EIAR Volume II

Main Report

Chapter 15: Archaeology and Cultural Heritage

CONTENTS

15 ARCHAEOLOGY AND CULTURAL HERITAGE 15-1
15.1 Introduction 15-1
15.1.1 Project description 15-1
15.2 Statement of authority 15-1
15.3 Consultations 15-2
15.4 Planning and legislation background 15-2
15.4.1 Current guidelines 15-2
15.4.2 Current legislation 15-3
15.4.3 National planning framework 15-5
15.4.4 Cork County Development Plan 2022-2028 15-5
15.4.5 Limerick Development Plan 2022-2028 15-13
15.5 Methodology 15-14
15.5.1 Baseline surveys/ data gathering 15-14
15.5.2 Desktop study 15-24
15.5.3 Geographic information systems 15-24
15.5.4 Zone of theoretical visibility 15-25
15.5.5 Wireframes and photomontages 15-25
15.5.6 Record of monuments and places and sites and monuments record 15-25
15.5.7 Cartographic sources and aerial photography 15-25
15.5.8 Topographical files of the national museum of Ireland 15-25
15.5.9 Archaeological inventory series 15-26
15.5.10 Cork County Development Plan 15-26
15.5.11 Excavation database 15-26
15.5.12 National inventory of architectural heritage 15-26
15.5.13 Field inspection 15-26
15.6 Receiving environment 15-27
15.6.1 Location and topography 15-27
15.6.2 UNESCO World Heritage Sites and those on the tentative list 15-28
15.6.3 National monuments 15-30
15.6.4 Recorded monuments within the site boundary 15-32
15.6.5 Site and monument records within 1km of the site boundary 15-32
15.6.6 Protected structures within 5km of the site boundary 15-36
15.6.7 NIAH within 5km of the wind farm site boundary 15-38
15.6.8 Grid connection routes 15-38
15.6.9 Turbine delivery route options 15-41
15.6.10 Archaeological and cultural background 15-44
15.6.11 Prehistoric period 15-44
15.6.12 Early medieval period (AD 500 – 1100) 15-46
15.6.13 Medieval period (AD 1100 – 1600) 15-48
15.6.14 Post-medieval period (AD 1600 – 1800) 15-48
15.6.15 Undated 15-49
15.6.16 Excavation index 15-50

15.6.17 Cartographic evidence 15-51
15.6.18 Aerial photographic analysis 15-54
15.6.19 LiDAR analysis 15-54
15.6.20 Place-name and folklore analysis 15-57
15.7 Do nothing scenario 15-57
15.8 Construction phase effects 15-57
15.8.1 Indirect effects 15-57
15.8.2 Direct effects 15-58
15.9 Operational phase effects 15-63
15.9.1 Indirect effects 15-63
15.10 Mitigation measures 15-69
15.10.1 'Do-nothing' scenario 15-69
15.10.2 Construction phase 15-69
15.10.3 Operational phase 15-71
15.10.4 Decommissioning phase 15-71
15.11 Residual effects 15-71
15.11.1 'Do nothing' scenario 15-71
15.11.2 Construction phase 15-71
15.11.3 Operational phase 15-72
15.11.4 Decommissioning phase 15-72
15.12 Cumulative effects 15-72
15.12.1 'Do-nothing' scenario 15-73
15.12.2 Construction phase 15-73
15.12.3 Operational phase 15-73
15.12.4 Decommissioning phase 15-75

TABLES

Table 15.1: Study areas for the assessment of direct effects on archaeological, architectural, and cultural heritage assets considered according to sensitivity 15-15
Table 15.2: Study areas for the assessment of indirect effects on the setting of archaeological, architectural, and cultural heritage assets considered according to sensitivity 15-16
Table 15.3: Types of effects 15-17
Table 15.4: Criteria used for rating magnitude of change 15-18
Table 15.5: Criteria used for describing significance of effects 15-20
Table 15.6: Suggested guidance for assessing the importance of cultural heritage receptors 15-21
Table 15.7: Matrix for assessing magnitude of change and significance of effects in relation to significance/sensitivity 15-23
Table 15.8: National monuments within 10km of the wind farm site 15-30
Table 15.9: SMRs within 1km of the wind farm site boundary 15-34
Table 15.10: Record of protected structures within 5km of the wind farm site boundary 15-38
Table 15.11: Analysis of townland names in the project area 15-57

FIGURES

Figure 15.1: Location of the Project and study areas 15-29
Figure 15.2: National monuments and protected structures within the study areas 15-31
Figure 15.3: Sites and monuments record within 1km of the wind farm site 15-33

Figure 15.4: Record of protected structures and national inventory of architectural heritage structures within 5km of the wind farm site boundary 15-37
Figure 15.5: All heritage assets along the GCR options within a 100m study area..... 15-40
Figure 15.6: All recorded heritage assets along TDR option 1 15-42
Figure 15.7: All recorded heritage assets along TDR option 2 15-43
Figure 15.8: Site location on the OSI 1st edition 6 inch map 1829-1841 15-52
Figure 15.9: SMR and buffer zones within the wind farm site boundary 15-53
Figure 15.10: Wind farm site location on the OSI 2nd edition 6 inch map 1897-1913 15-55
Figure 15.11: Wind farm site location of LiDAR 15-56

APPENDICES (EIAR Volume III)

Appendix 15.1: Recorded monuments
Appendix 15.2: Impact Assessment and the cultural heritage resource
Appendix 15.3: Mitigation measures and the cultural heritage resource
Appendix 15.4: Photographs

15 ARCHAEOLOGY AND CULTURAL HERITAGE

15.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) for the proposed Tullacondra Green Energy Project ('the Project') presents the results of an archaeological and cultural heritage impact assessment for the Project.

The purpose of this chapter is to present an assessment of the likely significant effects of the proposed Project on the surrounding archaeological, architectural, and cultural heritage landscape. The assessment is based on both a desktop review of the available cultural heritage and archaeological data and a comprehensive programme of field walking of the study area to identify areas of archaeological/architectural/cultural significance or potential which are likely to be directly or indirectly affected by each phase of the proposed development. An assessment of significance of effects, including cumulative effects, is presented, and mitigation measures are recommended where appropriate.

15.1.1 Project description

The Project includes the construction, operation and decommissioning phases of a wind energy development consisting of nine wind turbine generators with foundations and crane pad hardstanding areas; a permanent meteorological mast; an on-site 38kV substation, underground cabling connecting the turbines to the on-site substation; and underground grid connection to the boundary of the Mallow 110kV substation; along with all associated site works including site clearance, temporary compounds and storage areas; a new temporary entrance and upgrade of an existing entrance; upgrade of existing site tracks and construction of new site tracks; site drainage; and ancillary developments including security gates and fencing, lighting and signage; and biodiversity mitigations and enhancements. This chapter includes an assessment of the likely significant effects from both Grid Connection Route (GCR) Options and both Turbine Delivery Routes (TDR) Options.

The site layout plan of the proposed wind farm is shown in **Figure 1.4**, in EIAR **Chapter 1 Introduction**. Further details of the Project, the construction programme and sequencing of works which are used as the basis for assessments in this EIAR are provided in **Chapter 5 Project Description**.

15.2 Statement of authority

This chapter was prepared by Dr Diarmuid O'Seaneachain BA PhD MCIfA and Greg Bowen BA (Hons.) MA PCIfA, Archaeology Consultant with RSK ADAS Limited. Dr Diarmuid O'Seaneachain leads the ADAS Archaeology and Historic Buildings Team. He is a Member of the Chartered Institute of Archaeologists with over 17 years' experience. ADAS is a Registered Organization with the Chartered Institute of Archaeologists and is a member of the Institute for Historic Building Conservation. Dr

O'Seaneachain has previously worked on several large-scale infrastructure schemes in Ireland including the N8 Fermoy/Mitchelstown Road scheme, the N18 Gort/Crusheen road scheme and the A4/A5 Dungannon/Ballygawley road project. In 2008/2009, Diarmuid worked as a heritage consultant on the route determination and cultural heritage assessment of the EIA for the A5 Derry to/Ballygawley motorway scheme. Dr O'Seaneachain has produced dozens of historic environment desk-based assessments, heritage statements and cultural heritage chapters for Environmental Statements and EIA reports for wind energy developments across the UK including large-scale wind farm developments at Llangurig and Hendy Bank in Wales and multiple turbine developments (between 1-5 turbines in size) across England and Scotland. Greg Bowen, Archaeology Consultant from ADAS assisted with the preparation of this EIAR chapter, including conduction desktop research for the baseline data and preparing figures for this chapter. Greg has a Bachelor of Arts (Hons) in Ancient Greek and Roman Studies from Trent University (2016) and Master of Arts in Archaeology of the Ancient Mediterranean from Sheffield University (2018). He has over 5 years' experience in commercial archaeology. He has produced numerous desk-based assessments for renewable energy projects and grid connection schemes, including Oatfield wind farm, Dublin Airport Solar Park, and Portarlington Flood Relief Scheme.

15.3 Consultations

Discussion of key consultations are provided in **Chapter 3 Scoping, Consultations, Community Engagement and Key Issues.** RSK has consulted with Cork County Council at a pre-planning meeting (attended by Diarmuid O'Seaneachain). The scope of the assessment and the outline mitigation strategy has been agreed during phone and email discussions with the Cork County Archaeologist and the Cork County Conservation Officer during the preparation of this chapter.

15.4 Planning and legislation background

This chapter has been prepared in compliance with all relevant EIA legislation (National Monuments Act 1930 (as amended), National Monuments (Amendment) Act 2004 (as amended), Cultural Institutions Act 1997 (as amended), Register of Historic Monuments (1997 Act), Section 12 (1) and Section 12 (3) of the National Monuments (Amendment Act 1993) (as amended), and the Heritage Act 1995 (as amended)) and guidance. The report is also cognisant of the Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023 (passed into law in October 2023) along with Heritage Ireland 2030.

15.4.1 Current guidelines

The scope and methodology for the baseline assessment has been devised in consideration of the following guidelines:

- Guidelines on the information to be contained in Environmental Impact Assessment Reports (Environmental Protection Agency, 2022)[1].

[1] Environmental Protection Agency (2022) Guidelines on the Information to be Contained in Environmental Impact Statements, Available at: https://www.epa.ie/publications/monitoring--assessment/assessment/guidelines-on-the-information-to-be-contained-in-environmental-impact-assessment.php [Accessed December 2023].

- Places for People, National Policy on Architecture (Department of Housing, Local Government and Heritage, 2022)[2].
- Department of Arts, Heritage, Gaeltacht and the Island (DAHGI) (1999a)[3] 'Frameworks and Principles for the Protection of the Archaeological Heritage'.
- Department of the Environment, Heritage and Local Government (2004)[4] 'Architectural Heritage Guidelines'.
- Guidelines for Cultural Heritage Impact Assessment of TII National Road and Greenway Projects PE-ARC-02009 February 2024[5]
- Eirgrid (2015)[6] 'Cultural Heritage Guidelines for Electricity Transmission Projects. A standard approach to archaeological, architectural and cultural heritage impact assessment of high voltage transmission projects.

15.4.2 Current legislation

Archaeological monuments are safeguarded through national and international policy, which is intended to secure the protection of the cultural heritage resource. The European Convention on the Protection of the Archaeological Heritage (Valletta Convention) was ratified by Ireland in 1997. Both the National Monuments Act 1930 (as amended) and the National Monuments (Amendment) Act 2004 (as amended) and relevant provisions of the Cultural Institutions Act 1997 (as amended) are the primary means of ensuring protection of archaeological monuments in Ireland, the latter of which includes all man-made structures of whatever form or date. There are several provisions under the National Monuments Act which ensure protection of the archaeological resource. One is the Register of Historic Monuments (1997 Act) which provides that any interference to a monument is illegal under that Act. All registered monuments are included on the Record of Monuments and Places (RMP).

The RMP was established under Section 12 (1) of the National Monuments (Amendment) Act 1994 (as amended). It consists of a list of known archaeological monuments and accompanying maps. The RMP affords some protection to the monuments entered therein. Section 12 (3) of the 1994 Amendment Act states that any person proposing to carry out work at or in relation to a recorded monument must give notice in writing to the Minister (Culture, Heritage, and the Gaeltacht) and shall not commence the work for a period of two months after having given the notice. All proposed works, therefore, within or around any archaeological monuments are subject to statutory protection under the legislation (National Monuments Act 1930-2004).

[2] Department of Housing, Local Government and Heritage (2022) Places for People, National Policy on Architecture.

[3] Department of Arts, Heritage, Gaeltacht and the Islands (1999a) Framework and Principles for the Protection of the Archaeological Heritage, Available at: https://www.archaeology.ie/sites/default/files/media/publications/framework-and-principles-for-protection-of-archaeological-heritage.pdf [accessed December 2023].

[4] Department of the Environment, Heritage and Local Government (2004), Architectural Heritage Guidelines.

[5] TII, Guidelines for Cultural Heritage Impact Assessment of TII National Road and Greenway Projects PE-ARC-02009 February 2024: https://www.tiipublications.ie/library/PE-ARC-02009-01.pdf

[6] Eirgrid (2015) Cultural Heritage Guidelines for Electricity Transmission Projects. A standard approach to archaeological, architectural and cultural heritage impact assessment of high voltage transmission projects, Available at: https://www.eirgridgroup.com/site-files/library/EirGrid/Cultural-Heritage-Guidance-for-Electricity-Transmission-Projects.pdf [accessed December 2023].

Under the Heritage Act (1995) (as amended) architectural heritage is defined to include:

> *"all structures, building, traditional, and designed, and groups of buildings including street-scapes and urban vistas, which are of historical, archaeological, artistic, engineering, scientific, social or technical interest, together with their setting, attendant grounds, fixtures, fittings, and contexts…"*

The Architectural Heritage section of the Planning and Development Act 2000 (as amended) commonly known as Part IV, makes provision for protected structures and Architectural Conservation Areas (ACAs) in Ireland, as follows:

In relation to protected structures, the P&D Act 2000 states that:

> *"For the purpose of protecting structures, or parts of structures, which form part of the architectural heritage, and which are of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest, every development plan shall include a record of protected structures and shall include in that record every structure which is, in the opinion of the planning authority, of such interest within its functional area".*

> *"For the purpose of protecting structures, or parts of structures, which form part of the architectural heritage, and which are of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest, every development plan shall include a record of protected structures and shall include in that record every structure which is, in the opinion of the planning authority, of such interest within its functional area".*

The Council of Europe, in Article 2 of the 1985 Convention for the Protection of the Architectural Heritage of Europe (Granada Convention), states that 'for the purpose of precise identification of the monuments, groups of structures and sites to be protected, each member State will undertake to maintain inventories of that architectural heritage'. The Granada Convention emphasises the importance of inventories in underpinning conservation policies.

The National Inventory of Architectural Heritage (NIAH) was established in 1990 to fulfil Ireland's obligations under the Granada Convention, through the establishment and maintenance of a central record, documenting and evaluating the architectural heritage of Ireland. Article 1 of the Granada Convention establishes the parameters of this work by defining 'architectural heritage' under three broad categories of Monument, Groups of Buildings, and Sites:

- Monument: all buildings and structures of conspicuous historical, archaeological, artistic, scientific, social or technical interest, including their fixtures and fittings.
- Group of buildings: homogeneous groups of urban or rural buildings conspicuous for their historical, archaeological, artistic, scientific, social or technical interest, which are sufficiently coherent to form topographically definable units.
- Sites: the combined works of man and nature, being areas which are partially built upon and sufficiently distinctive and homogenous to be topographically definable, and are of conspicuous historical, archaeological, artistic, scientific, social or technical interest.

The Council of Europe's definition of architectural heritage allows for the inclusion of structures, groups of structures and sites which are considered to be of significance in

their own right, or which are of significance in their local context and environment. The NIAH believes it is important to consider the architectural heritage as encompassing a wide variety of structures and sites as diverse as post boxes, grand country houses, mill complexes and vernacular farmhouses.

15.4.3 National planning framework

The project Ireland 2040 National Planning Framework (NPF) (February 2018)[7] is a planning framework to guide development and investment over the coming years. It does not provide detail for every part of the country, but it empowers each region to lead in the planning and development of their communities, containing a set of national objectives and key principles from which more detailed and refined plans will follow. The national policy objectives in this framework which are most relevant to archaeology, architectural and cultural heritage are as follows:

- National Policy Objective 17: Enhance, integrate, and protect the special physical, social, economic, and cultural value of built heritage assets through appropriate and sensitive use now and for future generations.
- National Policy Objective 23: Facilitate the development of the rural economy support a sustainable and economically efficient agricultural and food sector, together with forestry, fishing and aquaculture, energy and extractive industries, the bio-economy and diversification into alternative on-farm and off-farm activities, while at the same time noting the importance of maintaining and protecting the natural landscape and built heritage which are vital to rural tourism.
- National Policy Objective 60: Conserve and enhance the rich qualities of natural and cultural heritage of Ireland in a manner appropriate to their significance.

15.4.4 Cork County Development Plan 2022-2028

As the main elements of the Project will take place in County Cork, this section presents only the element of the Cork County Development Plan which relate to archaeology and architecture and cultural heritage.

The Cork County Development Plan 2022-2028[8] (CDP) came into effect on Monday 6th June 2022. It is a six-year development plan for the County that attempts to set out, as concisely as possible Cork County Council's current thinking on planning policy looking towards the year of 2028. The plan also sets out the overall planning and sustainable development strategy for the county which must be consistent with the National Planning Framework 2018 and the Southern Region Regional Spatial and Economic Strategy and Cork Metropolitan Area Strategic Plan (MASP) 2020.

At a regional level, the Regional Spatial and Economic Strategy (RSES) for the Southern Region recognises the vibrant and diverse cultural attributes that exist across the cities, towns, rural areas and islands of the Southern Region. The Region boasts a rich tapestry of national and recorded monuments, national parks and nature reserves, cultural

[7] National Planning Framework (2019). Project Ireland 2040: Building Ireland's Future. National Planning Framework. Government of Ireland.

[8] Cork County Council (2022). Cork Development Plan 2022-2028, Available at: https://www.corkcoco.ie/sites/default/files/2022-06/cork-county-development-plan-2022-faq-english.pdf [accessed December 2023].

institutions, historic cities, towns and villages along with a history of folklore, music, dance, arts, crafts and local traditions.

The responsibility of Local Authorities in relation to the care and protection of heritage is also identified in the National Heritage Plan[9]. Key actions in the National Heritage Plan include the requirement of Local Authorities to prepare and implement Local Heritage Plans in partnership with the main stakeholders in the area. The Cork County Heritage Plan[10] was adopted in 2005 and is currently in its implementation phase. Actions arising from the current Plan include eight heritage publications which focus on a range of issues including guidance on the protection of areas of special cultural interest (Múscraí Heritage Plan), a detailed publication on the county's archaeological resource, and guidance on specific elements of built heritage value including shopfronts and works within Architectural Conservation Areas.

Cork's heritage and culture are derived from tangible physical artefacts, collections, sites and structures as well as intangible customs, folklore and language. Art is the expression of human creativity and ideas, often but not exclusively taking inspiration from cultural heritage. Development can impact on heritage, culture and the arts though the physical alteration of the environment in which they exist, through the provision of spaces for their display or celebration, and through the protection and safeguarding of sites and structures via buffer areas or appropriately scaled and sensitively designed schemes.

15.4.4.1 Built heritage

The CDP Objectives relating to built heritage include:

- HE 16-1: County Heritage Plan - Continue to implement the current County Heritage Plan (2005) in partnership with relevant stakeholders and any successor of this document.
- HE 16-4: Zones of Archaeological Potential in Historic Towns and Settlements - Proposed development works in Historic Towns and settlements, Zones of Archaeological Potential, Zones of Notification and the general historic environs in proximity to the zones, should take cognisance of the impact potential of the works, and all appropriate archaeological assessments employed to identify and mitigate the potential impacts.
- HE 16-7: Battlefields, Ambush and Siege Sites and Defensive Archaeology - Protect and preserve the defensive archaeological record of County Cork including strategic battlefield, ambush and siege sites, and coastal fortifications and their associated landscape due to their historical and cultural value. Any development within or adjoining these areas shall undertake a historic assessment by a suitably qualified specialist to ensure development does not negatively impact on this historic landscape.
- HE 16-14; Record of Protected Structures –

[9] Heritage Council (2022) Heritage Ireland 2013, Available at: https://www.gov.ie/en/publication/778b8-heritage-ireland-2030/

[10] Cork County Council (2014) Cork Heritage Plan 2018-2023, Available at: https://www.fingal.ie/sites/default/files/2019-11/fingal-heritage-plan-_2018-2023_heritage_plan_web.pdf [accessed December 2023].

- The identification of structures for inclusion in the Record will be based on criteria set out in the Architectural Heritage Protection Guidelines for Planning Authorities (2011[11]).
- Extend the Record of Protected Structures in order to provide a comprehensive schedule for the protection of structures of special importance in the County during the lifetime of the Plan as resources allow.
- Seek the protection of all structures within the County, which are of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. In accordance with this objective, a Record of Protected Structures has been established and is set out in Volume Two Heritage and Amenity, Chapter 1 Record of Protected Structures.
- Ensure the protection of all structures (or parts of structures) contained in the Record of Protected Structures.
- Protect the curtilage and attendant grounds of all structures included in the Record of Protected Structures.
- Ensure that development proposals are appropriate in terms of architectural treatment, character, scale and form to the existing protected structure and not detrimental to the special character and integrity of the protected structure and its setting.
- Ensure high quality architectural design of all new developments relating to or which may impact on structures (and their settings) included in the Record of Protected Structures.
- Promote and ensure best conservation practice through the use of specialist conservation professionals and craft persons.
- In the event of a planning application being granted for development within the curtilage of a protected structure, that the repair of a protected structure is prioritised in the first instance i.e., the proposed works to the protected structure should occur, where appropriate, in the first phase of the development to prevent endangerment, abandonment and dereliction of the structure.

- HE 16-15: Protection of Structures on the NIAH - Protect where possible all structures which are included in the NIAH for County Cork, that are not currently included in the Record of Protected Structures, from adverse impacts as part of the development management functions of the County.
- HE 16-16: Protection of Non- Structural Elements of Built Heritage - Protect non-structural elements of the built heritage. These can include designed gardens/garden features, masonry walls, railings, follies, gates, bridges, shopfronts and street furniture. The Council will promote awareness and best practice in relation to these elements.

[11] Department of Arts, Heritage, Gaeltacht and the Islands (2011) Architectural Heritage Protection, Available at: https://www.buildingsofireland.ie/app/uploads/2019/10/Architectural-Heritage-Protection-Guidelines-for-Planning-Authorities-2011.pdf [accessed December 2023].

- HE 16-17: Areas of Special Planning Control - Establish areas of special planning control within Architectural Conservation Areas where appropriate. These areas will include a scheme setting out objectives for the conservation and enhancement of the special character of the area and will be based on an Architectural Appraisal of each town.
- HE 16-18: Architectural Conservation Areas - Conserve and enhance the special character of the Architectural Conservation Areas included in this Plan. The special character of an area includes its traditional building stock, material finishes, spaces, streetscape, shopfronts, landscape and setting. This will be achieved by;
    - Protecting all buildings, structures, groups of structures, sites, landscapes and all other features considered to be intrinsic elements to the special character of the ACA from demolition and non-sympathetic alterations.
    - Promoting appropriate and sensitive reuse and rehabilitation of buildings and sites within the ACA and securing appropriate infill development.
    - Ensure new development within or adjacent to an ACA respects the established character of the area and contributes positively in terms of design, scale, setting and material finishes to the ACA.
    - Protect structures from demolition and non-sympathetic alterations.
    - Seek the repair and re-use of traditional shopfronts and where appropriate, encourage new shopfronts of a high-quality architectural design.
    - Ensure all new signage, lighting advertising and utilities to buildings within ACAs are designed, constructed and located in such a manner they do not detract from the character of the ACA.
    - Protect and enhance the character and quality of the public realm within ACAs. All projects which involve works within the public realm of an ACA shall undertake a character assessment of the said area which will inform a sensitive and appropriate approach to any proposed project in terms of design and material specifications. All projects shall provide for the use of suitably qualified conservation architects/ designers.
    - Protect and enhance the character of the ACA and the open spaces contained therein. This shall be achieved through the careful and considered strategic management of all signage, lighting, utilities, art works/pieces/paintings, facilities etc to protect the integrity and quality of the structures and spaces within each ACA.
    - Ensure the protection and reuse of historic street finishes, furniture and features which contribute to the character of the ACA.
- HE 16-19: Vernacular Heritage
    - Protect, maintain and enhance the established character, forms, features and setting of vernacular buildings, farmyards and settlements and the contribution they make to our architectural, archaeological, historical, social and cultural heritage and to local character and sense of place.

- Cork County Council encourages best conservation practice in the renovation and maintenance of vernacular buildings including thatched structures through the use of specialist conservation professionals and craft persons. Development proposals shall be accompanied by appropriate documentation compiled by experienced conservation consultant.
- There will generally be a presumption in favour of the retention of vernacular buildings and encouragement of the retention and re-use of vernacular buildings subject to normal planning considerations, while ensuring that the re-use is compatible with environmental and heritage protection.

- HE 16-21: Design and Landscaping of New Buildings
  - Encourage new buildings that respect the character, pattern and tradition of existing places, materials and built forms and that fit appropriately into the landscape.
  - Promote sustainable approaches to housing development by encouraging new building projects to be energy efficient in their design and layout.
  - Foster an innovative approach to design that acknowledges the diversity of suitable design solutions in most cases, safeguards the potential for exceptional innovative design in appropriate locations and promotes the added economic, amenity and environmental value of good design.
  - Require the appropriate landscaping and screen planting of proposed developments by using predominantly indigenous/local species and groupings and protecting existing hedgerows and historic boundaries in rural areas. Protection of historical/commemorative trees will also be provided for.
- HE 16-22: Village Design Statements - Facilitate the preparation and implementation of village design statements and other community led projects and plans to enhance village environments whilst ensuring that such initiatives are consistent with other Plan policies.
- HE 16-24: Naming of New Developments - Promote and preserve local place names, local heritage and the Irish language by ensuring the use of local place names or geographical or cultural names which reflect the history and landscape of their setting in the naming of new residential and other developments. Such an approach will be a requirement of planning permissions for new developments.
- HE 16-26: The Arts
  - Provide for balanced development of arts infrastructure in County Cork that meets the cultural and artistic needs of communities, supports creative activity and enhances cultural, economic and social life in communities.
  - Consider proposals for development of arts spaces and facilities including performance, exhibition, studio and other arts related facilities in

appropriate locations, where proposals are in accordance the other policies and objectives of this Plan.

- Encourage the provision of arts, cultural and entertainment facilities, the commissioning of new works of art for the public realm in association HE proposals, where appropriate and having regard to Public Art: Per Cent for Art Scheme, General National Guidelines" (2004), as amended in 2019.
- Promote and facilitate sustainable development and the creation and display of art and heritage works in public areas while complying with the planning and environmental criteria and development management standards.
- Acknowledge and support the implementation of objectives set out in the Arts Plan and Culture and Creativity Strategy (and any plan / strategy hereafter), which will be supported through effective collaboration with the County Arts Office.
- Undertake an evidence based 'needs' approach during the lifetime of the Development Plan in collaboration with the Arts Office to identify the spatial distribution/concentration of arts and culture 'assets' across the county, and to inform future/area needs provision including the co-location of services and activities. This may inform the pursuit of specific arts and arts infrastructure projects in association with the County Arts Office, through the National URDF funding programme or, such other funding programmes during the lifetime of the Development Plan.

15.4.4.2 Archaeological heritage

The CDP policies relating to archaeological heritage include:

- HE 16-2: Protection of Archaeological Sites and Monuments - Secure the preservation (i.e., preservation in situ or in exceptional cases preservation by record) of all archaeological monuments and their setting included in the Sites and Monuments Record (SMR) (see www.archaeology.ie) and the Record of Monuments and Places (RMP) and of sites, features and objects of archaeological and historical interest generally.

  In securing such preservation, the planning authority will have regard to the advice and recommendations of the Development Applications Unit of the Department of Housing, Local Government and Heritage as outlined in the Frameworks and Principles for the Protection of the Archaeological Heritage policy document or any changes to the policy within the lifetime of the Plan.
- HE 16-2: Underwater Archaeology - Protect and preserve the archaeological value of underwater archaeological sites and associated underwater and terrestrial features. In assessing proposals for development, the development will take account of the potential underwater archaeology of rivers, lakes, wetlands, intertidal and sub-tidal environments through appropriate archaeological assessment by a suitably qualified archaeologist.
- HE 16-5: Zones of Archaeological Potential - Protect the Zones of Archaeological Potential (ZAPs) located within historic towns, urban areas and around

archaeological monuments generally. Any development within the ZAPs will need to take cognisance of the upstanding and potential for subsurface archaeology, through appropriate archaeological assessment.

- HE 16-6: Industrial and Post Medieval Archaeology - Protect and preserve industrial and post-medieval archaeology and long-term management of heritage features such as mills, limekilns, forges, bridges, piers and harbours, water-related engineering works and buildings, penal chapels, dwellings, walls and boundaries, farm buildings, estate features, military and coastal installations. There is a general presumption for retention of these structures and features. Proposals for appropriate redevelopment including conversion should be subject to an appropriate assessment and record by a suitably qualified specialist/s.
- HE 16-8: Burial Places – Protect all historical burial places and their setting in County Cork and encourage their maintenance and care in accordance with appropriate conservation principles.
- HE 16-9: Archaeology and Infrastructure Schemes - All large-scale planning applications (i.e., development of lands on 0.5 ha or more in area or 1km or more in length) and Infrastructure schemes and proposed roadworks are subjected to an archaeological assessment as part of the planning application process which should comply with the Department of Arts, Heritage and the Gaeltacht's codes of practice. It is recommended that the assessment is carried out following pre planning consultation with the County Archaeologist, by an appropriately experienced archaeologist to guide the design and layout of the proposed scheme/development, safeguarding the archaeological heritage in line with Development Management Guidelines.
- HE 16-10: Management of Monuments within Development Sites - Where archaeological sites are accommodated within a development it shall be appropriately conservation/ protection with provision for a suitable buffer zone and long-term management plan put in place all to be agreed in advance with the County Archaeologist.
- HE 16-11: Archaeological Landscapes - To protect archaeological landscapes and their setting where the number and extent of archaeological monuments are significant and as a collective are considered an important archaeological landscape of heritage value.
- HE 16-12: Raising Archaeological Awareness - As part of the Heritage Plan it is an objective to develop a management plan, if resources allow, for the archaeology of County Cork, which could include an evaluation of the Historic Character Assessment of Cork County helping to identify areas for tourism potential, and strategic research while also promoting best practice in archaeology and encouraging the interpretation, publication and dissemination of archaeological findings from the development application process.
- HE 16-13: Undiscovered Archaeological Sites - To protect and preserve previously unrecorded archaeological sites within County Cork as part of any development proposals. The Council will require preservation in situ to protect archaeological monuments discovered. Preservation by record will only be considered in exceptional circumstances.

- HE 16-20: Historic Landscapes:
    - Recognise the contribution and importance of historic landscapes and their contribution to the appearance of the countryside, their significance as archaeological, architectural, historical and ecological resources.
    - Protect the archaeological, architectural, historic and cultural element of the historic/heritage landscapes of the County of Cork.
    - All new development within historic landscapes should be assessed in accordance with and giving due regard to Cork County Councils 'Guidance Notes for the Appraisal of Historic Gardens, Demesnes, Estates and their Settings' or any other relevant guidance notes or documents issued during the lifetime of the Plan.
- HE 16-23: Cultural Heritage - Protect and promote the cultural heritage of County Cork as an important economic asset and for its intrinsic value to identity of place and the well-being of people within the County.
- HE 16-25: Gaeltacht Areas - Protect the linguistic and cultural heritage of the Gaeltacht areas of Cork by:
    - Encouraging development within the Gaeltacht and in the Gaeltacht Service Town of Macroom, which promotes, facilitates or complements the cultural heritage, including Irish language use.
    - Encouraging development within the Gaeltacht and the Gaeltacht Service Town of Macroom, which provides employment or social facilities, especially, but not exclusively, where these are of relevance to local young people.
    - Resisting development within the Gaeltacht, which would be likely to erode the cultural heritage (including the community use of Irish language), unless there are over-riding benefits for the long-term sustainability of the local community or for the proper planning and sustainable development of a wider area.
    - Ensuring that where the County Council erects signs within the Gaeltacht, these have Irish as their primary language, unless there are positive and over-riding reasons for doing otherwise.
    - Discouraging the exhibition of advertisements within the Gaeltacht which do not use Irish as their primary language.
    - Consider the requirement for the use of demanding linguistic impact analyses with planning applications for particular major developments. These would be cases where the potential impact of the development on the use of Irish as the community language is not immediately apparent and pivotal in the determination of the application.
    - Facilitate the preparation and implementation of local Gaeltacht Plans, Programmes and Initiatives, including Language Plans and Conservation Plans such as the Múscraí Heritage Plan, in the interests of the proper planning and sustainable development of Cork's Gaeltacht's, provided that such plans are in keeping with Council policy.

- Encourage the use of the Irish language, not just in Gaeltacht areas but throughout the County, particularly with regard to service provision, planning and development and Council initiatives/activities.
- The use of the Irish language is promoted in the design of developments e.g., business advertising, recreational and community facilities are clearly identified and provided, and shop-front signage should be in the Irish language.
- The Plan encourages collaboration between Gaeltacht stakeholders, Gaeltacht communities and State agencies in the future planning and development projects to ensure the protection and promotion of the Irish language as the community language.

15.4.5 Limerick Development Plan 2022-2028[12]

The potential effects on archaeology and cultural heritage of the parts of the TDR Options which are located in County Limerick are likely to be neutral (see section 15.12 below). Nevertheless, the heritage policies of the Limerick Development Plan that are relevant to the associated accommodating works for the TDR s are listed below.

15.4.5.1 Heritage

- Objective 9. Protect, conserve, and enhance the **built and cultural heritage** of Limerick, through promoting awareness, utilising relevant heritage legislation and ensuring good quality urban design principles are applied to all new developments. The principle that well planned and integrated development enhances the sustainability of attractiveness and quality of an area should be at the centre of any proposal.
- EH P4: Compliance with Limerick's Heritage Plan – It is a policy of the Council to place ecological and environmental issues at the centre of planning policies and decisions and in doing so, will adhere to the objectives set out in *Limerick's Heritage Plan 2017-2030.*
- EH P5: Protection of the Built Environment – It is a policy of the Council to promote high standards for conserving and restoring the built environment and promote its value in improving living standards and its benefits to the economy.
- EH 036: Preservation of the Archaeological Heritage – It is an objective of the Council to seek the preservation of all known sites and features of historical and archaeological interest. This is to include all the sites listed in the Record of Monuments and Places as established under Section 12 of the National Monuments (Amendment) Act 1994. The preferred option is preservation in situ, or at a minimum preservation by record.

[12] Limerick City and County Council (2022) Draft Limerick Development Plan 2022-2028.

15.5 Methodology

This section presents the methodology used in assessing the baseline cultural heritage environment. The scope and methodology for the baseline assessment has been devised in consideration of the legislation, planning policy and guidelines.

Appendix 15.1 contains further details on the heritage assets contained in this chapter. Appendix 15.2 provides further background detail on how potential impacts (effects) on Archaeological and Historical remains are defined. Appendix 15.3 outlines general potential mitigation strategies for cultural heritage remains. Appendix 15.4 contains a selection of photographs taking during the site inspection and setting impact assessment.

15.5.1 Baseline surveys/ data gathering

15.5.1.1 Zone of Influence or study areas

The study areas for the assessment of direct effects of the Project were defined based on professional opinion and are in accordance with EPA guidelines for assessment, see **Table 15.1**. The size of the study areas used in this assessment were development based on all the likely direct and indirect effects that the various elements of a wind farm development may have on the historic environment. The study areas were also determined based on the type of heritage asset and its level of legal protection combined with their determined significance (sensitivity), and in consultation with Cork County Council during the scoping stage of the assessment (EIAR **Volume III, Appendix 3.2**).

It is considered that any potential for significant adverse direct effects will be confined to historic environment assets recorded within the red line boundary and within 1km of the wind farm site boundary.

A 100m study area was considered adequate for the assessment of direct effects of the GCR where construction works associated with both of the GCR Options are predominantly confined to the existing public road network.

It is understood that minimal accommodating works will be required for each TDR Options (see EIAR **Chapter 16 Traffic and Transport**). The study area for the TDR is taken to be edge of the existing public road network from the ports to the junction where each TDR leaves the N20 travelling towards the site entrance. A 100m study area was considered from the turn off the N20 onto the L5523 (Boherash Cross) for TDR Option 1 and from the turn off the N20 onto the L1200 for TDR Option 2 to the site entrance. This is due to the potential for accommodating works in these areas to facilitate the transport of turbine components.

Table 15.1: Study areas for the assessment of direct effects on archaeological, architectural, and cultural heritage assets considered according to sensitivity

Cultural Heritage Asset	Study Area
UNESCO World Heritage Sites (including tentative sites, if relevant), National Monuments, Recorded Monuments, RPS, Architectural Conservation Areas, NIAH and previously unregistered archaeological sites, upstanding historic structures and earthworks	Within the red line boundary and within **1km** of the wind farm site boundary
UNESCO World Heritage Sites (including tentative sites, if relevant), National Monuments, Recorded Monuments, RPS, Architectural Conservation Areas, NIAH and previously unregistered archaeological sites, upstanding historic structures and earthworks	Within **100m** of the Grid Connection Route/s
UNESCO World Heritage Sites (including tentative sites, if relevant), National Monuments, Recorded Monuments, RPS, Architectural Conservation Areas, NIAH and previously unregistered archaeological sites, upstanding historic structures and earthworks	To the edge of the public road between the port and the junction of the N20 where each TDR route option leaves the N20. Within 100m of each TDR route option from the junction of the N20 to the site entrance

The study areas for the assessment of indirect effects, see **Table 15.2**, were defined based on professional opinion and are in accordance with EPA guidelines above for assessment and in consultation with Cork County Council during the scoping stage of the assessment.

