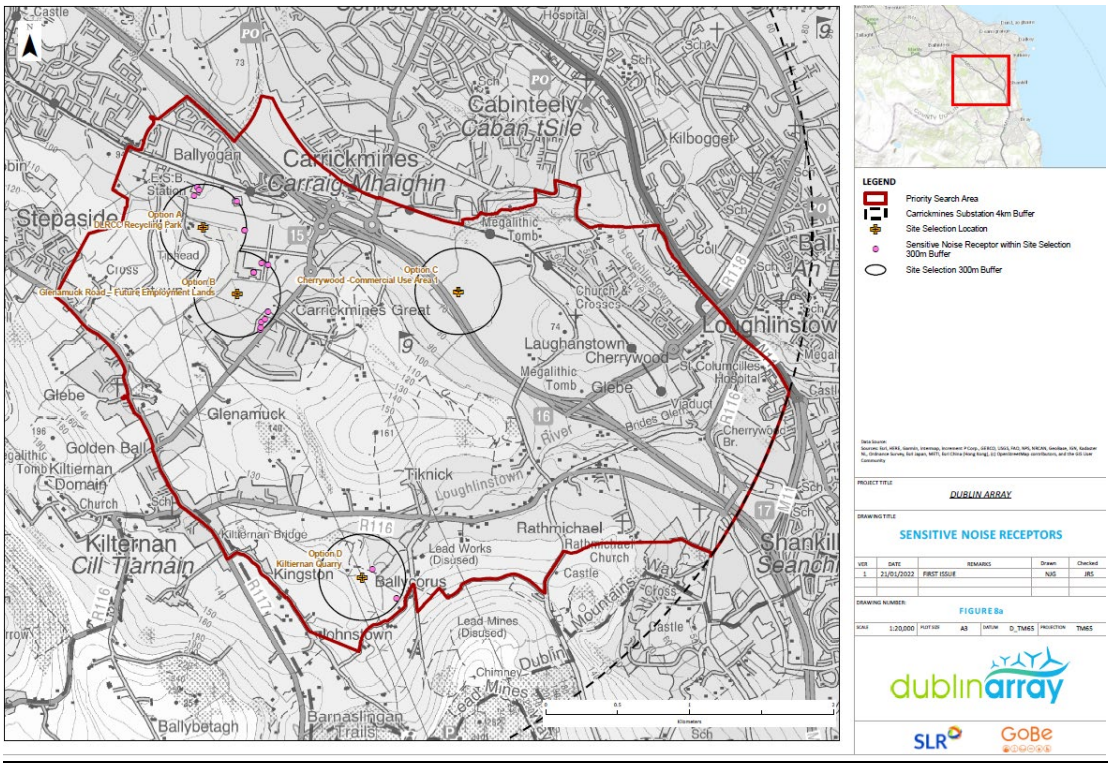


Figure 4.15 Noise Sensitive Receptors within 100m of Proposed Site Selection Locations

A total of seven healthcare facilities, one church, two schools, one religious building, and two societies and clubs are located within the PSA. These facilities are concentrated within Loughlinstown, Ballyogan and Carrickmines and are shown on Figure 4.6. Sensitive receptors also include open space, proposed parks, existing residential areas and new proposed residential areas.

A review of tourism and recreation facilities within the search area was also undertaken as described earlier. Facilities consist of several sports pitches, open space and an area used for dog walking. These facilities are discussed in more detail in Section 4.3 and are shown on Figure 4.6.

Key Constraints

The key constraints associated with the development of the Project within the PSA in terms of potential of noise and air related impacts to sensitive receptors are summarised in 4.10.

Table 4.10 Key Noise and Air Related Constraints

Key Constraint
Noise/dust impacts associated with the construction phase: The construction works will result in a temporary increase in noise and dust in the vicinity of the search area. Site selection for the Project should be considerate of proximity to sensitive receptors such as domestic dwellings and recreational areas.

The potential construction noise impacts on the sensitive receptors will be considered further at the next stage of the evaluation process.
Increase in traffic construction: The construction works will result in a temporary increase in construction traffic within the PSA for the duration of the works. The potential construction traffic noise and air quality impacts on the sensitive receptors will be considered further at the next stage of the evaluation process.
Noise impacts associated with the operational phase: Operational equipment in the substation may result in changes in baseline noise during the operational phase. Site selection of the project should consider sensitive receptors which may be impacted during the operational phase of the development.

5. Technical Requirements

5.1. Introduction

In March 2021 EirGrid published their analysis of potential grid connection options for selected suitably progressed offshore wind projects [4]. In this analysis EirGrid identified the existing Carrickmines 220kV Substation and the existing Poolbeg 220kV Substation as potential grid connection points for offshore wind projects situated off the coast of South Dublin and Wicklow.

5.2. Overview of Technical Requirements

In order to connect the electricity from offshore wind site(s) to the Carrickmines 220kV substation a new onshore substation will be required. This new onshore substation will be the point at which the cables coming from the offshore windfarm(s) can be safely connected to and disconnected from the system. The new onshore substation is also required to facilitate the connection of ancillary equipment to ensure the offshore windfarm(s) can comply with the technical requirements of EirGrid. There is also a requirement for a dedicated ESBN interface point. There are a number of design considerations in relation to the new onshore substation.

The first design consideration is how this new onshore substation is connected into the grid at Carrickmines. Typically this can be done by a new radial connection to Carrickmines or by looping into an existing part of the 220kV system in the vicinity of Carrickmines.

The second design consideration is the technology to be used in the new onshore substation. This consists of a choice between Air Insulated Switchgear (AIS) or Gas Insulated Switchgear (GIS) for the main High Voltage switchgear in the substation.

The final design consideration for the Onshore substation is the use of either overhead line (OHL) or underground cable (UGC) for the connection to the existing Carrickmines 220kV substation.

These design considerations are described in detail in Chapter 6.

[4] https://www.cru.ie/wp-content/uploads/2021/10/CRU21112a-EirGrid-Offshore-Phase-1-Projects-Grid-Connections-Assessments-March21.pdf

6. Technology Options and Short-Listing

This section describes the technology options available, assesses each option and concludes the chosen technologies to be used for the site selection for the proposed onshore Substation.

6.1. Grid Connection – Looped or Direct Connection

EirGrid have identified Carrickmines 220kV Substation as a feasible connection point for 824MW, however, the connection methodology was not specified. In principle two connection method types may be considered.

6.1.1. Loop In Connection

A Loop In connection consists of connecting into one or more of the 220kV circuits connected to Carrickmines. This is done by building a new Substation in proximity to the existing 220kV circuit and diverting the circuit to enter and exit the new substation and then continue its connection to the existing Carrickmines 220kV Substation.

A Loop In connection requires the existing 220kV circuits to have enough spare capacity for the new connection. Given the location of the offshore wind farm projects which are the subject matter of this report the potential candidate circuits for a Loop In are the two 220kV (one currently operating at 110kV) overhead circuits between Arklow and Carrickmines. Based on EirGrid's analysis there will not be sufficient capacity in these circuits, even allowing for their uprating to the maximum possible rating at 220kV, due to the connection of other generation further south on the East coast. The only possible method to facilitate a Loop In connection is to rebuild the 220kV circuits as 400kV circuits or to build a new 220kV or 400kV circuit along the East coast route of approximately 54km along with the major redevelopments at the remote end stations. Both of these options are not considered suitable for this project requirements given the scale of infrastructure required, the design, consenting and construction timelines associated with same.

6.1.2. Direct Connection

A Direct connection consists of building a new substation in the vicinity of the existing Carrickmines 220kV Substation and connecting the two substations via one or more new 220kV circuits and via a dedicated ESBN interface point located directly adjacent to the new substation.

A Direct connection requires either spare bays in the 220kV switchgear which can be utilised to connect the new circuits or space to expand the existing switchgear to add such bays. EirGrid have confirmed that two spare 220kV bays already exist in the 220kV switchgear at the existing Carrickmines substation and are available for connection of two new circuits associated with offshore wind. Based on this there would be minimal work required in the existing Carrickmines 220kV Substation to facilitate a Direct connection.

Based on the above the chosen technology type for the grid connection method is a Direct connection to the existing Carrickmines 220kV Substation.

6.2. Switchgear Technology – AIS or GIS

One of the fundamental design considerations for any High Voltage substation is the choice of technology for the switchgear – Air Insulated Switchgear (AIS) or Gas Insulated Switchgear (GIS).

6.2.1. Air Insulated Switchgear

AIS utilises air to insulate between the live conductors of the High Voltage equipment and also between the live conductors and the ground. This results in large steel lattice structures supporting the conductors to provide the necessary clearances. Due to the required clearances the footprint required for an AIS 220kV substation is approximately 300m x 125m (excluding ancillary 220kV equipment).

Due to the space required the AIS switchgear is located outside and can be highly visible due to the heights of the conductors and the supporting structures.

6.2.2. Gas Insulated Switchgear

GIS utilises SF6 gas to insulate between the live conductors of the High Voltage equipment and also between the live conductors and the ground. This results metal enclosures housing both the conductor and the SF6 gas. As SF6 is a much more effective insulator than air the clearances are greatly reduced resulting in a much-reduced footprint. Due to the smaller space required the GIS switchgear is located inside a building. The typical footprint required for a GIS 220kV Substation is approximately 160m x 70m (excluding ancillary 220kV equipment).

A summary of the AIS/GIS considerations in the context of the proposed onshore substation at Carrickmines is shown in the table below.

Table 6.1 Key AIS vs GIS Considerations

Consideration	Context of the connection between the new onshore substation and the existing Carrickmines 220kV substation
Land Requirement	Given the urban/suburban nature of the locality in question the availability and potential purchase price of land is a key consideration. A GIS solution requires approximately one third of the land required for a AIS solution (excluding ancillary 220kV equipment). This will lower the impact on Land, Archaeology, Biodiversity and Land & Soils due to the reduced size of land potentially affected by the proposed development.
Visual	The GIS building will be of an increased height compared to control building in an AIS solution. However, the fact that the HV Switchgear is not visible in GIS and the fact that AIS requires very high lightning protection structures means the GIS solution will have a lower overall visual impact. In addition due to the urban/suburban nature of the study area it is considered that the warehouse structure typical of GIS infrastructure provide enhanced opportunity for integrating the proposed development with neighbouring structures and land-uses.
System Reliability	In AIS Switchgear the different pieces of equipment can be accessed for maintenance and repair easier than in GIS.

Air Quality	Compared to AIS, GIS uses Sulphur Hexafluoride gas which is a greenhouse gas. Design in accordance with international standards is required to minimise the risk of reduced gas leakage.
Construction	The smaller footprint of a GIS substation will result in a lower level of construction activities and disruption for the locality.
Noise	GIS offers a lower noise output as the HV switchgear is located inside a building.

Based on the above GIS switchgear technology is preferred when compared with AIS technology for this project.

6.3. Chosen Technology Options

Based on the above the optimum solution for the onshore substation at Carrickmines is a GIS substation which will connect via an adjacent ESBN GIS to the existing Carrickmines 220kV substation using underground cable infrastructure.

7. Summary of Project Consultation

In identifying prospective development site option the project team engaged in a range of consultation and engagement activities with various site owner across private and public sector landowners.

Following confirmation of the suitability of the preferred development site with EirGrid and the site owner it is the intention of the Project Team to engage in a public consultation process.

The purpose of the public consultation process will be to provide the public and interested parties to

- Understand the key characteristics of the study area which have guided the identification of development site options
- Gain an awareness of the key differentiating criteria when comparing short-listed site options
- Provide an opportunity to identify any further considerations when considering the identification of the preferred site
- To provide a method of participation into the planning stage design and environmental assessment processes in advance of the preparation of a development consent application.

8. Criteria for Identifying the Best Performing Option

8.1. Introduction

The minimum site size requirement ranges between 4 acres (1.6 ha) and 6 acres (2.4 ha) dependent on the configuration (dimensions). Once a range of sites were identified for comparison they were proposed to be assessed under the following criteria;

- Technical criteria
- Economic performance;
- Environmental;; and
- Socio-Economic.

8.2. Technical Criteria

Technical performance sub criteria are:

- **Safety**

The substation solution at the proposed site should comply with relevant international standards such as IEC and comply with EirGrid's Functional Specifications as part of the design process.

It should be noted that only sites which can meet the minimum safety criteria will be considered for development. As such this sub criterion will not be evaluated further for each site. As the proposed development progresses into the planning (and later stage) design process a Project Supervisor Design Process/Specialist Designer will be appointed in accordance with the requirements of the Safety, Health and Welfare at Work (Construction) Regulations, 2013.

- **Suitable Access**

The road access into the substation for construction, operation and maintenance of the substation is required to be designed to satisfy all the requirements of the owner/operator during the intended life of the substation and shall safely support all traffic loading without damage or distress to the asset. Consideration in design and construction shall be given to strength, durability, stability and robustness, weather and other causes of deterioration. The access road shall be used by operational vehicles, cars, vans and 4x4 as well as Heavy Goods Vehicles (HGVs), Abnormal Indivisible Loads (AIL's) and lastly emergency services vehicle access.

- **Distance to existing Carrickmines 220kV Substation**

For a number of electrical considerations the distance from the onshore substation to the existing Carrickmines substation should be minimised:

1. Real Power losses – *the longer the distance to the existing substation the more power is lost along the route. While these losses are small it is important they are minimised.*

2. Reactive Power – *the cables between the onshore substation and the existing Carrickmines substation generate reactive power due to their capacitance. This reactive power/capacitance needs to be managed so increasing the cable length increases the risk of requiring additional equipment in the existing substation.*

- Enabling Works Requirements

Each site will require enabling works to a lesser or greater extent the delivery of the optimum substation design. Enabling works infrastructure will include new access road construction, roadside drainage, existing below ground services diversion (where necessary) earthworks reprofiling (cut/fill), substation platform construction, concrete foundations, piling activities (where necessary), below ground drainage/attenuation, possibly below ground earthing mat installation and perimeter security fencing. Enabling works will also include construction contractors temporary construction compound offices, welfare facilities, material storage/laydown, site waste skips, carparking and temporary services installation, incoming water, MV/LV (medium voltage/low voltage) electricity, waste removal.

- Construction

The site construction, installation and commissioning activities will vary subject to the design. Project studies and assessments of the potential impacts in relation to Air Quality, Water Quality, Traffic and Noise, Archaeology, Soil Geology of both the proposed substation site and the cable corridor to the existing EirGrid Carrickmines substation will also vary subject to site selection. The closer the selected site is to the existing EirGrid Carrickmines substation, will see a reduction in the spatial extent of construction impacts on the surrounding area.

8.3. Economic Performance

The overall equipment required in the substation is the same regardless of the chosen substation location. The two most economic distinguishing factors which are site dependent are the distance to Carrickmines existing Substation and the level of work required in relation to existing infrastructure. Given the overall scale of the costs for the new onshore substation these factors, while differing from site to site, will have a relatively minor economic impact on the development.

- Distance to Existing Carrickmines Substation:

Costs are associated with the underground cable between the new onshore substation and the existing Carrickmines 220kV substation are proportional to the distance between the sites.

- Key Utility Infrastructure Costs:

The level of work required in relocating or undergrounding existing infrastructure at each site will be very site specific.

8.4. Environmental Performance

Environmental performance sub criteria are:

- Biodiversity, Flora and Fauna:

Assessment of the potential impacts on protected sites for nature conservation, habitats and protected species.

- Landscape and Visual:

Assessment of landscape constraints and designations and potential impact on visual amenity.

- Archaeology, Architectural and Cultural Heritage:

Assessment of the potential impacts on archaeology, architecture and cultural heritage resources.

- Water Resources and Flood Risk:

Assessment of the potential impacts on water resources and flood risk.

- Soils, Geology and Hydrogeology:

Assessment of the potential impacts on soils, geology and hydrogeology within the project study area.

- Noise and Air:

Potential for nuisance impacts of grid connection and substation taking into account sensitive receptors.

8.5. Socio-economic Performance

Socioeconomic performance sub criteria are:

- Population, Landuse and Communities:

Assessment of the potential impact on population, landuse and sensitive receptors in the project study area; and

- Recreation & Tourism:

Potential impact on recreational activities and tourism that are not included in other sub criteria.

8.6. Scale used to Assess Performance

The assessment of an option against each of the specific criteria is presented in a performance matrix assessing a range between

"more significant"/"more difficult"/"more risk" to "less significant"/"less difficult"/"less risk". The following scale is used to illustrate the assessment range.

Dark Blue	Blue	Dark Green	Green	Cream

More significant/difficult/risk **less significant/difficult/risk**

In the text this scale is quantified by text for example mid-level (Dark Green), low-moderate (Green), low (Cream), moderate-high (Blue) or high (Dark Blue).

9. Evaluation of Substation Site Alternatives

9.1. Options Identification

With the identification of the substation site search area and the definition of the minimum site size requirement (4 acres/1.6 ha to 6 acres/2.4 ha) a desk-based and targeted field inspection was undertaken to identify potentially suitable substation sites.

The desktop search started with a review of the applicable Dun Laoghaire-Rathdown County Development Plani to identify land zoned for employment within the general area and these locations are shown in Figure 9.1 below.

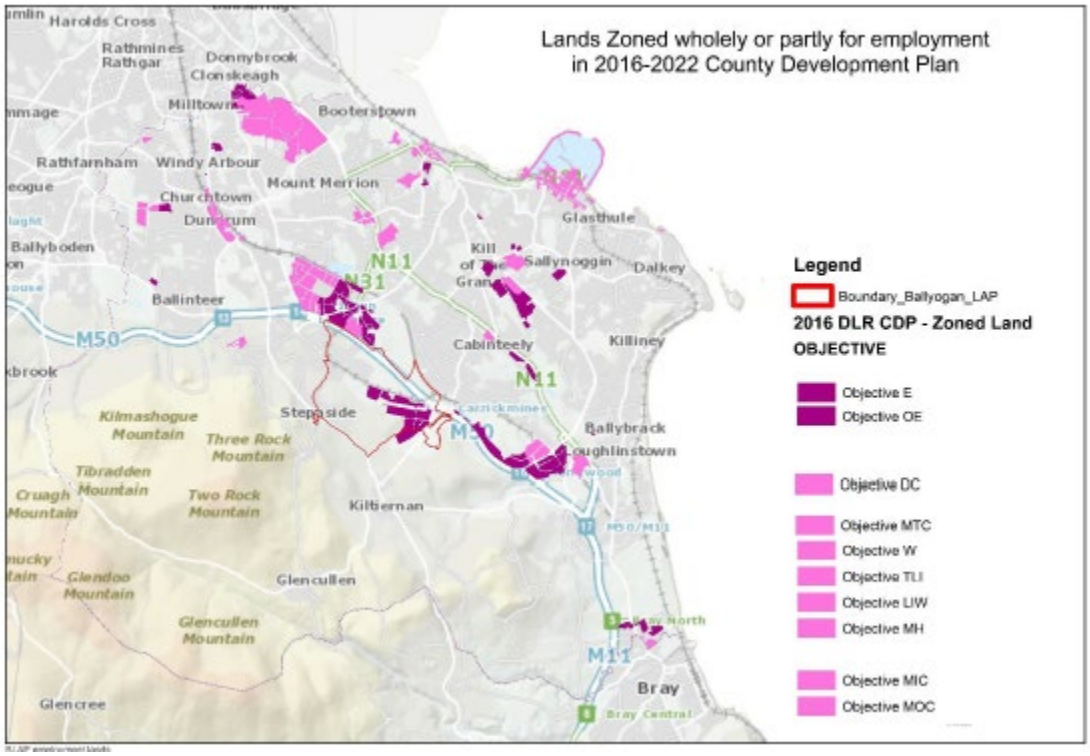


Figure 9.1 Lands Zoned Wholly or Partly for Employment (Ballyogan Environs Local Area Plan 2019-2025)

Having due regard to the target search area ('Mixed Opportunity Area') as identified in Section 4.1 of this report, general target areas of opportunity were identified in lands contained within the general Ballyogan and environs area and the Cherrywood area. Based on targeted field inspections and supplementary research other potential areas of opportunity were identified that were considered to be surplus land or brownfield (i.e. previously developed sites with further development/re-use potential).

A long list of 17 potential sites were identified. The sites have been grouped into general geographical areas and given the following prefixes:

CM = Carrickmines / Ballyogan / Glenamuck

LT = Leopardstown

CW = Cherrywood

KT = Kiltiernan

BC = Ballycorus

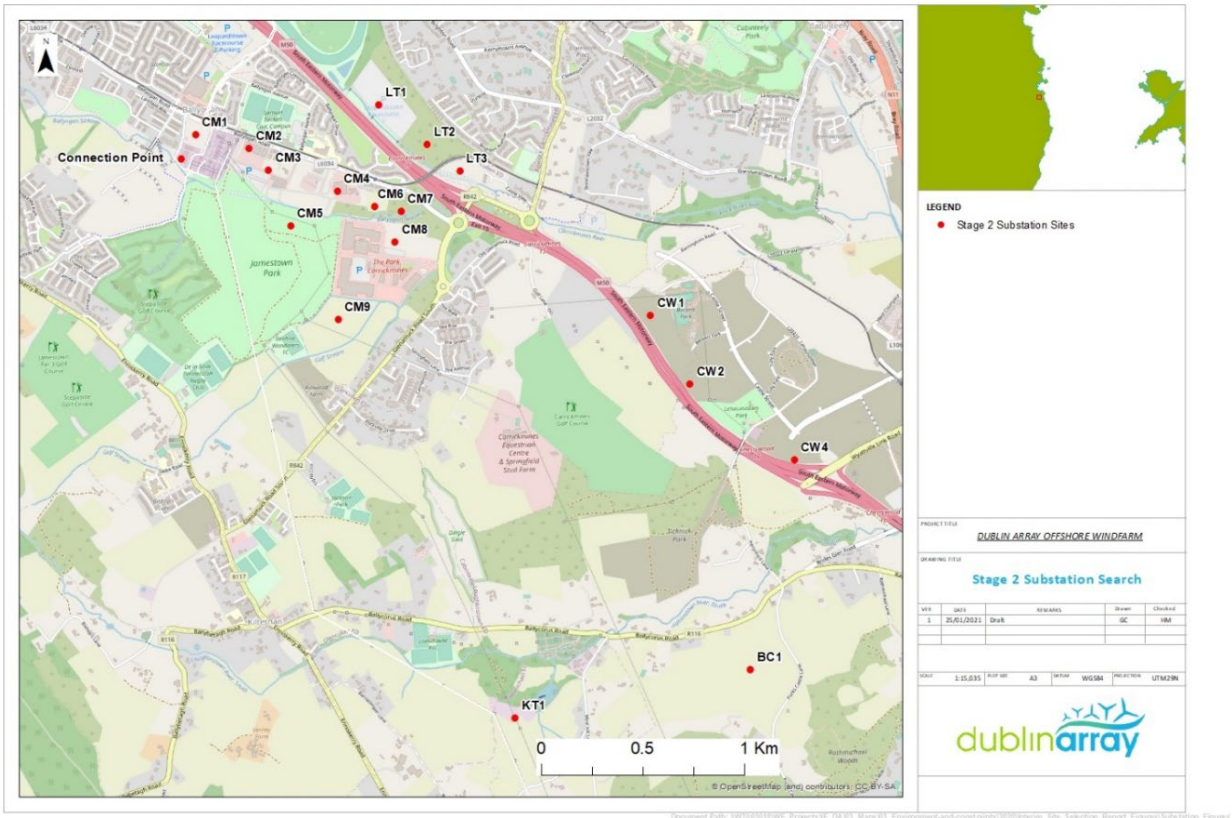


Figure 9.2 Long-List Sites for Initial Screening

9.2. Initial Options Screening

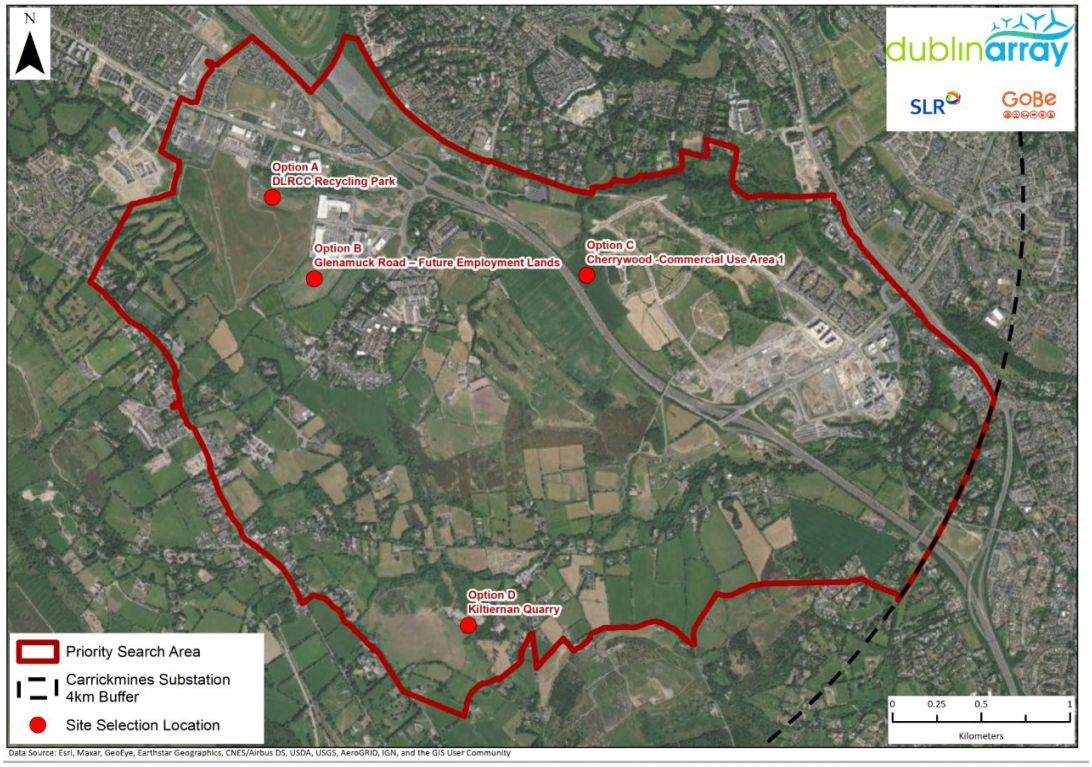
Each site on the long list was assessed to confirm whether it would be considered suitable for development as a substation. This involved a review of the County Development Plan and other relevant plans (e.g. Ballyogan and Environs Local Area Plan and Cherrywood Strategic Development Zone Planning Scheme). This evaluation is set out in the table overleaf.

Site Reference	Site Description	Comment	Screened In for Further Assessment (Yes/No)
CM1	ESB Carrickmines Substation Landholding	EirGrid have advised that there is no land available for potential substation development within the existing land-holding.	No
CM2	Ballyogan Business Park	Business Park fully occupied – no development opportunity	No
CM3	DLRCC Depot	Depot site fully occupied- no development opportunity	No
CM4	DLRCC Former Waste Baling Station	DLRCC have advised that the site is not available for development. Future waste management opportunities are being sought by DLRCC at this location.	No
CM5	DLRCC Recycling Park	Potential site development opportunity	Yes
CM6	DLRCC Land East of Waste Baling Station	Site size below minimum requirements	No
CM7	Park Development Lands – The Park	Planning permission has been secured for other purposes and site is now under development	No
CM8	Park Development Lands – Northern Area and Site Access	Planning permission has been secured for other purposes and site is now under development	No
CM9	Glenamuck Road – Future Employment Lands	Potential site development opportunity	Yes
LT1	Leopardstown Racecourse (car park)	Future residential development land – development zoning not consistent with large scale utility infrastructure.	No
LT2	Leopardstown Racecourse (site north of M50 LUAS Crossing)	Future residential development land – development zoning not consistent with large scale utility infrastructure.	No
LT3	Leopardstown Racecourse (site East of M50 LUAS Crossing)	Future residential development land – development zoning not consistent with large scale utility infrastructure.	No
CW1	Cherrywood Commercial Use Area 1	Potential site development opportunity	Yes
CW2	Cherrywood Commercial Use Area 2	Site size below minimum requirements	No

Site Reference	Site Description	Comment	Screened In for Further Assessment (Yes/No)
CW4	Cherrywood Commercial Use Area 4	Site size below minimum requirements	No
KT1	Kiltiernan Quarry	Potential site development opportunity within confines of former quarry works area	Yes
BC1	Ballycorus Road – Greenfield site	Development zoning to protect and improve rural amenity and to provide for the development of agriculture. Development zoning not consistent with large scale utility infrastructure.	No

On the basis of the initial screening assessment included in the table above the following locations were carried forward for detailed comparison;

- CM5 DLRCC Recycling Park (Option A)
- CM9 Glenamuck Road – Future Employment Lands (Option B)
- CW1 Cherrywood -Commercial Use Area 1 (Option C)
- KT1 Kiltiernan Quarry (Option D).



9.3. Option A DLRCC Recycling Park

Technical Performance

Access

A new road access into the proposed substation at the DLRCC Recycling Park would need to be designed and constructed to satisfy all the requirements of the owner/operator during the intended life of the substation, likewise, to meet the necessary construction requirements and traffic loading from HGV and AIL deliveries as well as the operational traffic over the lifespan of the HV substation. The site does not have direct road access to the proposed site location. There is already an existing access road across DLRCC land from the main Ballyogan Road and close links to the M50 motorway, the end of the existing asphalt road then changes to a stone track which passes beneath he overhead HV tower lines. A new section of engineered road into the proposed substation site would have to be constructed with surface water drainage. Option A low level moderate (Green).

Distance to existing Carrickmines 220kV Substation

The straight-line distance to the existing Carrickmines substation is less than 300m which is extremely short and will minimise the electrical losses and the risk of any potential for additional equipment. This close proximity results in a minimal impact (cream).

Key Utility Infrastructure

The site requires the relocation of two 38kV/MV underground cables at the northern boundary of the site, however, this would not be deemed significant in the overall development. Development of this site would also require the relocation of two 110kV overhead lines which traverse through the site. This is a significant piece of infrastructure and is considered a mid-level (dark green) impact.

Construction

The site construction, installation and commissioning activities will vary subject to the design. The substation at the Option A DLRCC Recycling area will be located on made ground. Upon completion of the site geotechnical studies, the information gathered shall inform the design, whether there is a degree of land remediation required and determine the method of foundation construction to support the substation HV equipment and the substation (GIS) and Statcom building superstructures. Whether gravity based foundations or concrete piling and caps are necessary, either design and construction are industry standard and not of a complicated engineering nature. The substation construction will also consist of below ground surface water drainage, flood attenuation, a combination of below ground cable ducts and concrete cable troughs/covers, below ground fault current earth mat, steel frame and composite clad buildings to house the mechanical indoor High Voltage equipment, outdoor High Voltage and ancillary electrical/mechanical equipment. Overall the development side is considered a mid-level (dark green) impact.

Combined Technical Performance

	Access	Distance	Key Utility Infrastructure	Construction	Overall
Technical Performance					

In terms of combined evaluation for Technical Performance, while the site is the closest to the existing Carrickmines site of any option, the remaining technical criteria are all considered mid level. Hence, this option has a mid level impact (dark green) overall.

Economic Performance

Distance to existing Carrickmines 220kV Substation

The straight-line distance to the existing Carrickmines substation is less than 300m which is extremely short. This close proximity results in a minimal impact (cream).

Key Utility Infrastructure

The site requires the relocation of two 38kV/MV underground cables at the northern boundary of the site and requires the relocation of two 110kV overhead lines which traverse through the site. This is a significant piece of infrastructure and is considered a mid-level (dark green) impact.

Combined Economic Performance

	Connection Costs to Carrickmines 220kV	Key Utility Infrastructure Costs	Overall
Economic Performance			

While the impact of the Key Utility Infrastructure Costs is deemed mid-level this is offset by the close proximity to Carrickmines Substation. Therefore, the combined evaluation for Economic Performance for this Option is low-moderate (Green).

Environmental Performance

Biodiversity, Flora and Fauna

Option A is located on disturbed ground and is bounded to the north by Carrickmines Stream and to the east by Carrickmines Park. The capped former Ballyogan landfill site sit adjacent to the south and west of the site. Settlement / attenuation ponds for storm run off and treatment ponds for run off from the recycling centre are present in the north of the site.

The site predominantly consists of grassland however there are areas of scrub to the east and to the north around Carrickmines Stream. There is potential to lose some of these habitats to facilitate the development of the substation.

There is a risk of direct impacts on Carrickmines Stream during the construction, however will be managed through use of a Construction and Environment Management Plan (CEMP) during construction works.

Indirect impacts on the watercourse and settlement ponds may occur. Degradation of water quality has the potential to impact aquatic species and habitats which may occur within Carrickmines Stream.

There are no Natura 2000 sites within the site boundary. However, there is potential for indirect impacts Rockabill to Dalkey Island SAC (site code 003000) further down river of the Carrickmines River due to the potential for the run-off of contaminated surface water, sedimentation and or generation of dust from the construction works deposited within the site if not appropriately managed. Again, use of a CEMP during the construction works will help to manage these risks and make the adverse effects on this asset unlikely to occur.

Option A therefore has a potential mid-level impact (Dark Green) on biodiversity, flora and fauna.

Landscape and Visual

Option A is located on land characterised by use as the former Ballyogan Landfill. To the north west of the site is the existing ESB Substation, to the north is Ballyogan Recycling Park, to the east is Carrickmines Park and the to the south and west is land associated with the now capped former landfill site. The part of the former landfill is identified for development of a local public park in the County Development Plan 2016-2022. Development of the proposed substation at this site would result in a moderate intensification of infrastructure in this area The site is not located within a landscape sensitivity area as set out in the County Development Plan.

There are a small number of residential properties located to the north and north east of the site. Views are likely to be restricted due to existing vegetation, surrounding topography and existing buildings and infrastructure.. From the north, the site will be partially screened by the existing ESB Substation and associated infrastructure, a mature tree line, the Ballyogan Recycling Centre and DLRCC offices. Views from the east are screened by the Carrickmines Park commercial development. The capped landform of the former landfill to the south and west would partially screen views from these directions Existing vegetation is also likely to restrict views from the Stepaside Golf Course and Enniskerry Road beyond this.

Option A therefore has a potential low impact (Cream) on landscape and visual receptors.

Archaeology, Architecture & Cultural Heritage

There are no known archaeological, architectural or cultural heritage features within the site. There are two national monuments to the north west of the site (a linear earthwork DU02401 and an enclosure DU02218) both with a surrounding zone categorised as 'records of monuments and place'. National Monument DU02218 is also surrounded by a SMR zone of notification (R149316). The routeing of access road/s to the substation site have the potential to directly affect these assets, therefore it will be important to select route alignments for these which use existing gaps in the assets. If possible, the existing access route onto the former Ballyogan Landfill Site would be used.

The positioning of the main substation footprint on land formerly used as a landfill is likely to restrict the potential for uncovering unknown archaeology during construction works. A settings assessment would be required given the proximity of the National Monuments to the site.

Option A therefore has a potential low-moderate impact (Green) on archaeology, architecture and cultural heritage.

Water Resources and Flooding

Option A is located within 100m south of the Carrickmines Stream. To the west of the site, there is a culvert under the former Ballyogan Landfill. Leachgate Gas Combustion Plant is located in the south west corner of the site, the Leachgate Pumping Station and Sump is located in the north west corner of the site and adjacent to the Leachgate Storage Tank and methane stripping plant. The BRP surface water treatment plant for the Ballyogan Recycling Centre is located in the north east corner of the site, treated run off from the recycling centre goes into Carrickmines stream. Settlement / attenuation ponds for storm run off and treatment ponds for run off from the recycling centre are present in the north of the site.