Table 15.2: Study areas for the assessment of indirect effects on the setting of archaeological, architectural, and cultural heritage assets considered according to sensitivity

Cultural Heritage Asset	Sensitivity	Study Area
UNESCO World Heritage Sites (including tentative sites, if relevant)	Very High	20km from the nearest proposed turbine; within 100m of the GCR Options; Within the TDR Study Area
National Monuments	High	10km from the wind farm site boundary; within 100m of the GCR Options; Within the TDR Study Area
Record of Protected Structures, Architectural Conservation Areas	High	5km from the wind farm site boundary; within 100m of the GCR Options; Within the TDR Study Area
Recorded Monuments and NIAH buildings, parks and gardens	Medium	1km from the wind farm site boundary within 100m of the GCR Options; Within the TDR Study Area
Unregistered cultural heritage sites (built heritage and buried archaeology)	Low	Within 100m of the proposed wind farm site boundary; within 100m of the GCR Options; Within the TDR Study Area
Unregistered cultural heritage sites for which there are no extant remains and where there is little or no potential for associated subsurface evidence	Negligible	Within the wind farm site boundary within 100m of the GCR Route Options; Within the TDR Study Area

15.5.1.2 Describing types of effects

Table 15.3 sets out the types of effects and their definition which could potentially result from impact of the Project.

Table 15.3: Types of effects

Types of Effect	Definition
Direct Effects (physical effects)	Direct effects or impacts arise where an archaeological, architectural and/or cultural heritage feature or site is physically located within the footprint of the proposed development, or its associated physical impact zone, whereby the removal of part, or all of the feature or site is required.
Indirect Effects (off -site effects)	Effects on the historic environment, which are not a direct result of the project. These arise when an archaeological, architectural or cultural heritage feature is not located within the footprint of the proposed development or its associated impact zone and is therefore not impacted directly. Such an effect could include effects on setting or effects on the zone of archaeological potential of a site.
Cumulative Effects	In addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects.
'Do-nothing Effects'	The historic environment as it would be in the future should the subject project not be carried out
'Worst-case' Effects	The effects arising from a project in the case where mitigation measures substantially fail
Indeterminable Effects	When the full consequences of a change in the environment cannot be described
Irreversible Effects	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
Residual Effects	The degree of environmental change that will occur after the proposed mitigation measures have taken effect
Synergistic Effects	Where the resultant effect is of greater significance than the sum of its constituents

15.5.1.3 Methodology used for assessing baseline value of archaeological and cultural heritage sites

Baseline values have been assigned to each identified site of cultural heritage significance and/or potential within the study areas. The[13] baseline value of a site is determined with reference to the 'significance' and 'sensitivity' of the site (as set out in **Table 15.2**).

[13] Transport Infrastructure Ireland, 2024. Guidelines for Cultural Heritage Impact Assessment of TII National Road and Greenway Projects. Available at: https://www.tiipublications.ie/library/PE-ARC-02009-01.pdf

In accordance with Transport Infrastructure Ireland (TII) Guidelines (2024), the significance of a site is determined based on the following criteria: legal status, condition, historical associations, amenity value, ritual value, specimen value, group value and rarity. The sensitivity of a site is determined based on its susceptibility to direct (physical) effect, as well as susceptibility to indirect effect on setting.

The National Monuments Act 2023 does not differentiate recorded archaeological sites on the basis of relative importance or sensitivity. In addition, the Planning and Development Act 2000 (as amended) does not differentiate Protected Structures or Areas of Architectural Conservation on the basis of relative importance or sensitivity as there is no national portal for Architectural Conservation Area (ACAs) in Ireland. Consequently, professional judgement has been exercised to rate these heritage assets based on their perceived significance and sensitivity in relation to both direct effects and indirect effects on setting.

15.5.1.4 Magnitude of change

The magnitude of change is a product of the scale, extent or degree of change that is likely to be experienced as a result of the Project. **Table 15.4** outlines criteria used to inform this judgement.

Table 15.4: Criteria used for rating magnitude of change

Magnitude of Change	Criteria
Very High	Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse effects only. These effects arise where an archaeology site is completely and irreversibly destroyed. A magnitude of change that obliterates the architectural heritage of a structure or feature of national or international importance. These effects arise where an architectural structure or feature is completely and irreversibly destroyed by the proposed development. Mitigation is unlikely to remove adverse effects.
High	A change which, by its magnitude, duration or intensity, alters an important aspect of the environment. A magnitude of change like this would be where part of a site would be permanently impacted upon, leading to a loss of character, integrity and data about an archaeological feature/site. A change that by its magnitude, duration or intensity alters the character and/or the setting of the architectural heritage. These effects arise where an aspect or aspects of the architectural heritage is/are permanently impacted upon leading to a loss of character and integrity in the architectural structure or feature. Appropriate mitigate is likely to reduce the effect. A beneficial or positive effect that permanently enhances or restores the character and/or setting of a feature of archaeological or cultural heritage significance in a clearly noticeable manner.
Medium	A medium magnitude of change arises where a change to a site/monument is proposed which though noticeable, is not such that the archaeological integrity of the site is

Magnitude of Change	Criteria
	compromised, and which is reversible. This arises where an archaeological feature can be incorporated into a modern-day development without damage and that all procedures used to facilitate this are reversible. A medium magnitude of change to a site/monument may also arise when a site is fully or partly excavated under license and all recovered data is preserved by record. A magnitude of change to the architectural heritage which, although noticeable is not such that alters the integrity of the heritage asset. The change is likely to be consistent with existing and emerging trends. Effects are probably reversible and may be of relatively short duration. Appropriate mitigation is very likely to reduce the effect. A beneficial or positive change that results in partial or temporary enhancement of the character and/or setting of a feature of archaeological or cultural heritage significance in a clearly noticeable manner.
Low	A magnitude of change in the character of the environment, such as visual impact, which are not high and do not directly affect an archaeological feature or monument. A magnitude of change that causes some minor change in the character of architectural heritage of local or regional importance without affecting its integrity or sensitivities. Although noticeable, the effects do not directly impact on the architectural structure or feature. Impacts are reversible and of relatively short duration. Appropriate mitigation will reduce the effect. A beneficial or positive effect that causes some minor or temporary enhancement of the character of an architectural heritage significance which, although positive, is unlikely to be readily noticeable.
Negligible	A magnitude of change on archaeological features or monuments capable of measurement but without noticeable consequences. A magnitude of change on architectural heritage of local importance that is capable of measure merit but without noticeable consequences. A beneficial or positive effect on architectural heritage of local importance that is capable of measurement but without noticeable consequences.
No Change	No likely change to the existing historic environment

15.5.1.5 Significance of effects

Sensitivity, in relation to the historic environment, is a subjective term, which describes the potential for a heritage asset to absorb change. It reflects the current setting of an asset and the extent to which changes to that setting would affect the significance of the asset. The criteria to describe the Quality of Effects and the Significance of Effects is presented in **Table 15.5**.

Table 15.5: Criteria used for describing significance of effects

Types of Effects	Definition
Quality of Effects It is important to inform the non-specialist reader whether an effect is positive, adverse or neutral	**Positive Effects**: A change which improves the quality of the historic environment. **Neutral Effects**: No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error. **Adverse Effects**: A change which reduces the quality of the heritage asset or historic environment.
Describing the Significance of Effects	'Significance' is a concept that can have different meanings for different topics. For this assessment, the following terminology is applied based on a combination of EPA and Transport Infrastructure Ireland (NRA) guidance. The Effects described below can be positive, neutral or adverse.
Neutral	No change to elements, parcels or components of the historic environment; no visual or audible changes, no changes arising from amenity or community factors
Imperceptible	An effect on an archaeological feature, monument or architectural heritage site which is capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable changes in the character of the historic environment, on archaeological features or monuments or on architectural heritage but without significant consequences.
Slight Effects	An effect which causes noticeable changes in the character of the historic environment without affecting its sensitivities.
Moderate Effects	An effect that alters the character of the historic environment in a manner that is consistent with existing and emerging baseline trends.
Significant Effects	An effect which, by its character, magnitude, duration or intensity, alters a sensitive aspect of the historic environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the historic environment.
Profound Effects	An effect which obliterates sensitive characteristics. Changes to most or all key archaeological materials, such as the resource is totally altered. Comprehensive changes to setting.

15.5.1.6 Setting assessment

There is no standardised approach for the assessment of setting impacts (indirect effects) in Ireland. While direct physical effects to a site or monument can be assessed in quantitative terms, the assessment of indirect effects on setting can be subjective and as such is a matter of qualitative, professional judgement and experience. The criteria used

in the assessment of effects on setting are based on professional judgement and on the methodology for comparing the character of the predicted effect to the sensitivity of the receiving environment in order to determine the significance of the effect shown in EPA Guidelines (**Chapter 2 EIA Methodology, Figure 2.2**). The assessment criteria also takes into consideration approaches used in major road schemes contained in the TII publication Guidelines for Cultural Heritage Impact Assessment of TII National Road and Greenway Projects February 2024. Table 5.6 of this Guidance sets out suggested guidance for assessing importance of Cultural heritage Receptors which has been adopted here (see **Table 15.6**).

Table 15.6: Suggested guidance for assessing the importance of cultural heritage receptors

Importance	Suggested Examples (in alphabetical order)
Very High	Designated Built Heritage Receptors rated as being of international importance, including associated historic gardens and designed landscapes. Designated features of international intangible heritage value. Designated historic landscapes of international value. National Monuments. Other designated Cultural Heritage Receptors of international importance. World Heritage Properties.
High	Architectural Conservation Areas. Built Heritage Receptors rated as being of national importance by the NIAH, including associated historic gardens and designed landscapes. Historic landscapes (designated or undesignated) of outstanding interest and of demonstrable national value. These will be well-preserved historic landscapes exhibiting considerable coherence, time-depth, or other critical factors. Other designated or undesignated Cultural Heritage Receptors of demonstrable national importance. Places or features of national intangible heritage value. Protected Structures. Recorded Monuments (or sites and monuments scheduled for inclusion on the RMP) of high quality and importance. Sites and monuments subject to a Preservation Order or Temporary Preservation Order. Undesignated receptors of high quality and importance. World Heritage Tentative List properties.

Importance	Suggested Examples (in alphabetical order)
Medium	Built Heritage Receptors rated as being of regional importance by the NIAH, including associated historic gardens and designed landscapes. Historic landscapes of regional value (designated or undesignated). Historic townscapes or built-up areas with demonstrable historic integrity in their buildings or built settings (e.g. including street furniture and other structures). Other designated or undesignated receptors of regional Cultural Heritage importance. Places or features of regional intangible heritage value. Recorded Monuments (or sites and monuments scheduled for inclusion on the RMP).
Low	Built Heritage Receptors rated as being of local importance by the NIAH, including associated historic gardens and designed landscapes. Historic landscapes whose value is limited by poor preservation and/or poor survival of contextual associations. Historic townscape or built-up areas of limited historic integrity in their buildings or built settings (e.g. including street furniture and other structures). Other designated or undesignated Cultural Heritage Receptors of local importance. Places or features of local intangible heritage value. Receptors compromised by poor preservation of contextual associations with inherent, albeit limited, Cultural Heritage value. Undesignated historic buildings of modest quality in their fabric or historical association.
Negligible	Receptors/landscapes with very little surviving Cultural Heritage interest.

Setting assessment is not simply the visual envelope of the heritage asset in question. It is those parts of the asset's surroundings that are relevant to the significance of the asset and the public's appreciation of the asset.

In most instances setting will relate to the historical value of the asset, where an appreciable relationship between the asset and an element of its surroundings helps the visitor understand and appreciate the asset. This may be in terms of a physical relationship, such as between a castle and the natural rise that it occupies, or a more distant visual relationship, such as a designed vista or the view from, for example, one ringfort to another. The former is referred to as immediate setting and the latter as landscape setting. Many assets will only have an immediate setting. Some assets will have aesthetic value that relates to the surrounding landscape, such as in the case of a designed view incorporating a distant hill, or that relates to the contribution the asset makes to the local landscape, for example a church spire providing a focal point in a view

down a valley. These are broad factors which have been taken into consideration when assessing the significance of effect on the setting of heritage assets.

For the setting assessment of the Project, not all sites were visited as some monuments/buildings are located in private lands and have no public access, however, where possible they were viewed from the public road. For the purpose of assessing indirect setting effects, site visits were undertaken of the key receptors (Monuments, Protected Structures and NIAH structures) identified from desk-based analysis of likely setting effects. The assessment of effects on visual setting was undertaken with the aid of the Zone of Theoretical Visibility (ZTV) map in the Landscape and Visual Impact Assessment (EIAR **Chapter 14 - Landscape and Visual**).

Draft wireframes produced for the heritage assessment were also used to inform the results of the setting assessment, along with analysis of the wireframes and photomontages produced for the Landscape and Visual Impact Assessment (EIAR **Volume IV).**

15.5.1.7 Methodology for assessing significance of effects.

The significance of effect on a heritage asset is assessed by combining the magnitude of change and the baseline value of the heritage asset. The matrix provides a guide to decision-making, but it is not a substitute for professional judgement and interpretation, particularly where the baseline value or magnitude of change levels are not clear or are borderline between categories. The permanence of the effects are also taken into account, with irreversible effects being more significant while temporary or reversible changes are likely to be less significant.

Table 15.7: Matrix for assessing magnitude of change and significance of effects in relation to significance/sensitivity

Significance/Sensitivity	Very High	Neutral	Imperceptible to Slight	Moderate to Very Significant	Very Significant to Profound	Profound
	High	Neutral	Imperceptible to Slight	Slight to Moderate	Moderate to Very Significant	Very Significant to Profound
	Medium	Neutral	Imperceptible to Not Significant	Not Significant	Moderate to Significant	Significant to Profound
	Low	Neutral	Imperceptible to Not Significant	Imperceptible -Not significant	Slight to Moderate	Moderate to Profound
	Negligible	Neutral	Imperceptible	Imperceptible -Not Significant	Imperceptible -Not Significant	Slight to Profound
		No change	Negligible	Low	Medium	High- Very High
		Magnitude of Change				

15.5.2 Desktop study

The assessment of the archaeological, architectural and cultural heritage potential of the study areas around the Project is based on documentary and cartographic sources. All known recorded archaeological monuments are indicated on 6-inch Ordnance Survey Ireland (OSI) maps. The 1st (1840s) and 2nd (1900s) edition OSI maps for the area were also consulted (**Figures 15.8** and **15.10**). Wireframes and Photomontages, a ZTV, and LiDAR flyover and aerial imagery data produced for the Project were also used to inform the assessment.

The following sources were consulted for this assessment:

- The Record of Monuments and Places (RMP)
- The Sites and Monuments Record (SMR)
- National Monuments (Cork and Limerick)
- The Topographical Files of the National Museum of Ireland[14]
- First Edition Ordnance Survey Ireland maps (OSI)
- Second edition Ordnance Survey Ireland maps (OSI)
- Third edition Ordnance Survey Ireland Map (Record of Monuments and Places)
- Down Survey maps (www.downsurvey.tcd.ie)
- Aerial photographs (copyright of Ordnance Survey Ireland (OSI)
- Excavations Database[15]
- Cork County Development Plan 2022-2028, Cork County Council
- Limerick Development Plan 2022-2028, Limerick County Council
- National Inventory of Architectural Heritage (NIAH)
- Record of Protected Structures (Cork and Limerick)
- Heritage Maps.ie[16]
- LiDAR flyover and aerial imagery data captured for this Project.

15.5.3 Geographic information systems

Geographic Information System (GIS) is a system that creates, manages, analyses and maps all types of data. GIS was used to manage the datasets relevant to the archaeological and architectural heritage assessment and for the creation of all the maps in this section of the report. This involved the overlaying of the relevant archaeological and architectural datasets on georeferenced aerial photographs and road maps where available. The integration of this spatial information allows for the accurate measurement of distances of a proposed development from archaeological and cultural heritage sites and the extraction of information on 'monument types' from the datasets. Areas of archaeological or architectural sensitivity may then be highlighted to mitigate the potential adverse effects of a development on archaeological, architectural and cultural heritage.

[14] National Museum of Ireland Topographical Files, County Dublin.

[15] Database of Irish Excavation Reports, Available at: https://excavations.ie/ [accessed December 2023].

[16] The Heritage Council (2023) Heritage Maps, Available at: http://www.heritagemaps.ie/ [accessed December 2023].

15.5.4 Zone of theoretical visibility

Setting Assessment carried out for this chapter includes analysis of the ZTV. A ZTV is based off the topography but does not take vegetation or existing structures into consideration. The ZTV determines which areas are visible from specified observer points (the observer points being the monuments). Visibility settings are used to set the height of the observer (1.75m standard), the height, for example of the observed features (e.g., turbines), and the maximum viewing distance of the observer. This tool was utilised to ascertain the potential/theoretical visual effects on Cultural Heritage Assets (in other words, what could potentially be seen from specific monuments). The results show the worst-case scenario since the model does not take trees or vegetation into consideration. The results are mapped on **Figures 15.2** and **15.5** and outlined in section 15.8.

15.5.5 Wireframes and photomontages

Analysis of wireframe and photomontage views to assess setting effects was carried out along with visual assessment of sightlines from key receptors towards the Project and desk-based analysis of sightlines using Google Earth. The wireframes and photomontages used in this assessment can be found in EIAR **Volume IV.**

15.5.6 Record of monuments and places and sites and monuments record

A list of known archaeological sites known which are afforded legal protection under Section 12 of the 1994 National Monuments Act (as amended) are published as records of monuments and places (RMP) and sites and monuments (SMR).

The records hold documentary evidence and reports of field inspections of all known archaeological sites and monuments. Some information is also held about archaeological sites and monuments which precise location is not known (e.g., only a site type and townland are recorded). These are known to the National Monuments Section as 'un-located sites' and cannot be afforded legal protection due to lack of information. As a result, these are omitted from the Record of Monuments and Places. SMR sites are also listed on a website maintained by the Department of Housing, Local Government and Heritage – www.archaeology.ie

15.5.7 Cartographic sources and aerial photography

Cartographic sources are important in tracing land use change within the site area as well as providing important topographical information on areas of archaeological potential and the development of buildings. Available cartographic information has been analysed to identify any topographical anomalies or structures that no longer remain within the landscape. These are:

- Down Survey Map of the Barony of Orrery and Killmore, c. 1655
- John Rocque's Map of the City and County of Cork, 1757 Ordnance Survey Maps of Ireland 1829-1995

15.5.8 Topographical files of the national museum of Ireland

National Archives holds information on all known finds recorded by the National Museum. This archive relates primarily to artefacts but also includes references to monuments and unique records of previous excavations. The find spots of artefacts are important sources

of information on the discovery of sites of archaeological significance. The database of topographical files was consulted on www.heritagemaps.ie[16]

15.5.9 Archaeological inventory series

Further information on archaeological sites may be obtained in the published County Archaeological Inventory series prepared by the Department of Housing, Local Government and Heritage. The archaeological inventories present summarised information on sites listed in the SMR/RMP and include detail such as the size and location of monuments as well as any associated folklore or local information pertaining to each site. The inventories, however, do not account for all sites or items of cultural heritage interest which are yet undiscovered.

15.5.10 Cork County Development Plan

The County Development Plan contains a Record of Protected Structures and archaeological sites within the county. The Cork County Development Plan (2022-2028[8]) was consulted to obtain information on cultural heritage sites in and within the immediate vicinity of the proposed Project area.

15.5.11 Excavation database

This database summarises every archaeological excavation that has taken place in Ireland from 1970 up until 2010, and since 1987 has been edited by Isabel Bennet. This information is vital when examining the archaeological content of any area which may not have been recorded under the SMR and RMP files. This information is also available online (www.excavations.ie[15]) from 1970-2022.

15.5.12 National inventory of architectural heritage

The NIAH is a state initiative under the administration of the Department of Culture, Heritage and the Gaeltacht which was established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999. The purpose of the NIAH is to identify, record, and evaluate the post-1700 architectural heritage of Ireland, uniformly and consistently as an aid in the protection and conservation of the built heritage.

NIAH surveys provide the basis for the recommendations of the Minister for the Environment, Heritage and Local Government to the Planning Authorities for the inclusion of structures in their Record of Protected Structures (RPS). The published surveys are a source of information on the selected structures for relevant Planning Authorities. They are also a research and educational resource. It is hoped that the work of the NIAH will increase public awareness and appreciation of Ireland's architectural heritage.

The NIAH database was consulted for all townlands within and adjacent to the 5km Study Area. The NIAH survey for Cork and Limerick has been published and was downloaded on to the base mapping for the proposed development (www.buildingsofireland.ie).

15.5.13 Field inspection

Field inspection is necessary to determine the extent and nature of archaeological and historical remains and can also lead to the identification of previously unrecorded or

suspected sites and portable finds through topographical observation and local information.

The archaeological field inspection for the Project which was carried out on 10th and 11th of October 2022 in warm weather conditions, entailed:

- Walking the wind farm site.
- Driving along the proposed TDR and GCR Options.
- Noting and recording the terrain type and land use.
- Noting and recording the presence of features of archaeological or historical significance.
- Verifying the extent and condition of any recorded sites.
- Visually investigating any suspect landscape anomalies to determine the possibility they are anthropogenic in origin.
- Carrying out a setting impact assessment of likely effects of the Project in the surrounding landscape.

A representative selection of photos showing the various parts of the site and the key heritage constraints along the site and GCR Options provided in EIAR **Volume III, Appendix 15.4**.

15.6 Receiving environment

15.6.1 Location and topography

The Project is located in the townlands of Tullacondra, Croughta, Ardskeagh and Polnareagha, approximately 2km south of Lisgriffin Cross, Co. Cork (**Figure 15.1**).

Consultation with Corine (2018)[17] Land Cover maps (EPA) indicate the landcover at the proposed wind farm site is predominantly 'agricultural pastures' and 'non-irrigated arable lands' (EIAR **Chapter 10 Land, Soils and Geology, Figure 10.2**). Similar land cover exists along the GCR (EIAR **Chapter 10 Land, Soils and Geology, Figure 10.2**) which also traverses areas of 'discontinuous urban fabric', 'complex cultivation patterns', 'land principally occupied by agriculture with significant areas of natural vegetation', 'inland marshes' and 'industrial and commercial units' near Foynes Port.

The underlying bedrock of the wind farm site consists of several lithologies ranging from dark muddy limestone, shale, red conglomerate, sandstone, mudstone and massive, unbedded lime-mudstone (EIAR **Chapter 10 Land, Soils and Geology, Figure 10.6a/b**). Observation during site surveys included several potential karst features (at the time of the survey) such as depressions that were dry with reeds/marshy and others that had standing water. A swallow hole was recorded 0.2km northeast of the location of T1 and another enclosed depression 0.1km east of the location of T5. A detailed description of the topography and geology of the wind farm site, GCR and TDR is provided in the EIAR **Chapter 10 Soils and Geology**.

[17] EPA (2018) Corine Land Cover 2018.

15.6.2 UNESCO World Heritage Sites and those on the tentative list

No UNESCO sites are located within 20km of the wind farm site, along the GCR Options, or along the TDR Options.

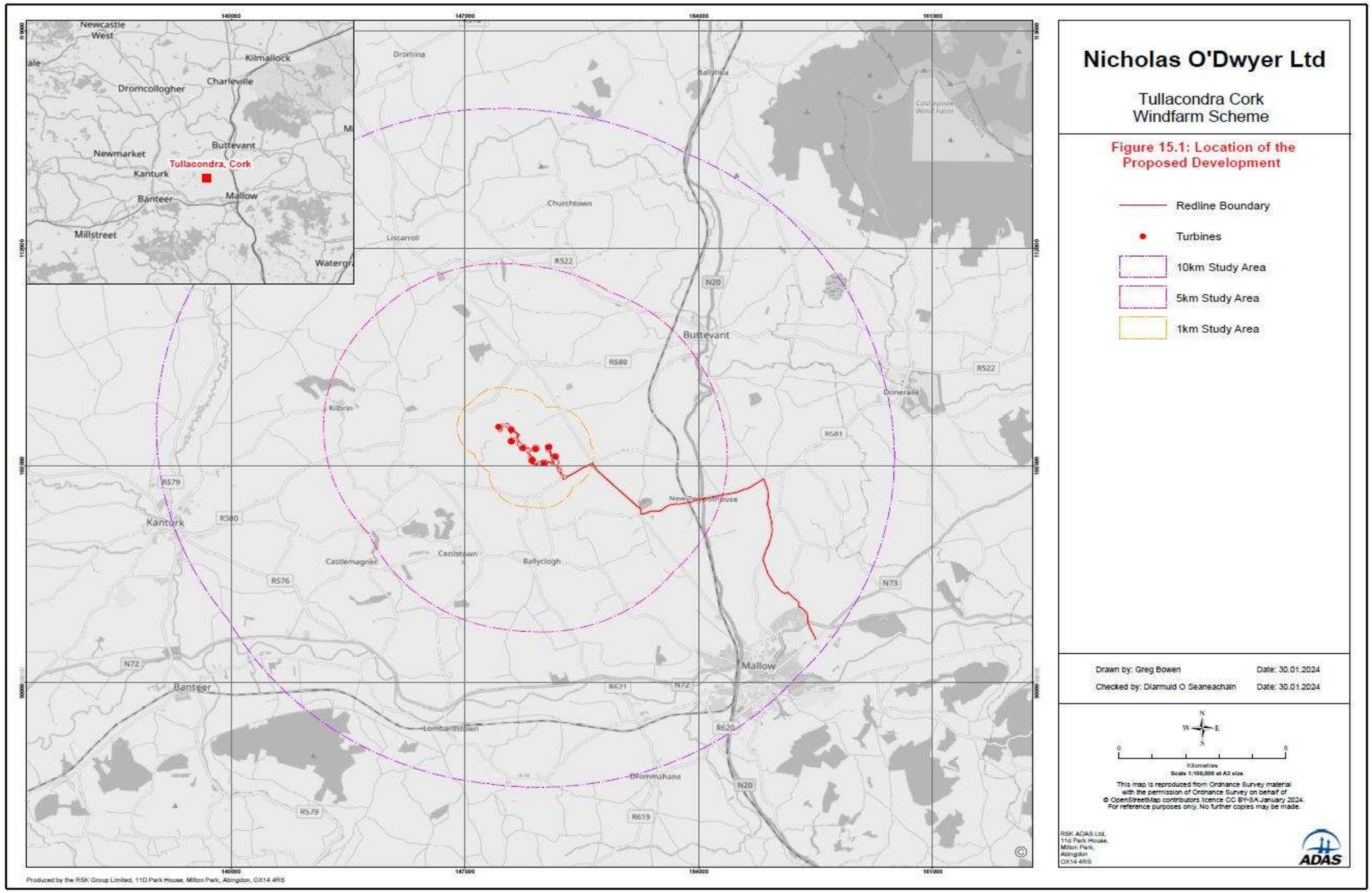

Figure 15.1: Location of the Project and study areas

15.6.3 National monuments

A review of all National Monuments within the defined study areas was undertaken as part of the assessment in order to ascertain any potential effects on their setting as a result of the Project. There are no National Monuments within the wind farm site. There are six National Monuments (one of which has three separate components) within 10km of the wind farm site (**Figure 15.2**). The nearest National Monument , the Blossomfort ringfort, is located at 3.71km south-west of the wind farm site boundary These National Monuments are listed in EIAR **Volume III, Appendix 15.1**, with a summary table below (**Table 15.8**).

Table 15.8: National monuments within 10km of the wind farm site

Map Id	SMR	Name	Monument Type	Townland	National Monument Number	Dist. From wind farm site boundary
1	CO016-015001-	Liscarroll Castle	Castle - Anglo-Norman masonry castle	Liscarroll	333	6.77km
2	CO017-053004-	Buttevant Abbey	Religious house - Franciscan friars	Buttevant	202	5.88km
3	CO024-129----	Blossomfort ringfort	Ringfort-rath	Blossomfort	594	3.71km
4	CO032-097002-	Dromaneen Castle	House - fortified house	Dromaneen	339	7.54km
5	CO033-009001-	Mallow Castle	House - fortified house	Castlelands	281	9.66km
103	CO017-059003-	Ballybeg Columbarium	Columbarium	Ballybeg East	301	5.20km
104	CO017-09002-	Ballybeg Belltower	Belltower	Ballybeg West	301	5.20km
105	CO017-09001	Ballybeg Monastic Building	Monastic Building	Ballybeg West	301	5.20km

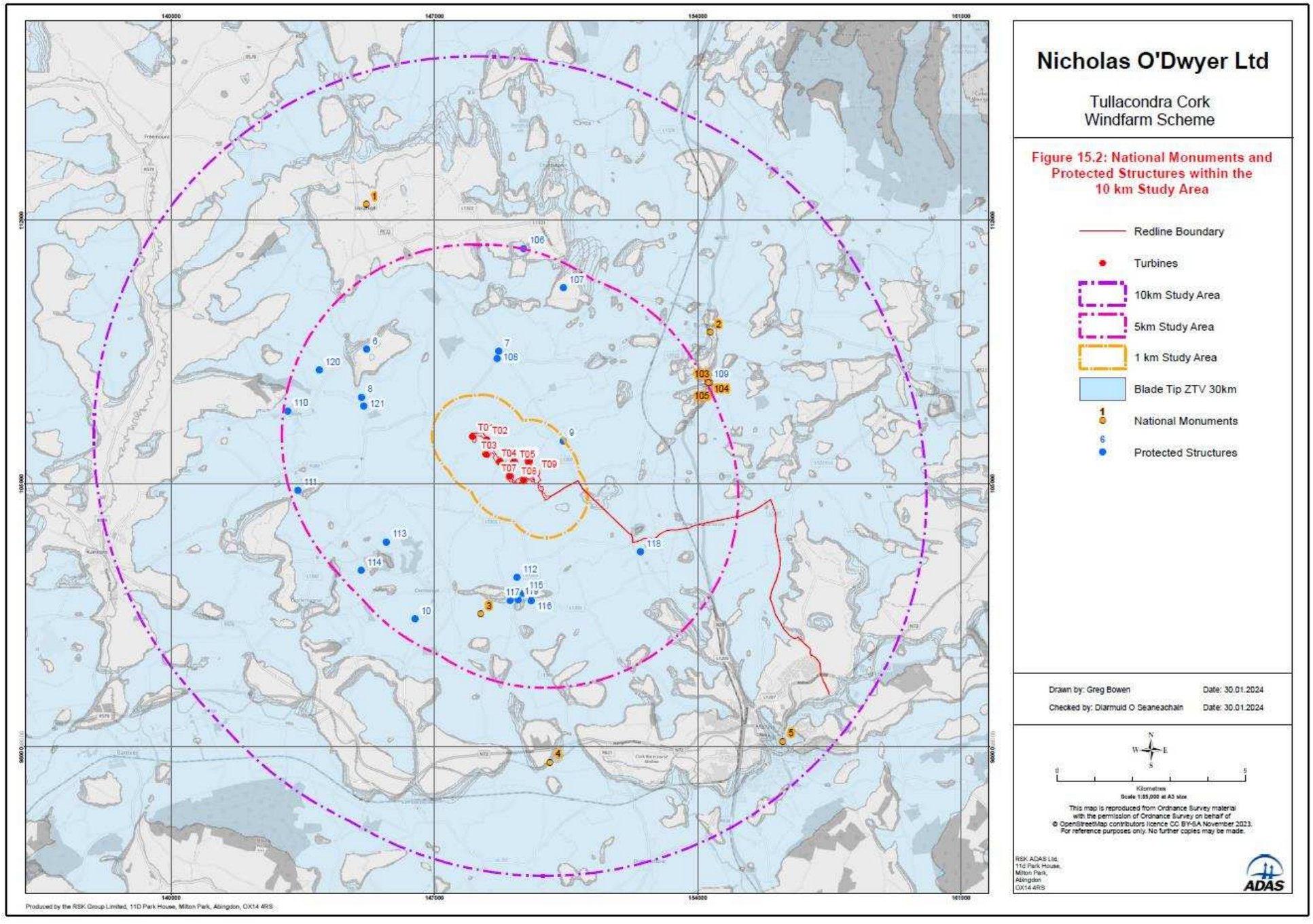

Figure 15.2: National monuments and protected structures within the study areas

15.6.4 Recorded monuments within the site boundary

The sites and monuments described in the chapter below are referenced according to their map numbers as shown in **Figure 15.3** to **Figure 15.4**. The map numbers are cross-referenced with the monument or building they refer to in the tables which accompany this chapter.

There are no monuments subject to statutory protection as defined in the Record of Monuments and Places or Sites and Monument Record located within the wind farm site boundary.

15.6.5 Site and monument records within 1km of the site boundary

Fifty-four monuments are located within 1km of the wind farm site boundary, and these are detailed in EIAR **Volume III, Appendix 15.1** listed on **Table 15.9** and shown on **Figure 15.3**.

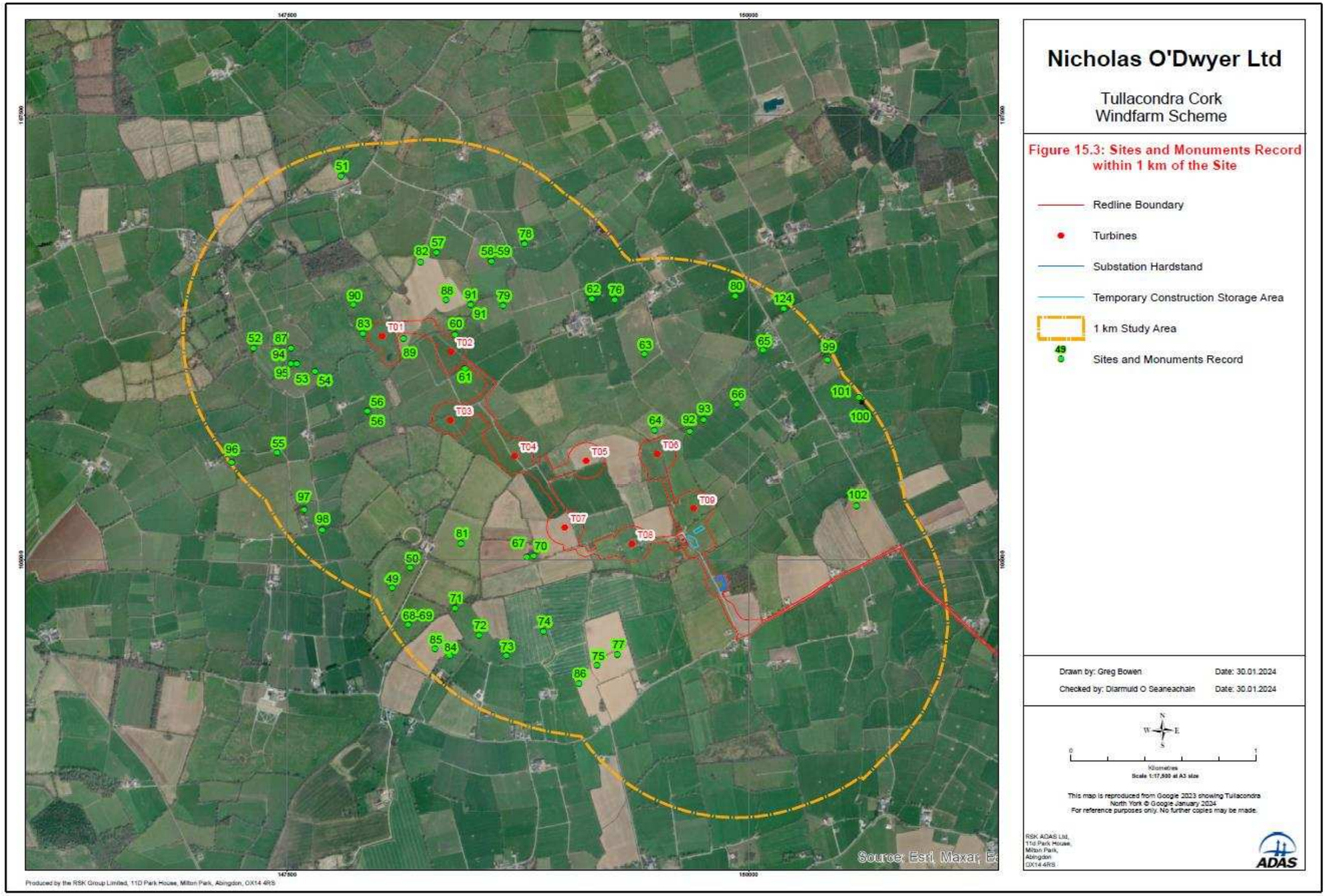

Figure 15.3: Sites and monuments record within 1km of the wind farm site

Table 15.9: SMRs within 1km of the wind farm site boundary

Map Id	SMR	ITM E	ITM N	Type	Td.	WTG ID
49	CO024-206----	548031	604897	Field system	BALLYCUSHEN	CO03338
50	CO024-207----	548129	605011	Enclosure	BALLYCUSHEN	CO03339
51	CO024-021----	547755	607211	Enclosure	CURRAGLASS (Orrery and Kilmore By.)	CO03118
52	CO024-023----	547280	606245	Fulacht fia	GARRANENAGEEVOGE	CO03120
53	CO024-024----	547514	606157	Enclosure	GARRANENAGEEVOGE	CO03121
54	CO024-025----	547614	606115	Enclosure	GARRANENAGEEVOGE, POLNAREAGHA	CO03122
55	CO024-027----	547410	605657	Moated site	GARRYDUFF (Orrery and Kilmore By.)	CO03124
56	CO024-030----	547898	605888	Moated site	GARRYDUFF (Orrery and Kilmore By.)	CO03127
57	CO024-031----	548272	606783	Fulacht fia	DREENAGH WEST	CO03128
58	CO024-032001-	548568	606734	Ringfort – rath	DREENAGH WEST	CO03129
59	CO024-032002-	548568	606734	Souterrain	DREENAGH WEST	CO03130
60	CO024-033----	548371	606319	Ringfort – rath	ARDSKEAGH (Orrery and Kilmore By.)	CO03131
61	CO024-034----	548425	606129	Fulacht fia	ARDSKEAGH (Orrery and Kilmore By.)	CO03132
62	CO024-035----	549113	606520	Standing stone	ARDSKEAGH (Orrery and Kilmore By.)	CO03133
63	CO024-036----	549397	606210	Ringfort – rath	ARDSKEAGH (Orrery and Kilmore By.)	CO03134
64	CO024-037----	549451	605784	Fulacht fia	ARDSKEAGH (Orrery and Kilmore By.)	CO03135
65	CO024-050----	550040	606230	Enclosure	KILMACLENINE	CO03149
66	CO024-051----	549898	605930	Ringfort – rath	KILMACLENINE	CO03150

Map Id	SMR	ITM E	ITM N	Type	Td.	WTG ID
67	CO024-091001-	548760	605073	Fulacht fia	TULLACONDRA	CO03201
68	CO024-090001-	548118	604691	Enclosure	BALLYCUSHEN	CO03199
69	CO024-090002-	548118	604691	Enclosure	BALLYCUSHEN	CO03200
70	CO024-091002-	548798	605077	Ringfort – rath	TULLACONDRA	CO03202
71	CO024-092----	548372	604782	Fulacht fia	DERRYORGAN	CO03203
72	CO024-093----	548502	604632	Standing stone	DERRYORGAN	CO03204
73	CO024-094----	548649	604515	Ringfort – rath	DERRYORGAN	CO03205
74	CO024-095----	548851	604654	Fulacht fia	DERRYORGAN	CO03206
75	CO024-096----	549141	604463	Enclosure	DERRYORGAN	CO03207
76	CO024-165----	549237	606517	Enclosure	ARDSKEAGH (Orrery and Kilmore By.)	CO03294
77	CO024-166----	549251	604523	Enclosure	DERRYORGAN	CO03295
78	CO024-174----	548748	606831	Redundant record	DREENAGH WEST	CO03304
79	CO024-209----	548631	606483	Ring-ditch	ARDSKEAGH (Orrery and Kilmore By.)	CO03341
80	CO024-210----	549890	606538	Enclosure	BOHERASCRUB WEST	CO03342
81	CO024-216----	548404	605145	Pit	BALLYCUSHEN	CO03348
82	CO024-218----	548186	606728	Enclosure	POLNAREAGHA	CO03350
83	CO024-219----	547872	606325	Enclosure	POLNAREAGHA	CO03351
84	CO024-222001-	548342	604515	Enclosure	DERRYORGAN	CO03354
85	CO024-222002-	548262	604555	Enclosure	DERRYORGAN	CO03355
86	CO024-224----	549043	604361	Enclosure	DERRYORGAN	CO03357
87	CO024-230----	547483	606245	Fulacht fia	GARRANENAGEEVOGE	CO03363
88	CO024-234----	548323	606513	Field system	POLNAREAGHA	CO03367
89	CO024-237----	548092	606295	Ring-ditch	POLNAREAGHA	CO03370
90	CO024-238----	547822	606485	Enclosure	POLNAREAGHA	CO03371
91	CO024-239----	548456	606490	Enclosure	POLNAREAGHA	CO03372
92	CO024-244----	549644	605778	Burnt mound	KILMACLENINE	CO18555

Map Id	SMR	ITM E	ITM N	Type	Td.	WTG ID
93	CO024-246----	549717	605843	Burnt mound	KILMACLENINE	CO18557
94	CO024-024001-	547484	606157	Linear earthwork	GARRANENAGEEVOGE	CO18819
95	CO024-024002-	547514	606157	Enclosure	GARRANENAGEEVOGE	CO18820
96	CO024-026----	547162	605605	Ringfort	GARRYDUFF	CO03123
97	CO024-028----	547555	605338	Ringfort	GARRYDUFF	CO03125
98	CO024-029----	547653	605222	Quarry	GARRYDUFF	CO03126
99	CO024-052002-	550390	606181	Castle	KILMACLENINE	CO03152
100	CO024-052004-	550568	605950	Graveyard	KILMACLENINE	CO03154
101	CO024-052005-	550558	605965	Church	KILMACLENINE	CO03155
102	CO024-053----	550547	605357	Souterrain	KILMACLENINE	CO03158
124	CO024-240----	550152	606466	Enclosure	KILMACLENINE	CO03373

15.6.6 Protected structures within 5km of the site boundary

There are no Protected Structures recorded within the wind farm site or within 1km of it. There are 21 Protected Structures within 5km of the wind farm site boundary (**Figure 15.4**). The nearest of these is Kilmaclenine Castle (9), which is located just over 1km to the east of the wind farm site and is described as an Anglo-Norman masonry castle (National Monuments Service (NMS), 2023). The other 21 Protected Structures within 5km of the wind farm site are located over 1.5km from the wind farm site boundary.

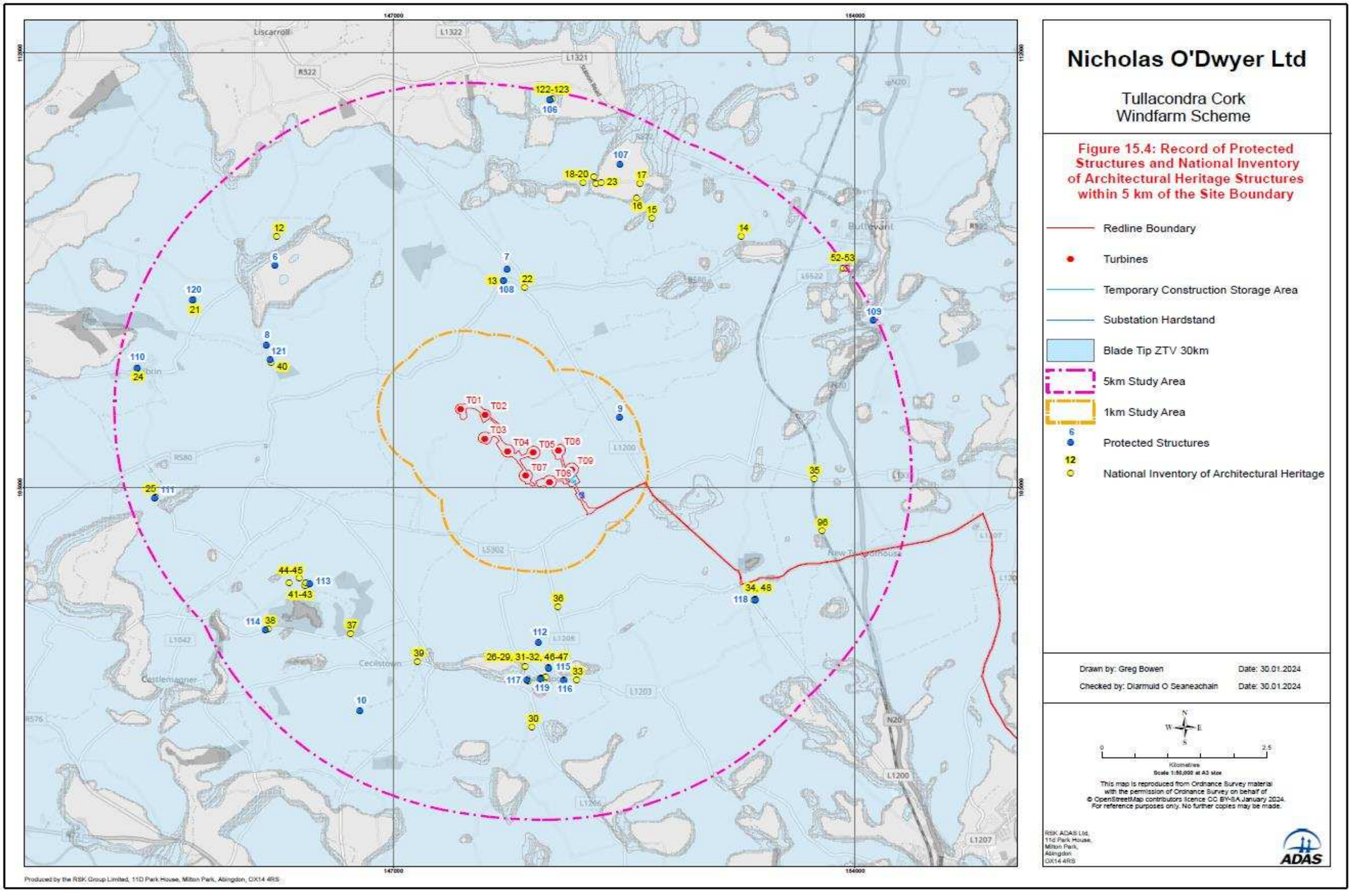

Figure 15.4: Record of protected structures and national inventory of architectural heritage structures within 5km of the wind farm site boundary

Table 15.10: Record of protected structures within 5km of the wind farm site boundary

Map Id	RPS No.	Structure	Td.	RMP Ref
6	40	Fortwilliam (Country House)	Castlelohort Dem	-
7	41	Lisgriffen Castle (in ruins)	Mountcorbitt	CO016-179
8	187	Ballygrady School	Dunbarry	CO024-227
9	186	Kilmaclenine Castle	Lisgriffin	CO024-05202
10	196	Lohort Castle	Ballybeg West	CO024-126
106	38	Mountcorbitt House and Stables	Knockballymartin	CO016-116
107	39	Dunbarry House	Marybrook	-
108	42	St. Mary's Roman Catholic Church	Ballyclogh	-
109	57	The Abbey Columbarium	Ballygiblin	CO017-05901
110	164	St John the Baptist's Catholic Church	Ballyhass	-
111	171	Marybrook House	Ballyclogh	CO023-109
112	183	Ballyclogh Ornamental Tower	Rathnee	CO024-163
113	188	Ballygiblin House (18th Century)	Ballyclogh	CO024-084
114	189	Former Ballyhass National School	Copsetown	-
115	190	Ballyclogh Castle	Knocalohert	CO024-135
116	191	St. John the Baptist Catholic Church	Kilbarry	-
117	192	Ballyclogh House	Ballygrady North	-
118	193	Copsetown Abbey	Lisgriffin	-
119	197	Former Church of Ireland	Ballygrady South	CO024-13602
120	580	Thatch House	Kilmaclenine	CO061-290
121	29	Thatch Cottage		CO024-242

15.6.7 NIAH within 5km of the wind farm site boundary

Forty NIAH structures are located within 5km of the wind farm site boundary. These are detailed in EIAR **Volume III, Appendix 15.1**.

15.6.8 Grid connection routes

Tullacondra Green Energy Limited propose to connect into the Mallow 110kV substation at St. Joseph's Road, Mallow. The Grid Connection Route (GCR) from the wind farm site to the boundary of the Mallow 110kV substation will be approximately 13.5km. It will consist of a 38kV underground cable which will be constructed primarily within the existing

road corridor. The two GCR options are described in EIAR **Chapter 5 Project Description**.

The GCR Options were subject to a visual examination and survey and was assessed as part of this EIAR. Heritage assets within 100m of either side of the each GCR were considered in the assessment, and these are mapped on **Figure 15.5**.

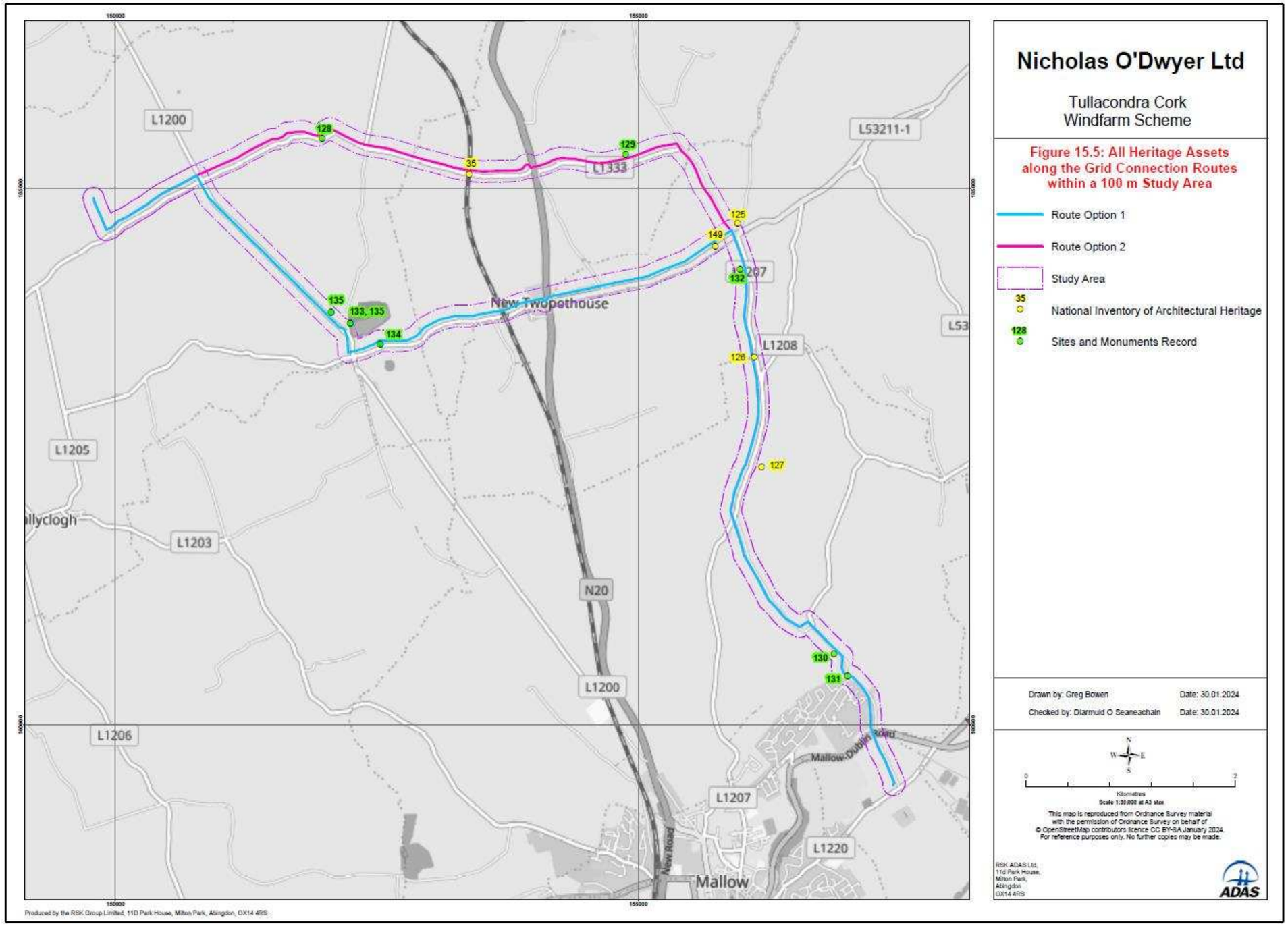

Figure 15.5: All heritage assets along the GCR options within a 100m study area

15.6.8.1 Grid Connection Route Option 1

There are no World Heritage Sites, National Monuments or Protected Structures recorded within 100m of GCR Option 1.

There are four structures recorded by the National Inventory of Architectural Heritage recorded within the 100m study area (**Figure 15.5**). These include an early 20th century chapel (125), a 17th century country house (126), and two 19th century houses (127 and 149) which are located in the 100m study area but outside of the public road where the GCR Option 1 will be constructed (NIAH, 2023[18]).

There are seven monuments recorded on the SMR within the 100m study area (**Figure 15.5**). These include an enclosure (130) a railway bridge (131), a fulacht fia (132); a souterrain (133), a lime kiln (134), a quarry (135), and a ringfort (136).

15.6.8.2 Grid Connection Route Option 2

There are no World Heritage Sites, National Monuments or Protected Structures recorded within 100m of GCR Option 2.

There is one NIAH structure along GCR Option 2 which is not within GCR Option 1. This is the Grange Bridge (35). The GCR will pass along the existing modern public road underneath this bridge (**Figure 15.5**). The other four NIAH structures located along GCR Option 1 are also located along GCR Option 2 (NIAH, 2023[18]).

There are five monuments recorded on the SMR within 100m of GCR Option 2 (**Figure 15.5**). Three of these are also found along GCR Option 1 (130-132). The other two include a ringfort (128) and a redundant record (129) (NMS, 2023[19]).

15.6.9 Turbine delivery route options

Two TDR s Options were subject to a desk-based assessment and field survey and were assessed as part of this EIAR. These two TDR Options are described in detail in EIAR **Chapter 16 Traffic and Transport**.

Heritage assets within the edge of the existing road and a 100m Study Area along the proposed accommodating works areas of each proposed TDR Options (TDR study area) were considered in the assessment, and these are mapped on **Figures 15.6** and **15.7.**

[18] National Inventory of Architectural Heritage (2023) https://www.buildingsofireland.ie/.

[19] National Monuments Service, Department of Department of Housing, Local Government and Heritage. Sites and Monuments Record, County Cork, Available at: https://maps.archaeology.ie/HistoricEnvironment/ [accessed December 2023].

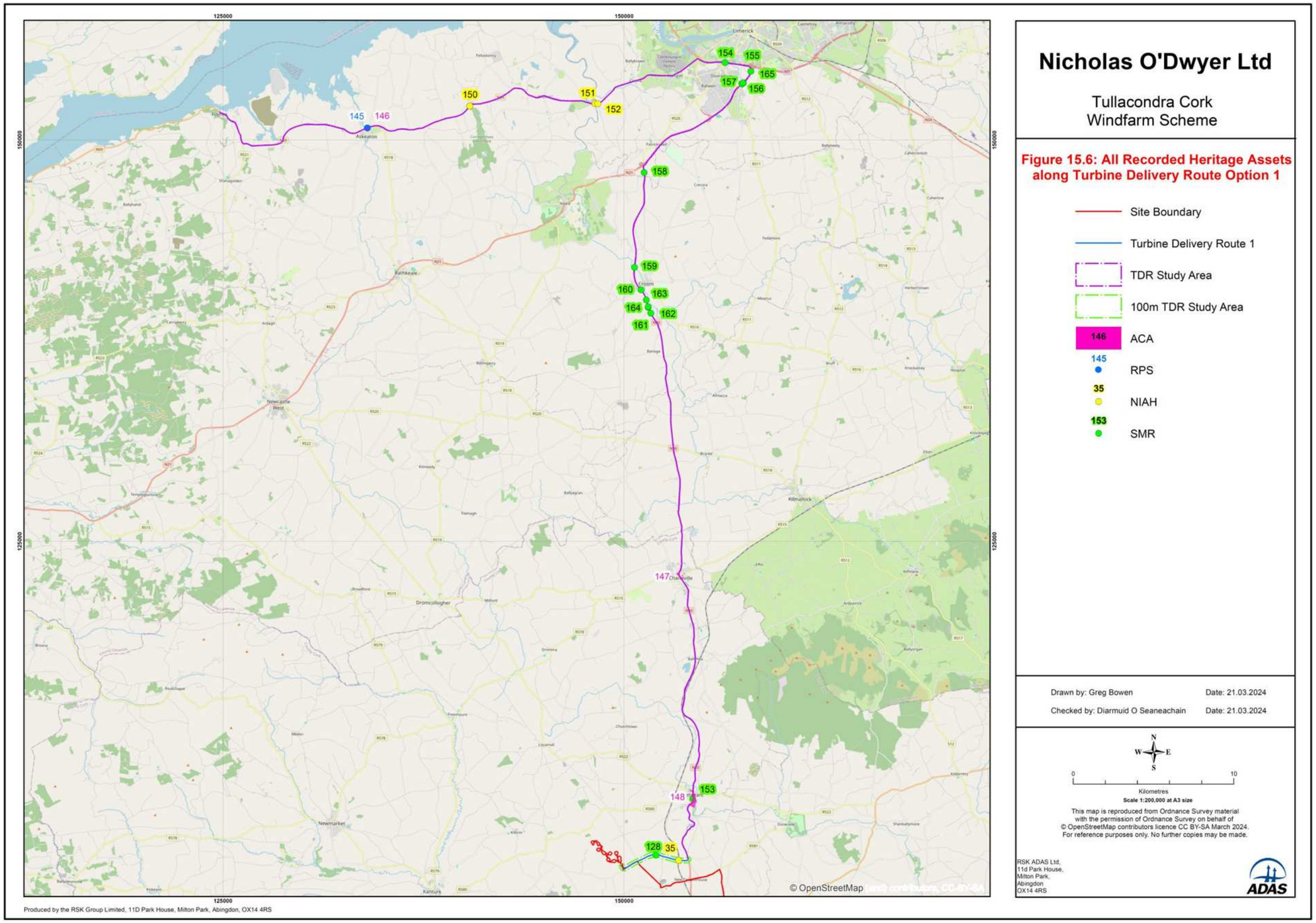

Figure 15.6: All recorded heritage assets along TDR option 1

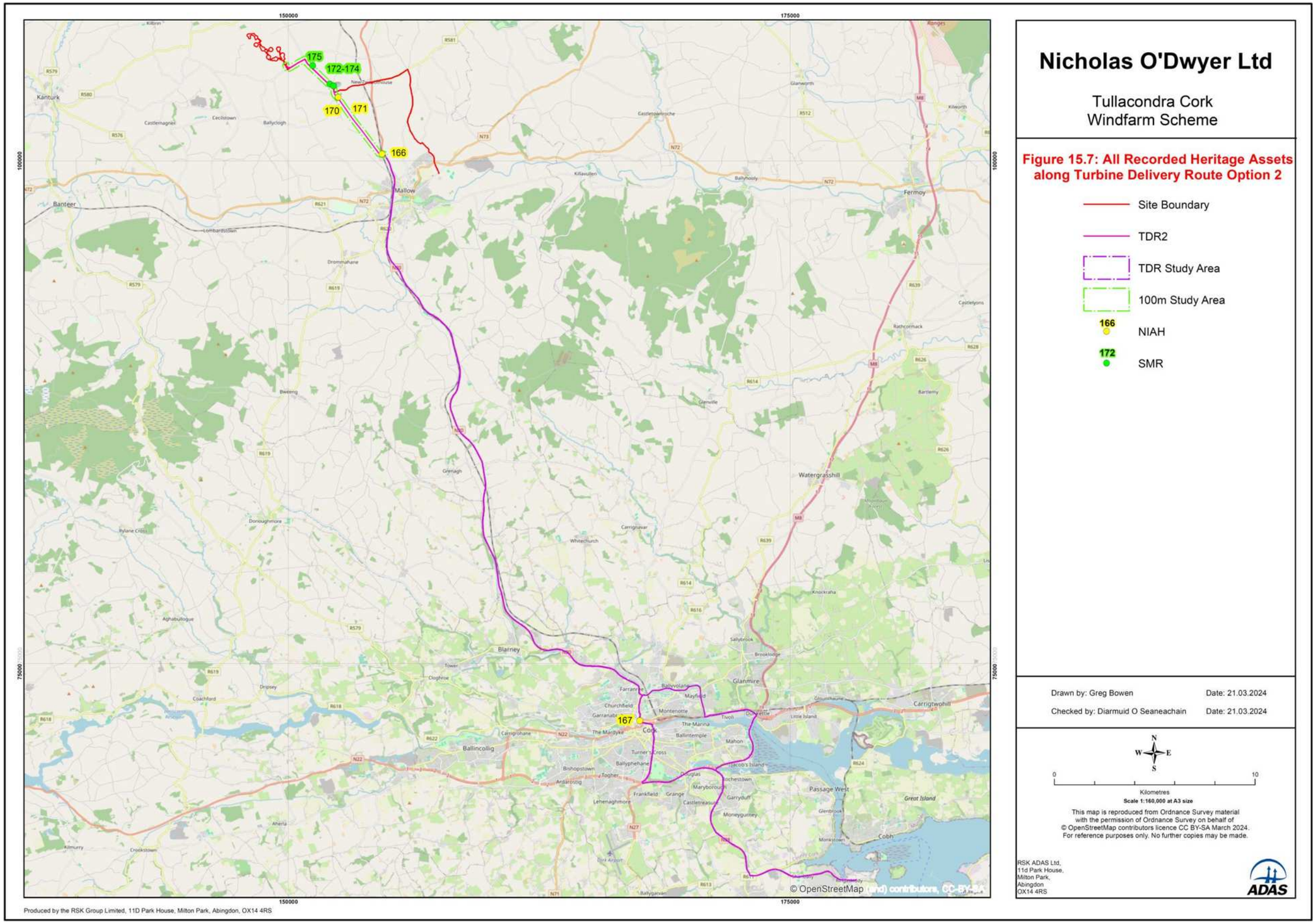

Figure 15.7: All recorded heritage assets along TDR option 2

There are no UNESCO World Heritage Sites or National Monuments located along TDR Options 1 or 2. There are three Architectural Conservation Areas (ACAs) along TDR Option 1. Limerick County Council records Friary Precinct Conservation Area along TDR Option 1 and County Cork records Charleville Conservation Area and Buttevant Conservation Areas along TDR Option 1. Limerick County Council records one Protected Structure within Friary Precinct Conservation Area (Heritage.ie, 2023[16]). These can be seen on **Figure 15.6** and described in EIAR **Volume III, Appendix 15.1**

There is one Protected Structure and three Architectural Conservation Areas (Friary Precinct in Askeaton, Charleville, and Buttevant), fourteen monuments recorded on the Site and Monument Records and four structures recorded on the NIAH along the proposed TDR Option 1 (**Figure 15.6**). These are described in EIAR **Volume III, Appendix 15.1**.

There are four monuments recorded on the SMR and four NIAH structures recorded within the TDR study area of the proposed TDR Option 2 (**Figure 15.7**). These are described in EIAR **Volume III, Appendix 15.1**.

15.6.10 Archaeological and cultural background

The following sections address the archaeological and cultural heritage potential of the wind farm site and the surrounding landscape.

15.6.11 Prehistoric period

15.6.11.1 Mesolithic Period (6000-4000 BC)

No monuments dating to the Mesolithic Period are recorded within 1km of the wind farm site boundary.

Although recent discoveries may push back the date of human activity by a number of millennia (Dowd and Carden, 2016[20]), the earliest widespread evidence suggests that Ireland was first occupied in the Mesolithic period by communities that subsisted on hunting, fishing, and foraging. The most common evidence indicative of Mesolithic activity at a site includes scatters of worked flint material; a by-product of flint implements or rubbish middens consisting largely of shells. The latter are commonly discovered in coast regions or at the edge of lakes (Anderson, 2019[21]).

15.6.11.2 Neolithic Period (4000-2500 BC)

There are two monuments dating to the Neolithic Period recorded within 1km of the wind farm site boundary that are described as enclosures. A fragmented pattern of rectilinear cropmarks (49) that are visible in aerial photography is recorded outside of the wind farm site boundary on land to the west of the wind farm site. A series of rectilinear cropmarks (88), some perpendicular to each other, that can be seen on aerial photography, is also recorded on land approximately 288m north-east of the wind farm site boundary (NMS, 2023[19]).

[20] Dowd, M., Carden, R. (2016) 'First evidence of a Late Upper Palaeolithic human presence in Ireland' Quaternary Science Reviews 132, 158-163.

[21] Anderson, J (2019) Archaeological Assessment at Skerries Road, Palmer Road, Palmer Avenue, and Maur's Park, Rush, County Dublin. IAC Archaeology Report Number J3438.

During the Neolithic period, communities became less mobile, and their economy was based on rearing of stock and cereal cultivation. This transition was accompanied by major social change. Agriculture demanded an altering of the physical landscape, forests were rapidly cleared, and field boundaries constructed. There was a greater concern for territory, which contributed to the construction of large communal ritual monuments called megalithic tombs, which are characteristic of the period. Evidence for settlement dating to this period in Ireland is hard to identify as the land has been so intensively farmed that the majority of sites have no above surface expression (Anderson, 2019[21]).

15.6.11.3 Bronze Age (2500-800 BC)

There are eleven monuments dating to the Bronze Age within 1km of the wind farm site boundary. These consist predominantly of burnt mounds or fulachtai fia.

The closest of these monuments to the Project is a roughly semi-circular mound of burnt material (64), which is located in marshy pasture in the south-eastern part of the wind farm site to the north of T6, just outside of the wind farm site boundary. In the south-west boundary of the wind farm site a spread of burnt material (67) has been recorded in pasture approximately 267m from the nearest proposed turbine location (NMS, 2023[19]).

A spread of heat-shattered stones and charcoal-enriched soil visible under the grass (92) is recorded in a field east of the wind farm site boundary, to the east of the T6. Another spread of heat-shattered stones and charcoal-enriched soil (93) is recorded nearby just east of (92).

A low mound of burnt material (52) is recorded outside of the wind farm site boundary on land approximately 646m west of the wind farm site boundary. A roughly horseshoe-shaped mound of burnt material (57) has also been recorded outside of the wind farm site boundary on land to the north.

To the north-west of the wind farm site a grass-covered horseshoe-shaped mound (82) has been identified within the western side of an enclosure. The mound is composed of charcoal-enriched soil though no burnt stones have been observed. The shape of the mound is characteristic of a fulacht fiadh (NMS, 2023[19]).

A linear earthwork (94) of possible Bronze Age date is recorded outside of the wind farm site boundary to the north-west (NMS, 2023[19]).

A subcircular stone structure (H 1.45m; 1.3m x 1.1m), tapering to a point at the top (62). This is located in Ardskeagh on land to the north-east of the wind farm site boundary. It is not marked on the 1842 and 1905 OS 6-inch maps and is located in level pasture (NMS, 2023[19]).

A barely perceptible mound of burnt material is visible in section in a drain which cuts through the north-west side of a mound (71) on land to the south-west of the wind farm site. Another mound which is irregular in plan (84) is located 180m south-east of (71). A kidney-shaped mound of burnt material (74) likely represents another fulacht fiadh which is located 474m south of the wind farm site boundary (NMS, 2023[19]).

The Bronze Age was marked by the widespread use of metal for the first time in Ireland. As with transition from Mesolithic to Neolithic, the transition into the early Bronze Age was accompanied by changes in society. The megalithic tomb tradition declined and ended with the burial of the individual becoming typical. Cremated or inhumed bones were often placed in a cist, which is a small stone box set into the ground or a stone-lined

grave. These were often accompanied by pottery. Burials were sometimes accompanied by barrows (mounds of earth set over the burial), or stone cairns. Often these types of burials are found on high ground and may have acted as a marker for ritual or burial space to the surrounding populations (Anderson, 2019[21]).

The most common Bronze Age site within the archaeological record is the burnt mound or *fulacht fia*. Over 4,500 *fulachtai fia* have been recorded in the country making them the most common prehistoric monument in Ireland (Waddell, 1998[22]). Although burnt mounds of heat-affected stone occur as a result of various activities that have been practiced from the Mesolithic to the present day, those noted in close proximity to a trough are generally interpreted as Bronze Age sites. *Fulacht fia* generally consist of a low mound of burnt stone, commonly in horseshoe shape, and are found in low lying marshy area or close streams or rivers. Often these sites have been ploughed out and survive as a spread of heat-shattered stones in charcoal rich soil with no surface expression and in close proximity to a trough. Much debate exists as to the function of these monuments and suggestions include cooking sites (O'Kelly, 1954[23]), bathing sites (Eogan and Shee Twohig, 2012[24]), or textile dyeing sites and brewing sites (Quinn and Moore, 2009[25]; Anderson, 2019[21]).

15.6.11.4 Iron Age (800 BC – AD 500)

No monuments specifically dating to the Iron Age are recorded within 1km of the wind farm site boundary. However, it is possible that some of the monuments discussed in the earlier periods continued in use throughout the Iron Age period.

The Iron Age was traditionally seen as a period for which there was little evidence in comparison to the preceding Bronze Age and the succeeding early medieval period. However, development-led excavation in recent decades and projects such as the Late Iron Age and Roman Project have added significantly to our knowledge of the Irish Iron Age. In Europe, there are two stages to the Iron Age, the earlier Hallstatt and followed by the La Tene phase. While in Ireland, evidence of a Hallstatt phase is rare, and the La Tene phase is reflected strongly in the style of metalwork of this period. It is clear there was significant contact and interaction between continental Europe, Britain, and Ireland at this time (Anderson, 2019[21]).

15.6.12 Early medieval period (AD 500 – 1100)

There are a number of possible ringforts and/or settlement dates of early medieval date located within the 1km study area. Ringforts are likely to represent the focal points of settlement in the immediate vicinity of the site during the early medieval period (NMS, 2023[19]).

The SMR has identified a possible ringfort (60) 16m north of the wind farm site boundary near T2. There is no visible trace of this monument, but historic mapping analysis indicates that it was approximately 25m in diameter (NMS, 2023[19]).

[22] Waddell, J. (1998) The Prehistoric Archaeology of Ireland, Wordwell, Bray.

[23] O'Kelly, M.J. (1954) Excavations and experiments in ancient Irish cooking places.

[24] Eogan, J. and Shee Twohig, E. (2012) Cois tSiuire – Nine Thousand years of Human Activity in the Lower Suir Valley.

[25] Quinn, B. and Moore, D. (2009) Fulachta fiadh and the beer experiment

A barely perceptible mound of burnt material (61) is recorded 15m south of the wind farm site boundary near the site tracks and within approximately 123m of the nearest turbine T2 (NMS, 2023[19]). This may represent a fulacht fiadh and may be associated with the nearby possible ringfort (60).

A possible ringfort or enclosure (70) is recorded 135m south-west of the wind farm site boundary, defined by two earthen banks with intervening fosse, internal fosse, and external fosse, is recorded within 235m of the nearest proposed turbine (T7) and site tracks.

Elsewhere in the 1km study area, to the north-east of the wind farm site, a probably levelled ringfort (58) is located in level pasture. It is depicted as a hachured circular enclosure on historic Ordnance Survey (OS) maps. According to local information the ringfort was levelled in c. 1928. A circular enclosure is visible as the cropmark of a fosse in aerial photographs. The ringfort (59) was discovered in 1958 when a roof collapsed. It comprised at least two stone-built corbelled chambers. Charcoal and animal bones have been found at the end of one of the chambers (NMS, 2023[19]).

To the east of the wind farm site is a possible ringfort (63) located in pastures and defined by a low rise with slight trace of external fosse as shallow depression. A second enclosure or ringfort (66) is recorded to the east of the wind farm site on a gentle slope. It is depicted as a circular depression with an arc formed by hachured bank on the 1842 and 1905 OS 6-inch maps. To the west of the wind farm site are two possible ringforts (96 and 97) which are located in pastures. One (96) is circular and enclosed by three earthen banks with intervening fosses (NMS, 2023[19]).

A probable ringfort (73) is located outside of the wind farm site boundary 670m south-west of the wind farm site boundary near T7 in tillage, on a gentle slope. It is depicted as a hachured multivallate oval enclosure on the 1842 OS 6-inch map, with lime kiln at its centre. According to local information the interior enclosed by two banks was levelled in c. 1967, but the circular slightly raised platform survives (NMS, 2023[19]).

To the north-east of the wind farm site boundary a feature (78) is listed as a 'potential site-cartographic' in the SMR and as a 'natural feature' in the RMP. It is shown as a circular enclosure on the 1842. It has since been confirmed that this is a pond and not an archaeological monument (NMS, 2023[19]).

Ireland was primarily rural in nature in the early medieval period, with c. 150 kings across the country each ruling over his own *tuath* (Bryne, 1973[26]). A *tuath*, according to most recent estimates would have included 1,700 to 3,000 subjects (Stout, 2017[27]), many of whom would have lived within defended farmsteads known as ringforts. Ringforts, (also known as *rath, lios, caiseal, cathair*, and *dun*) are a type of defended homestead including a central site enclosed by a number of circular banks and ditches. The number of ditches can vary from one (univallate) to two or three (bivallate or multi-vallate) and is thought to reflect the status and affluence of the inhabitants (Edwards, 1996[28]). Another morphological variation consists of the platform or raised rath – the former resulting from the construction of the rath on a naturally raised area. Ringforts are most commonly located at sites with commanding views of the surrounding environs which provided an

[26] Byrne, F.J. (1973) Irish Kings and High Kings.

[27] Stout, M. (2017) Early Medieval Ireland: 431-1169.

[28] Edwards, N. (1996) The Archaeology of Early Medieval Ireland.

element of security. While raths, for the most part, avoid the extreme low and uplands, they also show a preference for the most productive soils (Stout, 1997[29]; Anderson, 2019[21]).

15.6.13 Medieval period (AD 1100 – 1600)

There are five monuments dating to the Medieval period recorded within 1km of the wind farm site boundary. An enclosure (55) is recorded approximately 860m to the west of the wind farm site boundary. It is depicted as a hachured square area on the 1842 OS 6-inch map. According to the local information as recorded by the NMS, the enclosing bank was levelled in the early 1970s and the fosse was infilled with rubble. Numerous linear features are visible as cropmarks of fosses in the same field. Therefore, it is thought that the enclosure could represent a medieval moated site. A modern farm track, extending from road to the south, cuts through the cropmarks. According to Grove White (1905-25, vol.4, 242), 'the "Batteries" … were supposed to have been erected during some of the wars of the 17th century. This could indicate a post-medieval phase of use for this possible moat' (NMS, 2023[19]).

A settlement, castle and fortifications (99), including random-coursed rubble walls, is located 970m east of the wind farm site with no remains of any structures surviving. The graveyard (100) and a church (100) associated with the settlement are recorded 990m east of the wind farm site boundary. The castle survives in ruins only, while the graveyard has no grave markers evident as is recorded as being used only for unbaptised children. The church survives only in fragments with its naïve and chancel remaining at foundation level. The remaining walls largely collapsed in a 2014 storm. According to Gwynn and Hadcock (1988), there was an early monastic site at this located which was probably founded by Colman man Leinin of Cloyne (NMS, 2023[19]).

The possible levelled moated site (56) is located 280m southwest of the wind farm site boundary. It is depicted as a hachured square enclosure on the 1842 and 1905 OS 6-inch maps. The remains of the banks survive as a low rise with shallow external depression. The remains of the upstanding bank are incorporated into the field boundary system (NMS, 2023[19]).

These moated sites are likely to represent the focal points of settlement in the immediate vicinity of the site during the later medieval period. However, it should be noted that at least some of the enclosures and cropmarks ascribed to earlier periods may have been in use during the later medieval period.

Norman involvement in Ireland began in 1169, when Richard de Clare and his followers landed in Wexford to support Diarmait MacMurchadha, deposed King of Leinster, in his bid to regain the Kingdom of Leinster. By the end of the 12th century the Normans had succeeded in overthrowing the previous ruling elites in much of the country (Anderson, 2019[21]).

15.6.14 Post-medieval period (AD 1600 – 1800)

According to Lewis in March 1691, a body of native forces in the interest of James II posted themselves in Ballclough (Ballyclogh) parish and began to throw up entrenchments, but on the approach of Major Culliford from Cork, with a detachment of

[29] Stout, M. (1997) *The Irish Ringfort*.

400 men, they were compelled to abandon their works (Lewis, 1837[30]). This reference is likely related to the re-use of a possible earlier moated site (55) as defensive earthwork and battery during the Williamite wars (NMS, 2023[19]).

The 18th century saw a dramatic rise in the establishment of large residential houses around the country. This was largely due to the fact that after the turbulence of the preceding centuries, the success of the Protestant cause and effective removal of any political opposition, the country was at peace. The large country house was only a small part of the overall estate of a large landowner and provided a base to manage a large area of land that could be dispersed nationally. During the latter part of the 18th century, the establishment of a parkland context (or demesnes) for large houses was the fashion. Although the creation of a parkland landscape involved working with nature, rather than against it, considerable constructional effort went into their creation. Earth was moved, field boundaries disappeared, streams were diverted to form lakes and quite often roads were completely diverted to avoid travelling anywhere near the main house or across the estate. Major topographical features like rivers and mountains were desirable features for inclusion into, and as a setting, for the large house and parkland. This was achieved at all scales, from a modest Rectory Glebe to demesne landscapes that covered thousands of acres (Anderson, 2019[21]).

15.6.15 Undated

There are a number of undated enclosures and field systems that are likely to reflect sustained land use and occupation of the wind farm site, and the land immediately around it, from the prehistoric period through to the present day.

The cropmark of the arc of fosse (83) is recorded approximately 27m west of the wind farm site boundary near T1. This was probably part of a circular enclosure (NMS, 2023[19]).