There is potential for direct impacts on the Carrickmines Stream and attenuation ponds depending on the works required to facilitate the substation development. If the construction works are not appropriately managed there is also the potential for indirect impacts to occur on the watercourse. In addition, impacts on water quality have potential to compromise the objectives of the Water Framework Directive (WFD). The site is not located within the CFRAMS fluvial or coastal flood extents risk area, however both of these are present to the north, either side of Carrickmines Stream.

Option A therefore has a potential low to moderate impact (Green) on water resources.

Soil, Geology and Hydrogeology

The site is located on land which was previously associated with the Ballyogan Landfill and comprises previously disturbed ground. The landfill operations have now ceased and the landfill capped. The only operational activity still ongoing is a recycling centre (Waste Licence No. W0015-01).

The site is approximately 50 hectares, 43 of which were previously used for landfilling. The remaining area consists of the site entrance and service roads, site compound, wetland and other services. The Ballyogan Recycling Park occupies a further 9 hectares. Land at Option A was previously used as settlement ponds for the landfill site however they have since been removed and the ground reinstated.

There are no other known geological features or hazards in proximity to Option A. The groundwater vulnerability under Option A is high.

Option A therefore has a potential low-moderate impact (Green) on soils, geology and hydrogeology.

Noise and Air

There are five noise sensitive receptors located within 100m of the proposed site; three residential properties to the north west, the Ballyogan Recycling Park to the north, and the north west corner of Carrickmines Park to the east of the site. Works associated with the construction of the proposed substation at this site would result in a temporary increase in noise and air quality impacts. The scale and temporary nature of the works would not result in significant adverse effects. Noise associated with the operation of the proposed substation may impact the baseline noise levels within the surrounding area however, due to the site context within the surrounding land uses, operational noise is not likely to have a significant adverse effect on receptors. All construction related nuisance relating to noise and air quality will be management by the project CEMP.

In terms of noise and air, Option A has a low impact (Cream).

Combined Environmental Performance

Option A	Biodiversity	Landscape and Visual	Archaeology, Architecture & Cultural Heritage	Water & Flooding	Soils, Geology and Hydrogeology	Noise & Air	Combined Environmental Performance
Environmental							

Option A has a combined environmental performance of low-moderate impact (Green). The low-moderate risks are assigned under the headings, landscape and visual, archaeology, architecture and cultural heritage, water and flooding, soils, geology and hydrogeology and noise. Biodiversity is considered to present a potential mid-level risk.

Socio-economic Performance

Population, Landuse & Communities

As set out in the Dun Laoghaire Rathdown County Development Plan 2016-2022, Option A is located within zoning objective E "To provide for economic development and employment" and is immediately south of zoning objective G "To protect and improve high amenity areas" and immediately north of zoning objective F "To preserve and provide for open space with ancillary active recreational amenities". Given this zoning objective, any overhead line infrastructure would more than likely be diverted underground wherever possible to facilitate the open space objective.

The Ballyogan and Environs Local Area Plan 2019-2025 sets out that "the Ballyogan South area is characterised by a range of municipal and utilities employers such as An Post, ESB Networks, and DLR County Council". The Plan states that the Council recognises the important function that the current cluster of municipal, communication, light industrial, and utility uses serve for both the local and wider catchment, noting that these uses are broadly "good neighbours" to one another in terms of the impacts from their activities. The Council supports their on-going role in this regard.

Additionally, the Local Area Plan sets out a series of employment policies. Policy EMP3 'Ballyogan South' applies to the site and sets out that the Council will support the existing cluster of municipal, communication, light industrial and utility uses in this area and encourage comparable uses. However, the zoning objective in the LAP does not explicitly state that electrical infrastructure is permitted in principle, so there is still a mid-level planning risk for siting a substation at this site.

The closest residential dwellings are located approximately 255m to the northwest of Option A. Any impacts associated with the construction and operation of the substation is likely to be low-moderate. Option A therefore has a potential of low-moderate impact (Green) on population, land use and communities.

Recreation & Tourism

Carrickmines Retail Park sits to the east of the site and contains several retail stores. To the south west is Stepaside Golf Course.

Option A therefore has a potential low impact on recreation and tourism (Cream).

Combined Socio-Economic Performance

Option A	Population, Land-Use and Communities	Recreation and Tourism	Combined Socioeconomic Performance
Socio-economic			

In terms of socio-economic performance, Option A has an overall potential of low impact due to the existing context of the surrounding area and distance between recreation facilities and residential properties.

Overall Performance Option A

Overall Performance	Option A – Ballyogan Recycling Park
Technical	
Economic	
Environmental	
Socio-economic	
Overall Performance	

On balance it is considered that Option A overall is considered to be of lower risk (Green) overall. The only criteria scoring less preferably across the range relates to technical matters. These technical matters are related to the potential enabling works requirement associated with existing overhead line electricity transmission infrastructure crossing the site, road access upgrade works within the site boundary and ground conditions for civil works. On balance it is considered that these risks can be effectively managed through engagement with DLRCC, ESB/EirGrid and prudent engineering design.

9.4. Option B Glenamuck Road Future Employment Lands

Technical Performance

Access

The same design requirements apply to Option B Glenamuck Road as described with Option A new access road shall be designed and constructed to satisfy all the requirements of the owner/operator during the intended life of the substation, likewise, to meet the necessary construction requirements and traffic loading from Heavy Goods Vehicles and Abnormal Indivisible Load deliveries. The Option B site would need have to have road access from the Glenamuck distribution road on the Carrickmines Retail Park. It is assumed a new section of engineered road and junction into the proposed substation site would have to be constructed with surface water drainage and utility services into the substation site. Option B has a mid level (Dark Green).

Distance to existing Carrickmines 220kV Substation

The straight-line distance to the existing Carrickmines substation is approximately 1km which is relatively short and will help minimise the electrical losses and the risk of any potential for additional equipment. This proximity results in a low-moderate impact (Green).

Key Utility Infrastructure

The site is likely to require the relocation of one 110kV overhead line which traverses through the site. This is a significant piece of infrastructure and is considered a mid-level (dark green) impact. The site will require a degree of enabling works subject to final substation design. Option B has a moderate level (Green).

Construction

The site construction, installation and commissioning activities will vary subject to the design. The substation at the Option B Glenamuck Lands will be located on ground south of the Carrickmines Retail Park. There is no available site geotechnical data publicly available. Site Investigation survey would need to be undertaken to inform the foundation design of the equipment and buildings. Whether there is a degree of land remediation required at the site will also need to be confirmed with site investigation surveys.

The proposed substation construction will also consist of below ground surface water drainage, flood attenuation, a combination of below ground cable ducts and concrete cable troughs/covers, below ground fault current earth mat, steel frame and composite clad buildings to house the mechanical indoor High Voltage equipment, outdoor High Voltage and ancillary electrical/mechanical equipment. Utility services from the Carrickmines Retail Park into the substation site will be required. The site is crossed by an existing 110kV pole line which will need to be diverted either above or below ground. The site is alongside the landfill at Ballyogan which has since ceased and has been capped and now only operates as a recycling centre. Option B has a mid level impact (Dark Green)

Combined Technical Performance

	Access	Distance	Key Utility Infrastructure	Construction	Overall
Technical Performance					

In terms of combined evaluation for Technical Performance, the Access and Construction criteria are deemed mid level while Distance to Carrickmines and Utility Interfaces are deemed low-moderate. On the basis that the latter two criteria are more distinguishing when comparing the four sites the overall Technical Performance for this option has a low-moderate impact (Green).

Economic Performance

Distance to existing Carrickmines 220kV Substation

The straight-line distance to the existing Carrickmines substation is less than 1km which is relatively short. This proximity results in a low-moderate impact (Green).

Key Utility Infrastructure

The site requires the relocation of one 110kV overhead lines which traverse through the site. This is a significant piece of infrastructure, however it is the only infrastructure requiring relocation and is considered a low-moderate impact (Green).

Combined Economic Performance

	Connection Costs to Carrickmines 220kV	Key Utility Infrastructure Costs	Overall
Economic Performance			

The combined evaluation for Economic Performance for this Option is low-moderate (Green).

Environmental Performance

Biodiversity, Flora and Fauna

Option B would result in the permanent loss of an agricultural field and may result in the loss of grassland and hedgerows to facilitate the proposed substation. As there are no watercourses located on this land or adjacent to the site, there will be no direct impacts on watercourses.

Indirect impacts on the Carrickmines Stream may occur due to run off from the site during construction. As a result, the potential degradation of water quality may impact aquatic species and habitats occurring within the stream.

There are no Natura 2000 sites within the site boundary. However, there is potential for indirect impacts Rockabill to Dalkey Island SAC (site code 003000) further down river of the Carrickmines River due to the potential for the run-off of contaminated surface water, sedimentation and or generation of dust from the construction works deposited within the site if not appropriately managed.

Option B therefore has a potential low-moderate impact (Green) on biodiversity, flora and fauna.

Landscape and Visual

There would be moderate intensification of infrastructure in this area.

The site is not located within a landscape sensitivity area as set out in the Dun Laoghaire Rathdown County Development Plan 2016-2022. However, the site does sit adjacent to the former Ballyogan Landfill site which lies to the west which in this area is categorised under zoning objective F "To preserve and provide for open space with ancillary active recreational amenities". There is potential for impact on users of this adjacent area.

The Carrickmines Park retail park is immediately to the north of the site. Several residential properties are located within 100m to the east along Glenamuck Road, separated from the site by an agricultural field, trees and hedgerows. This area is zoned in the Kiltiernan Local Area Plan as mixed/higher density residential development and is therefore likely to be further developed for housing over the lifetime of the plan. Further housing is located beyond this toward the northern end of Glenamuck Road. On the western edge of the new Glenamuck Road District roads scheme, the LAP notes a future provision of additional mixed-use development which will change the agricultural area over the life of the LAP. Option B therefore has a potential mid-level impact (Dark Green) on landscape and visual receptors.

Archaeology, Architecture & Cultural Heritage

There are no known archaeological, architectural or cultural heritage features within the site. There is one SMR zone of notification (R149278) located 200m to the east of the site along Glenamuck Road. The nearest National Monument is located approximately 750m to the north west (DU02401).

Option B therefore has a potential low impact (Cream) on archaeology, architecture and cultural heritage.

Water Resources and Flooding

There are no watercourses located within Option B site boundary. Golf Stream, a branch of Carrickmines River sits adjacent to the northern, eastern and western borders of the site.

If the construction works are not appropriately managed there is also the potential for indirect impacts to occur on the watercourse. Impacts on water quality have potential to compromise the objectives of the Water Framework Directive (WFD). The site is not located within the CFRAMS fluvial or coastal flood extents risk area.

Option B therefore has a low to moderate impact (Green) on water resources.

Soil, Geology and Hydrogeology

There are no known geological features or hazards located in proximity to Option B, however this is a greenfield site that has not previously been disturbed. The groundwater vulnerability under Option B is high.

Option B therefore has a low to moderate impact (Green) on soils, geology and hydrogeology.

Noise and Air

There are seven noise sensitive receptors located within 100m of this proposed option- four residential properties to the east along Glenamuck Road and three receptors within Carrickmines Park to the north. Works associated with the construction of the proposed substation at this site would result in a temporary increase in noise and air quality impacts, although it is noted that there are significant levels of construction activity currently ongoing and proposed (including road construction) in this area already. The scale and temporary nature of the works would not result in significant adverse effects but may still impact nearby residential properties. All construction related nuisance relating to noise and air quality will be management by the project CEMP.

In terms of noise and air, Option B has a mid-level impact (Dark Green).

Combined Environmental Performance

Option B	Biodiversity	Landscape and Visual	Archaeology, Architecture & Cultural Heritage	Water & Flooding	Soils, Geology and Hydrogeology	Noise	Combined Environmental Performance
Environmental							

Option B has a combined environmental performance of mid-level impact (Dark Green). The low-moderate risks are assigned under the headings biodiversity, water and flooding and soils, geology and hydrogeology. Noise and landscape and visual are assigned a potential mid-level impact due to the proximity and number of sensitive receptors within the area. Archaeology, architecture and cultural heritage is considered to present a low potential risk.

Socio-economic Performance

Population, Landuse & Communities

As set out in the Dun Laoghaire Rathdown County Development Plan 2016-2022, Option B is located within zoning objective E "To provide for economic development and employment". The area is currently undeveloped although it is noted that significant development work is ongoing in this area. Immediately east of zoning objective F "To preserve and provide for open space with ancillary active recreational amenities". The area to the east, across Glenamuck Road falls under zoning objective A "To protect and or improve residential amenity". The closest residential dwellings are located approximately 100m to the east of Option B. The northern end of Glenamuck road is categorised as an 'established residential' area within the Ballyogan and Environs Local Area Plan 2019-2025.

Notably, there is no direct or indirect zoning objective which is compatible with the provision of electrical infrastructure, however, it is noted that there is a significant quantum of utility and waste management infrastructure to the northeast of Option B. For this reason, and due to the surrounding existing and proposed land uses within the immediate area, there is a moderate planning risk associated with the provision of electrical infrastructure in this vicinity.

Any impacts associated with the construction and operation of the substation is likely to be low-moderate.

Option B therefore has a potential of mid-level impact (Dark Green) on population, land use and communities.

Recreation & Tourism

Carrickmines Park retail area sits to the north of the site and contains several retail stores. Dog walking paths are located throughout the agricultural fields to east. There is a quantum of open space provision to be provided immediately adjacent to this location.

Option B therefore has a potential low impact on recreation and tourism (Cream).

Combined Socio-Economic Performance

Option B	Population, Land-Use and Communities	Recreation and Tourism	Combined Socioeconomic Performance
Socio-economic			

In terms of socio-economic performance, Option B has an overall potential of a mid-level impact due to the existing context of the surrounding area, zoning objectives and distance from recreational facilities and residential properties.

Overall Performance Option B

Overall Performance	Option B – Glenamuck Future Employment Lands
Technical	
Economic	
Environmental	
Socio-economic	
Overall Performance	

Overall Option B is considered a mid-range category risk (Dark Green) site overall. Whilst the site scores well under technical and economic criteria its score less favourably on environmental and socioeconomic matters due to the location of the proposed site and its proximity to potentially sensitive receptors. In addition the general land development (ongoing and planned) in the area is for further intensification of residential development which increases the potential for the site to create a nuisance potential, particularly during the construction stage.

9.5. Option C Cherrywood Commercial Use Area 1

Technical Performance

Access

The same design requirements apply to Option C Cherrywood as described with Option A and B. A new access road is required to be designed and constructed to satisfy all the requirements of the owner/operator during the intended life of the substation, likewise, to meet the necessary construction requirements and traffic loading from Heavy Goods Vehicles and Abnormal Indivisible Load deliveries. The Option C site would need have to have road access from the Cherrywood development, Beckett Road is under construction and this would provide the required access back to Castle Street and Wyattville Road. There is no timeline available on the construction of Becket Road however once completed then access to the Option C site could be achieved. It is assumed a new section of engineered road and junction into the proposed substation site would have to be constructed with surface water drainage and utility services into the substation site. The Cherrywood Master Plan and Feasibility study has also identified further road construction identified as Route 1A and 1B, again no timeline information is available as to when these proposed roads will be complete. The site access could potentially be constrained to comply with the overall large development of Cherrywood. Option C has a moderate high level impact (Blue)

Distance to existing Carrickmines 220kV Substation

The straight-line distance to the existing Carrickmines substation is approximately 2.3km which is longer is longer compared to options A and B. This will increase the electrical losses and the risk of any potential for additional equipment. This proximity results in a mid-level impact (dark green).

Key Utility Infrastructure

The site does not have any existing infrastructure that would need to be relocated so this has a low impact (Cream).

Construction

The site construction, installation and commissioning activities will vary subject to the design. The substation at the Option C Cherrywood Lands will be located on ground south of the Cherrywood overall development. The whole Cherrywood area is under significant redevelopment commercially and residentially. The area around Option C site is progressively becoming more sensitive with residential housing, recreational playing fields. Site Investigation survey would need to be undertaken to inform the foundation design of the equipment and buildings. Whether there is a degree of land remediation required at the site will also need to be confirmed with site investigation surveys.

The substation construction will also consist of below ground surface water drainage, flood attenuation is likely to have to comply with the overall Cherrywood flood attenuation scheme. Utility services from the Cherrywood development into the substation site will be required LV/MV electric and Telecoms. Option C has a mid-level impact (Dark Green)

Combined Technical Performance

	Access	Distance	Key Utility Infrastructure	Construction	Overall
Technical Performance					

In terms of combined evaluation for Technical Performance, this option has a high level impact for access which needs to be compared with the anticipated low impact for Utility Infrastructure. Distance to Carrickmines and Construction are both mid level giving an overall mid-level impact (Dark Green).

Economic Performance

Distance to existing Carrickmines 220kV Substation

The straight-line distance to the existing Carrickmines substation is approximately 2.3km which is significantly greater than other options. This proximity results in a mid-level impact (dark green).

Key Utility Infrastructure

The site does not require the relocation of any existing infrastructure so is considered a low impact (Cream).

Combined Economic Performance

	Connection Costs to Carrickmines 220kV	Key Utility Infrastructure Costs	Overall
Economic Performance			

While the economic impact of the distance to Carrickmines is deemed mid-level this is offset by the lack of infrastructure requiring relocation. Therefore, the combined evaluation for Economic Performance for this Option is low-moderate (Green).

Environmental Performance

Biodiversity, Flora and Fauna

Option C would result in the permanent loss of an agricultural field, resulting in the loss of grassland and hedgerow to facilitate the development. No instream works would be required to facilitate the construction of the substation, therefore there is no potential for direct impacts to nearby watercourses. The site is located adjacent to the Laughlinstown River North which discharges into the Carrickmines Stream approximately 100mto the north of the site. There is potential for indirect impacts to the stream if construction works are not appropriately managed. A degradation of water quality has the potential to impact aquatic species and habitats which may occur within these watercourses

There are no Natura 2000 sites within the designated side boundary. However, there is potential for indirect impacts Rockabill to Dalkey Island SAC (site code 003000) further down-river of the Carrickmines Stream/ Shanganagh River due to the potential for the run-off of contaminated surface water, sedimentation and or generation of dust from the construction works deposited within the site if not appropriately managed. In terms of biodiversity, option C has a mid-level impact (Dark Green).

Landscape and Visual

Option C is located within an agricultural field setting. This option would result in a moderate intensification of infrastructure in this area in tandem with the Cherrywood Strategic Development Zone which is currently under construction c. 200m to the east of the field boundary. However, it is not located within a landscape sensitivity area as indicated in the Dun Laoghaire-Rathdown County Development Plan. Option C has limited potential for adverse impacts on any dwellings located in the area. Notably it is located immediately adjacent to the M50 motorway which dominates the landscape in this area. The site is not considered to be part of any ecological corridor and is of limited ecological value according to the Cherrywood SDZ SEA Environmental Report

Option C therefore has a potential low to moderate impact (Green).

Archaeology, Architecture & Cultural Heritage

Option C presents no direct impact to any nonprotected structures or features. There are no known archaeological, architectural or cultural heritage features within the site. The closest archaeological figure is located approximately 300 m to the west, on the western extent of the M50 motorway. The nearest feature of cultural heritage/architectural heritage is located approximately 600 m to the north-west of the site.

It is therefore considered that option C has a low impact (Cream).

Water Resources and Flooding

Option C would not include instream works, however, this option is situated adjacent to a watercourse identified as the Laughlinstown River which feeds into the Carrickmines Stream approximately 100 m to the north of the site. While Option C has no potential for direct impacts on these watercourses, there is potential for indirect impacts on the watercourse if construction works are not appropriately managed. Impacts on water quality have potential to compromise the objectives of the Water Framework Directive WFD. Option C occurs outside the CFRAMS fluvial risk area.

Option C therefore has a low to moderate impact (Green).

Soil, Geology and Hydrogeology

There are no known geological features or hazards located in proximity to option C. The groundwater vulnerability under option C is low. In terms of soil, geology and hydrogeology, option C has a low to moderate impact (Green).

Noise and Air

There are no noise sensitive receptors within proximity of Option C. The construction works associated with option C would result in a temporary increase in noise and dust impacts, however scale and temporary nature of the works would not result in significant effects. All construction related nuisances would be managed by the project CEMP.

In terms of noise and air, option C was assigned a low impact (Cream).

Combined Environmental Performance

Option C	Biodiversity	Landscape and Visual	Archaeology, Architecture & Cultural Heritage	Water & Flooding	Soils, Geology and Hydrogeology	Noise	Combined Environmental Performance
Environmental							

Option C has a combined environmental performance mid level (Dark Green) impact. The mid level impact performance is a result of the mid level risks assigned under the heading biodiversity and the low moderate risks assigned under the headings of landscape and visual, water and flooding, soils, geology and hydrogeology.

Socio-economic Performance

Population, Landuse & Communities

Option C is located within zoning objective E "*To provide for economic development and employment*" in the Dun Laoghaire Rathdown County Development Plan 2016 – 2022 and is located in the Cherrywood Strategic Development Zone. The provision of a new substation is not open for consideration within the land-use objective, however, light industrial is permitted in principle though it is unclear in the Development Plan whether this would be a compatible use. A new access would also be required. It is considered that, given the requirements of a Strategic Development Zone to strictly adhere to the zoning objectives as set out in the Cherrywood SDZ Development Plan, provision of the substation at this location poses a significant planning risk.

The closest residential dwelling is located approximately 330 m north-east of Option C. However, there is a significant provision of residential and mixed-use development to be provided within close proximity to the location of Option C as set out in the Cherrywood SDZ Development Plan. Any impacts associated with the construction and operation of the substation are likely to be moderate.

In terms of socio-economic performance, Option C has a high impact (Dark Blue).

Recreation & Tourism

There is no potential for impact and any features of national or regional importance within this site area of Option C. There are no recreation or tourism receptors within proximity to the site.

In terms of recreation and tourism, Option C has a low overall impact (Cream).

Combined Socio-Economic Performance

Option C	Population, Land-Use and Communities	Recreation and Tourism	Combined Socioeconomic Performance
Socio-economic			

In terms of socio-economic performance, Option C has an overall potential high impact (Dark Blue), given the zoning objectives associated with an SDZ, the separation distance between the site and existing /future dwellings and the lack of recreation and tourism receptors within the vicinity.

Overall Performance Option C

Overall Performance	Option C – Cherrywood Commercial Use Area 1
Technical	
Economic	
Environmental	
Socio-economic	
Overall Performance	

Option C comparatively is considered to present significant risks when compared with other site alternatives. One of the main potential risks with this option is that the Cherrywood SDZ Planning Scheme does not clearly indicate the intention, or suitability, of the location for a large scale high voltage substation. Recognising that a Planning Scheme provides greater specificity concerning acceptable land-use than a Local Area Plan or a County Development Plan, it is considered that this is a considerable risk to successfully securing development consent at this location.

From a technical perspective a key differentiating risk is site access. Access to the site is dependent on a number of future road construction projects within the Cherrywood development – the timing and delivery of which is outside of the control of the Projects.

Overall it is considered that this option has some potentially significant risks (Light Blue) overall when compared with alternative site options.

9.6. Option D Kiltiernan Quarry

Technical Performance

Access

The same design requirements apply to Option D Kiltiernan Quarry as described with the Options A, B and C. A new access road will need to be designed and constructed to satisfy all the requirements of the owner/operator during the intended life of the substation, likewise, to meet the necessary construction requirements and traffic loading from Heavy Goods Vehicles and Abnormal Indivisible Load deliveries. Access to the Site at Option D would have to be from Mine Hill Lane back to Ballycorus Road. Mine Hill Lane is a narrow rural road leading to a cluster to residential and commercial developments. The existing track access from Mine Hill Lane into the Site Option D would need upgrading to meet the requirements of the substation. Mine Hill lane would not be suitable for HGV construction traffic and necessary Abnormal Indivisible Load deliveries (AILs) without making considerable road alterations at Mine Hill Lane on this basis Option D has a high level impact (Dark Blue)

Distance to existing Carrickmines 220kV Substation

The straight-line distance to the existing Carrickmines substation is approximately 3km which is the longest of any of the options. Also, a feasible cable route between the two sites would be significantly longer. This will increase the electrical losses and the risk of any potential for additional equipment. This proximity results in a mid-level impact (dark green).

Key Utility Infrastructure

The site requires the relocation of three 110kV overhead line circuits which traverse through the site. These consist of one single circuit overhead line and one double circuit overhead line. These are a significant piece of infrastructure, and this is considered a mid-level (dark green) impact.

Construction

The site construction, installation and commissioning activities will vary subject to the design. The substation at the Option D Kiltiernan Quarry Lands although would be located on a brownfield site is zoned for agricultural amenity. The site whilst large to develop a compliant substation will require cut/fill earthworks to level the site. Available geotechnical information has highlighted a high water table around the Option D site which will require site dewatering and specific attenuation drainage design. The access road upgrade as part of the enabling works from Mine Hill Lane along the track access does negatively impact the suitability of the site to develop for the substation. The area around Option D site is sensitive with residential housing. Construction traffic impacts on the surrounding area present high risk.

Utility services from into the substation site will be required LV/MV electric and Telecoms. Option D has a moderate-high level impact (Blue).

Combined Technical Performance

	Access	Distance	Enabling Works	Construction	Overall
Technical Performance					

In terms of combined evaluation for Technical Performance, this option has a high level impact for Access and moderate-high for Construction. The impact of the Access and Construction issues result in a moderate-high (Blue) overall.

Economic Performance

Distance to existing Carrickmines 220kV Substation

The straight-line distance to the existing Carrickmines substation is approximately 3km which is significantly greater than other options. This proximity results in a mid-level impact (dark green).

Key Utility Infrastructure

The site requires the relocation of three 110kV overhead line circuits which traverse through the site. These consist of one single circuit overhead line and one double circuit overhead line. These are a significant piece of infrastructure, and the economic impact is considered a mid-level (Dark Green) impact.

Combined Economic Performance

	Connection Costs to Carrickmines 220kV	Key Utility Infrastructure Costs	Overall
Economic Performance			

Both economic sub criteria are mid-level (dark green) impacts, so the overall impact is mid-level (Dark Green).

Environmental Performance

Biodiversity, Flora and Fauna

Option D would be located on ground which was formerly used as a sand and gravel quarry. The site is bounded by scrub, woodland and hedgerows and there is potential to lose some of these habitats to facilitate the substation development. No instream works would be required to facilitate the construction of the identified substation, therefore there is no potential for direct impacts to nearby watercourses. The site is located adjacent to the Ballycorus Stream which feeds into the Loughlinstown River South approximately 20 metres to the southeast of the site. There is potential for indirect impacts to the watercourse if construction works are not appropriately managed. A degradation of water quality has the potential to impact aquatic species and habitats which may occur within this river and further downstream where it joins the Shanganagh River before flowing into Dublin Bay.

There are no Natura 2000 sites within the side boundary. However, there is potential for indirect impacts to Rockabill to Dalkey Island SAC (site code 003000) further down river of the Shanganagh River due to the potential for the run-off of contaminated surface water, sedimentation and or generation of dust from the construction works deposited within the site if not appropriately managed.

In terms of biodiversity, option D has a mid-level impact (Dark Green).

Landscape and Visual

Option D is located within a disused quarry. This option would result in a moderate intensification of infrastructure in this area. It is not located within a landscape sensitivity area as indicated in the Dun Laoghaire Rathdown County Development Plan 201-2022, however there is potential for the substation to be visible from elevated ground in the High Amenity land to the south and west. Option D has potential for adverse impacts on a singular dwelling located c. 100m to the northeast of the site.

In terms of landscape and visual, Option D has a potential mid-level impact (Dark Green).

Archaeology, Architecture & Cultural Heritage

Option C presents no direct impact to any nonprotected structures or features. There are no known archaeological, architectural or cultural heritage features within the site. The closest archaeological figure is located approximately 400 m to the south of the site. The nearest feature of cultural heritage/architectural heritage is located approximately 200 m to the east of the site (Balycorus Grange, NIAH 60260053).

The positioning of the substation on previously developed ground is likely to reduce the potential of uncovering subsurface remains. However, given the proximity of an NIAH protected site, a settings assessment would be required to ascertain if there are any impacts to its curtilage. It is therefore considered that option D low to moderate impact (Green).

Water Resources and Flooding

Option D is located adjacent to the Ballycorus Stream which feeds into the Loughlinstown River South approximately 20 metres to the southeast of the site. There is potential for indirect impacts to the river if construction works are not appropriately managed. While the site has no potential for direct impacts on these watercourses, there is potential for indirect impacts on the watercourse if construction works are not appropriately managed. Impacts on water quality have potential to compromise the objectives of the Water Framework Directive WFD. Option D occurs outside the CFRAMS fluvial risk area.

Option D therefore has a low to moderate impact (Green).

Soil, Geology and Hydrogeology

There are no known geological features or hazards located in proximity to option D. The groundwater vulnerability under option D is low.

In terms of soil, geology and hydrogeology, option D has a low to moderate impact (Green).

Noise and Air

There is one noise sensitive receptor within proximity of option D. The construction works associated with option D would result in a temporary increase in noise and dust impacts, however scale and temporary nature of the works would not result in significant effects. All construction related nuisances would be managed by the project CMP.

In terms of noise and air, option D has a low to moderate impact (Green).

Combined Environmental Performance

Option D	Biodiversity	Landscape and Visual	Archaeology, Architecture & Cultural Heritage	Water & Flooding	Soils, Geology and Hydrogeology	Noise	Combined Environmental Performance
Environmental							

Option D has a combined environmental performance of mid-level impact (Dark Green). The low to moderate impact performance is a result of the mid-level risks assigned under the headings biodiversity and landscape and visual and the low moderate risks assigned under the headings of archaeology, architecture and cultural heritage, water and flooding, soils, geology/hydrogeology and noise.

Socio-economic Performance

Population, Landuse & Communities

Option D is located within zoning objective D "To protect and improve rural amenity and to provide for the development of agriculture" and immediately adjacent to zoning objective G "To protect and improve high amenity areas" in the Dun Laoghaire Rathdown County Development Plan 2016 – 2022. The provision of a new substation is open for consideration within the land-use objective. Currently the lands are a disused quarry (a brownfield site), modifications would be required, subject to the development management requirements of Dun Laoghaire-Rathdown County Council. Notably, there is no direct or indirect zoning objective which is compatible with the provision of electrical infrastructure. Additionally, the current zoning objective D does not take into consideration that the site is a previously operational quarry. For these reasons, and due to the surrounding existing and proposed land uses within the immediate area, there is a moderate high to significant planning risk associated with the provision of electrical infrastructure at this option.

The closest residential dwelling is located approximately 100 m east of option D, and there are five other residential dwellings within 300m. Any impacts associated with the construction and operation of the substation is likely to be moderate to moderate high.

In terms of socio-economic performance, Option D has a high (Dark Blue) impact.

Recreation & Tourism

There is no potential for impact and any features of national or regional importance within this site area of option D. There are no recreation or tourism receptors within proximity to the site.

In terms of recreation and tourism, option D has a low overall impact (Cream).

Combined Socio-Economic Performance

Option A	Population, Land-Use and Communities	Recreation and Tourism	Combined Socioeconomic Performance
Socio-economic			

In terms of socio-economic performance, Option C has an overall potential high (Dark Blue) impact.

Overall Performance Option D

Overall Performance	Option D – Kiltiernan Quarry
Technical	
Economic	
Environmental	
Socio-economic	
Overall Performance	

Option D comparatively is considered to present significant risks when compared with other site alternatives. From a technical perspective, the narrow access route through Mine Hill Lane presents safety risks in addition to a potential need for localised enabling works being required to facilitate safe passage. In addition to this based on available geotechnical information there is a risk of encountered high groundwater on the site increasing the potential need for localised dewatering on the site. From a socioeconomic perspective this option is located within lands which are subject to zoning objective D "To protect and improve rural amenity and to provide for the development of agriculture" and immediately adjacent to zoning objective G "To protect and improve high amenity areas" in the Dun Laoghaire Rathdown County Development Plan 2016 – 2022. To this extent, whilst the quarry site has been the subject of previous 'industrial/employment' type activities it is considered that overall intention in the development plan is not for further industrial/utility type development at this location.

Overall it is considered that this option has some potentially significant risks (Light Blue) overall when compared with alternative site options.

10. Description of Best Performing Option

10.1. Description

As set out in *Chapter 6 Technology Options and Short-Listing* the technology options available to the project were assessed. The conclusion from this assessment was that the optimum solution for the onshore substation at Carrickmines is a GIS configuration with the connection to the existing Carrickmines 220 kV substation my means of underground cable infrastructure.

A review of alternative site options considered in presented in Chapter 9 with a summary table presented hereunder.

Table 10.1 Summary Comparison Table

Overall Performance	Option A – Ballyogan Recycling Park	Option B – Glenamuck Road Future Employment Lands	Option C – Cherrywood Commercial Use Area 1	Option D – Kiltiernan Quarry
Technical				
Economic				
Environmental				
Socio-economic				
Overall Performance				

The preferred site for the proposed substation has been identified as being Option A located adjacent to the former Ballyogan landfill within the Dun Laoghaire-Rathdown County Council Recycling Park.

The key differentiators for this site when compared with the alternative sites include in particular the former utility use of the site, suitable land-use zoning, the access options available from the Ballyogan Road, separation distance from residential dwellings and the effective screening available due to neighbouring land-use and landform.