The cropmark of the fosse of a small circular enclosure visible in aerial photographs (89) has been identified approximately 35m south of the wind farm site boundary near T1 and the proposed site access tracks (NMS, 2023[19]).

Elsewhere in the study area, a monument depicted as a hachured circular enclosure on the 1842 and 1905 OS 6-inch maps (51) is also recorded on a gentle slope on land to 848m north of the wind farm site boundary. The external fosse survives as a slight depression in the ground. Cropmarks of the fosse of a roughly circular enclosure visible on aerial photographs (82) are also recorded 316m north of the wind farm site boundary. The cropmark of the fosse of a rectangular enclosure (90) visible on aerial photography is also present 155m northwest of the wind farm site boundary near T1. There are linear cropmarks of possible field boundaries in the same field (NMS, 2023[19]).

A lozenge-shaped hachured enclosure (75) is depicted on the 1842 OS 6-inch map 600m south of the wind farm site boundary at T8, as a hachured arc showing semi-circular fosse on the 1905 and 1937 OS 6-inch maps. An irregular complex of cropmarks visible in aerial photographs (77), along with the faint cropmark of the arc of fosse visible in aerial photograph (86), are also recorded in the same approximate location (NMS, 2023[19]).

To the south-west of the wind farm site boundary an incomplete cropmark of fosse of a large enclosure (84) and the cropmark of fosse of a roughly circular enclosure (85) are visible on aerial photographs, approximately 880m. A roughly L-shaped series of at least

[30] Lewis, S. (1837) (online edition) Topographical Dictionary of Ireland.

10 circular maculae (81) are also visible as cropmarks on aerial photographs in this general arc. In the same general area, the cropmark of a fosse of roughly circular enclosure within a field system (50) has been recorded. Another enclosure (68), identified from cropmarks of a fosse of oval enclosure on aerial photographs has been recorded in this area to the south-west of the wind farm site. No visible surface traces persist (NMS, 2023[19]).

A pear-shaped monument (53) defined by nearly levelled earthen bank with a shallow external fosse has been identified 420m north-west of the wind farm site, below the brow of a gently rolling hill amongst a cluster of sites in Garrnagenageevoge. Another monument located nearby in the same cluster (54) is depicted as a hachured circular enclosure on the 1842 OS 6-inch map. It has since been levelled and there is no longer a visible surface trace (NMS, 2023[19]).

A cropmark of a fosse of small circular enclosure which is visible on aerial photographs (79) is recorded 300m north-east of the wind farm site boundary. Further to the east cropmarks of a bank and external fosse sides of a rectangular enclosure (76) and the cropmarks of the fosse of a roughly oval enclosure (80) have been identified from aerial photographs (NMS, 2023[19]).

To the east of the wind farm site boundary a monument depicted as a hachured roughly circular enclosure (65) is depicted on the 1842 OS 6-inch map in view of Kilmaclenine Castle (9).

The fosse of a large subcircular enclosure is also visible on aerial photographs (69) approximately 910m south-west of the wind farm site boundary. It is truncated by a laneway and field fence on western side.

To the east of the site is a circular enclosure (124) visible as faint cropmarks.

A quarry (98) located west of the wind farm site has been determined by the NMS not to be of archaeological significance.

15.6.16 Excavation index

There is one National Museum of Ireland (NMI) burial excavation recorded over 5km south-west of the wind farm site. The excavation at Lisduggan North, Cork (SMR CO023-29) records the discovery of two skeletons and two ‘pots’ in a quarry near Kanturk, Co. Cork in 1946. Analysis on the pots suggested that they were made in, or close to, a granite area and ‘imported’ into north Cork (excavations.ie, 2023[15]).

A review of the Excavations Bulletin (1970-2023) has revealed that the next closest previous archaeological investigation has been carried out 10km from the nearest turbine (excavations.ie, 2023[15]). A pre-development test excavation was carried out in 2008 in Derryleigh in advance of the construction of a slatted cubicle house and concrete yards within the zone of archaeological potential of a ringfort at Derryleigh, Clondrohid (SMR CO059–068). Six test-trenches were excavated. The stratigraphy consisted of between 0.2m and 0.5m of grey/brown clayey loam overlying a grey gravelly boulder clay. No archaeological features or finds were noted (excavations.ie, 2023[15]).

15.6.17 Cartographic evidence

Down Survey Map of the Barony of Orrery and Killmore, c. 1655

The wind farm site is not shown in detail on the Down Survey parish map of Ballyclogh and Liscannor in the Barony of Orrery and Killmore, but it is likely that wind farm site was within the landholding of Kilbrin.

John Rocque's Map of the City and County of Cork, 1757

The wind farm site is not shown in detail on John Rocque's map of 1757. The nearest areas of settlement shown on this map are 'Buttervant' (Buttevant) to the north-east, 'Killmoclenine' (Kilmaclenine) to the south and 'Lysgriffin' (Lisgriffin) to the north.

Ordnance Survey Historical Mapping 1829-1995

The First Edition 6 Inch Ordnance Survey map of the Area (1829-1942) shows the wind farm site in detail for the first time (**Figure 15.8**). The site is depicted as a series of large agricultural fields within the townland of Tullacondra, Derryorgan, and Ardskeagh. Castlecor is depicted to the west of the wind farm site. Kilmaclenine Castle (9) is labelled to the east of the site. Buttevant Abbey also labelled to the east of the wind farm site (**Figure 15.8**). The site access track and the majority of the proposed turbine locations in the Project are located along or immediately adjacent to the early 19th century field boundaries depicted on the First Edition map.

A farmstead (labelled as 137 on **Figure 15.9**) is located along the northern wind farm site boundary (Ordnance Survey Ireland GeoHive Map Viewer, 2023[31]).

The ringfort (60) is clearly shown on this map in the field outside the area of the proposed site access track and proposed turbine locations (**Figure 15.8**; Ordnance Survey Ireland GeoHive Map Viewer, 2023[31]).

T8 and the site access track are located along an existing farm trackway shown on this First Edition Map. A small building (139) is shown along this trackway on this map (Ordnance Survey Ireland GeoHive Map Viewer, 2023[31]).

A small structure which has been interpreted by ADAS as a possible lime kiln (138) on **Figure 15.9** is depicted on the First Edition map to the northeast of T7 (**Figure 15.8**).

[31] Ordnance Survey Ireland GeoHive Map Viewer (2023) Ordnance Survey Ireland, Available at: https://osi.ie/ [accessed December 2023].

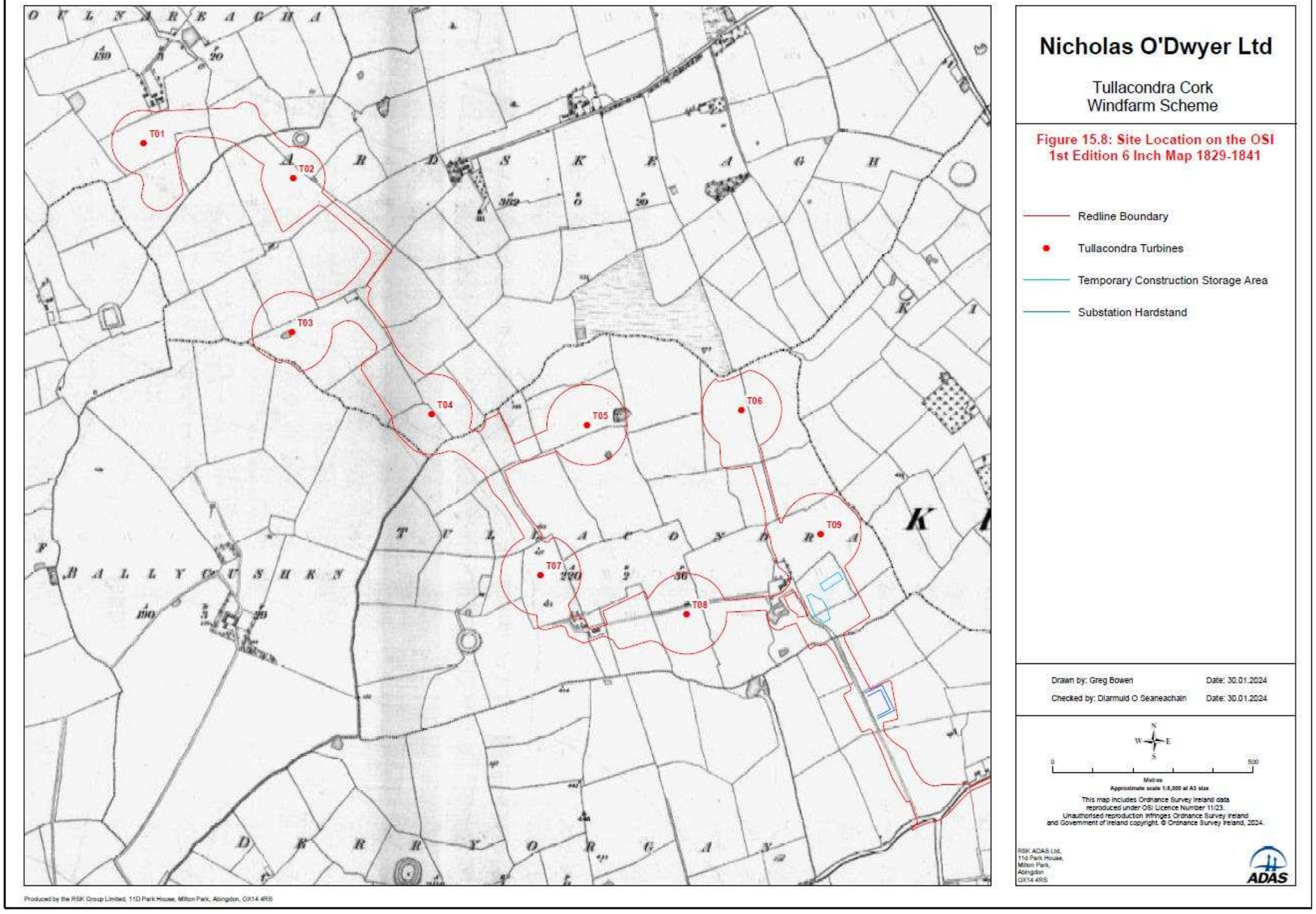

Figure 15.8: Site location on the OSI 1st edition 6 inch map 1829-1841

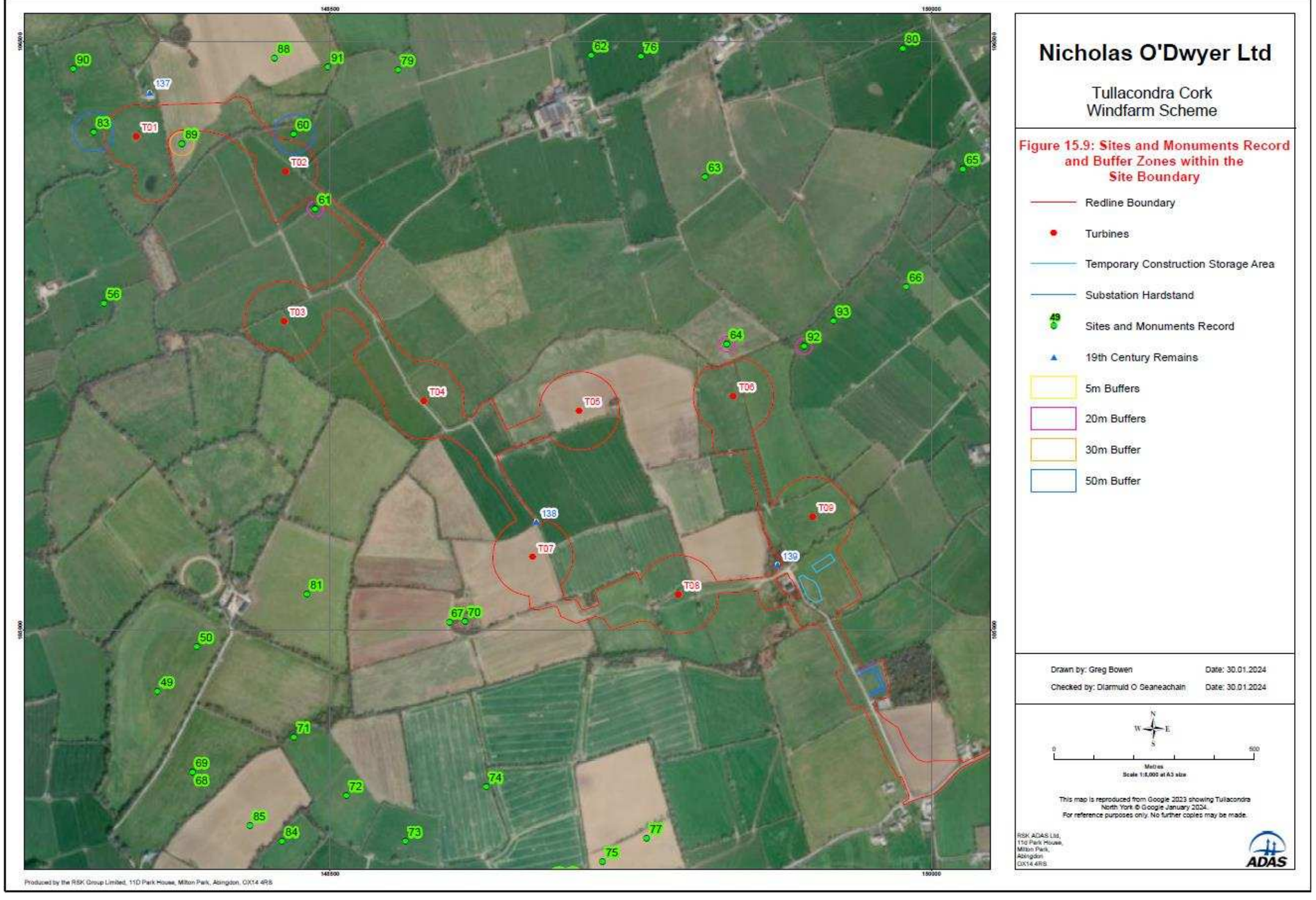

Figure 15.9: SMR and buffer zones within the wind farm site boundary

A geological feature is shown on this map immediately adjacent the approximate location of the T5 (**Figure 15.8**; Ordnance Survey Ireland GeoHive Map Viewer, 2023[31]).

The 2nd Edition 6 Inch Ordnance Survey map of the Area (1897-1913) shows little change to the field boundary arrangement from the First Edition 6 Inch Ordnance Survey map. An enclosure is depicted along the western edge of the wind farm site boundary (**Figure 15.10**; Ordnance Survey Ireland GeoHive Map Viewer, 2023[31]).

15.6.18 Aerial photographic analysis

Inspection of aerial photographic coverage of the proposed development area held by the Ordnance Survey (1995, 2005-2012, 2013-2018[32]) by Google Earth (2005-2023[33]), as well as aerial photographs taken specifically for the Project was carried out. A large number of monuments in the 1km study area have been identified from cropmarks on aerial photos and these have been discussed in sections 15.5.13, 15.5.14, 15.5.15, 15.5.17 and 15.5.20.

Aerial photographs of the wind farm site from 1995 shows only minor changes from the field boundary arrangement and land use shown earlier Ordnance Survey maps of the site (Ordnance Survey Ireland GeoHive Map Viewer, 2023[31]).

Aerial and satellite images from the wind farm site 2005-2012 show little change to the field boundary arrangement or land-use within the wind farm site boundary. The wind farm site appears to have been predominately in use as either grass pasture or arable fields during this time (Ordnance Survey Ireland GeoHive Map Viewer, 2023[31]).

More recent aerial imagery shows continuity in the land use and field boundary arrangement within the wind farm site boundary up to the present day.

15.6.19 LiDAR analysis

LiDAR data produced for this Project has been overlaid with the recorded Sites and Monuments and the unregistered 19th century historic structures identified in **Figure 15.11**, Analysis of this dataset indicates that the southern part of the wind farm site has been heavily ploughed and contains evidence for historic ridge and furrow cultivation. The northern part of the wind farm site shows evidence of likely drainage features, in particular around T1. The extent of enclosures recorded by aerial photographs and on historic maps shows up relatively well on the LiDAR imagery. In particular the LiDAR data shows that Ardskeagh ringfort-rath (60), which has no visible trace above ground, is located entirely outside of the wind farm site boundary. No currently unknown buried archaeological enclosures or former field systems are indicated by the LiDAR data within the wind farm site boundary.

[32] Maps of Ireland, Available at: https://www.osiemaps.ie/ [accessed December 2023].

[33] Google Earth (2023) Satellite imagery of the proposed development area, available at: www.googleearth.com [accessed December 2023].

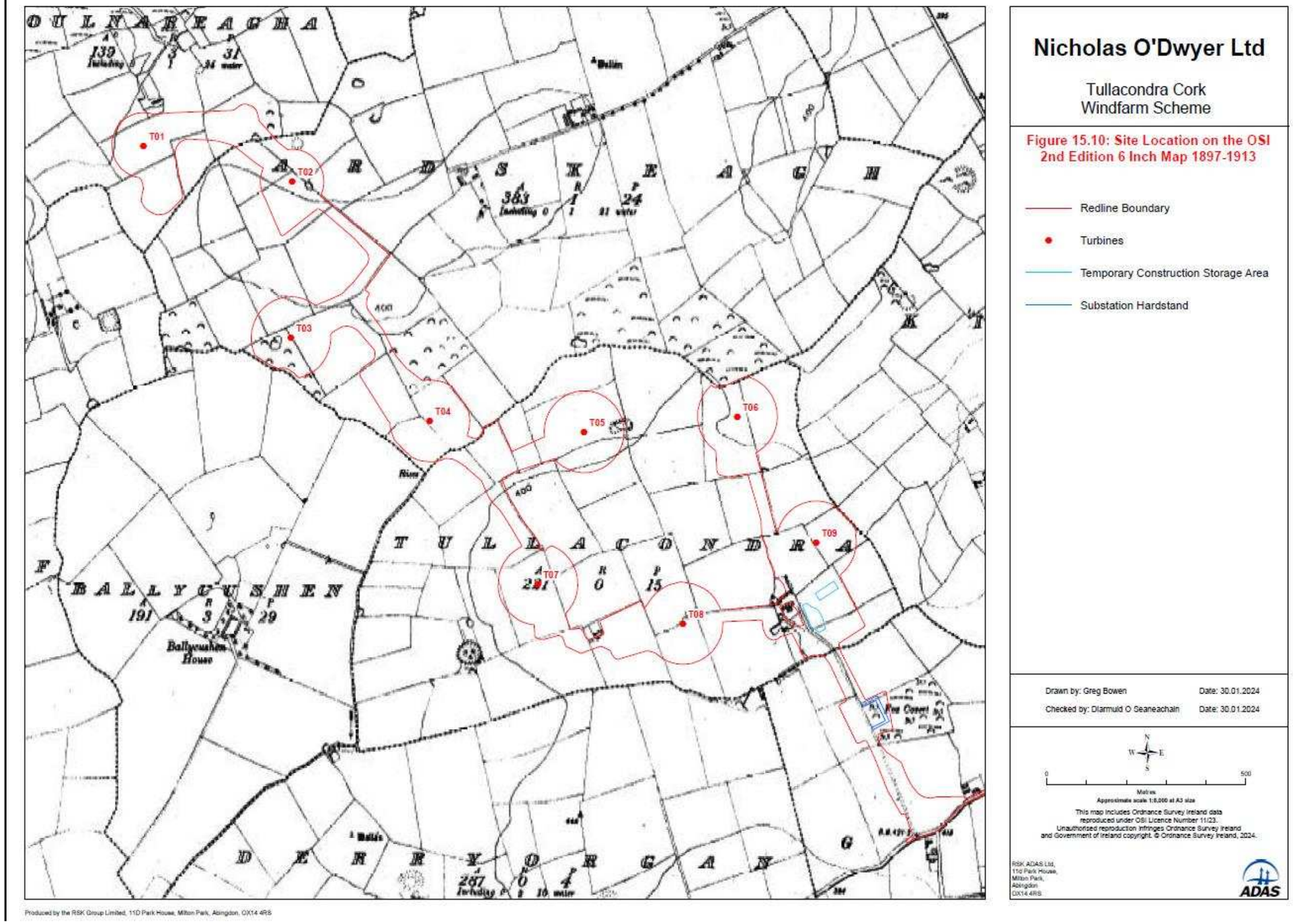

Figure 15.10: Wind farm site location on the OSI 2nd edition 6 inch map 1897-1913

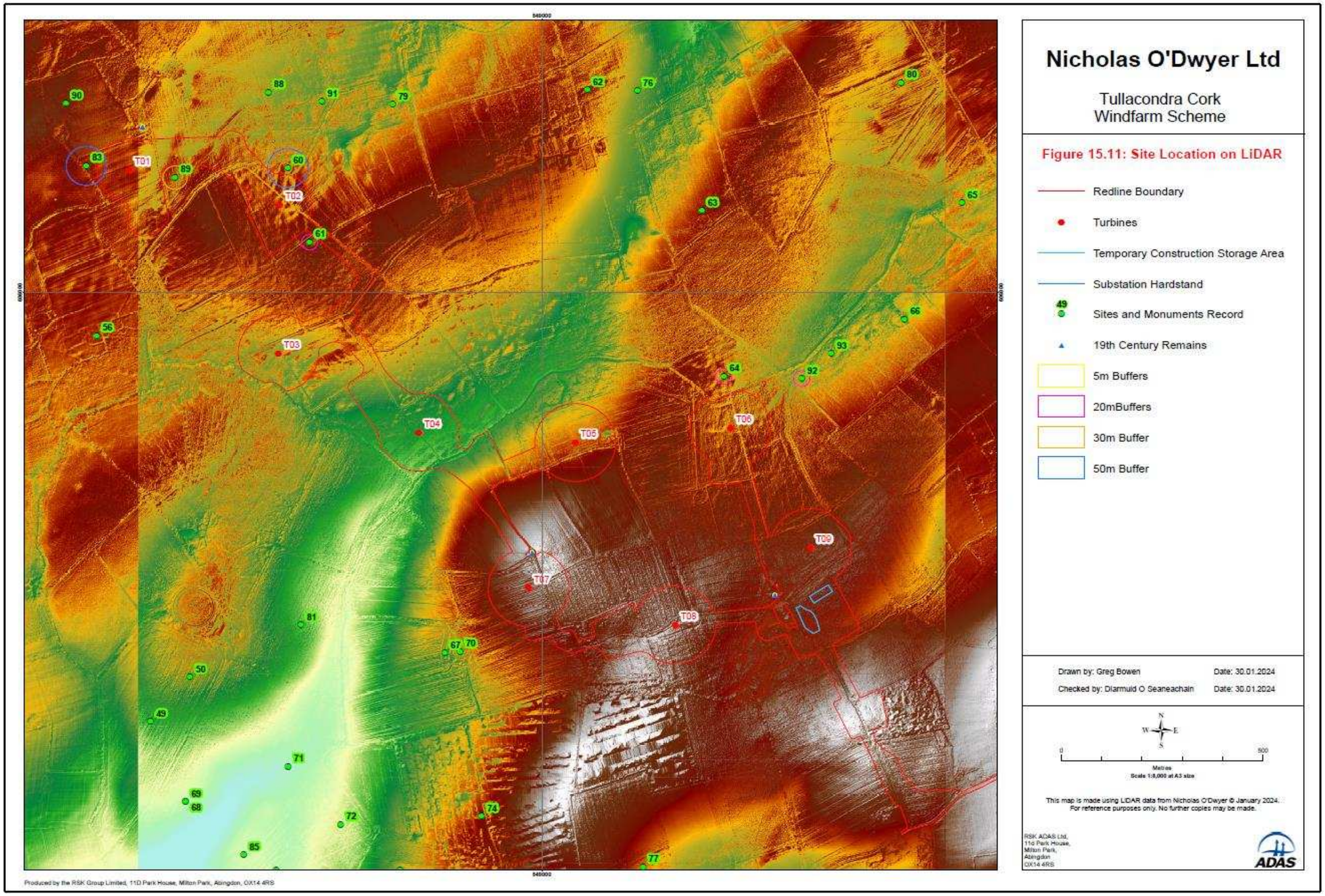

Figure 15.11: Wind farm site location of LiDAR

15.6.20 Place-name and folklore analysis

The wind farm site is located within the townlands of Tullacondra, Ardskeagh, Polnareagha, and Croughta.

Table 15.11: Analysis of townland names in the project area

Townland	Genitive	Translation/Interpretation
Tullacondra	Tulach Chonractha	Conradh's Hill
Ardskeagh	Ard Sciath	'the height or hill of the briers or thorns'
Polnareagha	Pholl na Riabhaiche	Poll 'hole, pool, (tidal-)stream
Croughta	An Chrochta	'A croft or closed field'

15.7 Do nothing scenario

The do-nothing scenario seeks to describe the consequences that are reasonably likely to occur without the Project. If the Project were not to proceed, the wind farm site would continue to be managed as existing arable and pasture farmland. Potential effects to sub-surface archaeology (if present) and historic structures on the wind farm site could continue to occur if any groundworks took place as part of the management of the farmland. Indirect effects on Archaeological, Architectural and Cultural Heritage in the wider landscape setting would not occur.

Potential effects to sub-surface archaeology (if present) and historic structures along both GCR Options could continue to occur if any groundworks took place as part of the management of existing public roads and roadway verges. Indirect effects on Archaeological, Architectural and Cultural Heritage in the wider landscape setting would not occur.

Potential effects to sub-surface archaeology (if present) and historic structures along both TDR options could continue to occur if any groundworks took place as part of the management of existing public roads and roadway verges and agricultural activities. Indirect effects on Archaeological, Architectural and Cultural Heritage in the wider landscape setting would not occur.

15.8 Construction phase effects

15.8.1 Indirect effects

Indirect effects, in terms of archaeology, architectural and cultural heritage are considered to be those effects which happen away from 'the wind farm site.' This includes effects on visual setting of any cultural heritage asset in the wider landscape. Since these effects are only possible once the proposed turbines are constructed, they are considered operational effects and are therefore discussed further below.

No indirect effects will occur at the construction phase.

15.8.2 Direct effects

Direct effects refer to a 'physical impact' on a monument or site. The construction phase of the development consists largely of earthmoving activities such as topsoil and subsoil removal and possibly the removal of some existing structures on the wind farm site such as field boundaries. The potential effects on the known and potential archaeological, architectural and cultural heritage of the area are outlined below with the suggested mitigation measures. The effects are described by asset type (e.g., National Monuments, Recorded Monuments, etc.) identified in the receiving environment.

15.8.2.1 Direct effects on National Monuments and World Heritage Sites

National Monuments within 10km and World Heritage Sites within 20km of the wind farm site boundary are discussed below. There are no World Heritage Sites within 20km of the wind farm site.

There are six National Monuments (**Table 15.7**) in State Care within 10km of the wind farm site boundary (one of which has three separate parts). These monuments are considered in the assessment in order to ascertain any potential effects to the setting of the monuments. Effects on the setting of National Monuments are addressed below.

In terms of direct effects to National Monuments in State Ownership/Guardianship and World Heritage Sites, none are located within or close to the wind farm site boundary or close to any associated infrastructure including the GCR's and TDR's.

Therefore, the Project will have a No Change direct effect on these types of heritage assets. In relation to direct effects, the significance of effect on these types of heritage assets will be neutral **(No significant effects)**.

15.8.2.2 Direct effects on Protected Structures and Architectural Conservation Areas

There are no Architectural Conservation Areas or structures listed in the Record of Protected Structures (RPS) located within the wind farm site boundary or within 100m of it.

There are no Architectural Conservation Areas or Structures listed in the Record of Protected Structures within 100m of either of the proposed GCR Options.

There are three Architectural Conservation Areas (ACAs) and one Protected Structure located within the study area of TDR Option 1 (as shown in **Figure 15.6**). The Friary Precinct Conservation Area contains the Protected Structure and is located along the northern section of TDR Option 1. The Buttevant Conservation Area and Charleville Conservation Area are located along the southern and central portions of the TDR and flank the roadway which the route follows (heritagemaps.ie, 2023[16]). As the TDR follows along an existing road and no groundworks are required at any of the locations of these heritage assets the proposed accommodation works listed in **Table 16.5** in EIAR **Chapter 16 Traffic and Transport** will have a No Change direct effect on these heritage assets. In relation to direct effects, the significance of effect on these heritage assets will be neutral **(No significant effects).**

15.8.2.3 Direct effects on Recorded Monuments and NIAH Structures

Wind farm site and site tracks

There are no monuments recorded on the Sites and Monument Record (SMR) or NIAH Structures located within the wind farm site boundary, as the wind farm has been designed to exclude them through the implementation of buffer zones as shown in **Figure 15.9**.

As part of the mitigation for the Project no groundworks, construction vehicle movements or storage of materials will be carried out within the buffer zones around the recorded monuments identified closest to the wind farm site boundary.

It is considered that the Project will have a No Change direct effect on Recorded Monuments closest to the wind farm site boundary. No other direct effects on any other recorded monuments or NIAH Structures within 1km of the wind farm site are predicted. The significance of effect on Recorded Monuments and NIAH Structures from the construction of the wind farm and site access tracks will likely be neutral (**No significant effects).**

Grid Connection Route Option 1

There are seven monuments within 100m of GCR Option 1 (130-136). These include an enclosure site (130) a bridge (131) a fulacht fia (132), a souterrain (133), a lime kiln (134), a quarry (135), and a ringfort (136). The GCR will include a cable trench mainly dug within the existing roadway or along the roadway verge, so it will not directly affect any of these recorded monuments. GCR Option 1 will pass through the existing public roadway's verge over the Ballyviniter Railway Bridge (131). The construction of the cable trench across this bridge has the potential to truncate or remove architectural fabric of historic interest associated with this bridge structure (See EIAR **Volume III, Appendix 15.4**, **Photo 15.22**).

As the construction of the cable trench will most likely involve limited trenching groundworks along the top of the bridge this potential direct effect is likely to be low and the significance of effect on this recorded monument would likely be **Not Significant**.

There are two areas where Horizontal Directional Drilling (HDD) will be used to construct the GCR. One of these will be where the GCR crosses the N20 road, and the other will be where the GCR crosses under an unnamed watercourse (WFD ID: Blackwater (Munster_140) - also locally known as Caherduggan South). The remainder of the route will be constructed within the existing public road and grassy verge.

Therefore, there will be a No Change direct effect on other Recorded Monuments in relation to direct effects, the significance of effect on all other Recorded Monuments will be neutral **(No significant effects).**

There are four structures recorded by the National Inventory of Architectural Heritage recorded within 100m of the proposed GCR Option 1. These include an early 20th century chapel (125), a 17th century country house (126), and two 19th century houses (127 and 149). These structures are located outside of the public road and verge where the proposed GCR will be constructed.

Therefore, there will be a No Change direct effect on NIAH Structures in relation to direct effects, and the significance of effect on NIAH Structures will be neutral (**No significant effects)**.

Grid Connection Route Option 2

There are five recorded monuments located within 100m of GCR Option 2 (128-132). Three of these are also found along GCR Option 1 (130-132). GCR Option 2 will also pass over the Ballyviniter Railway Bridge (131) within the existing public road and grassy verge.

As the construction of the underground cable trench will most likely involve limited trenching groundworks along the top of the bridge, this potential direct effect is likely to be low and the significance of effect on this recorded monument would likely be **Not Significant**.

The other two monuments are Knockaunavaddre ringfort (128) and a redundant record (129). The cable trench will be dug in either the public road or along the verge at these locations. In November 2023, the NMS introduced a new category of buffer called a SMR Zone around ringfort (128). This extends into the L1333 public road and in the land to the south of the L1333 public road at this location. It is considered highly likely that the construction of the public road and subsequent road works will have truncated buried archaeological remains at this location. Therefore, groundworks for the GCR along the public road will likely have at worst a medium magnitude of effect on Knockaunavaddre ringfort (128). The significance of effect on this recorded monument will range from imperceptible to significant **(No Significant Effects to Significant Effects).**

There are five NIAH structures within 100m of GCR Option 2. Grange Bridge (35) is located along GCR Option 2. However, the GCR will pass along the existing modern road and underneath this bridge and therefore it is not expected to be directly affected by the groundworks. The other four structures are also recorded along GCR Option 1 (125-127 and 149). These structures are located outside of the public road and verge where the proposed GCR will be constructed (NIAH, 2023[19]).

Therefore, there will be a No Change direct effect on NIAH Structures in relation to direct effects, and the significance of effect on NIAH Structures will be neutral **(No Significant Effects).**

Turbine Delivery Route Option 1

There are four NIAH structures located along TDR Option 1. The TDR route will pass over a bridge (35). A demesne wall (150) and two houses (151-152) are also located adjacent to the public road. There are fourteen monuments recorded along TDR Option 1 (128 and 153-165). Five of these are redundant records (160 and 162-165). The rest are town defences (153), a bridge (154), three fulacht fiadh's (155-157), a moated site (158), a recorded excavation (159), a ringed-ditch (161), and a ringfort (128) (NMS, 2023[19]).

The TDR follows along an existing road from Foynes Port to the junction of the N20 and the L5523 at Boherash Cross. No groundworks are required at any of the locations of the heritage assets along TDR Option 1 and the proposed accommodation works listed in **Table 16.5** in **Chapter 16 Traffic and Transport** will have an (No Change) neutral direct effect on these heritage assets **(No Significant Effects).**

Any off-road accommodating works required on the section of the TDR Option 1 between the junction of the N20 and L5523 at Boherash Cross and the wind farm site have the potential to directly effect Knockaunavaddre ringfort (128) and the bridge (35). Without

mitigation, the magnitude of this effect could range from no change to high and the significance of this effect on these heritage assets could range from neutral to profound adverse (**No Significant Effects to Significant Effects).**

Turbine Delivery Route Option 2

There are four monuments recorded within the 100m study area along the potential TDR study area. Two of these are an associated souterrain (173) and ringfort (174). A kerb circle monument (175) is also recorded. A quarry (172) is currently recorded as a monument by this feature was determined by the NMS not to be a monument (NMS, 2023[19]). There are four NIAH structures recorded along TDR Option 2. TDR Option 2 will pass by a bridge (166) a street plaque (167), a house (170), and a farmyard complex (171). The bridge is a 19th century single-arch railway bridge while the plaque (167) is from the late 18th century and marks the site of the former Caroll's Bridge. The house (170) was built c. 1800 and is five-bay single-storey house while the farmyard complex (171) was constructed c. 1700.

As the TDR follows along an existing road from Cork Port to the junction of the N20 and L1200, the Lisgriffen Road, and as no accommodating are required at any of the locations of these heritage assets, the proposed accommodating works listed in **Table 16.6** in **Chapter 16 Traffic and Transport** will have an (no change) neutral direct effect on these heritage assets along this section.

Any off-road accommodating works required on the section of the TDR Option 2 between the junction of the N20 and L1200 and the wind farm site have the potential to directly affect the ringfort (173) and souterrain (174), the ringfort (174), the bridge (166) and the house (170) and farmyard complex (171). Without mitigation, the magnitude of this effect could range from no change to high and the significance of this effect on these heritage assets could range from neutral to profound adverse **(No Significant Effects to Significant Effects).**

Direct effects on sub-surface archaeological remains and above ground unregistered historic structures and field boundaries of architectural and historic interest - Wind farm site and access tracks

The potential exists for the proposed development area within the wind farm site to contain yet unrecorded sub-surface archaeological sites and artefacts. It is possible that such sites may be uncovered either within the topsoil and/or at the level of the underlying natural substrate.

Groundworks for the construction of the turbine bases, hardstanding, compounds, access tracks, and substation may truncate or remove any currently unknown sub-surface archaeological features and artefacts on the wind farm site and along the site access tracks.

Depending on the type of archaeological features or deposits and the extent to which they are affected, the potential direct effect of the proposed works within the wind farm site on currently unknown buried archaeology without mitigation is assessed as Negligible to Very High. The significance of this effect on currently unknown buried archaeology on the wind farm site and along the site access track could range from Imperceptible (An effect on an archaeological feature, monument or architectural heritage site which is capable of measurement but without significant consequences) to Profound (An effect which obliterates sensitive characteristics. changes to most or all key

archaeological materials such as the resource is totally altered). Comprehensive changes to setting). Without mitigation, this range of effects would be from **No Significant Effects** to **Significant Effects.**

Groundworks for the Project will also have the potential to truncate or remove a number of existing above ground unregistered structures of architectural and historic interest on the wind farm site. In particular, construction related activities for the construction of T7 have the potential to accidentally damage, truncate or remove a possible lime kiln (138) located in the corner of a field (located at the north-east corner of the proposed hardstanding area) (**Figure 15.9**). Construction related activities for the creation of the access track and ancillary structures associated with the construction of T9 have the potential to accidentally damage, truncate or remove the ruins of farmyard buildings (139) shown on 19th century maps at this location (**Figure 15.9**).

Without mitigation, the potential direct effect of the proposed Project on these 19th century structures is assessed as Low to High. The significance of this effect on these unregistered 19th century structures could range from **Not Significant** (An effect which causes noticeable changes in the character of the historic environment, on archaeological features or monuments or on architectural heritage but without significant consequences) to Profound (An effect which obliterates sensitive characteristics. Changes to most or all key archaeological materials, such as the resource is totally altered. Comprehensive changes to setting). Without mitigation, this range of effects would be **No Significant Effects** to **Significant Effects.**

Elsewhere, across the wind farm site, the construction of the turbines will likely remove sections of field boundaries that correspond with field boundaries shown on historic maps of the wind farm site (See EIAR **Volume III, Appendix 15.4**, **Photos 15.1-15.22**). To accommodate the Project, 431m of hedgerows will be removed, primarily due to accommodating temporary works at T4 and T8 as well as maintaining safe sightlines for vehicles exiting the wind farm site entrance. To offset for these losses, 2,911m of new hedgerow habitat will be planted across the wind farm site (EIAR **Volume IV, Chapter 07 Biodiversity**)**.**

The Project will have a likely negligible to low direct effect on these types of unregistered heritage assets and field boundaries and the significance of effect is therefore likely to be Imperceptible to Not Significant (**No Significant Effects)**.

Direct effects on sub-surface archaeological remains and above ground unregistered historic structures and field boundaries of architectural and historic interest – Grid Connection and Turbine Delivery Route Options

Any off-road groundworks required along the GCR Route Options and along the section of the TDR Options between the junction of the N20 and the wind farm site have the potential to directly affect currently unknown buried archaeology, unregistered earthworks, unregistered built heritage structures of historic interest and field boundaries of historic interest in the fields either side of the public road. Without mitigation, the magnitude of this effect could range from no change to high and the significance of this effect on these unregistered heritage assets could range from neutral to profound adverse **(No Significant Effects** to **Significant Effects).**

15.9 Operational phase effects

15.9.1 Indirect effects

Indirect effects can occur where a feature or site of archaeological, architectural heritage merit or their setting is near a proposed development. Indirect effects for the Project are mainly concerned with impacts on setting of cultural heritage assets. Effects on setting may arise when a development is proposed immediately adjacent to a recorded monument or cluster of monuments or any cultural heritage asset. While the Project may not physically impact on a cultural heritage asset, it may alter the setting of a historic structure, monument or group of monuments. There is no standardised industry-wide approach for assessing the degree of effect to the setting of a monument. This is based on professional judgement, experience and the use of software analysis tools (i.e., photomontages and wireframes).

Potential effects to the visual amenity of a site or area and their significance is dependent on several factors regarding the sensitivity of the location or 'receptor' and the scale or magnitude of the proposed development. Similarly, the extent of the development and its duration and reversibility should all be considered (EPA, 20221).

15.9.1.1 Effects on the setting of National Monuments

A review of all National Monuments within 10km of the wind farm site boundary was undertaken as part of the assessment in order to ascertain any potential effects on their setting as a result of the Project. No National Monuments are located within or adjacent to the wind farm site boundary. Eight monuments are located within the 10km study area (See EIAR **Volume III, Appendix 15.1)**.

Liscarrol Castle (1) and Dromaneen Castle (4)

Desk-based setting impact and field based visual assessment indicates that views of the wind farm site are generally well screened by existing hedgerow and tree vegetation. The bare ground Zone of Theoretical Visibility (see **Figures 15.2**) indicates that due to ground height there is not likely to be any visual effect on Liscarrol Castle (1).

The bare ground ZTV indicates that there will be at worst extremely limited views of the turbines from Dromaneen Castle (4).Desk-based and field-based assessment of the sightlines from Dromaneen Castle (4) indicate that views looking northward at ground level will be severely restricted due to existing mature tree vegetation around the castle. Dromaneen Castle itself is in ruins so there will be no possible views from upper stories of this National Monument. The visual change can also be reversed once the wind farm is decommissioned.

For these reasons, it is assessed the wind farm will likely have a long term (during the operational phase) No Change effect on the settings of these National Monuments. It will likely have a neutral effect on the significance of these two National Monuments (no change to elements, parcels or components of the historic environment, no visual or audible changes, no changes arising from amenity or community factors).

Significance of Effects – **No significant effects (neutral).**

Ballybeg (105), with its associated tower (104) and dovecote (103)

The 13th century monastic complex at Ballybeg (105), with its associated rectangular tower (104) and dovecote (103) are located over 4.9km to the east of the wind farm site. Setting impact assessment indicates that there will be no significant views of the proposed turbines which would affect the setting of this National Monument. The visual change can also be reversed once the wind farm is decommissioned.

For these reasons it is assessed the wind farm will likely have a long term negligible effect on the setting of this National Monument. It will likely have an adverse indirect effect on the significance of this National Monument. However, the significance of this effect will be at worst imperceptible adverse (An effect on an archaeological feature, monument or architectural heritage site which is capable of measurement but without significant consequences).

Significance of Effects – **No significant effects (imperceptible adverse).**

Franciscan Friary at Buttevant (2)

The Franciscan friary at Buttevant (2) is located 5.8km north-west of the nearest turbine, directly behind a row of buildings withing the village of Buttevant. These buildings are likely to block views of the turbines from this location. The visual change can also be reversed once the wind farm is decommissioned.

For these reasons, it is assessed the wind farm will likely have a long term negligible effect on the setting of this National Monument. It will likely have an adverse indirect effect on the significance of this National Monument. However, the significance of this effect will be at worst imperceptible adverse (An effect on an archaeological feature, monument or architectural heritage site which is capable of measurement but without significant consequences).

Significance of Effects – **No significant effects (imperceptible adverse).**

Mallow Castle (5)

Mallow Castle (5) is located almost 10km south-east of the proposed turbines. It is surrounded by Mallow Castle Park, which is itself surrounded by a row of tall trees to the north and west. The distance of this National Monument from the site and the presence of surrounding vegetation and intervening modern buildings suggests that there will unlikely be any significant views of the proposed development from this location. The visual change can also be reversed once the wind farm is decommissioned.

For these reasons it is assessed the wind farm will likely have a long term negligible effect on the setting of this National Monument. It will likely have an adverse indirect effect on the significance of this National Monument. However, the significance of this effect will be at worst imperceptible adverse (An effect on an archaeological feature, monument or architectural heritage site which is capable of measurement but without significant consequences).

Significance of Effects – **No significant effects (imperceptible adverse).**

Blossomfort Ringfort (3)

Setting assessment indicates that the upper portions of some turbines may be visible in medium range views from the vicinity of Blossomfort ringfort (3), which is located 3.3km south-east of the nearest turbine. Setting assessment indicates that this potential visual change will be reduced due to the presence of dense and high existing tree vegetation in

the landscape to the north of the ringfort which will effectively screen most views of the development from this direction (EIAR **Volume III, Appendix 15.4**, **Photo 15.18**). The ringfort itself is covered by mature tree vegetation which reduce the impact of changes to views out from the monument itself. The visual change can also be reversed once the wind farm is decommissioned.

For these reasons it is assessed the wind farm will likely have a long term (during the operational phase) low effect on the setting of this National Monument. It will likely have an adverse indirect effect on the significance of this National Monument. However, the significance of this effect will be at worst slight (An effect which causes noticeable changes in the character of the historic environment without affecting its sensitivities).

Significance of Effects – **No significant effects (slight adverse).**

15.9.1.2 Effects on the setting of Protected Structures

No built heritage structures and their curtilages which are subject to legal protection as Protected Structures are located within the wind farm site boundary or immediately adjacent to it. There are 21 protected structures located within 5km of the wind site (**Figure 15.2**). The nearest is Kilmaclenine castle (9), which is situated on a hill c. 1km from the nearest proposed turbine. The baseline noise level ranges from 24 to 35dB LA90 during the daytime at the location close to Kilmaclenine Castle (Receiver 16, Chapter 13 Noise, Section 13.6.3.4) and the predicted noise impact at this location is 23 to 37dB LA90 during the daytime (Receiver 16, **Chapter 13 Noise & Vibration**, section 13.8.2.1). This is regarded as not significant. Due to this, no noise or other setting effects apart from visual changes will affect the setting of any Protected Structure.

The other twenty Protected Structures within the 5km study area are located over 1.5km from the nearest proposed turbine. Desk-based analysis of the ZTV, Google Earth, and photomontages (EIAR **Volume IV. Visualisations** booklet), along with field-based visual assessment of the landscape indicated that views of the turbines from seventeen of these Protected Structures within 5km of the will be either blocked completely or extremely restricted due to the distance of these structures from the wind farm site as well as due to the presence of intervening modern buildings and tree vegetation between these structures and the site (see EIAR **Volume III, Appendix 15.1** for summary setting assessment).

Analysis of wireframe and photomontage views produced as part of this assessment, visual assessment of views from publicly accessible roads adjacent to each Protected Structure and their curtilages, and desk-based analysis of sightlines using Google Earth indicate that there may be some more noticeable views of the turbines from locations in the immediate vicinity of five Protected Structures and their historic landscape settings: Kilmaclenine Castle (9), St. Mary's Catholic Church (108), Lisgriffen Castle (in ruins) (7), Ballygiblin House and grounds (113) and Lohort Castle and grounds (10). These potential effects are discussed in further detail below.

Kilmaclenine Castle (9)

Kilmaclenine Castle is a ruined castle including some upstanding walls and earthworks on an elevated platform to the east of the L1200 road. It is located on private land and is currently overlooks agricultural fields with modern houses and stands of trees visible in the immediate vicinity of the structure. Setting assessment indicates that the upper

portions off the turbines will be visible in medium range views looking west from Kilmaclenine Castle (EIAR **Volume III, Appendix 15.4, Photo 15.17**). However, this castle is in ruins and located in private property. Therefore, it is viewed and experienced from the L1200 highway. The turbines will not be visible in these views looking east, north or south from this public highway and therefore the Project will not change the way Kilmaclenine Castle is normally viewed and understood in its setting. The proposed changes to the views looking west from Kilmaclenine Castle will not likely affect any key historic views or sightlines that contribute to the significance of the setting of Kilmaclenine Castle. The visual change can also be reversed once the wind farm is decommissioned.

For these reasons, it is assessed the wind farm may have a long term () low effect on the setting of this Protected Structure. It will likely have an adverse indirect effect on the significance of this Protected Structure. However, the significance of this effect will be at worst slight adverse (An effect which causes noticeable changes in the character of the historic environment without affecting its sensitivities).

Significance of Effects – **No significant effects (slight adverse).**

St Mary's (Lisgriffin) Catholic Church (108)

St Mary's (Lisgriffin) Catholic Church includes a freestanding single-cell gable-fronted Roman Catholic church, dated to 1897. It has been included for protection mainly due to its architectural, artistic and social special qualities which include its pointed arch door and window openings, its bellcote, its stained-glass windows and carved timber confessionals (NIAH, 2023[18]). It is set within a slightly elevated position overlooking the busy R580 road within a small square graveyard. A memorial cross along the road opposite the church also forms part of the landscape setting of this structure.

Setting assessment indicates that the upper portions of the turbines will be visible in medium range views looking south from the entrance to the Church, the graveyard and from the memorial cross. These views currently are of mainly farmland interspersed with modern houses and stands of trees and hedgerows. Long range views of existing wind turbines are visible in these views to the south (EIAR **Volume III, Appendix 15.4, Photo 15.20**).

The Church and grounds would normally be viewed and photographed from the R580 road, and these key views will not be changed by the Project, and the wind farm development will not likely alter the special architectural, social or artistic characteristics of the Church. The visual change can also be reversed once the wind farm is decommissioned.

For these reasons, it is assessed the wind farm may have a long term medium effect on the setting of this Protected Structure. It will likely have an adverse indirect effect on the significance of this Protected Structure. However, the significance of this effect will be at worst moderate adverse (an effect which alters the character of the environment in a manner that is consistent with existing and emerging baseline trends).

Significance of Effects – **No significant effects (moderate adverse).**

Lisgriffen Castle (7)

Lisgriffen Castle (7) is a ruined castle including some upstanding walls and earthworks to the north of St Mary's Catholic Church. It is located on private land and is currently overlooks agricultural fields with modern houses and stands of trees visible in the

immediate vicinity of the structure. Setting assessment indicates that the upper portions of the turbines will be visible in medium range views looking south from Lisgriffen Castle (EIAR **Volume III, Appendix 15.4, Photo 15.21**).

However, as the castle is in ruins and located in private property it is normally viewed and experienced from either the R580 road to the south or from St Mary's Catholic Church. The turbines will not be visible in these views north from these publicly accessible areas and therefore the Project will not change the way Lisgriffen Castle is normally viewed and understood in its setting. The proposed changes to the views looking south from Lisgriffen Castle will not likely affect any key historic views or sightlines that contribute to the significance of the setting of Lisgriffen Castle. The visual change will also be reversed once the wind farm is decommissioned.

For these reasons it is assessed the wind farm may have a long term (Low effect on the setting of this Protected Structure. It will likely have an adverse indirect effect on the significance of this Protected Structure. However, the significance of this effect will be at worst Not Significant (An effect which causes noticeable changes in the character of the historic environment, on archaeological features or monuments or on architectural heritage but without significant consequences).

Significance of Effects – **No significant effects (not significant adverse).**

Lohort Castle and ground (10)

Lohort Castle and grounds (10) is located on private land c. 4km to the south-west of the wind farm site. The castle is currently unoccupied and is set within a mature woodland that formed the core part of the historic demesne around the castle. Setting assessment indicates that it is highly unlikely there will be any views of the proposed turbines from the castle building itself or its immediate surroundings due to the dense mature stands of trees that define the octagonal-shaped designed area that forms the most significant part of Lohort Castle's immediate historic landscape setting. There will also be no views of the turbines along any of the key access roads to the between the castle and Cecilstown to the north. There may possibly be momentary medium range glimpsed views to the north-east of the turbine blades from the gates to the grounds of the castle located on the L1203 road close to Cecilstown (EIAR **Volume III, Appendix 15.4, Photo 15.20**). However, there will be no changes to the views of the castle and the grounds looking south and south-west from the approaches from Cecilstown, which is how the castle and grounds are normally, accessed, understood and appreciated by the general public. The proposed visual changes therefore will not likely affect any key historic views or sightlines that contribute to the significance of the setting of Lohort Castle and grounds. The visual changes can also be reversed once the wind farm is decommissioned.

For these reasons, it is assessed the wind farm may have long term (during the operational phase) negligible effect on the setting of this Protected Structure. It will likely have an adverse indirect effect on the significance of this Protected Structure. However, the significance of this effect will be at worst imperceptible (an effect capable of measurement but without significant consequences).

Significance of Effects – **No significant effects (imperceptible adverse).**

Ballygiblin House and Grounds (113)

Ballygiblin House and grounds (113) is located on private land c. 3.2km to the south-west of the wind farm site. The House is currently unoccupied and is set within a mature woodland that formed the core part of the historic grounds of the stately home. A modern working quarry (Ballyhass) has considerably impacted the wider historic grounds surrounding House to the south. Setting assessment indicates that it is highly unlikely there will be any significant views of the proposed turbines from the House itself, it's associated agricultural buildings or its immediate surroundings due to bands of mature trees and woodlands to the east which form part of its historic landscape setting (EIAR **Volume III, Appendix 15.4**, **Photo 15.19**). There will also be no significant views of the turbines along any of the key access roads through the historic grounds or from any of the surviving gate lodges at the entrances to the grounds.

There will be no changes to the key historic views of the Ballygiblin House and the grounds looking north and north-west along the main approach road through the historic grounds from the Ballyhas road, which is how the House and grounds are normally, accessed, understood and appreciated by the general public. There is also unlikely to be any significant views of the turbines in association with Ballygiblin House and its associated historic buildings from the approach road to the rear of the House north of Ballyhass quarry. The proposed visual changes therefore will not likely affect any key historic views or sightlines that contribute to the significance of the setting of Ballygiblin House and grounds. The visual changes can also be reversed once the wind farm is decommissioned.

For these reasons, it is assessed the wind farm may have a long term (during the operational phase) negligible effect on the setting of this Protected Structure. It will likely have an adverse indirect effect on the significance of this Protected Structure. However, the significance of this effect will be at worst imperceptible (an effect capable of measurement but without significant consequences).

Significance of Effects – **No significant effects (imperceptible adverse).**

15.9.1.3 Effects on the setting of NIAH Structures

There are no NIAH Structures recorded within 1km of the wind farm site. Forty-one structures on the NIAH are located within 5km of the wind farm site.

Desk-based analysis of the ZTV show (**Figure 15.2**) that thirty-eight of the structures within 5km of the nearest proposed turbine may have some potential visibility of turbines. This is a worst-case scenario as the ZTV model does not take vegetation or natural screening into consideration. Due to the distance from the Project and the presence of intervening landform, vegetation and modern buildings, desk-based and field-based analysis indicates that the potential likely indirect effects on NIAH heritage assets between 1km and 5km from the wind farm may include some visual changes. These effects will range from negligible to low on the settings of these NIAH Structures. The effect on the significance of these heritage assets will likely range from imperceptible (an effect capable of measurement but without significant consequences) to not significant (an effect which causes noticeable changes in the character of the historic environment, on archaeological features or monuments or on architectural heritage but without significant consequences).

The visual changes on NIAH Structures can also be reversed once the wind farm is decommissioned.

Significance of Effects – **No significant effects (imperceptible adverse - not significant adverse).**

15.10 Mitigation measures

The mitigation strategies outlined in this section detail the techniques to be adopted in order to ameliorate the effects that the proposed development may have on features of archaeological, architectural and / or cultural heritage within the study area during both the construction and operation phases of the Project. The decommissioning phase would see a reversal of any negative effects on setting.

The residual effects that will remain once these mitigation measures have been implemented are set out in section 15.10.

15.10.1 'Do-nothing' scenario

No mitigation measures would be required in the event of a 'do-nothing' scenario. Potential effects to sub-surface archaeology (if present) and historic structures on the wind farm site could continue to occur if any groundworks took place as part of the management of the farmland and on the wind farm site. Indirect effects on Archaeological, Architectural and Cultural Heritage in the wider landscape setting would not occur.

15.10.2 Construction phase

15.10.2.1 Wind farm site and access tracks, Grid Connection and Turbine Delivery Route Options

As part of embedded mitigation carried out during the design phase, the potential loss of historic 19th century field boundaries has been mitigated by moving some of the turbine locations, revising the site design and offsetting the site access tracks from the existing hedgerows where possible throughout the site. Refer to EIAR **Chapter 4 Project Need and Alternatives Considered**.

The TDR's, and GCR's have also been designed to follow the existing public road wherever possible, to avoid known heritage assets and to minimize or avoid loss or harm to currently unknown buried archaeology, unregistered historic structures and historic field boundaries.

It is not anticipated that groundworks, construction vehicle movements or storage of materials will be required to construct the TDR options within the buffer zones around the Recorded Monuments and NIAH structures as shown in **Figures 15.6** and **15.7**.

Within the wind farm site boundary, no groundworks, construction vehicle movements or storage of materials will be carried out within the buffer zones around the recorded monuments and unregistered 19th century-built heritage structures identified. The buffer zones (as shown on **Figure 15.9**) will be fenced off as agreed with the Cork County Archaeologist prior to the start of the construction phase.

As part of an advance works programme prior to construction, advance archaeological test trenching will be carried out for within the areas of major groundworks proposed on the wind farm site around each turbine location, at the location of the proposed substation, and along the parts of the site tracks that are located in agricultural fields

closest to areas of highest archaeological potential. If any significant buried archaeological remains are identified during this testing, further mitigation in the form of targeted archaeological strip, map and sample excavation will be agreed with Cork County Council and the NMS to preserve by record any buried archaeological remains which cannot be preserved in situ by detailed design mitigation/micro siting.

This advanced test trenching will:

- Be carried out by a suitably qualified archaeologist under licence.
- Result in a detailed report setting out any findings and outlining any further measures, within the parameters assessed in this EIAR, that should be employed in relation to the Project. This report will be submitted to the NMS (DHLGH).

The ruins of the historic farm buildings and 19th century structures identified in the vicinity of the wind farm site boundary, at T1, T7 and T9 will be preserved in situ. They have been excluded from the Red Line Boundary during the design phase as an embedded mitigation measure to remove the risk of potential adverse direct effects.

Upstanding historic field boundaries within the wind farm site, along the chosen GCR and along the chosen TDR will be preserved in situ wherever possible (this has already been achieved as part of embedded design mitigation). If a section of a historic field boundary must be removed to facilitate the construction then a representative cross-section of the boundary will be investigated and recorded by a suitably qualified archaeologist prior to removal.

All major sub-surface groundworks associated with the Project works will be subject to a programme of archaeological monitoring. These groundworks include:

- turbine and substation locations, and all access tracks through the wind farm site
- off-road open-cut trenching along the chosen GCR option.
- Off-road accommodating required along the chosen TDR.
- Groundworks associated with two sections of Horizontal Directional Drilling along the chosen GCR.
- Groundworks associated with construction of the GCR along Ballyviniter Railway Bridge (131).
- Groundworks associated with the construction of the GCR under Grange Bridge (35).
- Groundworks associated with the GCR and/or TDR along the public road adjacent to Knockaunavaddre ringfort (128).

The programme of archaeological monitoring will be carried out as follows:

- The archaeological monitoring will be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2004.
- If significant archaeological material is encountered during the course of archaeological monitoring, then resolution of any such significant material will be determined in consultation with the NMS (DHLGH) and Cork County Council.

- Where possible, every reasonable effort will be made to preserve in situ or reduce the impact on any identified archaeological material. Where preservation in situ cannot be achieved, either in whole or in part, then a programme of full archaeological excavation will be implemented to ensure the preservation by record of the portion of the site that will be directly impacted upon. This work will be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2004.
- A written report will be prepared detailing the results of all archaeological work undertaken.

15.10.2.2 National Monuments, Architectural Conservation Areas, Protected Structures and National Inventory of Architectural Heritage

Embedded design mitigation measures have been set out in the Landscape and Visual Impact Assessment Chapter (EIAR **Chapter 14 Landscape and Visual**).

15.10.3 Operational phase

Embedded design mitigation measures are discussed in the Landscape and Visual Impact Assessment Chapter (EIAR **Chapter 14 Landscape and Visual**) for this Project.

15.10.4 Decommissioning phase

Embedded design mitigation measures are discussed in the Landscape and Visual Impact Assessment Chapter (EIAR **Chapter 14 Landscape and Visual**) for this Project.

15.11 Residual effects

15.11.1 'Do nothing' scenario

There would be no residual effects as a result of a 'do-nothing' scenario. Potential effects to sub-surface archaeology (if present) and historic structures on the site could continue to occur if any groundworks took place as part of the management of the farmland on the site. Indirect effects on Archaeological, Architectural and Cultural Heritage in the wider landscape setting would not occur.

15.11.2 Construction phase

15.11.2.1 Wind farm site and access tracks, Grid Connection Route, and Turbine Delivery Route

With the implementation of the proposed archaeological mitigation, it is anticipated that all potential direct and indirect effects on buried archaeology, upstanding earthworks and upstanding structures of historic and architectural interest will be either mitigated or avoided.

Significance of Effects – **No significant effects (neutral to not significant adverse).**

15.11.3 Operational phase

15.11.3.1 National Monuments

The residual indirect effect on the significance of all National Monuments is assessed as Slight adverse

Significance of Effects – **No significant effects (Slight adverse).**

15.11.3.2 Architectural Conservation Areas

The residual indirect effect on the significance of all Architectural Conservation Areas is assessed as neutral.

Significance of Effects – **No significant effects (neutral).**

15.11.3.3 Protected Structures

The residual indirect effect on the significance of all Protected Structures is assessed as imperceptible to moderate adverse.

Significance of Effects – **No significant effects (imperceptible to moderate adverse).**

15.11.3.4 National Inventory of Architectural Heritage Structures

The residual indirect effect on the significance of all NIAH Structures is assessed as imperceptible to not significant.

Significance of effect – **No significant effect (imperceptible to not significant).**

15.11.4 Decommissioning phase

The potential direct effects on the archaeological, architectural and cultural heritage environment during the decommissioning of the Project will be no change (neutral). Any potential direct effects will already have been resolved through mitigation measures and the established site access tracks will be used for the removal of the built features of the wind farm. Once the wind farm is decommissioned all indirect visual effects on the settings of National Monuments, Protected Structures and other heritage sites in the surrounding landscape will be reversed.

15.12 Cumulative effects

Cumulative impact is defined as 'The addition of many small impacts to create one larger, more significant, impact' (EPA, 2022[1]). Cumulative effects encompass the combined effects of multiple developments or activities on a range of receptors. In this case the receptors are the archaeological monuments and architectural/cultural heritage sites in the immediate vicinity of the Project. Cumulative effects at the construction and operational phases are considered.

A detailed assessment of cumulative effects on views in the landscape around the Project is presented in section 14.8.8 of the Landscape and Visual Impact Assessment Chapter (EIAR **Chapter 14 Landscape and Visual**). The assessment of cumulative effects on archaeology and architectural heritage in this chapter is based on this assessment.

15.12.1 'Do-nothing' scenario

There would be no additional cumulative effects as a result of a 'do-nothing' scenario. Potential effects to sub-surface archaeology (if present) and historic structures on the wind farm site could continue to occur if any groundworks took place as part of the management of the farmland on the wind farm site. Indirect effects on Archaeological, Architectural and Cultural Heritage in the wider landscape setting from the Project would not occur.

15.12.2 Construction phase

Direct effects to archaeology and cultural heritage as a result of the Project are limited to its boundaries so any potential for cumulative effect is restricted to developments whose boundaries overlap with the Project or with receptors that will be affected during the construction phase of the Project.

As indicated in EIAR **Chapter 2 EIA Methodology**, **Table 2.2**, the N/M20 upgrade is scoped in for cumulative assessment in the EIAR due to the TDR routes crossing the N/M20 corridor in certain areas. The TDR will not likely affect the N/M20 as there are no groundworks proposed for this element which overlap this area. At this stage, the N/M20 design is at the preferred option stage and will be subject to further design and consultation. The N/M20 Project Office was engaged at scoping stage by the project team. The preferred route for this national road proposal was considered in the project design, selection of TDR options, and preparation of the EIAR.

There will be no additional direct cumulative effects on buried archaeology as a result of the Scart Limestone Quarry Extension, Ballyroe Solar Farm, Fiddane Solar Farm or Mallow Solar Farm. These projects do not overlap with or border the development area so there will be no additional direct effects on buried archaeology.

The Dublin to Cork Railway line upgrades are to level crossings involving the creation of bridges and short sections of new road. Groundworks for this development may overlap with very short sections of the GCR and the TDR where groundworks may be required around the railway line. These would have very localised effects and given the distance to the Project the potential for significant direct cumulative effects is considered to be negligible.

There will be no additional direct cumulative effects as a result of all other proposed or consented wind farm developments alongside the Project. These projects do not overlap with or border the development area so there will be no additional direct effects on buried archaeology.

With the implementation of the proposed archaeological mitigation for the Tullacondra wind farm Project, it is anticipated that all potential direct and indirect effects on buried archaeology, upstanding earthworks and upstanding structures of historic and architectural interest will be either mitigated or avoided. Therefore, the cumulative significance of effects during the construction phase after mitigation will be – **No significant effects (neutral to not significant adverse).**

15.12.3 Operational phase

Cumulative effects on setting are more likely to occur at the operational phase of the Project (i.e., post-construction). In this regard in order to assess overall cumulative effects

on archaeology and cultural heritage the Project is considered in the context of other developments, including other permitted and proposed wind farms. Other developments consist mainly of one-off housing and agricultural buildings. One off housing and buildings are not considered to be detrimental to the setting of archaeological monuments and will not arise in cumulative effects occurring.

The cumulative assessment of indirect effects carried out in EIAR **Chapter 14 Landscape and Visual** considered the following separate scenarios:

- Scenario 1 – The Project with operational and consented development – i.e., the effects of the Project compared to the current baseline – as described in the main LVIA.
- Scenario 2A – The Project with operational and consented development and Annagh wind farm.
- Scenario 2B – The Project with operational and consented development and Ballinagree wind farm.
- Scenario 3 – The Project with operational, consented development, Annagh wind farm and Ballinagree wind farm.

The cumulative assessment of indirect effects on the most significant cultural heritage receptors within 20km of the Project are considered in the EIAR **Chapter 14 Landscape and Visual** produced the following results:

15.12.3.1 Ballybeg Augustinian Priory

Figures 14.10 and 14.11 in EIAR **Chapter 14 Landscape and Visual** indicate that Ballinagree wind farm and Annagh wind farm would not be visible from Ballybeg Augustinian Priory. There would be no difference in effect compared to Scenario 1. Cumulative effects would be **Not Significant.**

15.12.3.2 Mallow Castle

Figure 14.10 in EIAR **Chapter 14 Landscape and Visual** indicates that the Project would be theoretically visible in addition to Ballinagree wind farm at Mallow Castle. Ballinagree wind farm would be 20km to the southwest of Mallow Castle and unlikely to be readily discernible due to screening by vegetation. Coom wind park would be 9.2km to the southeast of Mallow Castle and separated from the Project by a distance of 20km and seen in the opposite direction. The cumulative effects would therefore be no greater than those assessed for Scenario 1. **Figure 14.11** in EIAR **Chapter 14 Landscape and Visual** indicates that Annagh wind farm would not be visible from Mallow Castle. Cumulative effects would be **Not Significant.**

15.12.3.3 All National Monuments, Architectural Conservation Areas, Protected Structures, Recorded Monuments and NIAH Structures

The predicted visual effects for each of the scenarios in **Table 14.10** of the EIAR **Chapter 14 Landscape and Visual** indicates that the according to the LVIA methodology used in EIAR **Chapter 14 Landscape and Visual**, the scale of visual effect will range from negligible to medium.

Based on the EPA methodology used in this chapter it is assessed from this that the corresponding overall potential cumulative significance of effect on the settings of National Monuments, Architectural Conservation Areas, Protected Structures, Recorded Monuments and NIAH Structures would be - **No Significant Effects (neutral to moderate adverse indirect visual effects).**

15.12.4 Decommissioning phase

Any indirect effects on the setting and significance of heritage assets would be reversed by the decommissioning phase of the Project.

EIAR Volume II

Main Report

Chapter 16: Traffic and Transport

CONTENTS

16 TRAFFIC AND TRANSPORT 16-1
16.1 Introduction 16-1
16.1.1 Statement of authority 16-1
16.1.2 Study area 16-2
16.2 Assessment methodology 16-4
16.2.1 Receptor sensitivity/value criteria 16-8
16.2.2 Assumptions and limitations 16-11
16.2.3 Consultation 16-12
16.3 Existing environment 16-12
16.3.1 Existing road network 16-12
16.3.2 Traffic volumes 16-18
16.4 The Project 16-19
16.4.1 Site access 16-20
16.4.2 Construction haul routes 16-24
16.4.3 Turbine delivery route options 16-28
16.4.4 Grid connection route options 16-33
16.4.5 Pedestrians / public transport / safety 16-35
16.5 Identification of likely effects of the Project 16-36
16.5.1 Do-nothing scenario 16-36
16.5.2 Construction phase effects 16-36
16.5.3 Operational phase effects 16-38
16.5.4 Decommissioning phase effects 16-39
16.6 Assessment of effects 16-39
16.6.1 Construction Phase 16-39
16.6.2 Operational phase 16-63
16.6.3 Decommissioning phase 16-63
16.7 Mitigation measures 16-64
16.7.1 Construction phase 16-64
16.7.2 Operation 16-66
16.7.3 Decommissioning 16-67
16.8 Residual effects 16-67
16.8.1 Construction 16-67
16.8.2 Operation 16-67
16.8.3 Decommissioning 16-67
16.9 Cumulative effects 16-67

TABLES

Table 16.1: Pedestrian Fear and Intimidation Criteria 16-8
Table 16.2: Receptor Sensitivity 16-9
Table 16.3: Impact Magnitude Criteria 16-10
Table 16.4: Significance Criteria 16-11
Table 16.5: Road categories 16-15
Table 16.6: Baseline traffic volumes 16-18

Table 16.7: Projected traffic volumes 16-19
Table 16.8: Licensed waste facilities in the vicinity of Tullacondra wind farm 16-28
Table 16.9: Accommodation works on TDR option 1 16-29
Table 16.10: Accommodation works on TDR option 2 16-31
Table 16.11: Vehicle trip distribution – Project including GCR works 16-42
Table 16.12: Predicted AADT with average daily construction phase traffic – TDR option 1 16-45
Table 16.13: Predicted AADT with Average Daily Construction Phase Traffic – TDR Option 2 16-46
Table 16.14: Predicted AADT with Peak Construction Phase Traffic – TDR Option 1 16-48
Table 16.15: Predicted AADT with Peak Construction Phase Traffic – TDR Option 2 16-49
Table 16.16: Vehicle Trip Distribution - Project Excluding GCR Works 16-51
Table 16.17: Predicted AADT with Construction Phase Traffic - Main Wind Farm Site Only – TDR Option 1 16-54
Table 16.18: Predicted AADT with Construction Phase Traffic - Main Wind Farm Site Only – TDR Option 2 16-55
Table 16.19: Vehicle Trip Distribution - GCR Works 16-57
Table 16.20: Predicted AADT (GCR Works) – TDR Option 1 16-60
Table 16.21: Predicted AADT (GCR Works) – TDR Option 2 16-61

FIGURES

Figure 16.1:Site location and surrounding roads 16-3
Figure 16.2: Grid connection route options 1 & 2 16-13
Figure 16.3: Turbine delivery routes options 1 & 2 16-14
Figure 16.4: Option 2 TDR 16-16
Figure 16.5: Proposed site entrances layout 16-21
Figure 16.6: View to east of existing field entrance along the L5523 at 'X' = 0m 16-22
Figure 16.7: View to west of existing field entrance along the L5523 at 'X' = 0m 16-23
Figure 16.8: Haul route map 16-25
Figure 16.9: Nearest quarries for building materials 16-27
Figure 16.10: Grid connection route options 16-34
Figure 16.11: Average daily trip distribution - project including GCR works 16-43
Figure 16.12: Average daily trip distribution - project excluding GCR works 16-52
Figure 16.13: Average daily trip distribution - GCR works 16-58

APPENDICES (EIAR Volume III)

Appendix 16.1 Turbine delivery route assessment report
Appendix 16.2 Traffic count data

16 TRAFFIC AND TRANSPORT

16.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) for the proposed Tullacondra Green Energy Project ('the Project') evaluates the Project in the context of the traffic and transportation within the study area. The assessment examines potential effects and identifies mitigations for construction, operation and decommissioning phases of the Project.

The Project includes the construction, operation and decommissioning phases of a wind energy development consisting of nine wind turbine generators with foundations and crane pad hardstanding areas; a permanent meteorological mast; an on-site 38kV substation, underground cabling connecting the turbines to the on-site substation; and underground grid connection to the boundary of the Mallow 110kV substation; along with all associated site works including site clearance, temporary compounds and storage areas; a new temporary entrance and upgrade of an existing entrance; upgrade of existing site tracks and construction of new site tracks; site drainage; and ancillary developments including security gates and fencing, lighting and signage; and biodiversity mitigations and enhancements. This chapter includes an assessment of the likely significant effects from both Grid Connection Route (GCR) Options and both Turbine Delivery Routes (TDR) Options.

The site layout plan of the proposed wind farm is shown in **Figure 1.4**, in EIAR **Chapter 1 Introduction**. Further details of the Project, the construction programme and sequencing of works which are used as the basis for assessments in this EIAR are provided in **Chapter 5 Project Description**.

16.1.1 Statement of authority

The Traffic and Transport Chapter was prepared by Graham Young (NOD Dublin) and has been reviewed by Mark Dignam (NOD Dublin).

Graham Young is Senior Engineer of NOD Dublin and is a Chartered Engineer with over twenty years of experience in the design, and management of civil and structural engineering projects. He has extensive experience in the analysis and design of Road networks, Road upgrade works and Traffic Impact Assessments. Graham has been responsible for Traffic Impact Assessments on a large number of projects including, Sancta Maria College, Johnstown Educational Campus and Bray Educational Campus. Graham has also been responsible for the design of village improvement schemes at Cornellscourt and Kilshane.

Mark Dignam is Director at NOD Dublin and a Chartered Engineer with over twenty-two years in project management and design of infrastructure engineering projects of all sizes and levels of complexity. He has extensive experience in Civil Engineering Design, Water and Power Sector Infrastructure. Mark has been the Lead Engineer for several wind farm projects including Mountlucas (80MW) Wind Farm in county Offaly and Bruckana (40MW) Wind Farm in county Laois. Mark has been responsible for Traffic Impact Assessments

on a variety of projects including Vartry Water Supply Scheme, Longford Water Supply Scheme, Laytown Educational Campus as a well as being reviewer for Graham's work.

16.1.2 Study area

The Zone of Influence (ZoI) determines the receiving environment for the activities associated with the Project (i.e., an area that could be affected by changes as a result of project activities). In the case of Traffic and Transport, the likely environmental effects during all phases of the development for the proposed Project are local. Based on professional judgement, the ZoI for the Project is a 200m corridor of the TDR options (from Foynes and Ringaskiddy ports to site), GCR options (from the site to the Mallow 110kV substation) and construction haul routes.

The site location and surrounding road network including the study area is identified in **Figure 16.1**.

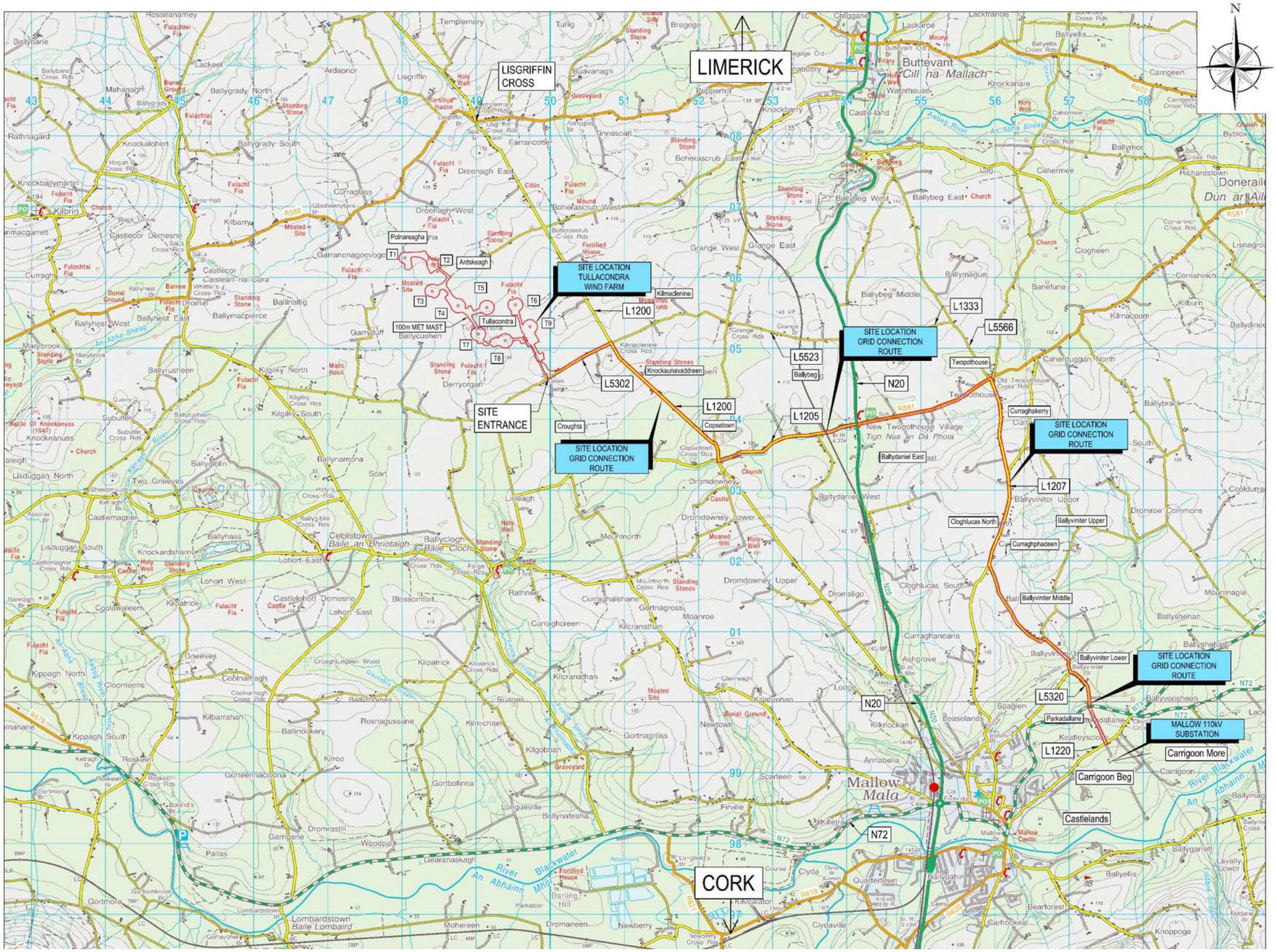

Figure 16.1:Site location and surrounding roads

16.2 Assessment methodology

The details of the Project are considered in relation to the construction, operation and decommissioning phases. The assessment uses a combination of field surveys, desktop studies and consultation. The methodologies used in the assessment align with best practice guidance for wind farms and road projects.