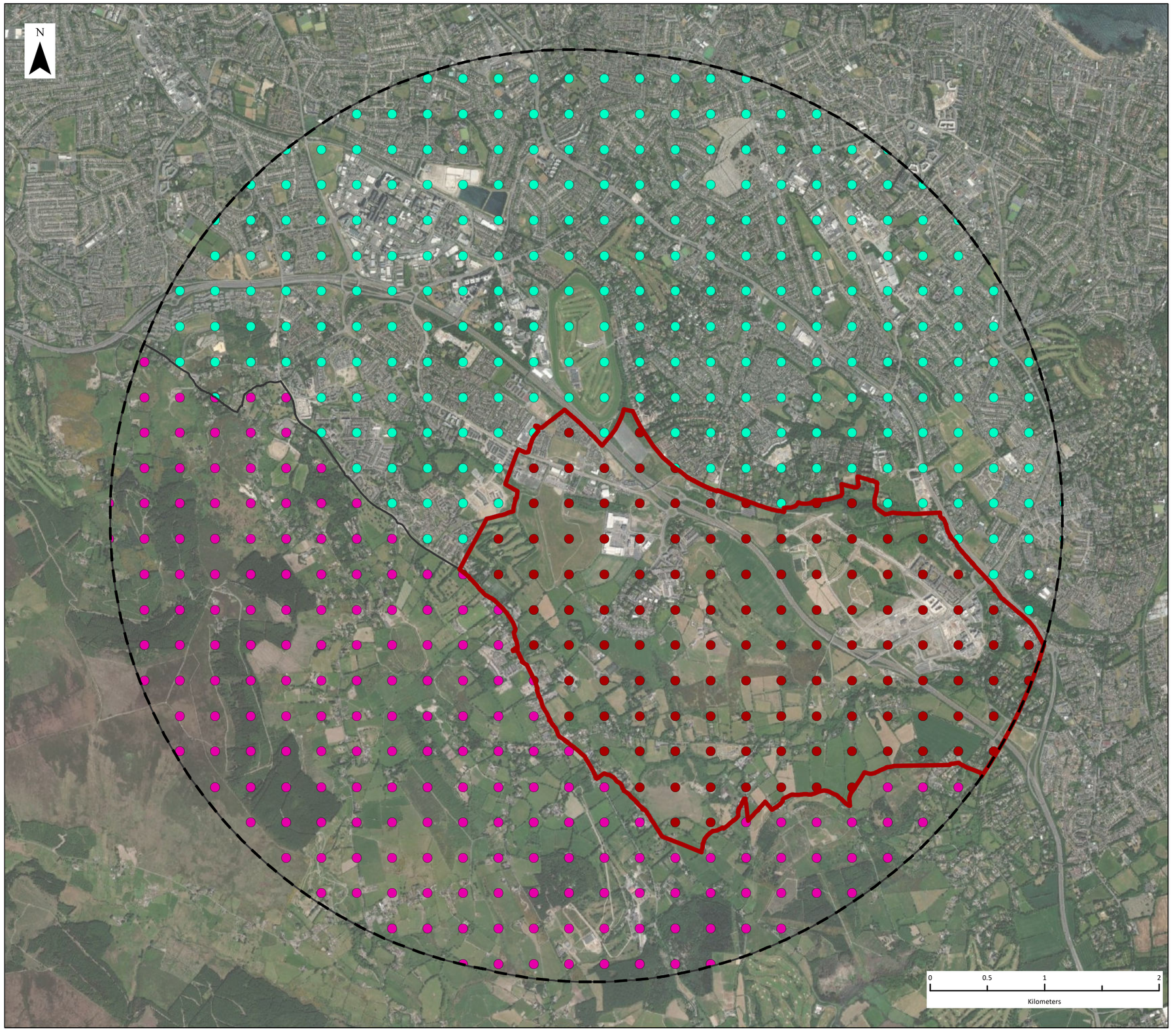
10.2. Next Steps

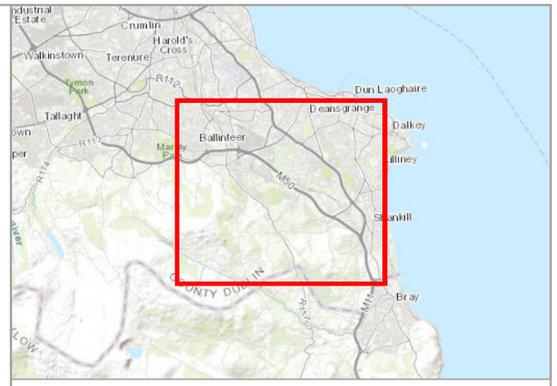
With the identification of the preferred site the intention is to progress the preliminary site investigation, design and environmental impact assessment processes to identify if there are any factors which would compromise the suitability of the site to be further developed and carried forward into the development consent process.

A copy of this report is intended to be submitted to the future asset owner (EirGrid) for review.

Appendix 1

Constraints Drawings





LEGEND

- High Density Residential Area
- High Amenity Area
- Priority Search Area
- Carrickmines Substation 4km Buffer

Data Source:
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

PROJECT TITLE

DUBLIN ARRAY

DRAWING TITLE

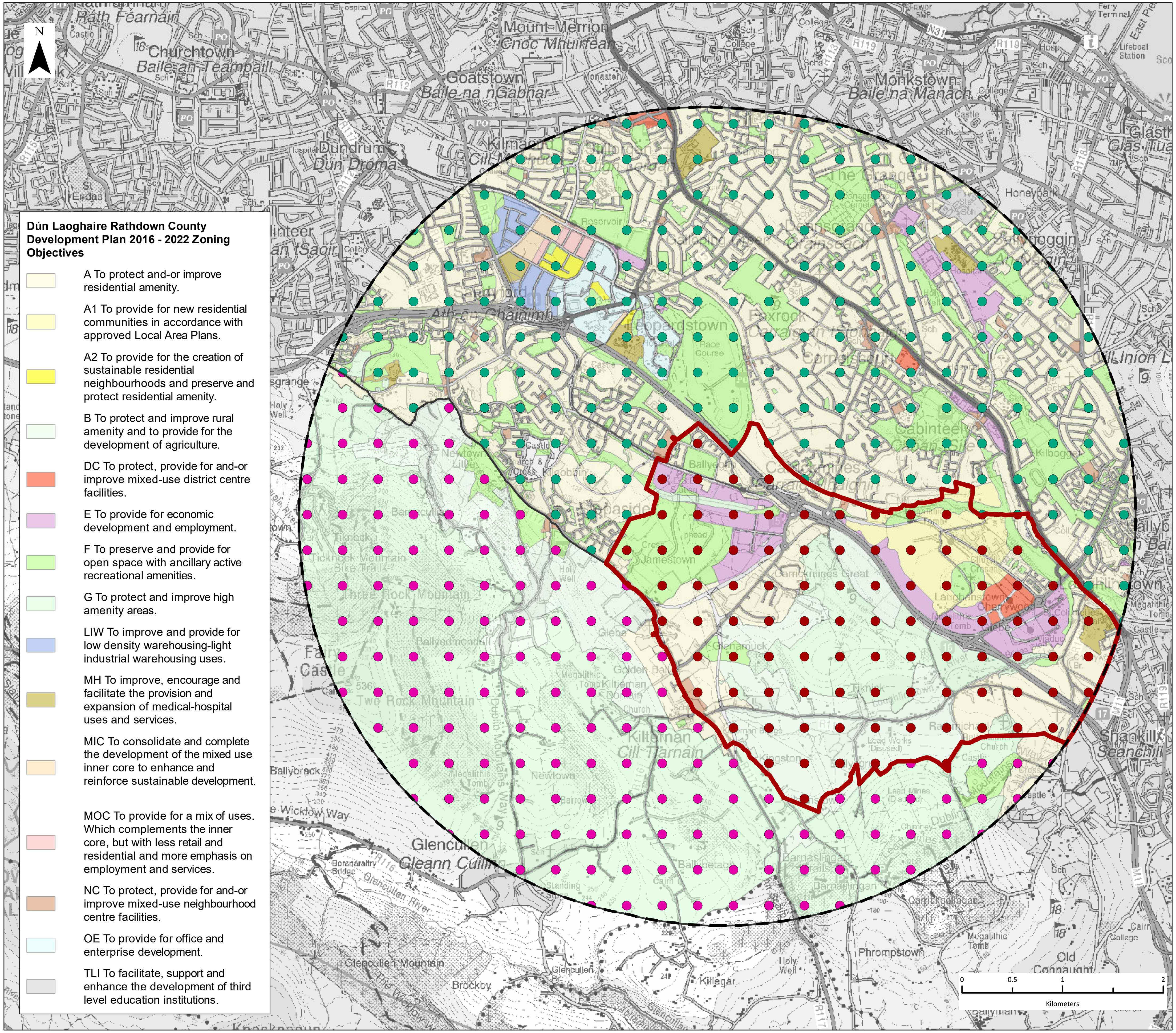
WIDER STUDY AREA

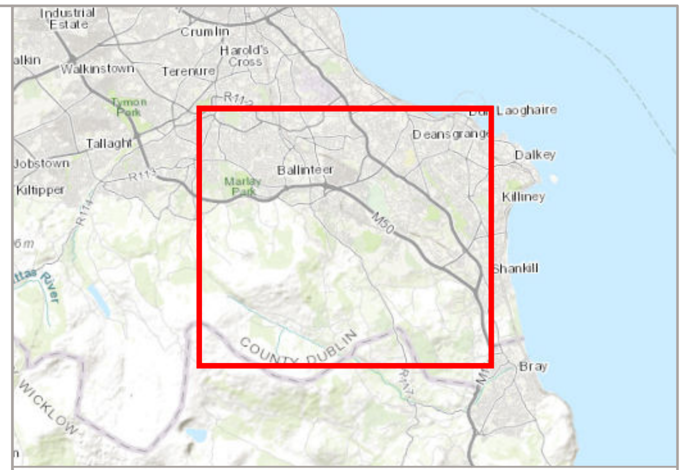
VER	DATE	REMARKS	Drawn	Checked
1	03/02/2022	FIRST ISSUE	NJG	JRS

DRAWING NUMBER:

FIGURE 4.1

SCALE	1:35,000	PLOT SIZE	A3	DATUM	D_TM65	PROJECTION	TM65





LEGEND

- High Density Residential Area
- High Amenity Area
- Priority Search Area
- Carrickmines Substation 4km Buffer

Data Source:
Zoning Objectives Data obtained from the Dún Laoghaire Rathdown County Development Plan 2016 - 2022.
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

PROJECT TITLE

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WIDER STUDY AREA ZONING OBJECTIVES

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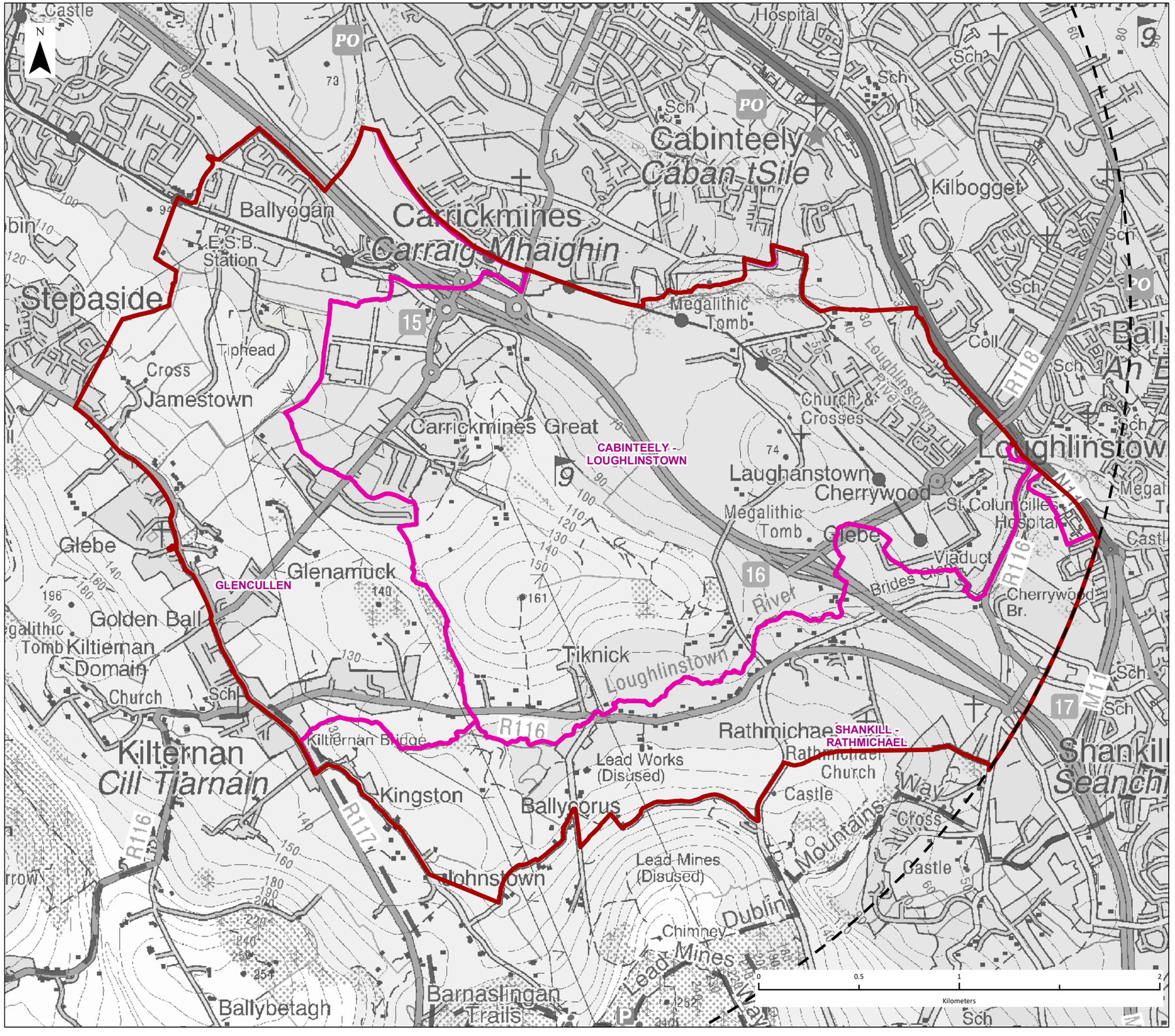
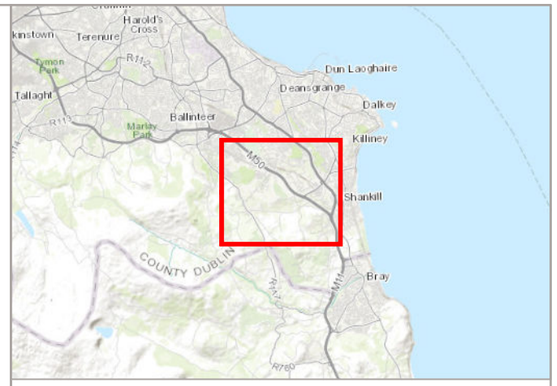
DRAWING NUMBER:

FIGURE 4.2

SCALE	1:40,000	PLOT SIZE	A3	DATUM	D_TM65	PROJECTION	TM65





LEGEND

- Priority Search Area
- Carrickmines Substation 4km Buffer
- Electoral Divisions

Data Source:
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

PROJECT TITLE

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SOCIO-ECONOMIC, POPULATION & LAND USE

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1	03/02/2022	FIRST ISSUE	NJG	JRS

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FIGURE 4.3

SCALE	1:20,000	PLOT SIZE	A3	DATUM	D_TM65	PROJECTION	TM65

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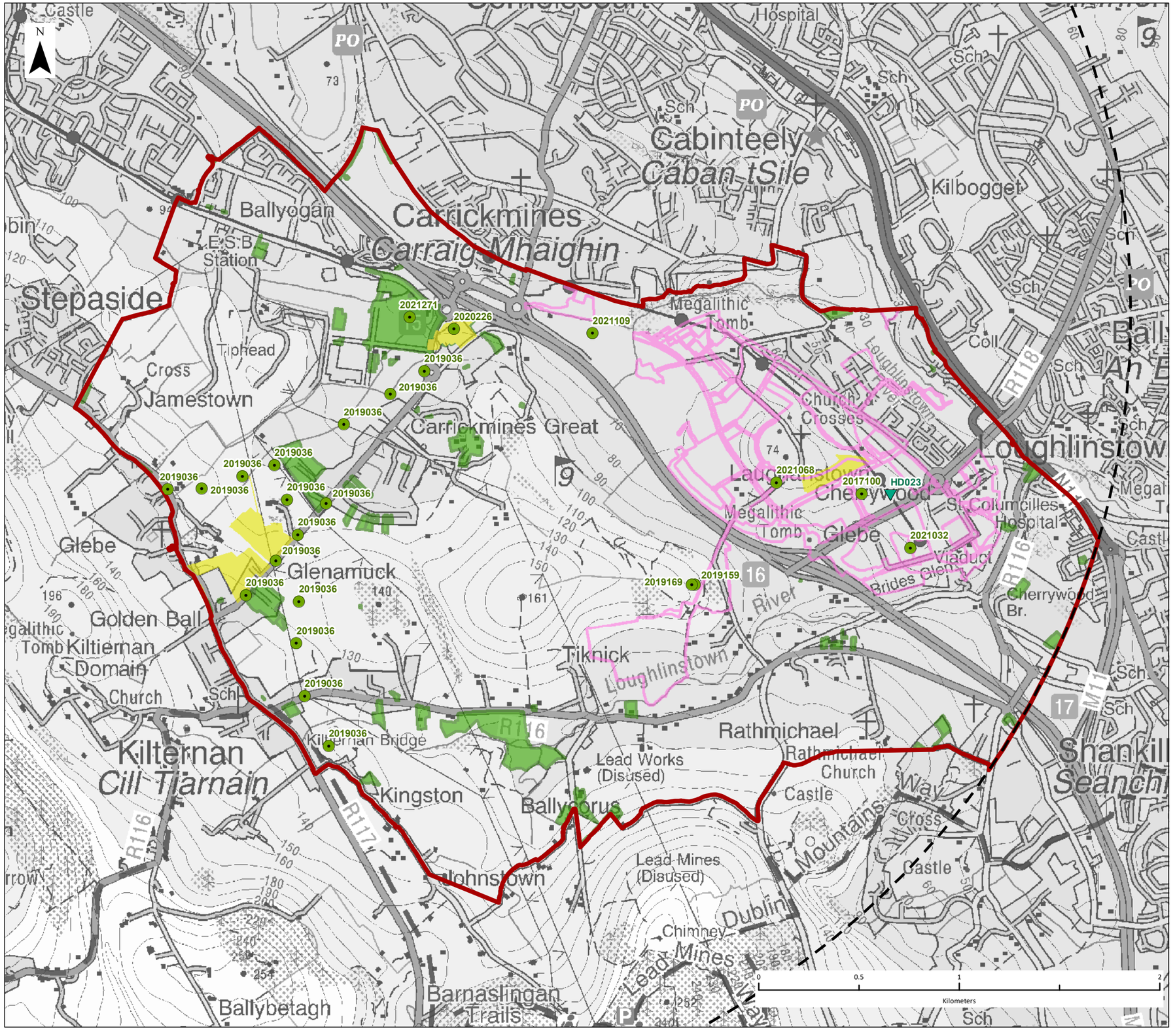
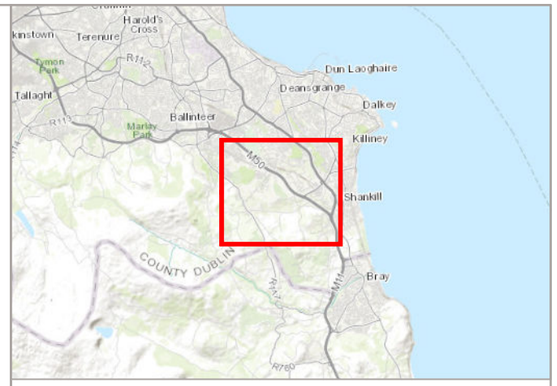
SLR GoBe