The following guidance was used for the assessment of traffic and transport impacts in this EIAR:

- Institute of Management and Assessment (IEMA) Guidelines: Environmental Assessment of Traffic and Movement, 2023[1].
- Transport Infrastructure Ireland (TII) Publication: Traffic and Transport Assessment Guidelines, 2014[2].
- TII Project Appraisal Guidelines for National Roads Unit 5.3 - Travel Demand Projections, 2019[3].
- Environmental Protection Agency (EPA) Guidelines on The Information to Be Contained in Environmental Impact Assessment Reports, 2022[4].
- Cork County Council – County Development Plan 2022 – 2028.
- TII Project Appraisal Guidelines for National Roads: Estimating AADT on National Roads, October 2016[5].
- Guidance on the preparation of the Environmental Impact Assessment Report, European Commission, 2017[6].
- TII Geometric Design of Junctions (priority junctions, direct accesses, roundabouts, grade separated, and compact grade separated junctions) DN-GEO-03060 April 2017[7].

Traffic count data was obtained from open-source TII traffic counter information. Other key sources of information used to assess traffic impacts include the following:

- Ordinance survey and aerial mapping.
- Project construction methodologies.
- Site Layout plans.

[1] Institute of Management and Assessment (IEMA) Guidelines: Environmental Assessment of Traffic and Movement, 2023

[2] Transport Infrastructure Ireland. (2014). Traffic and Transport Assessment Guidelines.

[3] Transport Infrastructure Ireland. (2019). TII Project Appraisal Guidelines for National Roads Unit 5.3 - Travel Demand Projections.

[4] EPA. (2022). Guidelines on The Information to Be Contained in Environmental Impact Assessment Reports.

[5] Transport Infrastructure Ireland. (2016). TII Project Appraisal Guidelines for National Roads: Estimating AADT on National Roads.

[6] European Commission. (2017). Guidance on the preparation of the Environmental Impact Assessment Report.

[7] Transport Infrastructure Ireland. (2017). TII Geometric Design of Junctions (priority junctions, direct accesses, roundabouts, grade separated, and compact grade separated junctions) DN-GEO-03060

- Route Surveys for the TDR options were carried out by Brian Foley & Associates and reports of same are provided in EIAR **Volume III, Appendix 16.1** Turbine Delivery Route Assessment Report.
- A traffic count survey for the local roads (no data available on TII) carried out by Traffinomics Limited. This survey data has been provided in EIAR **Volume III, Appendix 16.2**.

Based on the Project construction methodologies and phasing described in EIAR **Chapter 5 Project Description**, an estimate of the traffic likely to be generated by each phase of the Project is estimated to identify potential impacts on local roads and road users within the study area. An 18-month construction programme, as outlined in EIAR **Chapter 5 Project Description** is assumed for construction traffic generation movement calculations.

The traffic estimates generated are used to assess the impact on the road network in numerical terms, including an assessment of the Annual Average Daily Traffic (AADT) and the potential for additional delay and risk of collisions.

Construction Phase

The IEMA Guidelines state that two rules need to be considered when assessing the impact of development traffic on a highway link:

- Include highway links where traffic flows would increase by more than 30% (or the number of heavy goods vehicles (HGVs) would increase by more than 30%); and
- Include any other specifically sensitive areas where traffic flows would increase by 10% or more.

Less than a 30% increase is considered to result in imperceptible changes in the environmental effects of traffic. The IEMA Guidelines consider that projected changes in traffic flows of less than 10% create no discernible environmental effect.

Specifically, sensitive areas referred to above may include accident 'black spots', conservation areas, hospitals or links with high pedestrian flows.

This is a similar approach to that outlined in TII's Traffic and Transport Assessment Guidelines (PE-PDV-02045). The Traffic and Transport Assessment Guidelines set out advisory thresholds, with respect to traffic movements, for when a Traffic and Transport Assessment is required as follows:

- 100 trips in / out combined in the peak hours for the proposed development.
- Development traffic exceeds 10% of turning movements at junctions with and on National Roads.
- Development traffic exceeds 5% of turning movements at junctions with National Roads if location has potential to become congested or sensitive.

Should the development exceed 100 trips in / out combined in the peak hours for the proposed development as well as exceeding 10% of turning movements at junctions with and on National Roads or Development traffic exceeds 5% of turning movements at junctions with National Roads if location has potential to become congested or sensitive a full Traffic and Transport Assessment would be required.

The construction phase assessment has been limited to roads immediately adjacent to the Project and any roads further afield where traffic would increase by greater than 30% or 10% at nodes such as accident 'black spots', conservation areas, hospitals or links with high pedestrian flows.

Operational Phase

Estimated trip generation for the Project was provided for the assessment.

Effects on Pedestrian /Cyclist

Pedestrian / cyclist severance, delay, amenity, fear and intimation was assessed by considering the baseline traffic flows (AADT) and future traffic flows, as relevant. The effect on pedestrian / cyclists is directly linked to the increase in traffic levels, the proportion of HGV traffic and vehicle speeds.

The IEMA Guidelines acknowledge that the measurement and prediction of severance is extremely difficult and that the correlation between the extent of severance and the physical barrier of a road is not clear.

It notes that there are no predictive formulae which give simple relationships between traffic factors and levels of severance. However, the IEMA Guidelines do accept that in general, marginal changes in traffic flows are, by themselves, unlikely to create or remove severance.

Factors which need to be considered when determining severance comprise road width, traffic flows, speed of traffic, the presence of pedestrian crossing facilities and the number of pedestrian movements across the affected route.

The IEMA Guidelines suggest that:

- Changes in flow of up to 30% would produce slight changes in severance;
- Changes in flow of up to 60% would produce moderate changes in severance; and
- Changes in flow of up to 90% would produce substantial changes in severance.

It is recognised that these are guidelines only and are highly dependent on existing ambient traffic levels.

They are not considered to be definitive measures of severance and should be used with care and specific local conditions should be taken into consideration. The guidelines have been used to inform impact magnitude criteria for the assessment. Professional judgment has been applied to identify the likely scale of effects.

Pedestrian delay

The IEMA Guidelines note that changes in the volume, composition and/or speed of traffic may affect the ability of people to cross roads. Typically, increases in traffic levels result in increased pedestrian delay, although increased pedestrian activity itself also contributes. The IEMA Guidelines do not set any thresholds for absolute or actual changes in delay, recommending instead that assessors use their judgment to determine the significance of the effect.

The IEMA Guidelines refer to a report published by the Transport Research Laboratory (TRL) as providing a useful approximation for determining pedestrian delay. The TRL

research[8] concludes that the mean pedestrian delay was found to be eight seconds at flows of 1,000 vehicles per hour, and below 20 seconds at 2,000 vehicles per hour for various types of crossing condition.

A two-way flow of 1,400 vehicles per hour has been adopted as a lower threshold for assessment (equating to a mean 10 second delay for a link with no pedestrian facilities) in the TRL report.

Below this flow, pedestrian delay is unlikely to be a significant factor. This is deemed to be a robust starting point for narrowing down the modelled routes within the study area and ensuring the routes selected exceeded the suggested threshold of analysis in IEMA Guidelines. It should be noted that for controlled forms of pedestrian crossing the pedestrian delays are less.

As a result, any road with a two-way flow of less than 1,400 vehicles per hour is deemed to have a negligible effect. Roads above this are assessed on the basis of professional judgment.

IEMA Guidelines define pedestrian amenity as the relative pleasantness of a journey and may be influenced by fear and intimidation if they are relevant. As with pedestrian delay, pedestrian amenity is considered to be affected by traffic volumes and composition along with pavement width and pedestrian activity. The IEMA Guidelines suggest that a tentative threshold for judging the significance of changes in pedestrian amenity would be where the traffic flows are halved or doubled.

The Guidelines have been used to inform impact magnitude criteria for the assessment. Professional judgment has been applied to identify the likely scale of effects.

Pedestrian Fear and Intimidation

A number of factors are considered relevant in determining changes in the level of fear and intimidation experienced by pedestrians and cyclists including volume of traffic; percentage of HGVs; speed of traffic; proximity to people; and the availability and quality of pedestrian infrastructure.

The IEMA Guidelines set out the criteria reproduced in **Table 16.1** for measuring the effects of fear and intimidation.

The IEMA Guidelines stress the need for professional judgment when applying the above criteria. Accordingly, the guidelines have been used to inform impact magnitude criteria for the assessment. Professional judgment has been applied to identify the likely scale of effects.

[8] Transport Research Laboratory, 1991. The Estimation of Pedestrian Numbers.

Table 16.1: Pedestrian Fear and Intimidation Criteria

Pedestrian Fear and Intimidation Criteria			
Degree of Hazard	Average Traffic Flow over 18hr day (vehicles per hour)	Total 18-hr HGV Flow	Average Speed (mph)
Extreme	1,800+	3,000+	20+
Great	1,200–1,800	2,000–3,000	15-20
Moderate	600–1,200	1,000–2,000	10-15

Driver delay

This assessment considers the duration of delays or benefits i.e., less time to get through the network as a result of network improvements, occurring to the road users on the local road network based upon the estimated increase in traffic as a result of the Project during the construction phase and operational phase.

IEMA Guidelines note that driver delay can occur at several points on the network, although the effects are only likely to be significant when the traffic on the highway network is predicted to be at or close to the capacity of the system. Professional judgment has been applied to determine the significance of residual effects.

Accidents and Safety

There is no formal published guidance for the assessment of accidents and safety. Therefore, professional judgment has been applied to assess the implications of local circumstances and the Project's likely effect which may increase or decrease the risk of accidents.

16.2.1 Receptor sensitivity/value criteria

Highway Network

The potential receptors are the users of transport networks within the relevant study area. The sensitivity of a road can be defined by the vulnerability of the user groups who are likely to use it, i.e., the elderly or children.

A sensitive area may be where pedestrian activity is high, near a school, or an accident black spot.

It also takes into account the existing nature of the road, i.e., an existing residential area is likely to be more sensitive than a road capable of carrying larger volumes of traffic such as an R-Road, N-Road or M-Road.

Professional judgement has been used to define the value of receptors.

The sensitivity of receptors has been classified as low, medium or high, in accordance with the criteria set out in **Table 16.2**.

Table 16.2: Receptor Sensitivity

Pedestrian Fear and Intimidation Criteria	
Sensitivity	**Criteria**
High	Receptors of greatest sensitivity to traffic flow: schools, colleges, playgrounds, accident clusters, retirement homes, roads without footways that are used by pedestrians.
Medium	Receptors of moderate sensitivity to traffic flow: congested junctions, doctors' surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, recreation facilities.
Low	Receptors with some sensitivity to traffic flow: places of worship, public open space, tourist attractions and residential areas with adequate footway provision.
Very Low	Receptors with very low sensitivity to traffic flows and those sufficiently distant from affected roads and junctions.

Impact Magnitude Criteria

The magnitude of impact has been classified as low, medium or high, in accordance with the criteria set out in **Table 16.3.**

Table 16.3: Impact Magnitude Criteria

Impact Magnitude Criteria				
Impact	**Assessment Criteria**			
	Low	**Medium**	**High**	**Very High**
Severance	Increase in total traffic flows of 30% or under	Increase in total traffic flows of 30% – 60%	Increase in total traffic flows of 60%-90%	Increase in total traffic flows of 90% and above
Pedestrian Severance, Delay, Amenity, Fear and Intimidation	This has been assessed on a case-by-case basis using professional judgement subject to the sensitivity and vulnerability of the receptor. Threshold for judging the significance of changes to pedestrian amenity where the traffic flows is halved or doubled.			
Driver Delay	This has been assessed on a case-by-case basis using professional judgement subject to the sensitivity and vulnerability of the receptor. Impacts are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system.			
Accidents and Safety	Accident data for the local area have been reviewed and professional judgement have been applied to assess the implications of potential increase/decrease in traffic.			

Significance Criteria

Impacts have been assessed on the basis of the value/sensitivity of receptors against the magnitude of impact to determine the scale of effect as presented in **Table 16.4.** The matrix has been informed by the EPA Guidelines.

Table 16.4: Significance Criteria

Scale of Effect Criteria				
Magnitude	**Sensitivity of Receptors**			
	Very Low	Low	Medium	High
Low	Imperceptible	Not Significant	Slight	Slight
Medium	Not Significant	Slight	Slight	Moderate-Significant
High	Slight	Slight	Moderate-Significant	Very Significant
Very High	Slight	Moderate-Significant	Very Significant	Profound

The criteria used to assess whether an effect is significant or not, are given in the EPA Guidelines 2022 and are set out in EIAR **Chapter 2: EIAR Methodology**. The significance of effects is determined by consideration of the sensitivity of the receptor, the magnitude of impact and scale of the effect. In assessing the significance of an effect, consideration has been given to the quality, duration, probability and type of the effect, and its geographical extent, and the application of professional judgement.

Based on professional judgement, and with reference to the EPA Guidelines, moderate-significant, very significant and profound effects are considered significant. Imperceptible, not significant and slight criteria are considered not significant in EIA terms.

Where the existing baseline HGV or total traffic flows are very minor, a small increase in vehicles would produce a large change in magnitude whereas in real terms the increase in traffic may still be considered to be negligible or slight. In these instances, appropriate professional and experienced judgements have been made.

Nature of Effect Criteria

- The nature of the effect has been described as either adverse, neutral or positive as follows:
- Positive – An advantageous effect to a receptor;
- Neutral – An effect that on balance, is neither positive nor adverse to a receptor; or
- Adverse – A detrimental effect to a receptor.

16.2.2 Assumptions and limitations

Traffic generated from the Project is assigned to the network based on existing directional flows. Directional flows are based on traffic survey data.

Mitigation measures are proposed followed by identification of residual impacts. The potential for cumulative effects from other developments listed in section 2.4.3.3 of EIAR **Chapter 2 EIA Methodology** is addressed in section 16.9.

A Construction Traffic Management Plan (CTMP) which incorporates all mitigation measures proposed during construction phase is provided in EIAR **Volume III, Appendix 5.2.** This document will be updated and agreed with the Cork County Roads Authority and An Garda Siochána prior to commencing construction. The CTMP has been developed to minimise the impact of construction related activities on the local road network.

16.2.3 Consultation

Transport Infrastructure Ireland (TII), Cork County Council and other local bodies were consulted through the EIAR scoping process. Details of the consultations and responses received are contained in EIAR **Chapter 3 Scoping, Consultations, Community Engagement & Key Issues**. A copy of the correspondence from TII has been included in EIAR **Volume III, Appendix 3.2**.

16.3 Existing environment

16.3.1 Existing road network

Roads in the Republic of Ireland are classified as motorways, national (primary and secondary), regional, and local roads. Transport Infrastructure Ireland (TII) has overall responsibility for the planning and supervision of the construction and maintenance of motorways, national primary and secondary roads. The local authorities have responsibility for all non-national roads. The hierarchy of roads throughout Ireland is outlined in **Table 16.5.**

The GCR Option 1 will utilise the L5302, the L1200, the L1205, crosses the N20 and through R581, the L1207 the L53201 at Carhue, the L5320 to Ballyvinter crosses the N72, the L12201 then crossing the L1220-25 (St. Joseph's Road) to meet the boundary of Mallow 110kV substation (see **Figure 16.2).**

The GCR Option 2 will utilise the L5302, the L5523, crosses the N20 onto L5568, the L5566, crosses the R581 onto L1207 and then follows the same path as Option 1 to the boundary of Mallow 110kV Substation (see **Figure 16.2)**.

The TDR Option 1 from Foynes Port will utilise the N69, the N18, the M20; the N20, the L5523 and L5302 to deliver abnormal loads to the wind farm site entrance (see **Figure 16.3)**.

The TDR Option 2 from Ringaskiddy Port will utilise the N28, the N40, the N8, the R635 the N20 for delivery of wind turbine blades to the wind farm site. All other Wind Turbine Loads will utilise the N40, the N8, the N20, the L1200 and the L5302 to the wind farm site entrance (see **Figure 16.3)**.

The TDR options are described in more detail in section 16.4.3.

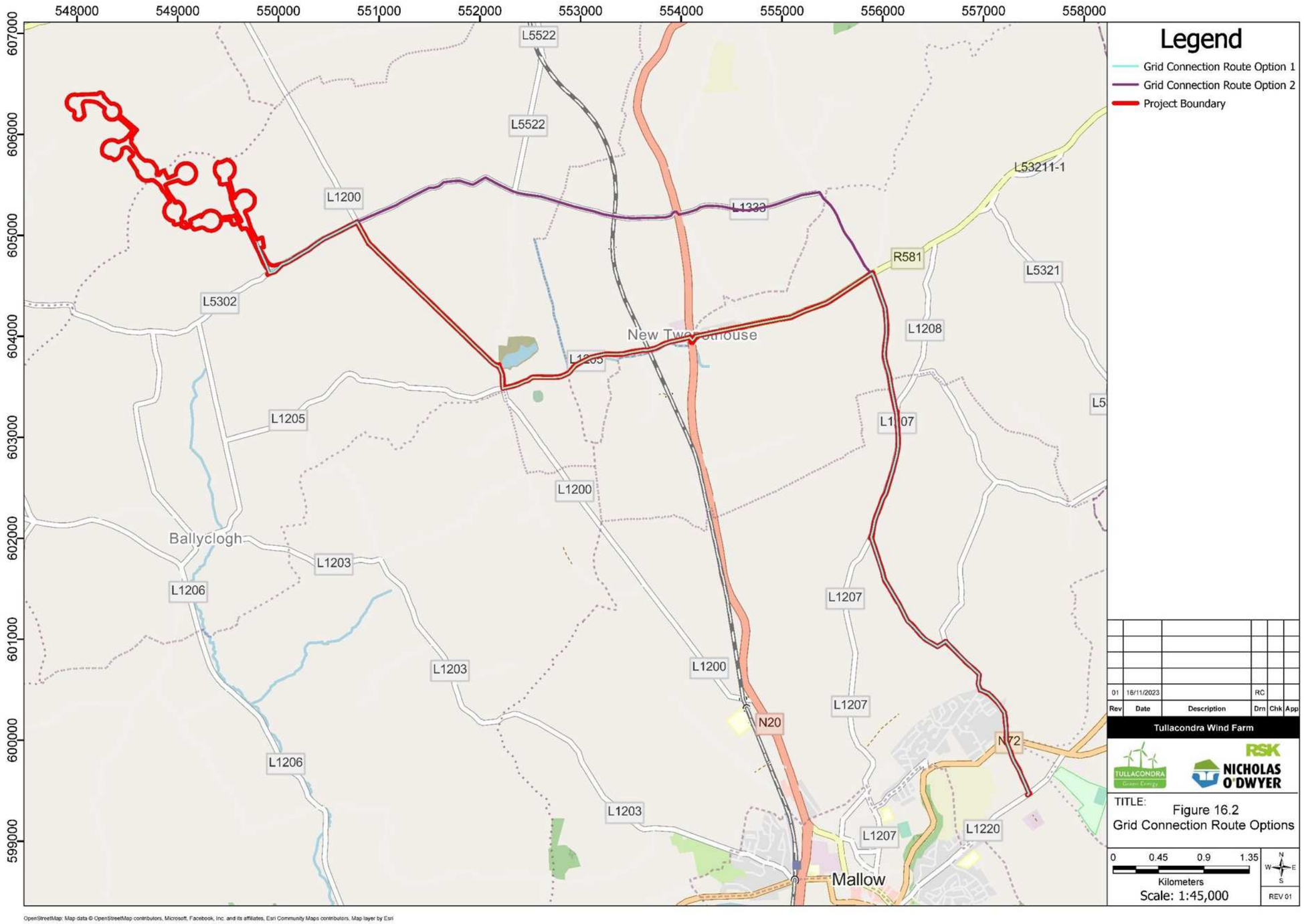

Figure 16.2: Grid connection route options 1 & 2

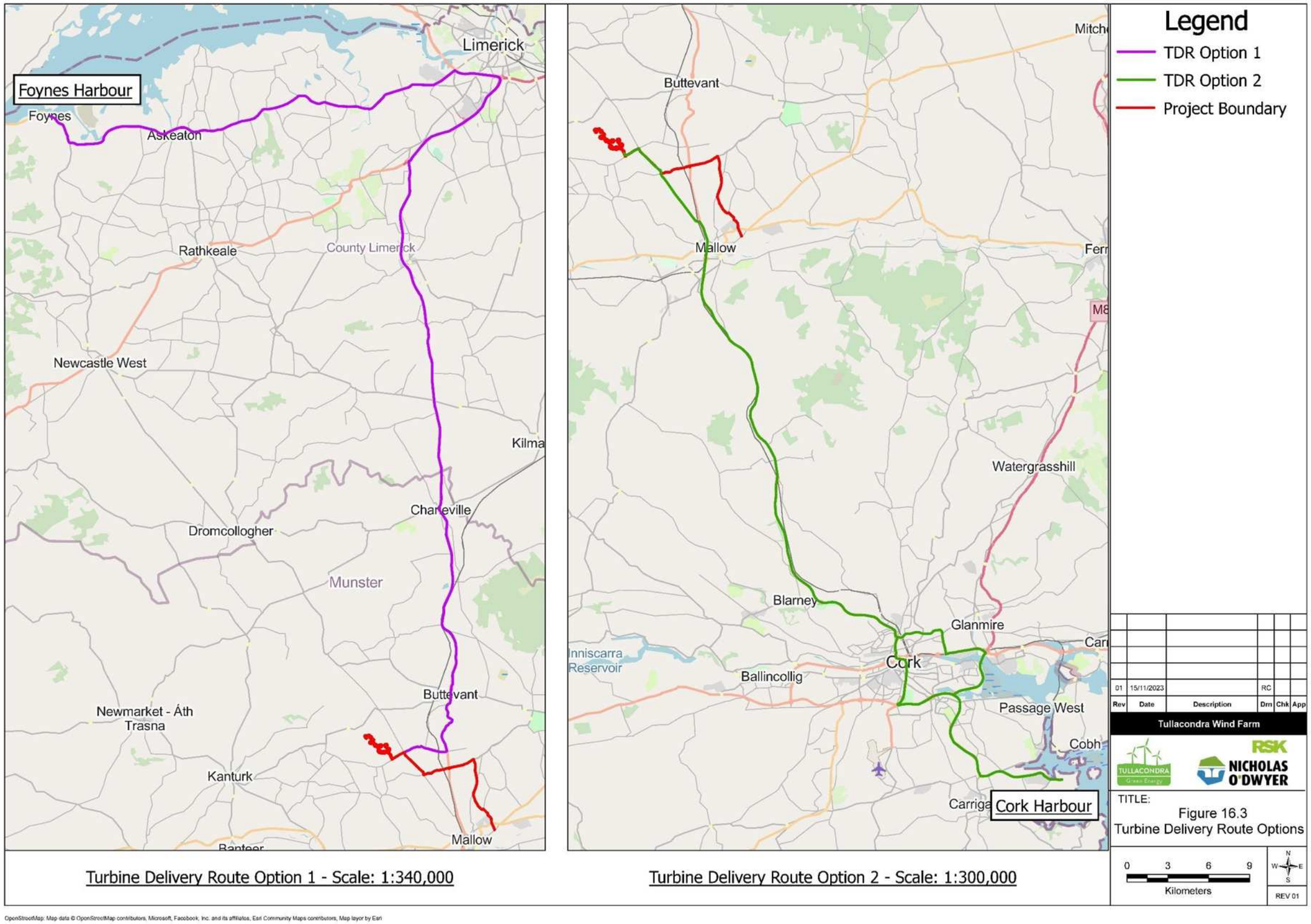

Figure 16.3: Turbine delivery routes options 1 & 2

Table 16.5: Road categories

Road Category	Description
Motorways	These are high quality multiple lane roads with limited grade separated junctions. They are high speed (120kmph) road predominantly provided to facilitate strategic traffic with reduced journey times.
National Primary Roads	These are predominantly single carriageway, with some that are dual carriageway. Generally high speed (100kmph) roads that facilitate strategic traffic, with reduced journey times.
National Secondary Roads	These are medium distance through-routes connecting towns, serving medium to large geographical areas and link to primary routes to form a homogeneous arterial network.
Regional Roads	Predominantly single carriageway roads of regional and local importance. These roads generally receive more frequent maintenance criteria than Local Roads and therefore tend to be structurally sound.
Local Roads (Primary, Secondary and Tertiary)	The local road system is operated in three tiers defining local importance, usage and maintenance priorities. They form a network of single carriageway roads of varying quality.

16.3.1.1 Motorways

The nearest motorway to the wind farm site is the M20 which connects to the N20 and the M7. The M7 is the arterial route for traffic connecting Limerick to Dublin. The M20 is located approximately 44km to the north of the wind farm site. For delivery of turbine components originating at Foynes (Option 1), it is proposed to utilise the M20 motorway for approximately 10km. The AADT for the M20 in 2023 according to TII automatic traffic counter data (M20 Between Jn02 Loughmore and Jn03 Ballycummin, Co. Limerick) was approximately 31,212 with approximately 5.9% of this total comprised of HGV traffic. For delivery of components from Ringaskiddy (Option 2), no motorways would be utilised.

16.3.1.2 National Primary Routes

Five kilometres to the east of the wind farm site, the closest national primary route is the N20 which connects the M20 at Limerick to Cork City. It is proposed that approximately 44km of this road will be part of the Option 1 TDR. The AADT for the N20 in 2023 according to TII automatic traffic counter data (N20 Between Croom and M20, Croom North, Co. Limerick) was 14,994 with 6.0% of this total comprised of HGV traffic.

Another primary road which is along the TDR Option 1 is the N18 which is located Northeast of Project near Limerick, the delivery route continues from the N69 along the N18 for approximately 4km before joining the M20.

The Option 2 TDR starts along the N69 and continues for approximately 30km until it joins the N18. The AADT for the N69 in 2023 according to TII automatic traffic counter data (N69 Between Askeaton and Foynes, Clondrinagh, Co. Limerick) was 5,982 with 8.1% of this total comprised of HGV traffic.

The TDR Option 2 starts along the N28 at Ringaskiddy and continues for approximately 12km until it joins the N40. The AADT for the N28 in 2023 according to TII automatic traffic counter data (N28 Between N40 & Rochestown, Co Cork) was 45,865 with 2.8% of this total comprised of HGV traffic.

The TDR Option 2 then splits in two directions; East along N40 for the wind turbine blades (option 2a), and West along N40 for all other wind turbine components (option 2b). The TDR continues West along N40 for approximately 3.5km from where it joins the N27 and continues for approximately 3.5km. From here, it connects onto the N8 for less than a kilometre and then joins into N20 going North for approximately 41km towards the site. The wind turbine blades continue East along N40, going through the Jack Lynch Tunnel for approximately 4km from where it joins the N25/N8 intersection and continues West for approximately 2.6km. From here, it connects onto the regional road R635 for approximately 5km and then joins into the N20 going North for approximately 39km towards the wind farm site. Refer to **Figure 16.4.**

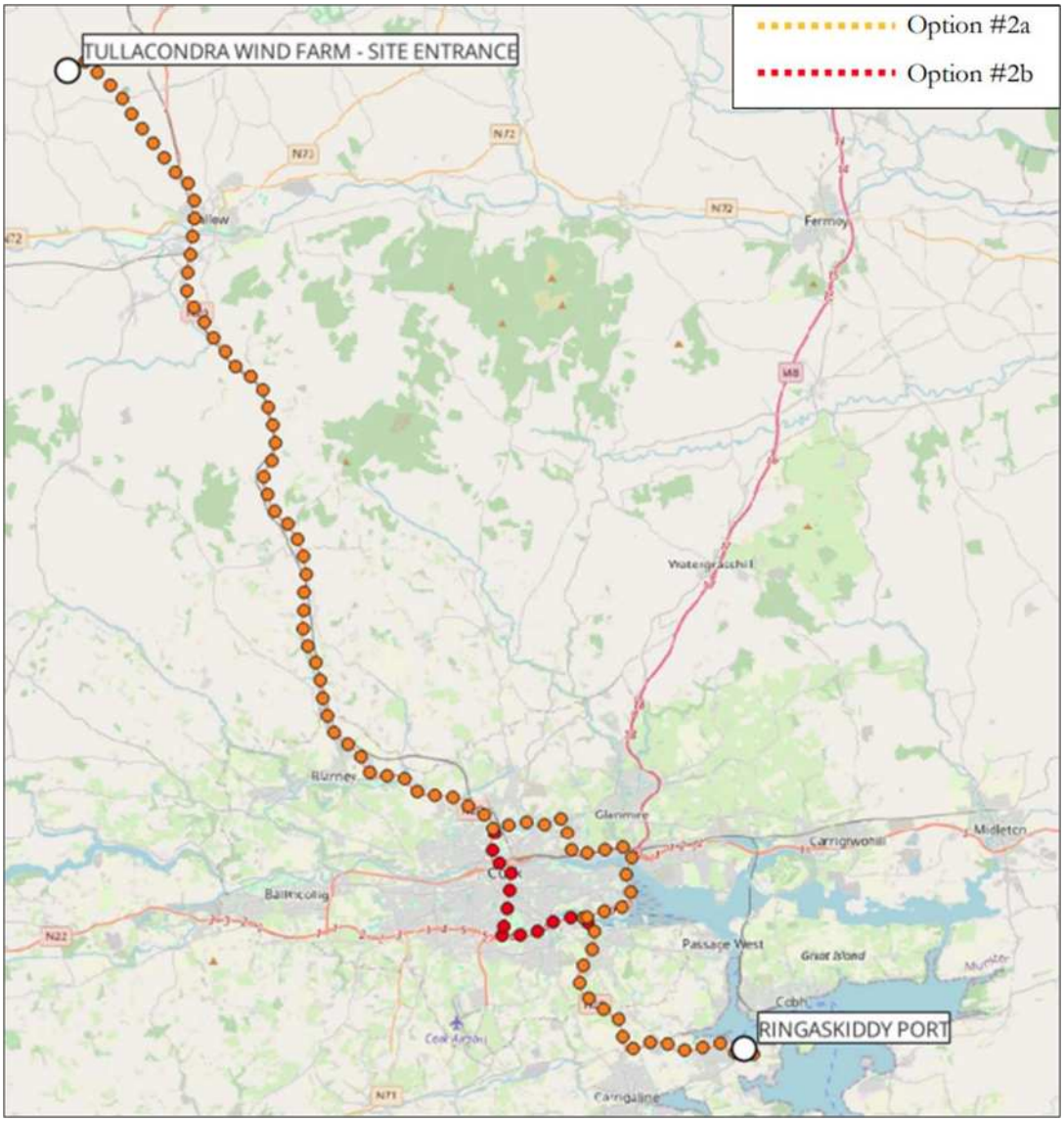

Figure 16.4: Option 2 TDR

The AADT for the N40 in 2023 according to TII automatic traffic counter data (N40 Between Kinsale Road and Douglas Interchange, South Ring Road, Togher, Co. Cork) was 80,869 with 3.2% of this total comprised of HGV traffic. The AADT for the N20 heading North from Cork in 2023 according to TII automatic traffic counter data (N20 Between Blarney and Cork, Blackpool, Co. Cork) was 22,182 with 4.7% of this total comprised of HGV traffic.

16.3.1.3 National Secondary Routes

The closest national secondary route to the south of the site is the N73. The N73 runs from the M8 motorway to Mallow and is located approx. 14km from the wind farm site entrance. The AADT for the N73 in 2023 according to TII automatic traffic counter data was 2,283, with 8.2% of this total comprised of HGV traffic.

16.3.1.4 Regional Roads

The closest regional road is the R580 which is located approximately 2.5km to the north of the wind farm site. The R580 connects the R576 to the N20 at Buttevant. This regional road will not be used for delivery of turbine components. However, it may be used as a transport route for building materials and for workers coming to from site. The R635 is a regional road which would be utilised for the TDR Option 2.

16.3.1.5 Local Roads

There are several local roads in the vicinity (within the ZoI) of the Project. The Option 1 TDR proposes the use of two of the local roads to the South of the wind farm site, the local road which connects Kilmaclenine to the N20 (L5523) and the local road which connects the wind farm site entrance to Kilmaclenine at Croughta (L5302).

TDR Option 2 proposes the use of two of the local roads to the South of the wind farm site, the local road which runs through Knockane from the N20 (L1200) (also known as the Lisgriffin road) and the local road which connects the wind farm site entrance to Kilmaclenine at Croughta (L5302).

Local roads associated with the GCR are located between the Mallow 110kV substation and the proposed on-site 38kV substation compound to the South of the wind farm site boundary. There are two GCRs assessed as part of this EIAR, GCR Option 1 utilises the L5302 road for approximately 1km before turning right onto L1200 (Lisgriffin road) for approximately 2.2km. From here, the connection turns left onto L1205 for circa 2km at which point it crosses the N20 and continues along R581 for approximately 2km. Here the GCR Option 1 turns right onto L1207 for approximately 2.7km where it turns left onto L53201. It continues along L53201 for circa 1.4km and then turns right and continues along L5320 for approximately 1.2km. Here it crosses the N72 onto a private lane and continues along L12201 for approximately 0.6km where it reaches the boundary of the Mallow 110kV Substation.

GCR Option 2 utilises the L5302 road for approximately 1km and continues along L5523 for approximately 1.8km. Here it crosses the N20 onto L5568 and continues along the local road for approximately 1.5km and turns right onto L5566. The route continues along this local road for approximately 1km to Fountainville and crosses the R581 onto L1207.

From here, the GCR Option 2 follows the same path as GCR Option 1 to the boundary of the Mallow 110kV Substation.

16.3.2 Traffic volumes

Existing traffic volumes on roads in the study area are shown in **Table 16.6** below. A medium Annual Growth Factor of 1.001 for HGV and 1.011 for LGV was chosen based on Table 5.5.1 - National Traffic Growth Forecasts: Annual Growth Factors in Unit 5.5 of the NRA Project Appraisal Guidelines[5]. Traffic count survey for the local roads (no data available on TII) carried out by Traffinomics Limited. This survey data has been provided in EIAR **Volume III, Appendix 16.2**.

Table 16.6: Baseline traffic volumes

Road	Existing Baseline AADT			Source
	HGV	LGV+Car	AADT	
N69 Between Askeaton and Foynes, Clondrinagh, Co. Limerick	535	5,831	6,366	trafficdata.tii.ie
M20 Between Jn02 Loughmore and Jn03 Ballycummin, Co. Limerick	1,935	31,424	33,359	trafficdata.tii.ie
N20 Between Croom and M20, Croom North, Co. Limerick	912	15,083	15,995	trafficdata.tii.ie
N28 Between N40 & Rochestown, Co Cork	1,262	42,256	43,518	trafficdata.tii.ie
N40 Between Kinsale Road and Douglas Interchange, South Ring Road, Togher, Co. Cork	2,612	81,641	84,253	trafficdata.tii.ie
N25 West of Mahon Interchange, between Mahon and Bloomfield Interchange	3,013	67,066	70,079	trafficdata.tii.ie
N08 Between Glanmire Roundabound and Jn19 N08/N25 Dunkettle, Cork	1,967	35,148	37,115	trafficdata.tii.ie
N20 Between Blarney and Cork, Blackpool, Co. Cork	1,036	21,483	22,519	trafficdata.tii.ie
L5523, L5302	16	246	262	Traffinomics Limited Traffic Count
L1200	18	658	676	Traffinomics Limited Traffic Count
Quarry delivery (L1200 north)	14	576	590	Traffinomics Limited Traffic Count

AADT figures were projected to a proposed construction commencement year of 2026 from 2023 source data in accordance with TII Project Appraisal Guidelines for National Roads Unit 5.3 - Travel Demand Projections, 2019[3].

Table 16.7: Projected traffic volumes

Road	Projected Baseline AADT		
	HGV	LGV	AADT
N69 Between Askeaton and Foynes, Clondrinagh, Co. Limerick	537	6,026	6,563
M20 Between Jn02 Loughmore and Jn03 Ballycummin, Co. Limerick	1,941	32,473	34,414
N20 Between Croom and M20, Croom North, Co. Limerick	915	15,587	16,502
N28 Between N40 & Rochestown, Co Cork	1,266	43,666	44,932
N40 Between Kinsale Road and Douglas Interchange, South Ring Road, Togher, Co. Cork	2,620	84,366	84,253
N25 West of Mahon Interchange, between Mahon and Bloomfield Interchange	3,023	69,304	70,079
N08 Between Glanmire Roundabound and Jn19 N08/N25 Dunkettle, Cork	1,974	36,321	38,295
N20 Between Blarney and Cork, Blackpool, Co. Cork	1,039	22,200	23,239
L5523, L5302	17	255	272
L1200	19	680	699
Quarry delivery (L1200 north)	15	596	611

16.4 The Project

A detailed description of the Project assessed is provided in EIAR **Chapter 5 Project Description.** Four main elements of the Project are addressed in this chapter:

- Site Access - Upgrade and creation of site entrances onto the public road.
- Construction haul routes.
- TDR options.

- GCR options.