LEGEND

- Priority Search Area
- Carrickmines Substation 4km Buffer
- EIA Location
- EIA Location - Archived

Planning Application

- Cherrywood
- Planning Board
- Planning Condition

Data Source:
Planning Application Data obtained from the Dún Laoghaire Rathdown County Planning Viewer.
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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PLANNING APPLICATIONS

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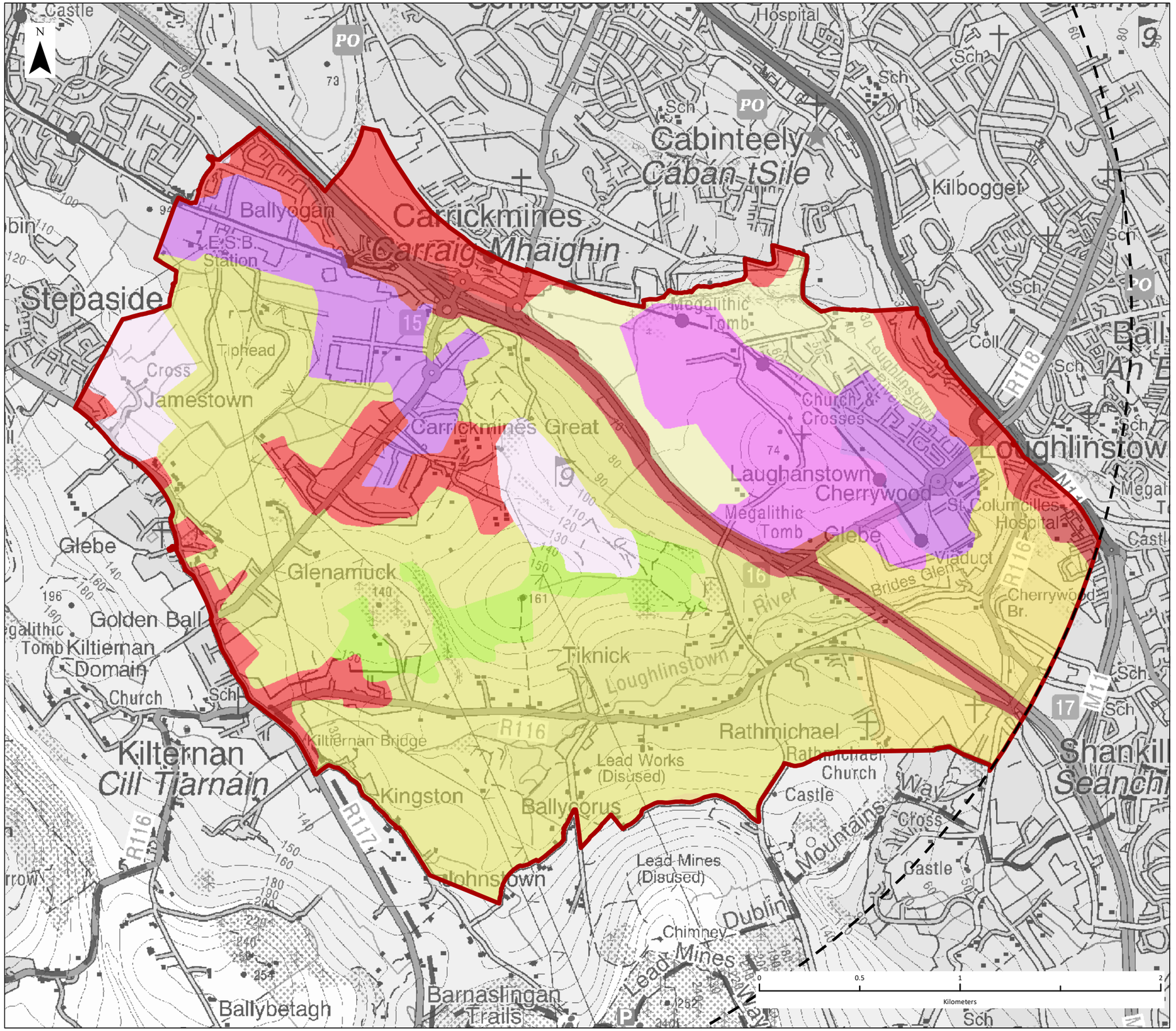
FIGURE 4.4

SCALE	1:20,000	PLOT SIZE	A3	DATUM	D_TM65	PROJECTION	TM65



LEGEND

- Priority Search Area
- Carrickmines Substation 4km Buffer

Corine Landcover 2018

- 112: Discontinuous urban fabric
- 121: Industrial or commercial units
- 122: Road and rail networks and associated land
- 133: Construction sites
- 142: Sport and leisure facilities
- 211: Non-irrigated arable land
- 231: Pastures
- 242: Complex cultivation patterns
- 243: Land principally occupied by agriculture, with significant areas of natural vegetation
- 324: Transitional woodland-shrub

Data Source:
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
The land monitoring products and services are made available through the Copernicus land portal on a principle of full, open and free access, as established by the Copernicus data and information policy Regulation (EU) No 1159/2013 of 12 July 2013

PROJECT TITLE

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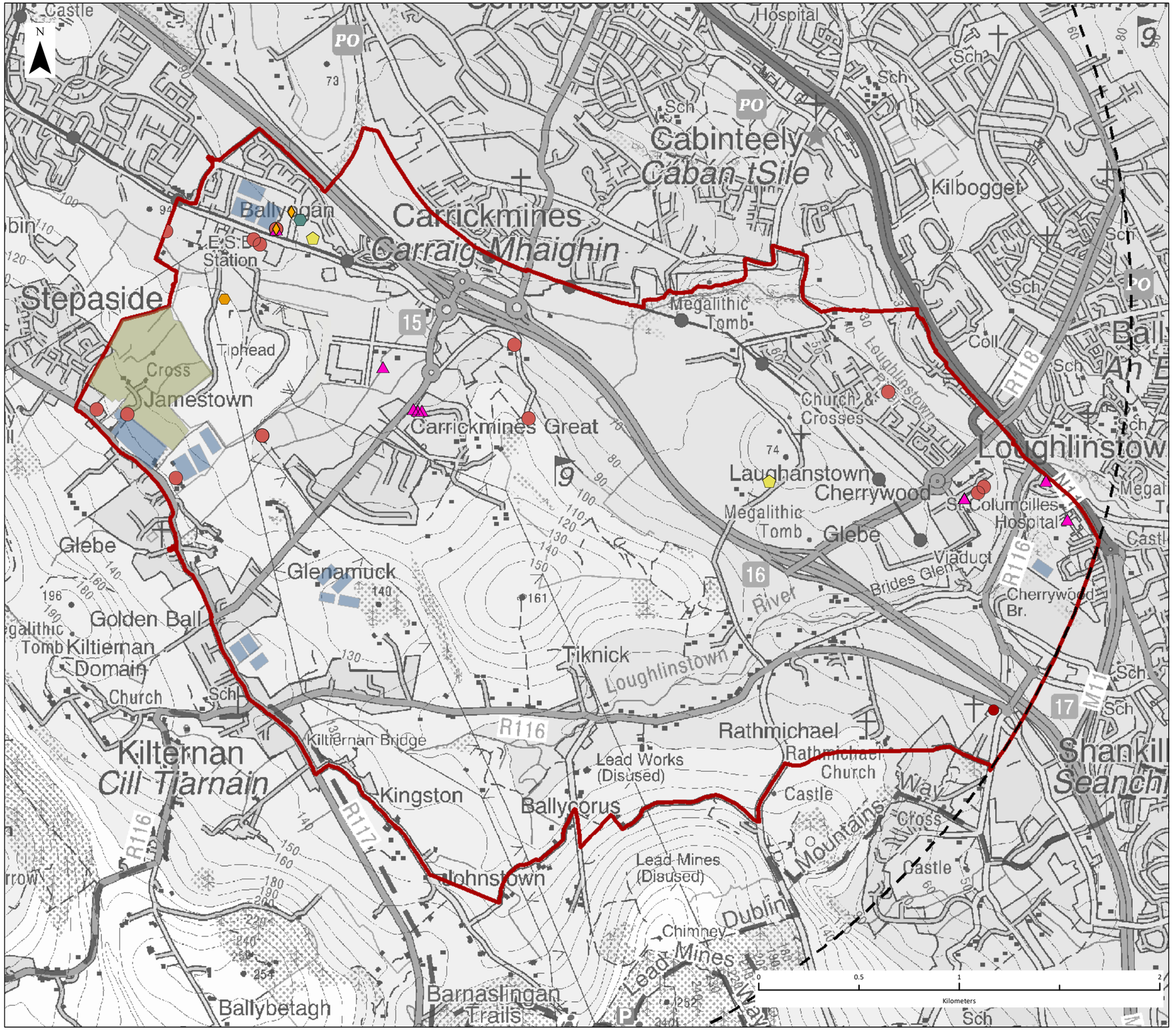
CORINE LANDCOVER

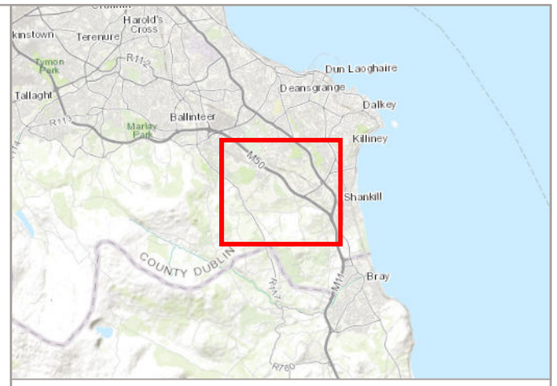
VER	DATE	REMARKS	Drawn	Checked
1	03/02/2022	FIRST ISSUE	NJG	JRS

DRAWING NUMBER:

FIGURE 4.5

SCALE	1:20,000	PLOT SIZE	A3	DATUM	D_TM65	PROJECTION	TM65





LEGEND

- Priority Search Area
- Carrickmines Substation 4km Buffer
- Dog Walking

Recreational Activities

- Outdoor Sports Facility
- Sports Pitches & Playgrounds

Community & Residential Facilities

- Community
- Healthcare
- Religious
- School
- Societies & Clubs
- Church

Data Source:
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

PROJECT TITLE

DUBLIN ARRAY

DRAWING TITLE

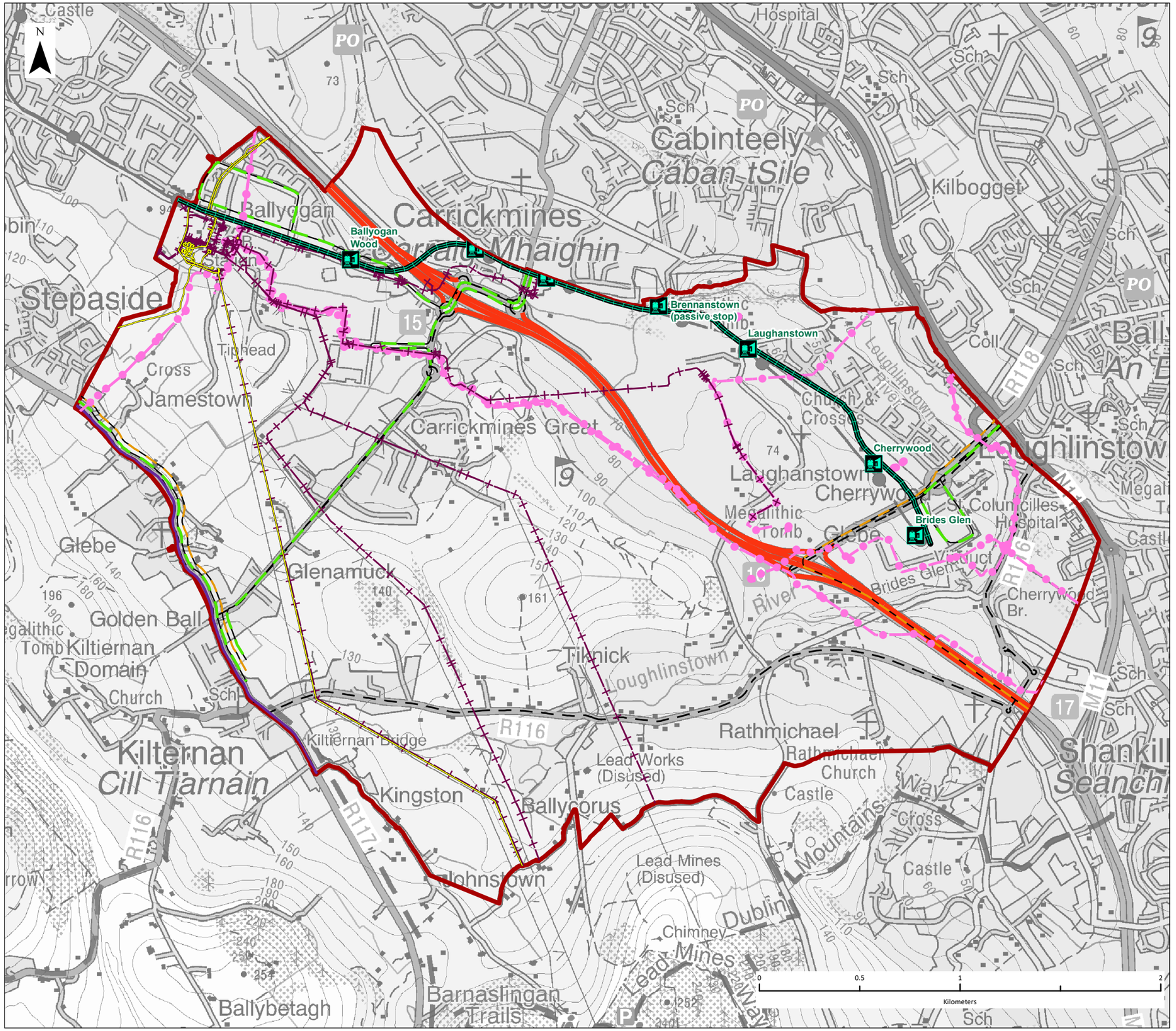
COMMUNITY/RESIDENTIAL FACILITIES, TOURISM, RECREATION & AMENITIES

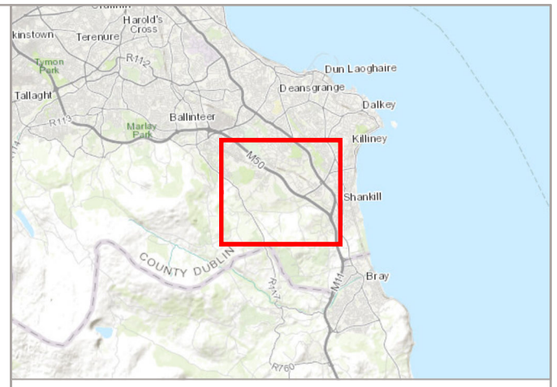
VER	DATE	REMARKS	Drawn	Checked
1	03/02/2022	FIRST ISSUE	NJG	JRS

DRAWING NUMBER:

FIGURE 4.6

SCALE	1:20,000	PLOT SIZE	A3	DATUM	D_TM65	PROJECTION	TM65





LEGEND

- Priority Search Area
- Carrickmines Substation 4km Buffer
- LUAS Station
- LUAS Rail Network

Bus Connects Revised Bus Network 2019

- Peak Time Routes
- Local Routes
- Other City Bound Routes

Road Network

- Motorway
- Primary Road
- Secondary Road

High Voltage Transmission Line

- 38kV Network Object
- 110kV Network Object
- 220kV Network Object

Data Source:
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

PROJECT TITLE

DUBLIN ARRAY

DRAWING TITLE

ELECTRICITY NETWORKS, TRAFFIC & TRANSPORTATION

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DRAWING NUMBER:

FIGURE 4.7

SCALE	1:20,000	PLOT SIZE	A3	DATUM	D_TM65	PROJECTION	TM65

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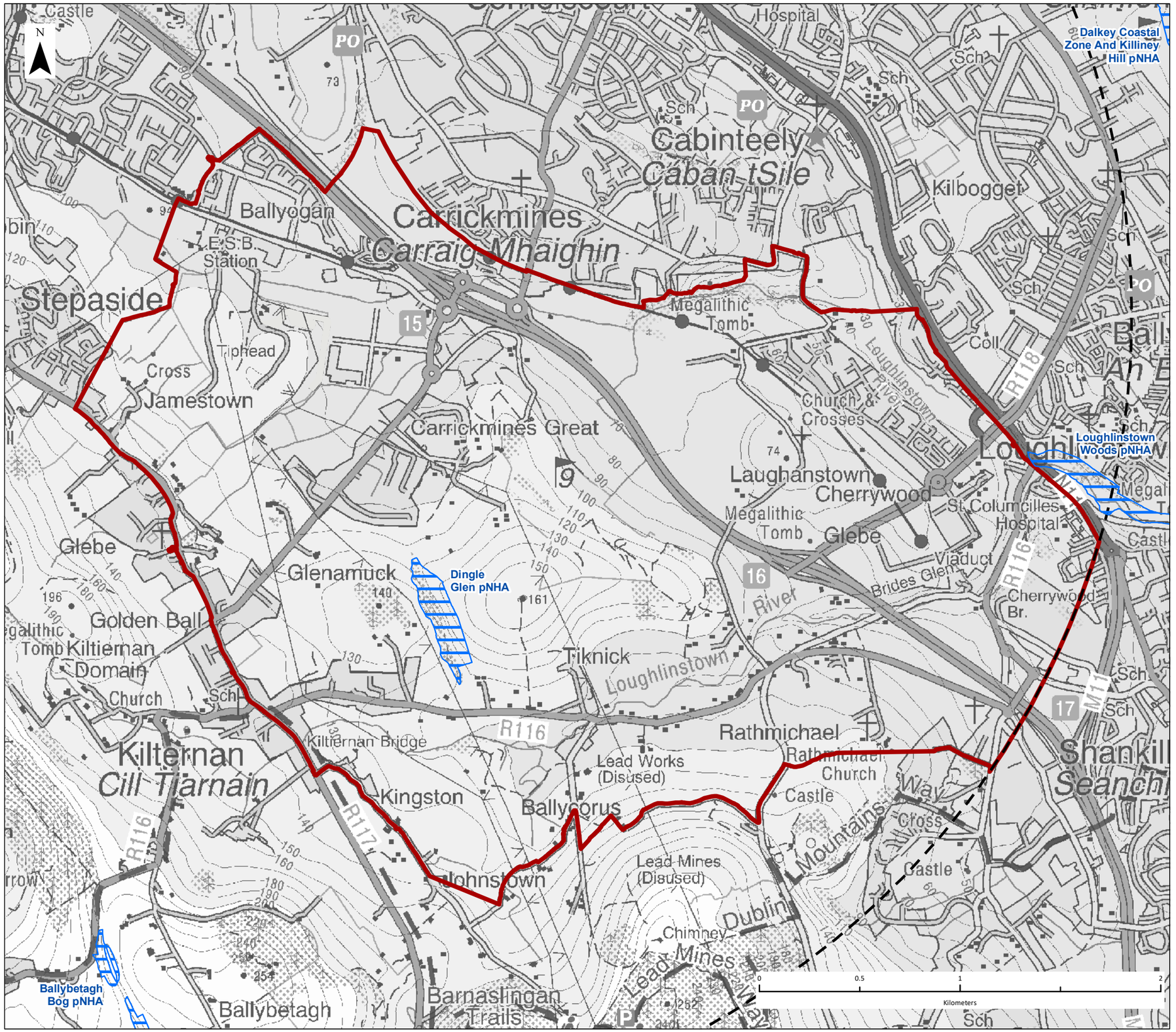

LEGEND

- Priority Search Area
- Carrickmines Substation 4km Buffer
- Proposed Natural Heritage Area (pNHA)

Data Source:
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

PROJECT TITLE

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DESIGNATED SITES

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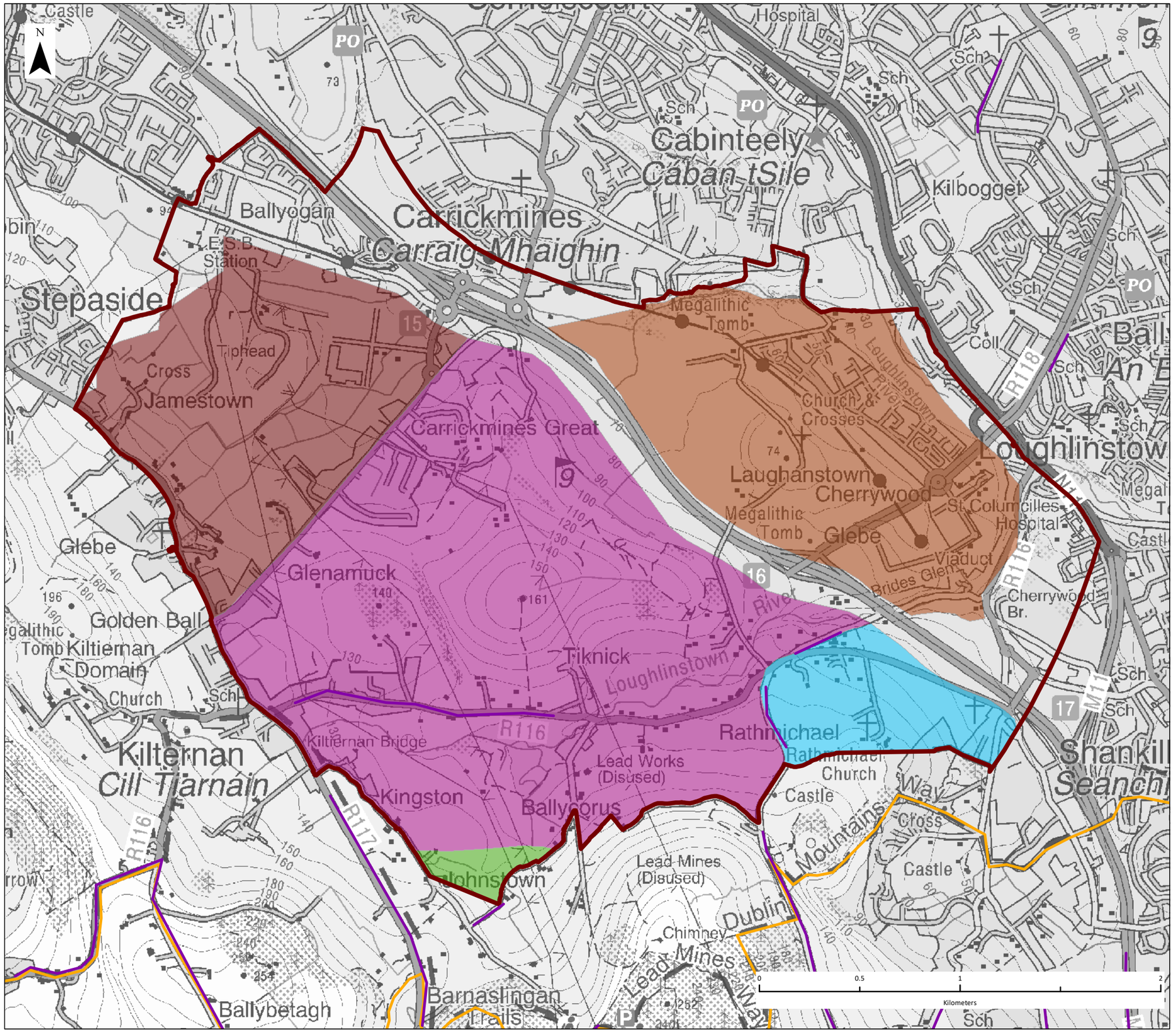
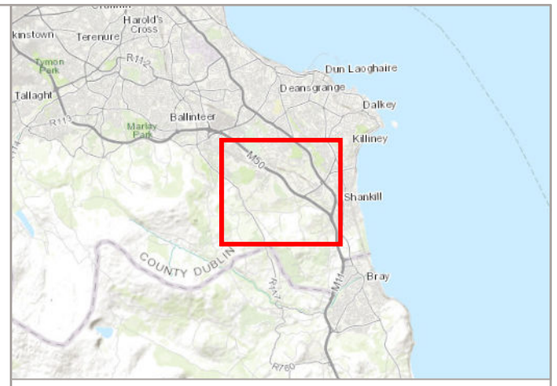
FIGURE 4.8

SCALE	1:20,000	PLOT SIZE	A3	DATUM	D_TM65	PROJECTION	TM65

dublinarray

SLR GoBe





LEGEND

- Priority Search Area
- Carrickmines Substation 4km Buffer
- Dublin Mountains Way
- To Preserve Views

Landscape Character Areas

- Ballycorus
- Carrickmines
- Cherrywood/Rathmicheal
- Kiltiernan Plain
- Rathmichael

Data Source:
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

PROJECT TITLE

DUBLIN ARRAY

DRAWING TITLE

LANDSCAPE CHARACTER & CONSTRAINTS

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1	03/02/2022	FIRST ISSUE	NJG	JRS

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FIGURE 4.9

SCALE	1:20,000	PLOT SIZE	A3	DATUM	D_TM65	PROJECTION	TM65

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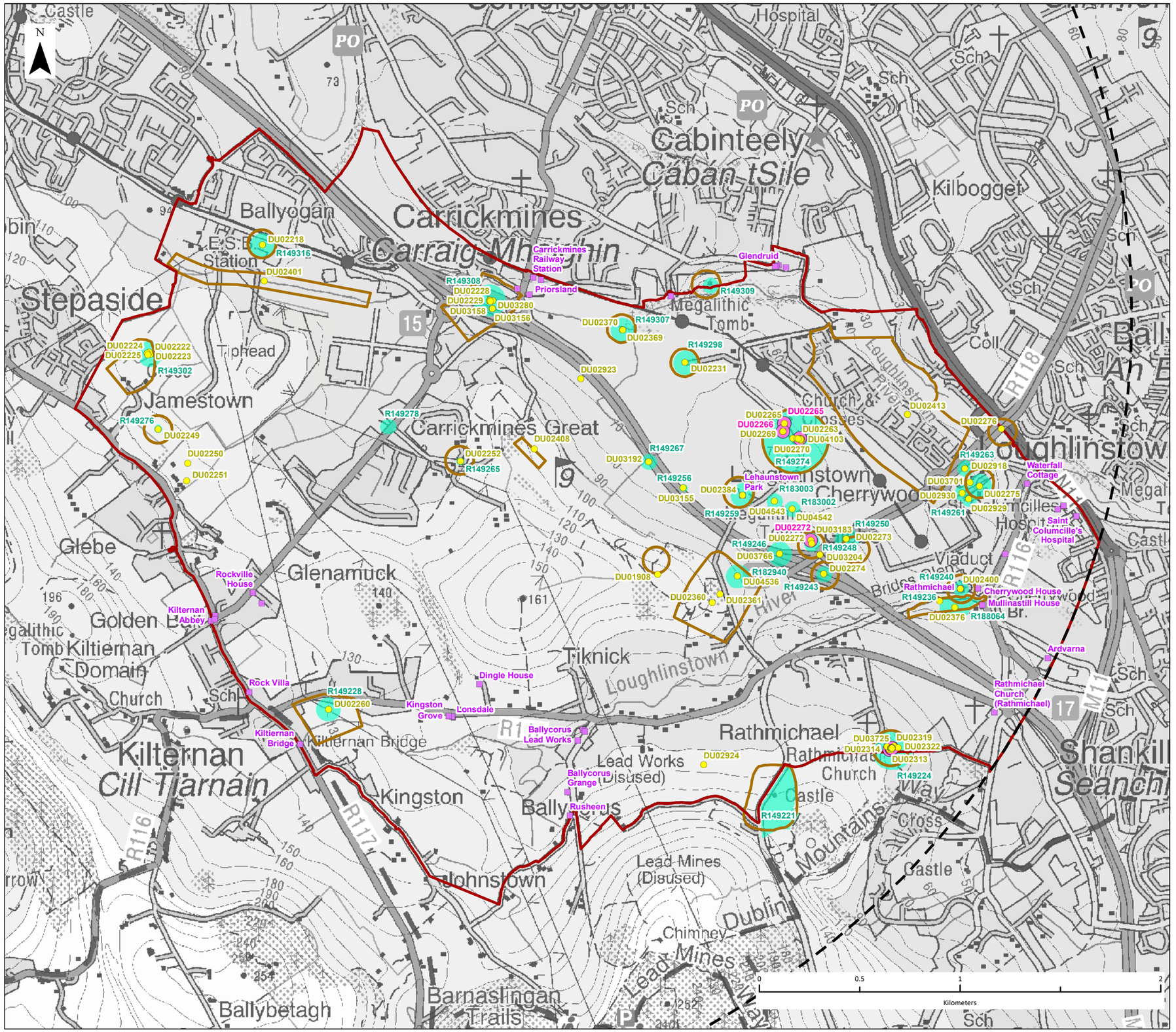

LEGEND

- Priority Search Area
- Carrickmines Substation 4km Buffer
- National Monument
- Monument in State Care Included in Setting Assessment
- National Inventory of Architectual Heritage Building / Recorded Protected Structure
- Records of Monuments and Place
- SMR Zone of Notification

Data Source:
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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DRAWING TITLE

ARCHAEOLOGY, ARCHITECTURAL & CULTURAL HERITAGE CONSTRAINTS

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FIGURE 4.10

SCALE	1:20,000	PLOT SIZE	A3	DATUM	D_TM65	PROJECTION	TM65

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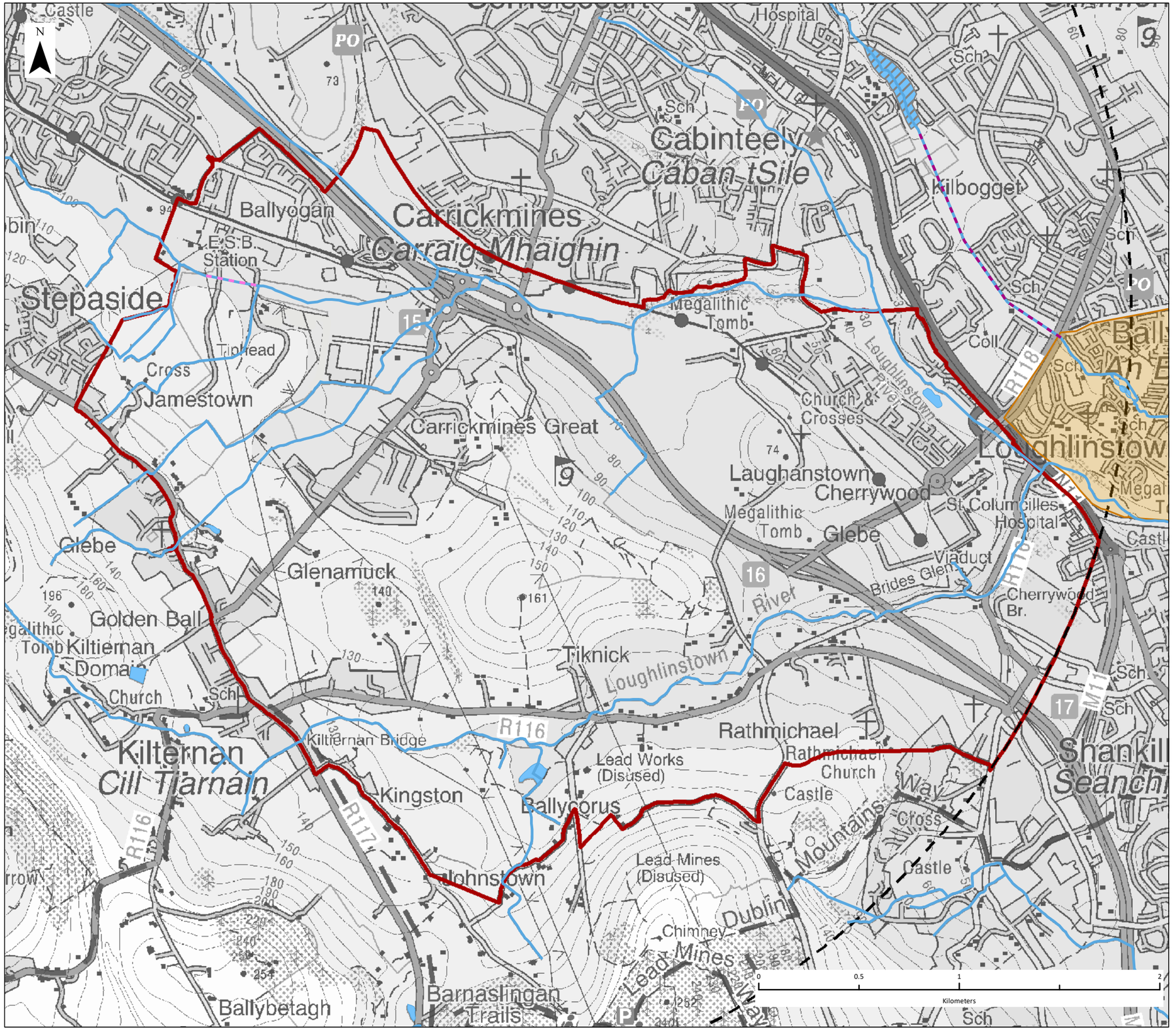

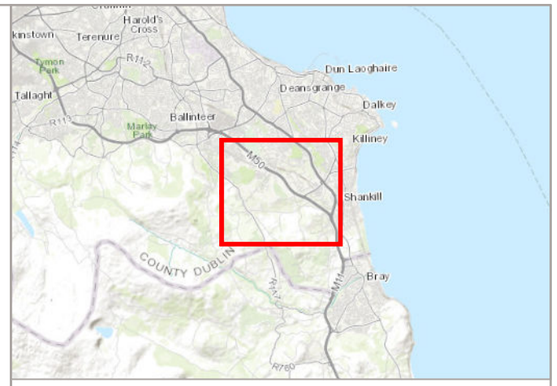

LEGEND

- Priority Search Area
- Carrickmines Substation 4km Buffer
- Culvert under Ballyogan Former Landfill
- Indicative Path of Culvert for Deansgrange Stream
- Watercourse
- Waterbody
- Loughlinstown Area Further Assessment (OPW CFRAMS)
- Kill-o-the-Grange Stream Flood Attenuation areas for DLR Deansgrange Flood Relief Scheme (DLRC)

Data Source:
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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SURFACE WATER & CFRAM CONSTRAINTS