16.4.1 Site access

The proposal is to provide a new temporary entrance along the L5302 approximately 120m east of an existing entrance at Croughta for access to the wind farm during the construction phase only. The existing entrance, which is currently used to access a private dwelling and a farm, is proposed for permanent access to the proposed wind farm during the operational phase. The proposals for site access are shown in **Figure 16.5.**

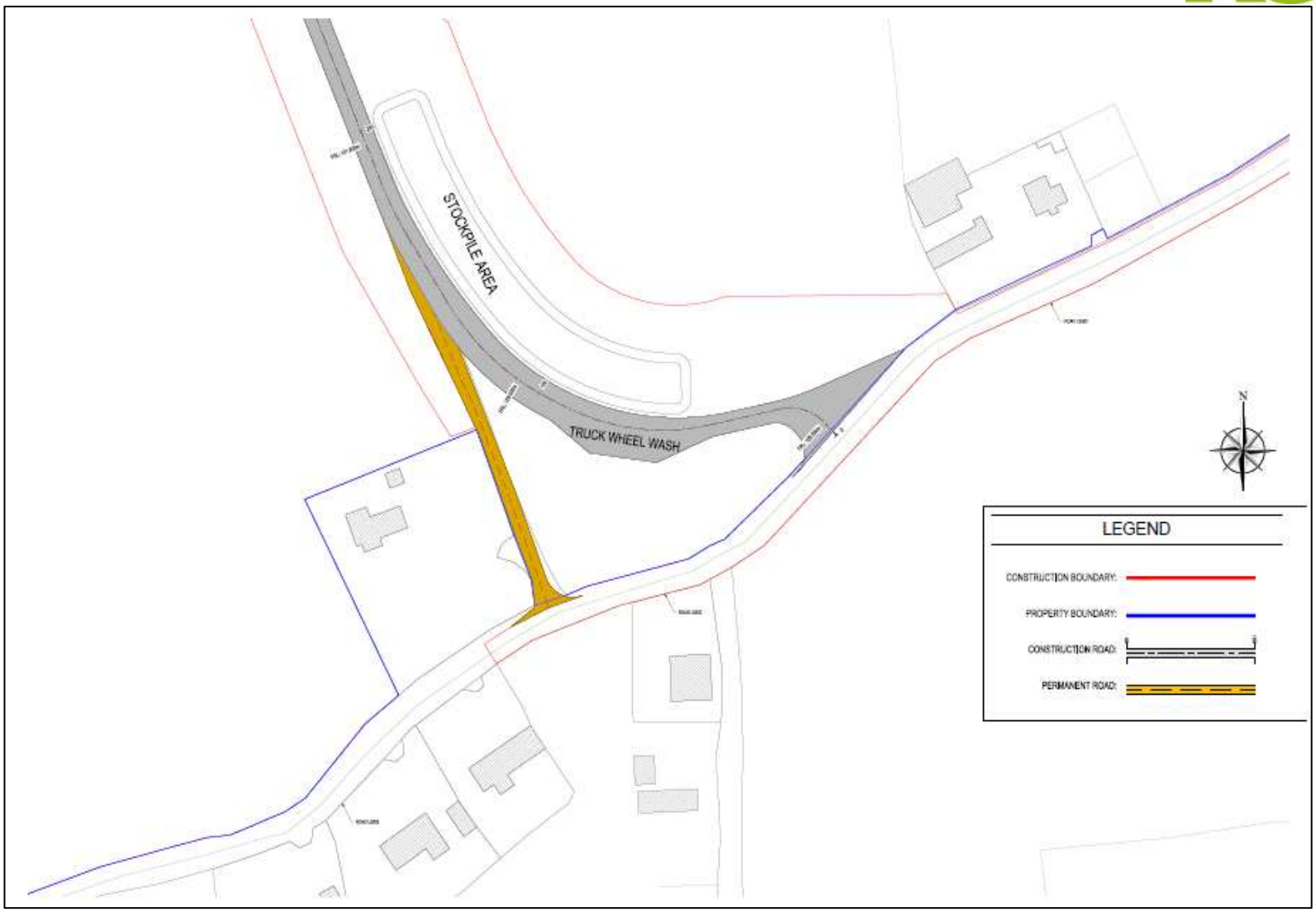

Figure 16.5: Proposed site entrances layout

The permanent site entrance for the proposed wind farm is located on the L5302 local road in Croughta. The required sightline distance for an 80kph road is 160m (80m to each side) in line with Transport Infrastructure Ireland (TII) standards (TII Publication DN-GEO-03060)[7]. An upgrade of the permanent entrance to the west is required to meet this standard.

Line of sight was first established at the existing field entrance. Visibility at this point allows for 200m west and 35m east. The view to the east is constrained by vegetation and an 'S' bend which hinders visibility. **Figure 16.6** and **Figure 16.7** provides photographs of the view to the east and the west of the proposed permanent entrance.

Figure 16.6: View to east of existing field entrance along the L5523 at 'X' = 0m

Figure 16.7: View to west of existing field entrance along the L5523 at 'X' = 0m

The location of the temporary site entrance is also along the L5302 Local Road in the townland of Croughta approximately 120m east of the permanent site entrance. A sightlines survey was conducted to identify an appropriate location for this entrance and a swept path analysis was carried out to determine land take required for delivery of turbine components. The temporary site entrance will comply with TII design guidelines DN-GEO-03060[7]. An unobstructed visibility splay of 80m in each direction set back 3m from the edge of the public road will be provided.

As reported in EIAR **Chapter 3 Scoping Consultations, Community Engagement and Key Issues** and **Chapter 4 Project Need and Alternatives Considered**, consultations were undertaken with Cork County Council, and it was confirmed that visibility splays measuring 80m on both sides of the entrance set back 3m from the edge of the public road is appropriate for the permanent and temporary site entrances at this location.

The works to upgrade the permanent site entrance and provide the temporary entrance, as described, will result in the temporary loss of trees and hedgerow along the public road boundary at this location. Following completion of the works, the boundary along the public road will be reinstated with permanent visibility splays provided only at the permanent entrance. The remainder of the public road boundary will be reinstated. A new fence line will be erected, and the hedgerow and trees replanted behind the permanent visibility splay and along the remainder of the public road boundary.

The proposed works to upgrade the permanent site entrance and create the temporary entrance, with associated sightlines, is shown in **Drawing Nos. 20910-NOD-XX-XX-DR-**

C-08101 and **20910-NOD-XX-XX-DR-C-08102**. These incorporate proposals for the control of surface water drainage at the site entrances.

16.4.1.1 Removal of hedgerows and treelines

As described above, the proposed works to upgrade the permanent site entrance and to create the temporary entrance will result in the loss of hedgerows and trees. A tree survey was undertaken in May 2023 along this stretch of road encompassing the site entrance proposals. Of the eight trees surveyed (all of which are common ash trees), seven trees are recommended for felling due to their condition (i.e., showing signs of ash dieback with poor future prospects) (tree nos. 0656 and 0657), showing signs of decay with the likelihood of becoming infected with ash dieback in the coming months (tree no. 0659), or already being dead (four trees under 0660). The one remaining tree (tree no. 0658) is noted as having poor future prospects due to the inevitable spreading of ash dieback to this tree at some point in the future. A copy of the Tree Survey Report is provided as Appendix 2 to the Planning Report submitted with the planning application.

The loss of hedgerows and trees to provide the site entrances proposals is addressed in EIAR **Chapter 7 Biodiversity**. The plans to reinstate hedgerows and trees along the wind farm site boundary is included in the Habitat Management Plan (HMP) contained in EIAR **Volume III, Appendix 7.3.**

16.4.2 Construction haul routes

In constructing the wind farm, materials and plant will need to be delivered to the wind farm site. The construction haul routes will include some of the surrounding road network which will need to cater for the additional traffic associated with the Project. The haul route map is shown in **Figure 16.8.**

Traffic associated with the construction phase include:

- HGVs carrying aggregates, pipes and other materials associated with construction of the internal access tracks, hard standings and drainage infrastructure.
- HGVs (Concrete wagons) carrying concrete and steel for turbine foundations and substation foundations.
- HGVs carrying building materials for the substation as well as electrical equipment and cabling.
- HGVs carrying plant and fuel.
- HGVs exporting site waste.
- Cranes and associated elements for erecting the turbines.
- Private cars and vans for the commuting workforce.

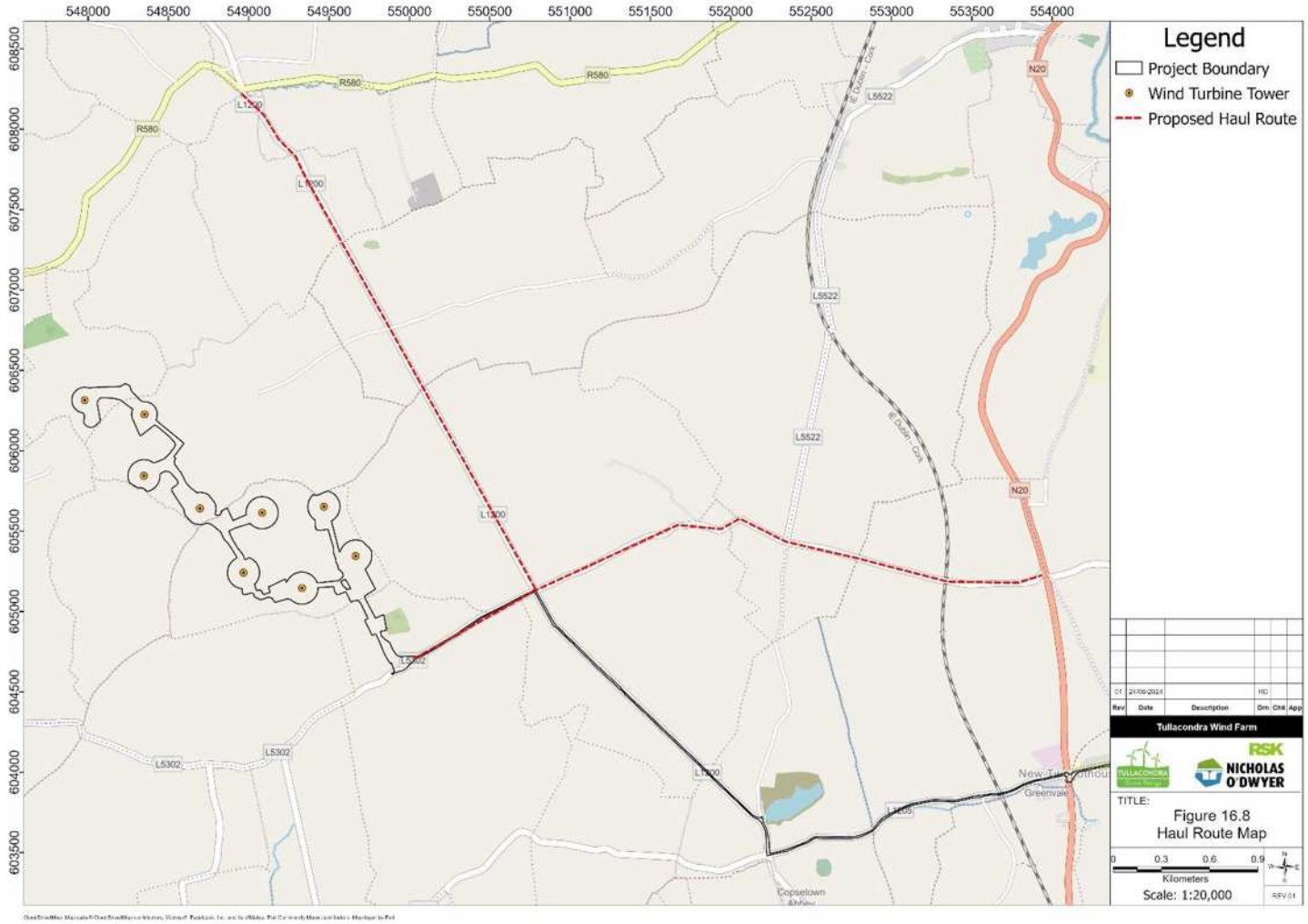

Figure 16.8: Haul route map

The surrounding quarries currently in operation and indicative haul routes to the site have been identified and are shown in **Figure 16.9.** The nearest suppliers of quarry stone (TII Class 6 products) are:

- Roadstone - Lackanamona, Mallow, Co. Cork. Located approximately 20km from Tullacondra.
- Buttevant Limestone Products Limited. - Farrancotter, Co. Cork. Located approximately 5.5km from Tullacondra
- Ballyhest Quarry - Ballyhest East, Co. Cork. Located approximately 7km from Tullacondra.
- Shane Foley Plant Hire Ltd - Ballyhea, Co. Cork. Located approximately 19km from Tullacondra.
- Lagan Cement - Danesfort, Upper Dromahane, Co. Cork. Located approximately 20km from Tullacondra.
- O'Flynn Quarries - Scart, Ballyclough and Kilgilky South, Cecilstown, Mallow, Co. Cork. Located approximately 2km from Tullacondra.

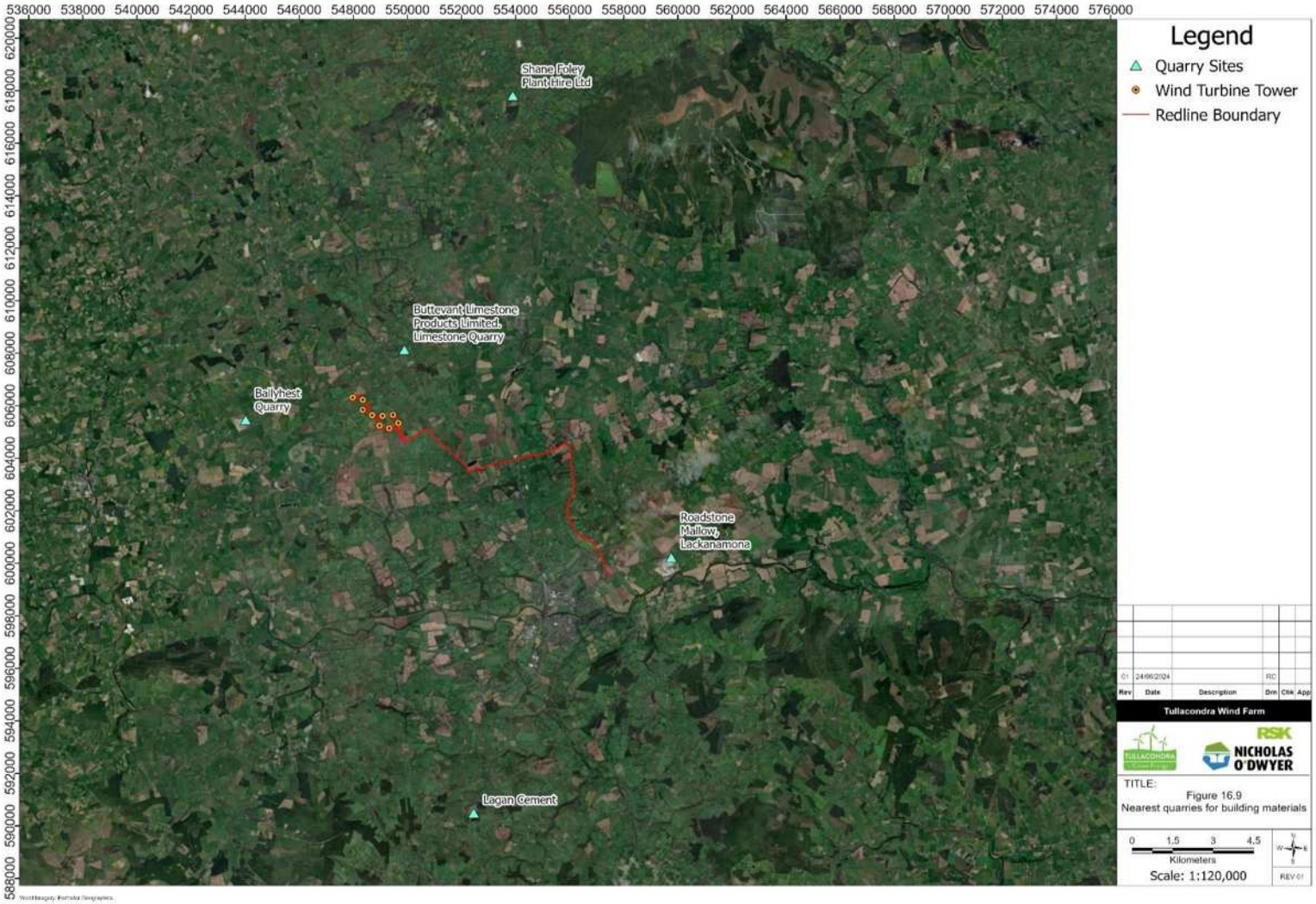

Figure 16.9: Nearest quarries for building materials

Authorised waste management facilities have been identified in the greater County Cork area as listed on the Local Authority Waste Facility Register by the National Waste Collection Permit Office. The authorised waste facilities utilised during the construction and decommissioning of the Project will depend on the contractors appointed and will depend on the capacity of the various facilities at the time of construction and decommissioning phases. A list of existing licensed waste facilities in proximity to the wind farm site is presented in **Table 16.8** below. These facilities were identified at the time of the preparation of this EIAR.

Table 16.8: Licensed waste facilities in the vicinity of Tullacondra wind farm

Licensed Waste Facility Location	Type of Waste
Tooreen South/Glashaboy South Carrignavar	Soil and Stone
Ballykenly, Glanworth	Soil and Stone
Newcastle, Blarney	Concrete, bricks, tiles, ceramics, soil and stone
Booladurragha North, Ballynoe, Mallow	Sludges from on-site effluent treatment
Spa Road, Mallow	Plastics, materials unsuitable for consumption or processing, sawdust, shavings, cuttings, wood, paper, cardboard, copper, bronze, brass, aluminium, lead, zinc, iron, steel, cables, glass, textiles, mixed construction and demolition waste, biodegradable kitchen and canteen waste, mixed municipal waste and other non-biodegradable wastes

16.4.3 Turbine delivery route options

There are two proposed TDRs as presented in **Figure 16.3**. A Turbine Delivery Route Assessment was carried out to identify the optimum delivery route to the wind farm site and is presented as EIAR **Volume III, Appendix 16.1**.

Large components associated with the wind farm construction will be transported to the wind farm site from Foynes Port via the Option 1 TDR or Ringaskiddy Port via TDR Option 2.

The TDR Option 1 to the wind farm site is as follows:

- Loads will depart Foynes Port and travel West-East via the N69 for approximately 30km until it joins the N18.
- Loads will travel south along the N18 for approximately 4km before exiting onto the M20.
- Loads will continue west on the M20 and then join the N20.
- Loads will continue to travel south on the N20 before turning off onto L5523.
- Loads will continue west on the L5523 and L5302 to the proposed site entrance.

The TDR Option 2 to the wind farm site is as follows:

- Loads will depart Ringaskiddy Port and travel Northeast via the N28 for approximately 12km until it joins the N40.
- Wind Turbine Blade loads will travel East along the N40 for approximately 4km before exiting onto the N8.
- Wind Turbine Blade loads will travel West along the N8 for approximately 2.6km before exiting onto the R635.
- Wind Turbine Blade loads will travel North along the R635 for approximately 5km before exiting onto the N20.
- All other Wind Turbine Loads will travel West along the N40 for approximately 3.5km before exiting onto the N8.
- All other Wind Turbine Loads will travel North through Cork along N8 for less than a kilometre before joining onto the N20.
- Loads will continue to travel North along the N20 for approximately 37km before turning off onto L1200.
- Loads will continue north on the L1200 for approximately 7.5km before turning left onto L5302.
- Loads will continue west on the L5302 to the proposed site entrance.

A detailed TDR Assessment Report (presented in EIAR **Volume III, Appendix 16.1**) has been undertaken to assess the suitability of TDR Option 1 and TDR Option 2 for the delivery of turbine components. The TDR Assessment Report describes the extent of works which will be required to facilitate the delivery of turbine components and found that limited works will be required to accommodate the delivery of turbine components and construction materials to the Project. All TDR route accommodation works to be undertaken will be temporary in nature including the temporary removal of road signs, street lighting and other street furniture; and the temporary hardcoring of road margins/verges and roundabout islands. A description of works at a number of key locations is described at **Table 16.9** and **Table 16.10** below; however, the TDR Assessment Report details all necessary works.

Table 16.9: Accommodation works on TDR option 1

TDR Node Reference Number	Location	Summary Description of Proposed Temporary Accommodation Works
Option 1 – Node 1	Junction of Port of Foynes Access Road & N69	Street furniture to be temporarily removed from roadside and splitter island. Ramps to be used to allow vehicle traverse kerbs of the splitter island. Tree/hedge trimming may be required.
Option 1 – Node 2	N69: Ferry Bridge	Tree/hedge trimming required. Utility Line/Poles to be temporarily diverted.
Option 1 – Node 3	N69: Clarina Roundabout	Street furniture to be temporarily removed. Modifications previously completed for traversing of abnormal loads are to be utilised. Survey at detailed design phase required of completed

TDR Node Reference Number	Location	Summary Description of Proposed Temporary Accommodation Works
		modifications to ensure their adequacy for the proposed WTG delivery vehicles. Tree/hedge trimming may be required.
Option 1 – Node 4a	N69: Dock Road West Roundabout	Steet furniture will require temporary removal. Tree/Hedge trimming required. Modifications previously completed for traversing of abnormal loads are to be utilised. Survey at detailed design phase required of completed modifications to ensure their adequacy for the proposed WTG delivery vehicles.
Option 1 – Node 4b	N69: Dock Road East Roundabout	Steet furniture will require temporary removal. Tree/Hedge trimming required. Temporary hardcore area to be installed in roundabout island to allow the abnormal load contraflow at this location. Any modifications previously completed at this location for traversing of abnormal loads are to be surveyed and used where applicable.
Option 1 – Node 5	N18 Exit #1 to 20	Steet furniture, including street lighting and road signs, will require temporary removal.
Option 1 - Node 6	M20 Exit #5 to N20 Southbound	Tree/Hedge trimming required.
Option 1 – Node 7	N20 - Ballymacrory	Steet furniture, including roadside barrier and road signs, will require temporary removal. Tree/Hedge trimming required. Utility Line/Poles to be temporarily diverted.
Option 1 – Node 8	N20 - Buttevant	Steet furniture will require temporary removal. Tree/Hedge trimming may be required.
Option 1 – Node 9	N20 - Ballybeg Bends	Road signs will require temporary removal. Tree/Hedge trimming required.
Option 1 – Node 10	Boherash (Grange) Cross	Steet furniture will require temporary removal. Vegetation clearance. Temporary hard surface in the form of compacted aggregate hard standing required.
Option 1 – Node 11	L5523 - Grange Bridge	Tree/Hedge trimming required.
Option 1 – Node 12	L5523: Grange East	Tree/Hedge trimming required. Utility Line/Poles to be temporarily diverted. Public road to be widened to meet minimum requirements of the turbine manufacturer.

TDR Node Reference Number	Location	Summary Description of Proposed Temporary Accommodation Works
Option 1 – Node 13	Kilmaclenine – L5523 bends	Vegetation clearance. Temporary hardcore load bearing surface to provide an access track.
Option 1 – Node 14	L5302-Site Construction Entrance	This node forms the main site entrance. Temporary hard surface in the form of compacted aggregate hard standing required. Vegetation and Hedgerow removal to facilitate site entrance sightlines

Table 16.10: Accommodation works on TDR option 2

TDR Node Reference Number	Location	Summary Description of Proposed Temporary Accommodation Works
Option 2a – Node 1	N28: Shannonpark Roundabout	Steet furniture, including street lighting and road signs, will require temporary removal. Tree/Hedge trimming required. Delivery vehicle to travel contraflow around roundabout to remain on N28.
Option 2a – Node 2	N28 - N40 Junction	Steet furniture, including roadside crash barrier and street lighting, will require temporary removal. Tree/Hedge trimming required.
Option 2a – Node 3	N8 - R635 – Cork City	Street furniture to be temporarily removed from roadside and splitter island. Ramps to be used to allow vehicle traverse kerbs of the splitter island. Tree/Hedge trimming required. Delivery vehicle to travel contraflow when travelling from N8 to R635.
Option 2a – Node 4	R635 - N20 – North Ring Road - Cork City	Steet furniture, including street lighting, traffic signals and road signs, will require temporary removal. Delivery vehicle to travel contraflow at this location in the vicinity of the junction. Tree/Hedge trimming required.
Option 2a – Node 5	N20 – N72 – Roundabout Mallow	Road signs in roundabout to be removed. Tree/Hedge trimming required. Steet furniture will require temporary removal. Vehicle wheels to traverse apron of the roundabout. If apron structure is insufficient to support the axial loading of abnormal load vehicle, road structure works will be required. Delivery vehicle to travel contraflow around the roundabout.

TDR Node Reference Number	Location	Summary Description of Proposed Temporary Accommodation Works
Option 2a – Node 6	N20 – Roundabout Mallow	Tree/Hedge trimming may be required.
Option 2a – Node 7	N20 – L1200 Junction	Temporary road widening, both sides of bridge, utilising hardcore surface in the form of compacted aggregate hard standing required. Culvert to be extended.
Option 2a – Node 8	Kilmaclenine Cross Roads	Vegetation clearance. Temporary hardcore load bearing surface to provide an access track.
Option 2b – Node 9	N40 – N27 Intersection – Cork City	Steet furniture will require temporary removal. Tree/Hedge trimming required.
Option 2b – Node 10	N27 – Albert Street Cork City	Steet furniture, including street lighting, railings and traffic signals to be temporarily removed from roadside and splitter islands. Ramps to be used to allow vehicle traverse kerbs of the splitter islands. Delivery vehicle to travel contraflow at this location in the vicinity of the junction. Tree trimming may be required.
Option 2b – Node 11	N27 – N8 Anderson's Quay Cork City	Steet furniture, including traffic signals to be temporarily removed. Tree / hedge trimming required. Delivery vehicle to travel contraflow along Anderson's Quay.
Option 2b – Node 12	N20 – Christy Ring Bridge – Cork City	Steet furniture, including street lighting and traffic signals to be temporarily removed.
Option 2b – Node 13	N20 – North City Link Road – Cork City	Steet furniture to be temporarily removed. Delivery vehicle to travel contraflow in vicinity of the junction.

All temporary accommodation works associated with the Project will be fully reinstated following the construction phase. Overhead utilities and obstructions will need to be modified at several locations to provide adequate overhead clearance. The modification of overhead utilities will involve temporary disconnections. Such works will be carried out by the utility providers in advance of turbine delivery to site.

Temporary accommodation works will only be required during the operational phase in the unlikely event of a major turbine component replacement. It is expected that these temporary accommodation works will not be required for the decommissioning phase as turbine components can be dismantled on site and removed using standard HGVs.

The locations of the above accommodation works are presented in the Turbine Delivery Route Assessment Report in EIAR **Volume III, Appendix 16.1**.

16.4.4 Grid connection route options

The grid connection for this Project will consist of a 38kV new on-site substation connected to the boundary of the Mallow 110kV substation via underground cable. Two GCR options have been assessed and are presented in **Figure 16.10**.

The GCR Option 1 consists of approximately 13.5km of underground cabling. This includes 0.5km of underground cabling in private lands and approximately 13km of cabling to be installed in the public road. The GCR will follow the onsite access tracks and will leave the wind farm site at the existing site entrance. This GCR will then proceed east along the L5302 local road where it turns south at Knockavadeen onto the L1200 local road through Knockane. It then turns onto L1205 and continues east across the N20 and through R581 to turn south at Fountainville onto L1207 heading south. It diverts onto a local road at Carhue (L53201), continuing south along the road to the east of Ballyvinter (L5320). The route continues south across the N72 and onto the L12201 then crossing the L1220-25 (St. Joseph's Road) to meet the boundary of Mallow 110kV substation. The GCR has been shown in **Drawing No. 20910-NOD-XX-XX-DR-T-18201**.

The GCR Option 2 consists of approximately 13.2km of underground cabling. This includes 0.5km of underground cabling in private lands and approximately 12.7km of cabling to be installed in the public road. The GCR Option 2 will follow the onsite access tracks and will leave the wind farm site at the existing site entrance. This GCR will then proceed east along the L5302 and L5523 local roads and cross the N20 onto L5568. The GCR turns right onto L5566 and continues south past Fountainville crossing the R581 onto L1207. From here, the GCR Option 2 follows the same route as GCR Option 1 to the boundary of Mallow 110kV Substation. A substation is proposed on-site which will collect the electricity produced by the wind farm. The substation has been located at the south of the wind farm site.

The above works will involve the installation of ducting, joint bays, drainage and ancillary infrastructure and the subsequent running of cables predominantly along the existing public road network. This will require delivery of plant and construction materials, followed by excavation, laying of cables and subsequent reinstatement of trenches.

It is expected that some full road closures will be put in place to facilitate cabling works in combination with lane closures, partial road closures and stop/go systems. This will enable the works to be completed as quickly and as safely as possible, with minimal disruption time for residents of the area. The exact location and number of these road closures will be developed in consultation with the local road's authority and An Garda Siochána and will be detailed in the CTMP prior to commencement. These works will be undertaken on a rolling basis with short sections closed for short periods before moving onto the next section. The minimum road width requirement for 2 lane traffic is 6 meters (CC-SCD-00003), therefore sections of the L5302 will require lane closure during construction to allow for passing traffic.

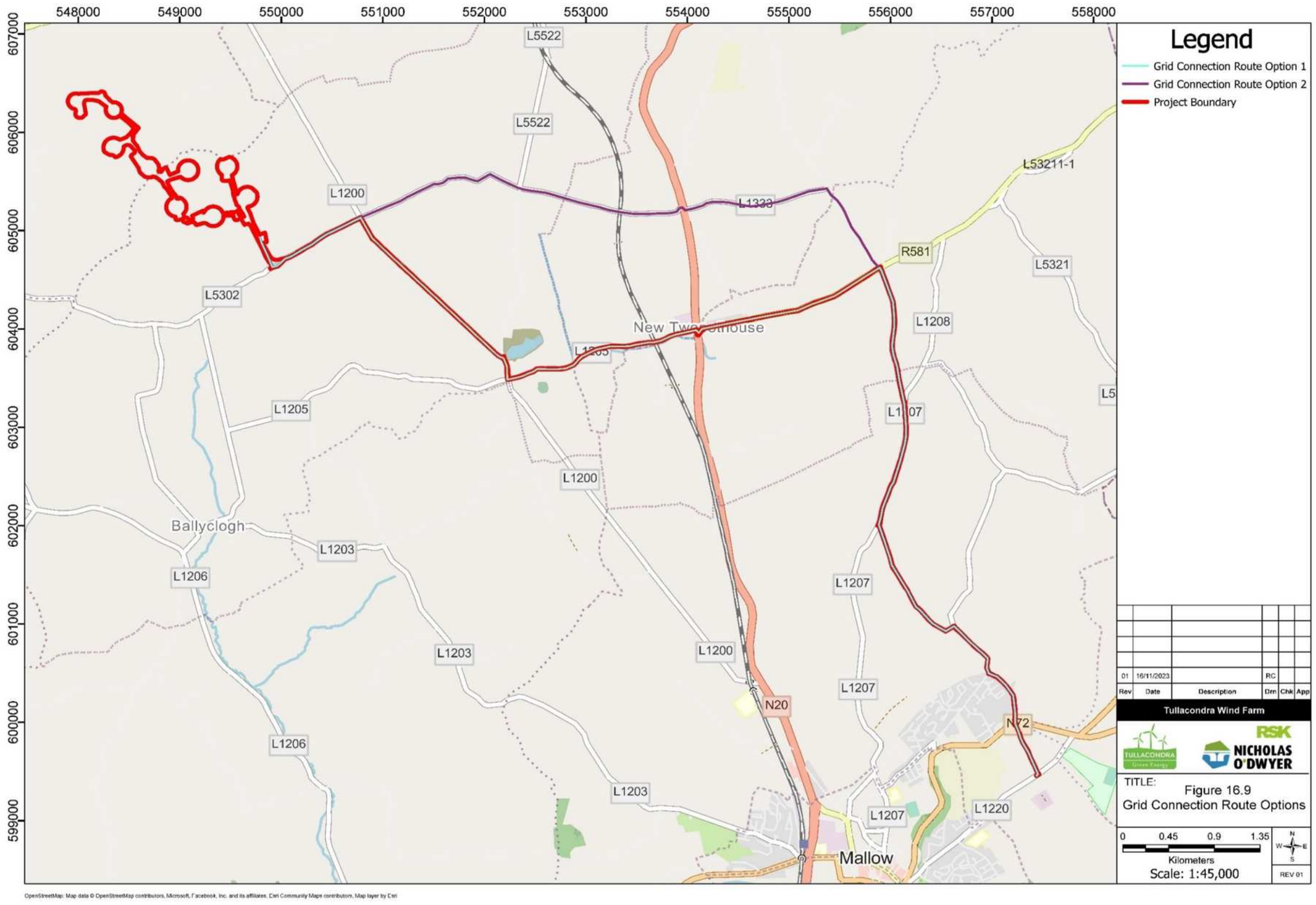

Figure 16.10: Grid connection route options

16.4.4.1 Grid Connection Installation works

All the grid cable / road crossing locations and its methods have been detailed in **Drawing Nos. 20910-NOD-XX-XX-DR-C-08210** to **20910-NOD-XX-XX-DR-C-08216** for the GCR Option 1. EIAR **Chapter 4 Project Need and Alternatives Considered, Figure 4.10** to **Figure 4.12** provide details on grid cable / road crossing locations for the GCR Option 2. **Table 4.9** and **Table 4.10** in EIAR **Chapter 4 Project need and alternatives considered** summarises the proposed services crossing and road crossing methods along the grid connection within the public road:

A careful approach will be taken to planning the works to ensure minimal impacts on road users and the general public. The cable trenching will be carried out with the aid of either a lane closure or road closure, which will ensure that the trenching works are completed as expeditiously as possible. As advised by Cork County Council, the works on the GCR outside Baltydaniel school will be done outside of school term.

Due to the length of the GCR within the road corridor, these works are expected to be conducted in just over a 5-month period (assuming 100m of ducting laid per day, with a 6-day working week). The road closures will be applied for by the appointed contractor and will outline local diversions whilst maintaining local access at all times for residents, farms and businesses.

Road closures will be subject to the applicable statutory processes as implemented by the road's authority. Road closures will be facilitated by the existing network of roads in the area. 'Rolling road closures' will be implemented, whereby the site will progress each day along a road, which will have the effect of reducing the impact on local residents.

The traffic impact associated with the grid connection installation works will fall into two main categories; the traffic related to the delivery of grid construction materials to the wind farm site, and the construction traffic related effects and the road/lane closure related effects. This includes the cable pull operations and surface reinstatement along the GCR. These operations include opening the joint bay and pulling the cable through it via a truck mounted reel followed by re-surfacing works to the TII standards and acceptance of Cork County Council.

The trenching and ducting installation works will involve constantly moving the working area as the grid connection works progress.

16.4.5 Pedestrians / public transport / safety

The following paragraphs provide an overview of the current baseline transport and accessibility conditions within the study area considering the following:

- pedestrian and cycle facilities and access;
- public transport accessibility; and
- the operation of the existing highway network.

Consideration is also given to the existing baseline flows where available. This analysis provides the baseline context against which the transport movements and accessibility of the **Project have been assessed.**

Pedestrian/Cyclist Accessibility

The wind farm site will be accessed via one site entrance using the L5302. The L5302 is a narrow single track road providing access to agricultural lands and a number of standalone houses/farmyards.

No facilities for pedestrians or cyclists were noted on the L5302, or elsewhere, in the vicinity of the wind farm site.

Public Transport

There are no bus facilities located in the vicinity of the wind farm site.

The nearest bus stops are located c. 5km from the wind farm site.

Accidents and Safety

The Road Standards Authority (RSA) has a statutory remit to report on fatal, serious and minor injury collisions on public roads. The RSA receive collision data from An Garda Síochána and produce official statistics to help develop evidence-based road safety interventions.

The RSA are in the process of reviewing road traffic collision (RTC) data sharing policies and procedures. Record-level RTC data cannot be shared until this review is complete.

Accident data has been requested from the RSA but at the time of writing no accident data has been made available by the RSA.

16.5 Identification of likely effects of the Project

Likely effects of the Project are outlined below, these are categorised in relation to the construction, operational and decommissioning phases of the Project. The Do-nothing scenario is also detailed.

16.5.1 Do-nothing scenario

If the Project is not constructed, there will be no change to the current road network and existing traffic patterns within the study area would increase as shown in **Table 16.7**.

16.5.2 Construction phase effects

16.5.2.1 Wind farm construction

The construction activities associated with the Project will lead to additional construction related traffic on the existing public road network over the duration of the construction works. These impacts will include:

- Heavy Goods Vehicles (HGVs) transporting materials to and from the wind farm site, including access track making materials, concrete, steel, building materials, drainage/ducting materials, cabling, electrical components and excavated spoil materials.
- HGVs transporting conventional earthworks machinery such as excavators, dumper trucks and rollers.
- Fuel trucks transporting fuel for plant to each site compound during the construction phase.

- Light Goods Vehicles (LGVs) such as cars, 4x4s and vans used by the workers and supervisory staff involved in the construction works.
- Oversized loads including turbine components (more details below).

Without appropriate mitigation measures, the proposed works have the potential to result in effects on the existing road network including:

- Delay and disruption to road users.
- Road safety issues should the works not be carried out in line with good traffic management practices.
- Inappropriate parking of construction related vehicles along the route of the works.
- Soiling of the public road leading to a general lack of cleanliness and poor skid resistance on roads.
- Damage to existing road surface.

16.5.2.2 Grid Connection Route works

The construction activities associated with the GCR works will generate construction related traffic on the existing public road network while the grid connection works are ongoing. These impacts will include:

- Heavy Goods Vehicles (HGVs) transporting materials to and from the GCR works, including road making materials for reinstatement works, drainage/ducting materials, cabling, electrical components and excavated material.
- Light Goods Vehicles (LGVs) such as cars, 4x4s and vans used by the workers and supervisory staff involved in the grid connection works.
- There will be construction traffic throughout the GCR works between the wind farm site and working area involving the transport of materials when required.

The GCR construction works will require a combination of temporary road closures with traffic diversions and temporary lane closures along the proposed route.

All road works will be subject to a road opening licence, but it is anticipated that the trenching and ducting installation works along local roads will be advanced using a combination of rolling lane closures and temporary road closures where the existing road width is insufficient to accommodate an open lane for traffic to pass the works area. The exact location and number of these road closures will be detailed in the CTMP. This CTMP will be developed in consultation with the local road's authority and An Garda Siochána prior to commencement.

The ducting installation works by their nature will be isolated to a relatively small works area which will move on a daily basis. Impacts associated with the works will be experienced on the road network in the immediate vicinity to the works area.

Where lane closures are implemented, the traffic will be allowed to travel in both directions. A stop/go system will be used to control the flow of traffic passing the works. This will have a temporary negative effect on road users in the form of a disruption to normal traffic flows.

Temporary road closures will be required at specific locations for the installation of joint bays and cable pulling and jointing operations at later dates. These activities are isolated and carried out in under a day at each location.

In terms of traffic and transportation, the activities associated with horizontal directional drilling (HDD) are isolated and typically carried out in under one working day. The works will be conducted within the public road. These works will require a road closure at the HDD location. The exact location and number of these road closures will be detailed in the CTMP.

16.5.2.3 TDR accommodation works

The delivery of turbine components including blades, tower sections and nacelles is a specialist transport operation owing to the oversized loads involved. The blades are the longest component and have been considered for the purpose of this assessment.

Turbine component deliveries will be carried out during off-peak times and will be done using a convoy and a specialist heavy haulage company. Turbine deliveries will also be escorted by An Garda Siochána. This will ensure the impacts of the turbine deliveries on the existing road network are minimised.