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FIGURE 4.11

SCALE	1:20,000	PLOT SIZE	A3	DATUM	D_TM65	PROJECTION	TM65

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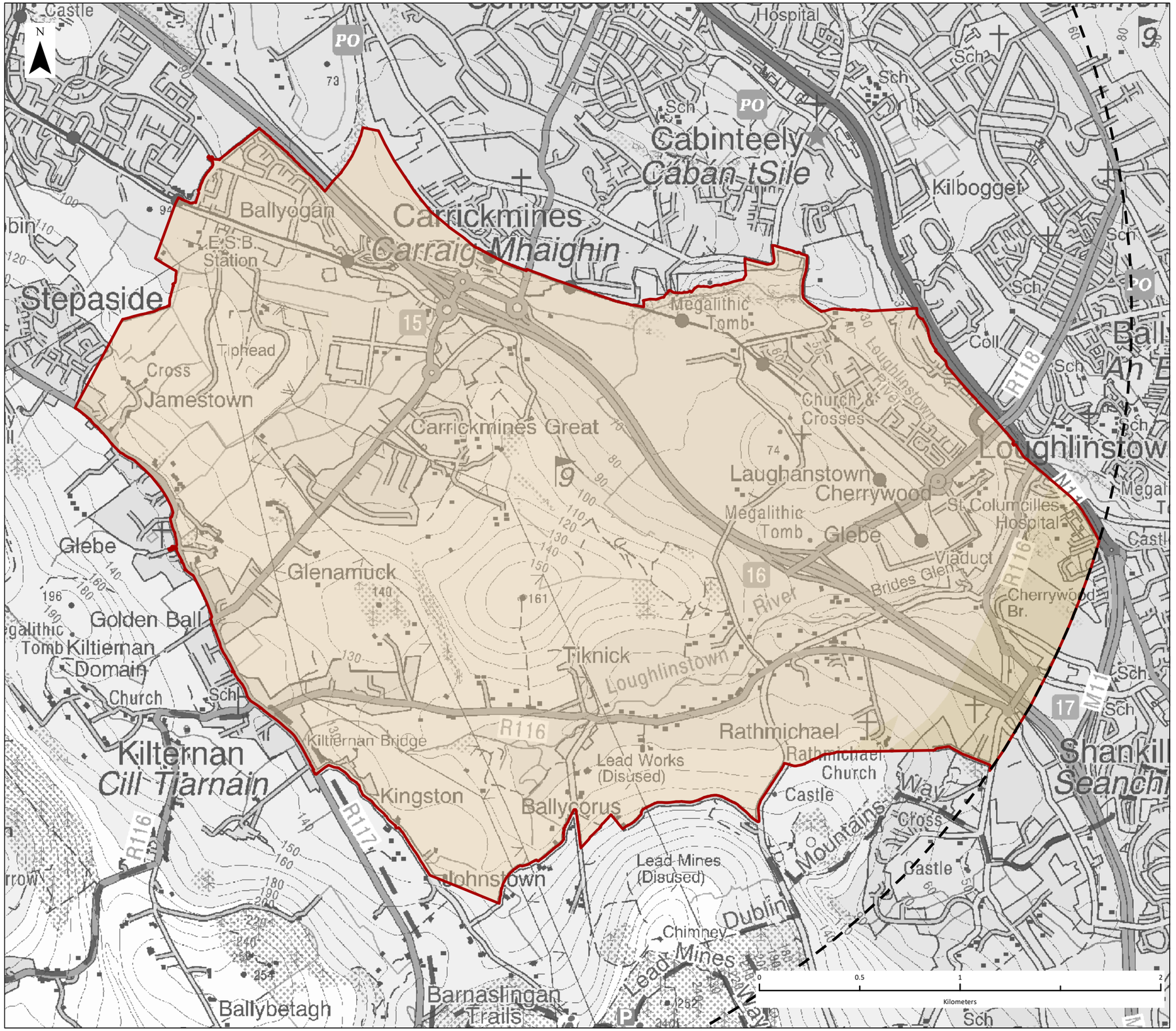

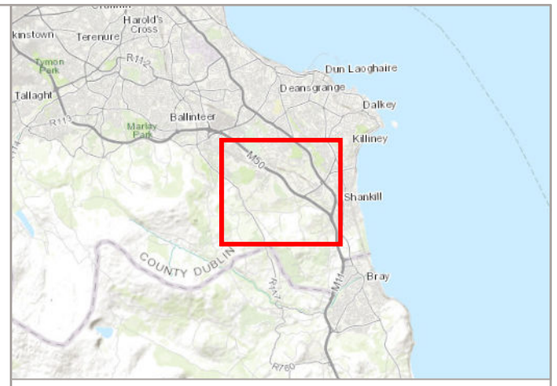

LEGEND

- Priority Search Area
- Carrickmines Substation 4km Buffer

Groundwater Bedrock Aquifers

- LI - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones
- Pl - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones

Data Source:
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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HYDROGEOLOGY

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FIGURE 4.12

SCALE	1:20,000	PLOT SIZE	A3	DATUM	D_TM65	PROJECTION	TM65

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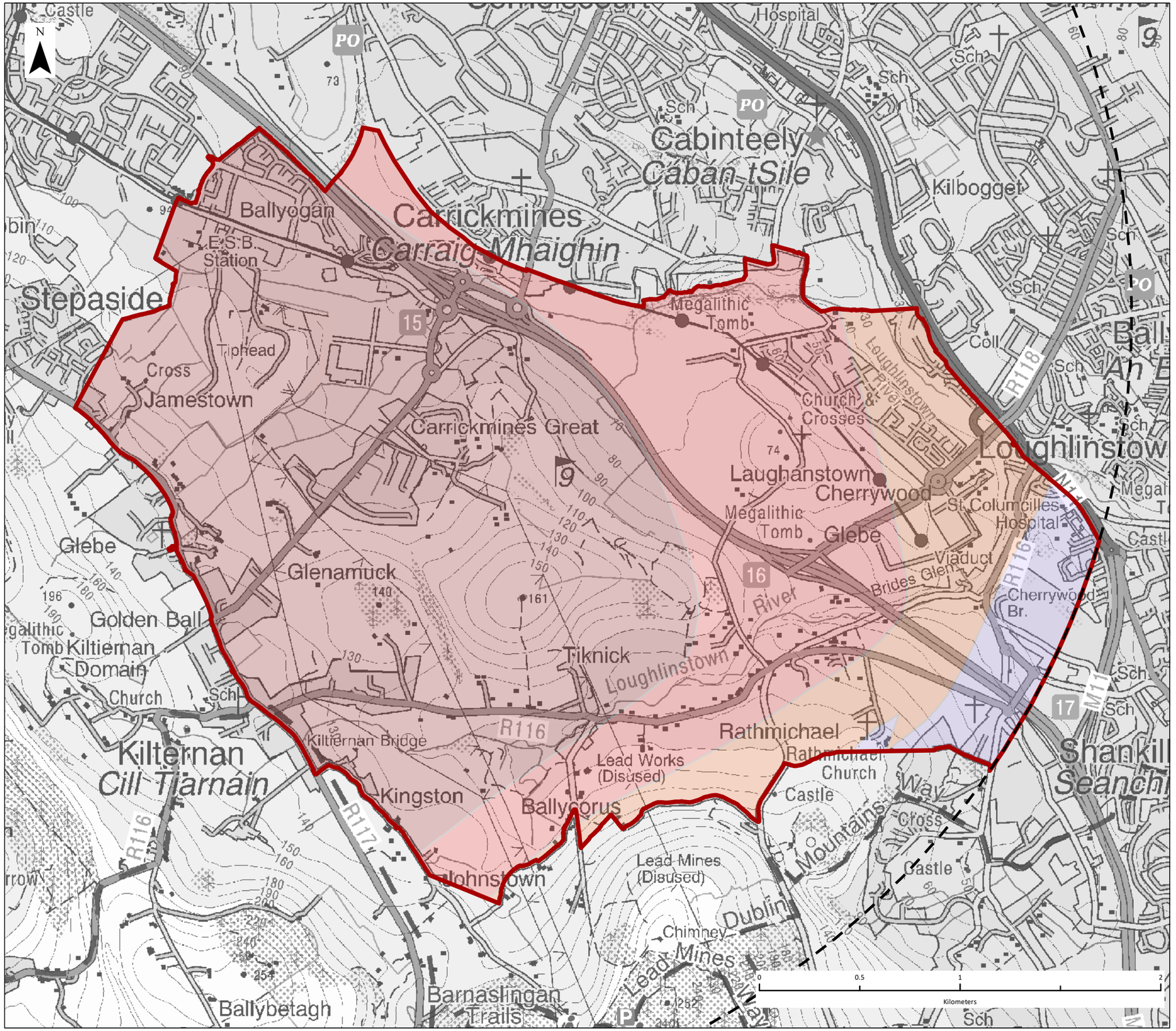

LEGEND

- Priority Search Area
- Carrickmines Substation 4km Buffer

Bedrock Geology

- Type 3 muscovite porphyritic
- Type 2e equigranular
- Type 2p microcline porphyritic
- Maulin Formation

Data Source:
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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GEOLOGY

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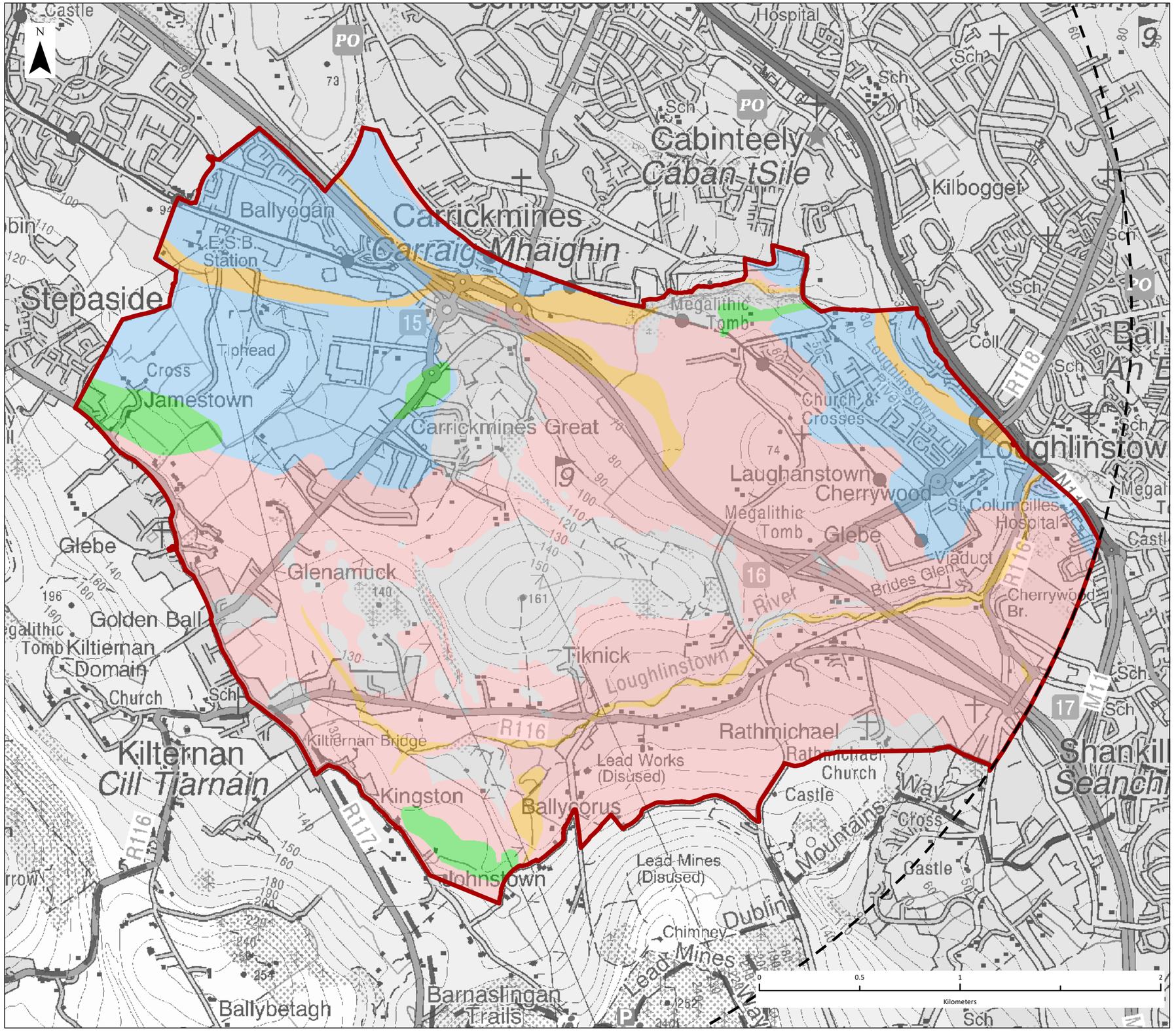
DRAWING NUMBER:

FIGURE 4.13

SCALE	1:20,000	PLOT SIZE	A3	DATUM	D_TM65	PROJECTION	TM65



LEGEND

- Priority Search Area
- Carrickmines Substation 4km Buffer

SYMBOLOGY

- Alluvium
- Gravels Derived from Chert, Granite and Limestones
- Irish Sea Till Derived from Limestones
- Bedrock Outcrop or Subcrop
- Till Derived from Granites
- TLs, Till derived from limestones

Data Source:
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

PROJECT TITLE

DUBLIN ARRAY

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SUBSOILS

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FIGURE 4.14

SCALE	1:20,000	PLOT SIZE	A3	DATUM	D_TM65	PROJECTION	TM65

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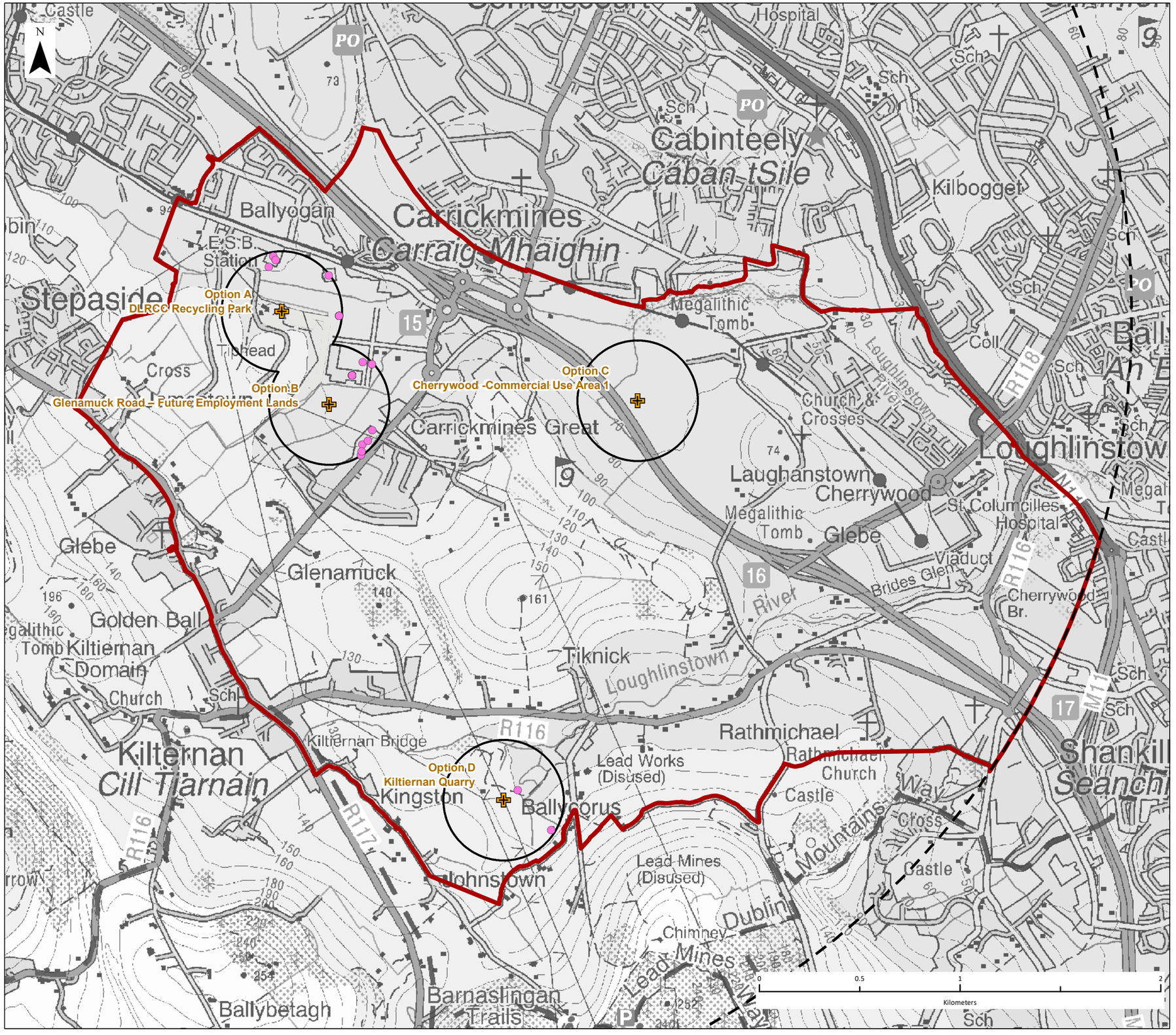

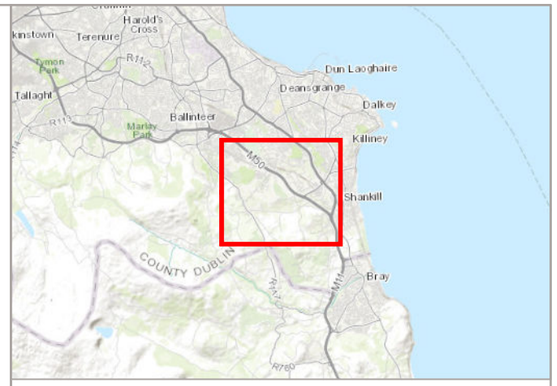

LEGEND

- Priority Search Area
- Carrickmines Substation 4km Buffer
- Site Selection Location
- Sensitive Noise Receptor within Site Selection 300m Buffer
- Site Selection 300m Buffer

Data Source:
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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SENSITIVE NOISE RECEPTORS

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FIGURE 4.15

SCALE	1:20,000	PLOT SIZE	A3	DATUM	D_TM65	PROJECTION	TM65

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