As described in section 16.4, and EIAR **Volume III, Appendix 16.1,** accommodation works are required along the TDR such as hedge or tree cutting, relocation of lampposts, signage and temporary local road widening through the laying of temporary hardcore surface to verges or on third party lands.

Without appropriate mitigation measures, the construction of the proposed temporary accommodation works have the potential to lead to a negative effect on the existing road network including:

- Delay and disruption to road users.
- Road safety issues should the works not be carried out in line with good traffic management practices.
- Inappropriate parking of construction related vehicles in the public road in the vicinity of the works areas.
- Soiling of the public road leading to a general lack of cleanliness and poor skid resistance on roads.
- Damage to existing public road infrastructure.

16.5.3 Operational phase effects

A small number of wind farm personnel are expected to be present occasionally during the operational phase of the Project. However, during the majority of this phase both the wind farm and substation will be operated remotely.

Traffic associated with the operational phase of the Project will be associated with the wind farm owner/operator and grid network operator personnel visiting the substation, and maintenance staff. There will also be a limited infrequent attendance by routine environmental monitoring/compliance staff.

Routine turbine maintenance is generally conducted by personnel climbing inside the tower. However, there may be circumstances where a crane may need to be mobilised to site to conduct non-routine maintenance.

The proposed substation will be designed in accordance with network operator requirements; this will not require full time operational staff and will be largely automated with occasional visits from maintenance teams.

Unforeseen or unplanned events such as emergency turbine repair works could potentially require the mobilisation of construction plant and personnel to site. The replacement of a large turbine component such as a blade will require a crane and the re-installation of some TDR temporary accommodation works. In such an event the impacts associated with these works will be less than those associated with the construction phase.

A cable fault along the GCR could potentially require temporary road works for intrusive investigations and repair. The above unplanned events are extremely unlikely to occur. However, once operational, the grid connection cable will fall under ESBN safety rules and becomes part of the national electricity distribution network.

16.5.4 Decommissioning phase effects

On decommissioning, cranes will disassemble the above ground turbine components which will be removed off site. The upper sections of the foundations projecting above ground will be removed, and the remainder of the foundations will be covered by soils typical of the surrounding environment and then reseeded or left to re-vegetate. It is proposed that the internal site access tracks and hard standings will be left in place.

Infrastructure associated with the GCR will form part of the national electricity distribution network and will be left in-situ.

The traffic impact associated with the decommissioning phase will be significantly less than the construction phase due to the considerably lower number of vehicle movements.

The decommissioning phase of the Project is described in EIAR **Chapter 5 Project Description,** and these works will be subject to a decommissioning plan which will be similar to the CEMP contained in EIAR **Volume III, Appendix 5.1**.

16.6 Assessment of effects

16.6.1 Construction Phase

The construction phase traffic generated by the Project on the surrounding road network has been calculated by estimating the number of vehicles required for each phase of the Project (construction, operation and decommissioning phases). The number of vehicles is then converted to the equivalent two-way trips, whereby every vehicle will generate two trips, one to and one from the site.

This assessment was completed by estimating the amount of traffic, in the form of heavy goods vehicles (HGV) and light goods vehicles (LGV) that will be generated during the construction phase and then distributing it over the duration of the construction programme. In determining the number of ‘trips’ the estimated number of HGV vehicles

was multiplied by a factor of 2 to account for a single trip 'in' and a corresponding single trip 'out'.

In the case of LGVs, the estimated number of vehicles was multiplied by 2.5 to account for some additional LGV movements e.g., some workers taking lunch breaks in the local area. The analysis allowed for a total number of trips per month to be calculated. This could be translated to annual average trips per day (AADT).

Some key assumptions taken when preparing the trip generation estimates include:

- An average ready mix concrete truck carries a load of approximately 8m^3 of concrete.
- An average tipper truck carries approximately 10m^3 of soil/rock/aggregate.
- A construction period of 12 - 18 months is expected based on the nature and scale of the proposed works. In order to assess for worst case in terms traffic volumes per day, an 18-month construction programme has been assumed here.
- It has also been assumed that cable trenching works associated with the construction of the GCR, which is expected to take 5 months to complete, including on-site internal grid cabling. The GCR cable will be placed in a ready-for-energisation state during the last months of the Turbine Installation Phase. This will be done in order to avoid delays in achieving full operation of the wind farm.
- It is anticipated that bedrock material arising at the wind farm site will be reused as fill material, but site tracks and turbine hardstands will be surfaced with a harder rock imported to the wind farm site if necessary. The imported rock will be locally sourced and be of similar nature to the local geo-chemistry.

Project related traffic will vary over the course of the construction programme. Activities can be broken up into the following main categories:

- Mobilisation and site setup – 432 two-way HGV trips expected over 2 months.
- Site clearance, Tree Felling and Fencing – 756 two-way HGV trips expected over 3 months.
- Internal access tracks and drainage – 2064 two-way HGV trips expected over 8 months.
- Turbine hard standing – 1206 two-way HGV trips expected over 9 months.
- Turbine/Met mast foundations – 3000 two-way HGV trips expected over 10 months.
- Onsite substation – 108 two-way HGV trips expected over 9 months.
- On-site Cable Installation – 100 two-way HGV trips expected over 5 months.
- GCR works (off-site section only) – 145 two-way HGV trips expected over 5 months.
- Turbine/Met mast Installation – 70 two-way HGV trips expected over 5 months.
- Energisation, Commissioning & Testing – 4 two-way LGV trips expected over 4 months.

- Biodiversity Enhancement – 4 two-way HGV trips expected over 1 month.
- Landscaping, reinstatement, demobilisation – 128 two-way HGV trips expected over 2 months.

Table 16.11 and **Figure 16.11** show construction phase vehicle trips and their distribution across the 18-month construction programme for the entire Project.

Table 16.11: Vehicle trip distribution – Project including GCR works

Activity	Month																		Total Two-Way Movements
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
Total Trips per Month	1162	1376	1030	1107	1126	1126	1126	1158	792	792	600	600	568	24	24	8	104	102	11625
Total HGV Trips per month (x2)	726	860	644	692	704	704	704	724	495	495	375	375	355	15	15	5	65	64	8017
Total LGV Trips per month (x2.5)	436	516	386	415	422	422	422	434	297	297	225	225	213	9	9	3	39	38	3608
Total Trips Per Week	271	320	240	258	262	262	262	270	185	185	140	140	133	6	6	2	25	24	2704
Total HGV Trips Per Week	169	200	150	161	164	164	164	169	116	116	88	88	83	4	4	2	16	15	1865
Total LGV Trips Per Week	102	120	90	97	98	98	98	101	69	69	52	52	50	2	2	0	9	9	839
Total Trips Per Day	46	54	40	43	44	44	44	45	31	31	24	24	23	1	1	1	5	4	451
Total HGV Trips Per Day	29	34	25	27	28	28	28	29	20	20	15	15	14	1	1	1	3	3	311
Total LGV Trips Per Day	17	20	15	16	16	16	16	16	11	11	9	9	9	0	0	0	2	1	140
Total Trips Per Hour	5	6	4	5	5	5	5	5	4	4	3	3	3	1	1	1	1	1	46
Total HGV Trips Per Hour	3	4	3	3	3	3	3	3	2	2	2	2	2	1	1	1	1	1	32
Total LGV Trips Per Hour	2	2	1	2	2	2	2	2	2	2	1	1	1	0	0	0	0	0	14

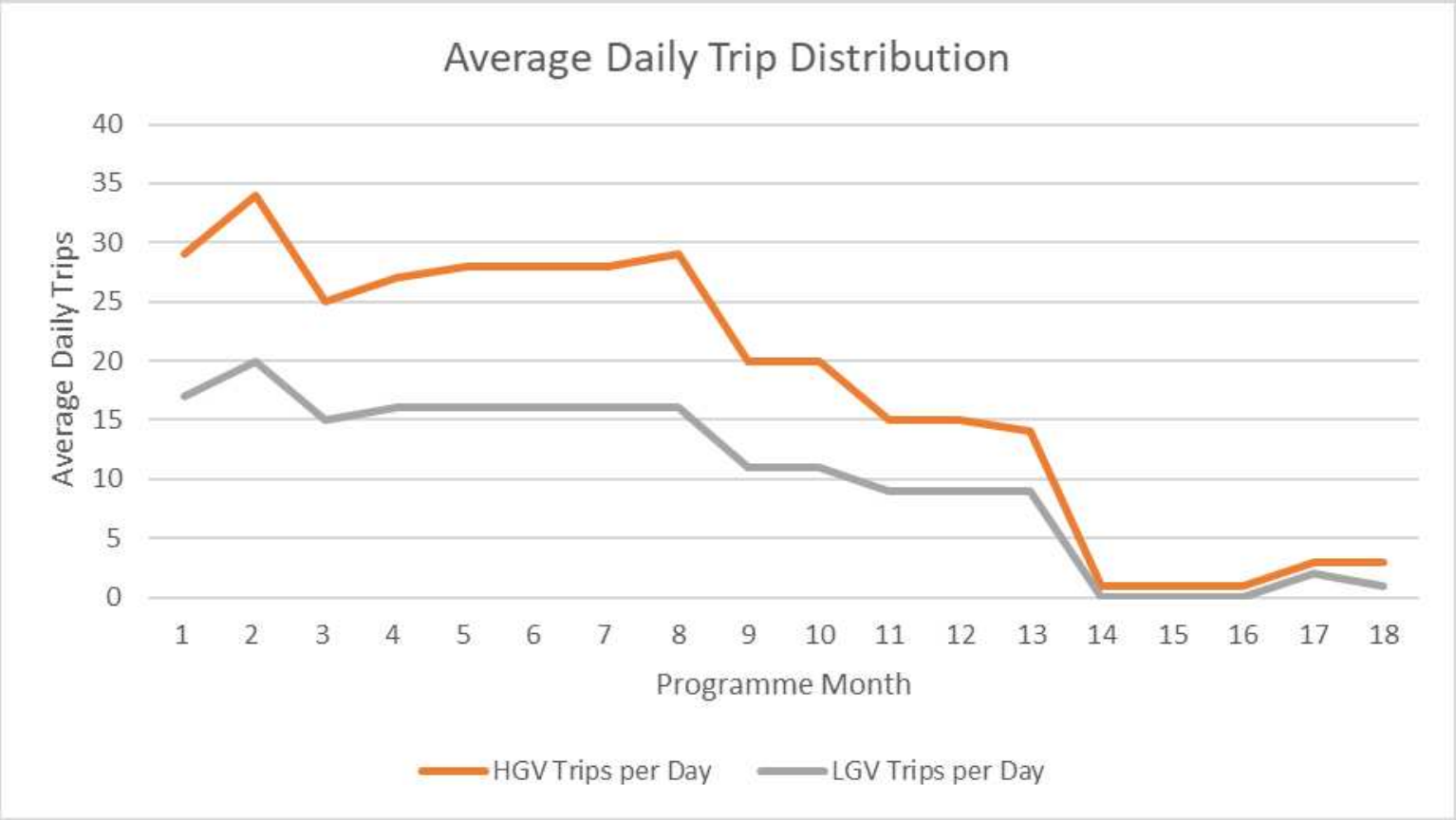

Figure 16.11: Average daily trip distribution - project including GCR works

The construction phase for the entire Project will lead to 8,017 additional HGV trips (two-way) over the duration of the construction works.

Calculations of HGV movements associated with the construction of the Project indicate an average daily increase of 18 HGV trips per day over a construction period of 18 months. This increases to an average of 34 HGV trips per day during the peak month which occurs in month 2 of the programme for HGV traffic.

An average workforce of 40 persons is anticipated, increasing to 50 persons during peak periods. This is estimated to give rise to an increase of LGV traffic of 10 trips per day on average rising to 20 trips during peak construction periods which occur for LGV traffic during month 2.

The combined HGV and LGV average daily increase is 28 trips per day throughout the construction programme.

The predicted AADT during the construction phase of the Project is presented in **Table 16.12** for TDR Option 1, and **Table 16.13** for TDR Option 2. The impact on predicted future traffic on the surrounding road network is also presented in this table.

Table 16.12: Predicted AADT with average daily construction phase traffic – TDR option 1

Location	Predicted AADT During Construction (Estimated Site End 2026)	HGV AADT Pre-Development	Average Daily HGV Trips Generated by Development	Predicted HGV AADT During Construction	% Increase	LGV AADT Pre-Development	Average Daily LGV Trips Generated by Development	Predicted LGV AADT During Construction	% Increase	Average Daily Trips Generated by Development (Combined)	Predicted Combined AADT During Construction	% Increase
N69 Between Askeaton and Foynes, Clondrinagh, Co. Limerick	6,563	535	18	553	3.366	5,831	11	5,842	0.189	29	6,592	0.4
M20 Between Jn02 Loughmore and Jn03 Ballycummin, Co. Limerick	34,414	1,935	18	1,953	0.930	31,424	11	31,435	0.035	29	34,443	0.1
N20 Between Croom and M20, Croom North, Co.Limerick	16,502	912	18	930	1.974	15,083	11	15,094	0.073	29	16,531	0.2
L5523, L5302	272	16	18	34	112.50	246	11	257	4.47	29	301	10.7

Table 16.13: Predicted AADT with Average Daily Construction Phase Traffic – TDR Option 2

Location	Predicted AADT During Construction (Estimated Site End 2026)	HGV AADT Pre-Development	Average Daily HGV Trips Generated by Development	Predicted HGV AADT During Construction	% Increase	LGV AADT Pre-Development	Average Daily LGV Trips Generated by Development	Predicted LGV AADT During Construction	% Increase	Average Daily Trips Generated by Development (Combined)	Predicted Combined AADT During Construction	% Increase
N28 Between N40 & Rochestown, Co Cork	44,932	1,262	18	1,280	1.426	42,256	11	42,267	0.026	29	44,961	0.1
N08 Between Glanmire Roundabound and Jn19 N08/N25 Dunkettle, Cork	38,295	1,967	18	1,985	0.915	35,148	11	35,159	0.031	29	38,324	0.1
N20 Between Blarney and Cork, Blackpool, Co. Cork	23,239	1,036	18	1,054	1.738	21,483	11	21,494	0.051	29	23,268	0.1
L1200	699	18	18	36	100.000	658	11	669	1.672	29	728	4.1
L5523, L5302	272	16	18	34	112.500	246	11	257	4.472	29	301	10.7

The busiest period during the construction programme is expected to occur in month 2 when multiple construction activities take place concurrently. These activities include Mobilisation and site setup, site clearance, tree felling and fencing, site access tracks and drainage and turbine hardstandings. During this month, combined HGV and LGV traffic increases to 54 average daily trips.

The predicted AADT for the Project during peak months of the construction phase of the Project is presented in **Table 16.14** for TDR Option 1, and **Table 16.15** for TDR Option 2.

Table 16.14: Predicted AADT with Peak Construction Phase Traffic – TDR Option 1

Location	Predicted AADT During Construction (Estimated Site End 2026)	HGV AADT Pre-Development	Average Daily HGV Trips Generated by Development during Peak Construction Month	Predicted HGV AADT During Peak Construction Month	% Increase	LGV AADT Pre-Development	Average Daily LGV Trips Generated by Development during Peak Construction Month	Predicted LGV AADT During Peak Construction Month	% Increase	Average Daily Trips Generated by Development (Combined) during Peak Construction Month	Predicted Combined AADT During Peak Construction Month	% Increase
N69 Between Askeaton and Foynes, Clondrinagh, Co. Limerick	6,563	535	34	569	6.358	5,831	20	5,851	0.343	54	6,617	0.8
M20 Between Jn02 Loughmore and Jn03 Ballycummin, Co. Limerick	34,414	1,935	34	1,969	1.757	31,424	20	31,444	0.064	54	34,468	0.2
N20 Between Croom and M20, Croom North, Co.Limerick	16,502	912	34	946	3.729	15,083	20	15,103	0.133	54	16,556	0.3
L5523, L5302	272	16	34	50	212.50	246	20	266	8.13	54	326	19.9

Table 16.15: Predicted AADT with Peak Construction Phase Traffic – TDR Option 2

Location	Predicted AADT During Construction (Estimated Site End 2026)	HGV AADT Pre-Development	Average Daily HGV Trips Generated by Development	Predicted HGV AADT During Construction	% Increase	LGV AADT Pre-Development	Average Daily LGV Trips Generated by Development	Predicted LGV AADT During Construction	% Increase	Average Daily Trips Generated by Development (Combined)	Predicted Combined AADT During Construction	% Increase
N28 Between N40 & Rochestown, Co Cork	44,932	1,262	34	1,296	2.694	42,256	20	42,276	0.047	54	44,986	0.1
N08 Between Glanmire Roundabound and Jn19 N08/N25 Dunkettle, Cork	38,295	1,967	34	2,001	1.728	35,148	20	35,168	0.057	54	38,349	0.1
N20 Between Blarney and Cork, Blackpool, Co. Cork	23,239	1,036	34	1,070	3.282	21,483	20	21,503	0.093	54	23,293	0.2
L1200	699	18	34	52	188.889	658	20	678	3.040	54	753	7.7
L5523, L5302	272	16	34	50	212.500	246	20	266	8.130	54	326	19.9

The construction of the proposed GCR works has been separated from the rest of the Project as these works will be isolated from the main wind farm site and carried out largely by an independent construction team. Refer to **Table 16.16.**

16.6.1.1 Wind farm construction

The volume and distribution of vehicle trips generated by the construction of the main wind farm site are presented in **Table 16.16** and **Figure 16.12.**

Table 16.16: Vehicle Trip Distribution - Project Excluding GCR Works

Activity	Month																		One-Way Movements
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
Total Trips per Month	1162	1376	1030	1107	1126	1126	1126	1126	714	714	522	522	522	44	44	34	102	102	11264
Total HGV Trips per month (x2)	726	860	644	692	704	704	704	704	446	446	326	326	326	14	14	4	64	64	7768
Total LGV Trips per month (x2.5)	436	516	386	415	422	422	422	422	268	268	196	196	196	30	30	30	38	38	3496
Total Trips Per Week	271	320	240	258	262	262	262	262	166	166	122	122	122	11	11	8	24	24	2620
Total HGV Trips Per Week	169	200	150	161	164	164	164	164	104	104	76	76	76	4	4	1	15	15	1807
Total LGV Trips Per Week	102	120	90	97	98	98	98	98	62	62	46	46	46	7	7	7	9	9	813
Total Trips Per Day	46	54	40	43	44	44	44	44	28	28	21	21	21	2	2	2	4	4	437
Total HGV Trips Per Day	29	34	25	27	28	28	28	28	18	18	13	13	13	1	1	1	3	3	302
Total LGV Trips Per Day	17	20	15	16	16	16	16	16	10	10	8	8	8	1	1	1	1	1	135
Total Trips Per Hour	5	6	4	5	5	5	5	5	3	3	3	3	3	1	1	1	1	1	44
Total HGV Trips Per Hour	3	4	3	3	3	3	3	3	2	2	2	2	2	1	1	1	1	1	31
Total LGV Trips Per Hour	2	2	1	2	2	2	2	2	1	1	1	1	1	0	0	0	0	0	13

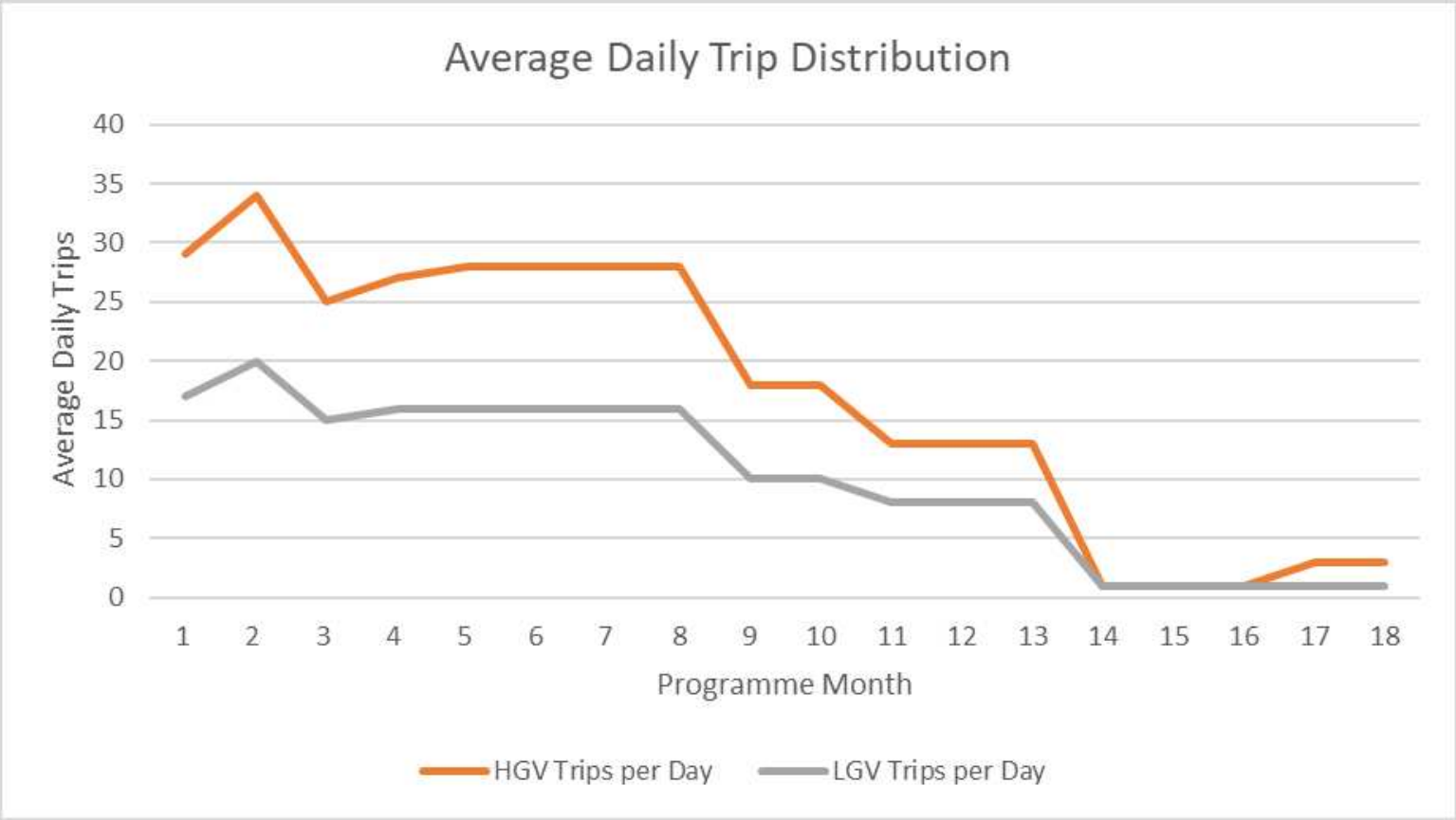

Figure 16.12: Average daily trip distribution - project excluding GCR works

It is estimated that the construction phase for the main wind farm site will lead to 7,768 additional HGV trips (two-way) over the duration of the construction works.

Calculations of HGV movements associated with the construction works indicate an average daily increase of 17 HGV trips per day over the course of the construction programme. The peak month for HGV trips occurs in month 2 where average daily HGV trips rises to 34.

An average workforce of 30 persons is anticipated, increasing to 36 persons during peak periods. This is calculated to give rise to an average daily increase of 10 LGV trips per day over a construction period of 18 months. The peak month for LGV trips occurs in month 2 where average daily LGV trips rises to 20.

The combined HGV and LGV average daily increase by 27 trips per day throughout the construction programme.

The predicted AADT during the construction phase of the wind farm site is presented in **Table 16.17** for TDR Option 1, and **Table 16.18** for TDR Option 2. The impact on predicted future traffic on the surrounding road network is also presented in this table.

Table 16.17: Predicted AADT with Construction Phase Traffic - Main Wind Farm Site Only – TDR Option 1

Location	Predicted AADT During Construction (Estimated Site End 2026)	HGV AADT Pre-Development	Average Daily HGV Trips Generated by Development	Predicted HGV AADT During Construction	% Increase	LGV AADT Pre-Development	Average Daily LGV Trips Generated by Development	Predicted LGV AADT During Construction	% Increase	Average Daily Trips Generated by Development (Combined)	Predicted Combined AADT During Construction	% Increase
N69 Between Askeaton and Foynes, Clondrinagh, Co. Limerick	6,563	535	17	552	3.231	5,831	10	5,841	0.172	27	6,590	0.4
M20 Between Jn02 Loughmore and Jn03 Ballycummin, Co. Limerick	34,414	1,935	17	1,952	0.893	31,424	10	31,434	0.032	27	34,441	0.1
N20 Between Croom and M20, Croom North, Co.Limerick	16,502	912	17	929	1.895	15,083	10	15,093	0.067	27	16,529	0.2
L5523, L5302	272	16	17	33	107.99	246	10	256	4.09	27	299	10.0

Table 16.18: Predicted AADT with Construction Phase Traffic - Main Wind Farm Site Only – TDR Option 2

Location	Predicted AADT During Construction (Estimated Site End 2026)	HGV AADT Pre-Development	Average Daily HGV Trips Generated by Development	Predicted HGV AADT During Construction	% Increase	LGV AADT Pre-Development	Average Daily LGV Trips Generated by Development	Predicted LGV AADT During Construction	% Increase	Average Daily Trips Generated by Development (Combined)	Predicted Combined AADT During Construction	% Increase
N28 Between N40 & Rochestown, Co Cork	44,932	1,262	17	1,279	1.369	42,256	10	42,266	0.024	27	44,959	0.1
N08 Between Glanmire Roundabound and Jn19 N08/N25 Dunkettle, Cork	38,295	1,967	17	1,984	0.878	35,148	10	35,158	0.029	27	38,322	0.1
N20 Between Blarney and Cork, Blackpool, Co. Cork	23,239	1,036	17	1,053	1.668	21,483	10	21,493	0.047	27	23,266	0.1
L1200	699	18	17	35	95.988	658	10	668	1.528	27	726	3.9
L5523, L5302	272	16	17	33	107.986	246	10	256	4.088	27	299	10.0

The works will result in a less than 1% temporary increase in traffic volumes on the M20 and N20, and therefore, in accordance with IEMA guidelines, effects are not significant on these roads. The L5523, L5302 and L1200 will see a higher temporary increase in traffic volumes over the course of the construction phase of 7.73 and 19.85%, respectively according to **Table 16.15**. The L5302 forms part of the proposed GCR, TDR Option 1 and haul routes. The L5523 forms a part of the proposed GCR Option 2, TDR Option 1 and haul routes. The L1200 forms a part of the proposed GCR Option 1, TDR Option 2 and haul routes. Additionally, the R581, L1205, L1207, L53201, L5320 and L12201 would be utilised for GCR Option 1, and the L5568, L5566, L1207, L53201, L5320 and L12201 would be utilised for GCR Option 2.

In the absence of mitigation, effects on L2100 for Option 2 are under the 10% threshold, with a predicted increase of approximately 8% during peak construction, resulting in a **temporary, adverse, slight** effect on this road, which is not significant. At L5523 and L5302, a percentage increase of approximately 11% increase is predicted during construction, which rises to approximately 20% during peak months. This results in a **temporary**, **adverse**, **moderate-significant** impact on these roads during the construction phase.

16.6.1.2 GCR works

The volume and distribution of vehicle trips generated by the construction of the GCR works are presented in **Table 16.19** and **Figure 16.3**.

Table 16.19: Vehicle Trip Distribution - GCR Works

Activity	Month																		One-Way Movements
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
Total Trips per Month	0	0	0	0	0	0	0	32	79	79	79	79	47	22	22	28	2	0	362
Total HGV Trips per month (x2)	0	0	0	0	0	0	0	20	49	49	49	49	29	1	1	1	1	0	249
Total LGV Trips per month (x2.5)	0	0	0	0	0	0	0	12	30	30	30	30	18	21	21	27	1	0	113
Total Trips Per Week	0	0	0	0	0	0	0	8	19	19	19	19	11	6	6	7	1	0	85
Total HGV Trips Per Week	0	0	0	0	0	0	0	5	12	12	12	12	7	1	1	1	1	0	58
Total LGV Trips Per Week	0	0	0	0	0	0	0	3	7	7	7	7	4	5	5	6	0	0	27
Total Trips Per Day	0	0	0	0	0	0	0	2	4	4	4	4	2	1	1	2	1	0	15
Total HGV Trips Per Day	0	0	0	0	0	0	0	1	2	2	2	2	2	1	1	1	1	0	10
Total LGV Trips Per Day	0	0	0	0	0	0	0	1	2	2	2	2	0	0	0	1	0	0	5
Total Trips Per Hour	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	2
Total HGV Trips Per Hour	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	1
Total LGV Trips Per Hour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

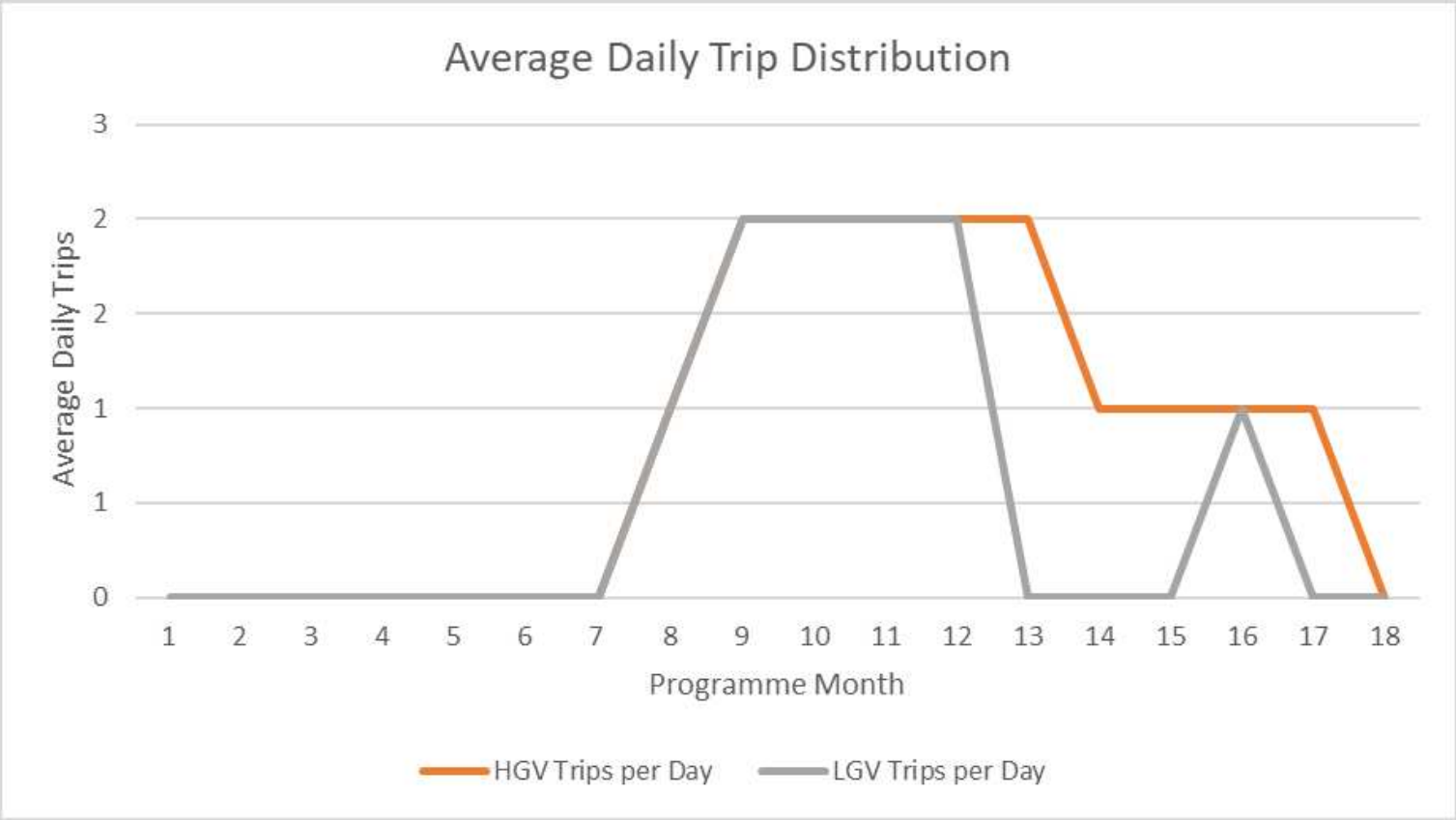

Figure 16.13: Average daily trip distribution - GCR works

The delivery of the ducting and the materials required for the GCR works will be carried out at the start of the GCR construction phase. Installation (cable pulling), jointing, energisation and testing of the grid cables will be carried out after completion of the ducting installation works on-site and off-site. It is estimated that the construction phase for the GCR works will lead to 249 additional HGV trips (two-way) over the duration of the construction works.

Calculations of HGV movements associated with the construction works indicate an average daily increase of 2 HGV trips per day over the course of the overall Project construction programme. The pattern of HGV trips will remain relatively steady throughout the construction works and does not exceed 2 HGV trips per day on average over a 10-month duration.

The workforce associated with this activity is expected to give rise to an average daily increase of 1 LGV trips per day over a total construction programme period of 10 months (including the Energisation, Commissioning & Testing Phase). The pattern of LGV trips will remain relatively steady throughout the construction works and does not exceed 2 LGV trips per day on average over a 10-month duration.

The combined HGV and LGV average daily increase is 3 trips per day throughout the overall Project construction programme over a 10-month GCR works, construction programme.

As described in section 16.5.2.2, the GCR works, by its nature, will be isolated to a small works area which will move on a daily basis as the construction progresses along the route. Adverse effects associated with the works will therefore be experienced on the road network in the immediate vicinity to the works area.

Should the construction of the GCR works be split over two or more works areas, this would result in a notable reduction in overall construction time. This approach would also have the effect of increasing the overall average number of construction vehicle trips per day associated with the construction of the GCR, albeit over a shorter timeframe and in separate locations.

The predicted AADT during the construction phase of the GCR works is presented in **Table 16.20** for TDR Option 1, and **Table 16.21** for TDR Option 2.

Table 16.20: Predicted AADT (GCR Works) – TDR Option 1

Location	Predicted AADT During Construction (Estimated Site End 2026)	HGV AADT Pre-Development	Average Daily HGV Trips Generated by Development	Predicted HGV AADT During Construction	% Increase	LGV AADT Pre-Development	Average Daily LGV Trips Generated by Development	Predicted LGV AADT During Construction	% Increase	Average Daily Trips Generated by Development (Combined)	Predicted Combined AADT During Construction	% Increase
N69 Between Askeaton and Foynes, Clondrinagh, Co. Limerick	6,563	535	1	536	0.156	5,841	1	5,842	0.010	1	6,564	0.02
M20 Between Jn02 Loughmore and Jn03 Ballycummin, Co. Limerick	34,414	1,935	1	1,936	0.043	31,434	1	31,435	0.002	1	34,415	0.004
N20 Between Croom and M20, Croom North, Co.Limerick	16,502	912	1	913	0.091	15,093	1	15,094	0.004	1	16,503	0.01
L5523, L5302	272	16	1	17	5.21	256	1	257	0.22	1	273	0.5

Table 16.21: Predicted AADT (GCR Works) – TDR Option 2

Location	Predicted AADT During Construction (Estimated Site End 2026)	HGV AADT Pre-Development	Average Daily HGV Trips Generated by Development	Predicted HGV AADT During Construction	% Increase	LGV AADT Pre-Development	Average Daily LGV Trips Generated by Development	Predicted LGV AADT During Construction	% Increase	Average Daily Trips Generated by Development (Combined)	Predicted Combined AADT During Construction	% Increase
N28 Between N40 & Rochestown, Co Cork	44,932	1,262	1	1,263	0.066	42,256	1	42,257	0.001	1	44,933	0.003
N08 Between Glanmire Roundabound and Jn19 N08/N25 Dunkettle, Cork	38,295	1,967	1	1,968	0.042	35,148	1	35,148	0.002	1	38,296	0.004
N20 Between Blarney and Cork, Blackpool, Co. Cork	23,239	1,036	1	1,037	0.080	21,483	1	21,484	0.003	1	23,240	0.01
L1200	699	18	1	19	4.630	658	1	659	0.084	1	700	0.2
L5523, L5302	272	16	1	17	5.208	246	1	247	0.226	1	273	0.5

The works will result in a less than 0.1% temporary increase in traffic volumes on the M20 and N20. These roads form part of the TDR Options and haul routes for the construction of the Project. The L5523 and L5302 will see a higher temporary increase in traffic volumes over the course of the construction phase of 0.51% respectively according to the table. The L5523 and L5302 forms part of the proposed GCR, TDR Options and construction haul routes.

While the overall temporary increase in traffic volumes can be considered low, there will be a noticeable temporary uplift in HGV traffic as a result of the GCR works along these local roads throughout the duration of the works. HGV traffic associated with the GCR cabling works will average two trips per hour and is not expected to exceed this throughout the duration of the works.

As described in section 16.5.2.2, the local roads associated with the proposed GCR have very low levels of traffic and therefore the impact that the temporary proposed road works will have on the wider road network will be limited to the vicinity of the works area and surrounding local roads where diversions will be in place. The effects from increase in traffic during construction in relation solely to the GCR, are therefore, **not significant**.

The GCR works will involve constantly moving the working area as the ducting and cable installation works progress.

Delays

The works will require a combination of temporary road closures with traffic diversions and temporary lane closures along the proposed GCR. The impact of the traffic diversions and lane closures on a section of road will depend on the location of the works and active traffic at the time of installation. All road works will be subject to a road opening licence. The trenching and ducting installation works along local roads will be advanced using a combination of rolling lane closures and temporary road closures where the existing road width is insufficient to accommodate an open lane for traffic to pass the work.

Where lane closures are implemented, the traffic will be allowed to travel in both directions. A stop/go system will be used to control the flow of traffic passing the works. This will have a **temporary slight adverse** impact on road users.

Off-line sections of the proposed GCR through private lands within the wind farm site will not generate any impact to existing traffic flows.

As described in section 16.5.2.2, the works by their nature will be isolated to a small works area which will move on a daily basis as the construction progresses along the route. Traffic management measures associated with the works that will impact existing road users in the form of delays and diversions, will therefore be experienced on the road network in the immediate vicinity to the works area, where lane or road closures, and diversions will be implemented. Should the construction of the GCR be split over two or more works areas, additional lane/road closers and diversions will be required, however as mentioned above, this approach would result in a notable reduction in overall construction time over the entirety of the route.

Horizontal directional drilling (HDD) operations will be required at two locations along the GCR Option 1 and 4 locations along the GCR Option 2. This has been detailed in section 16.4.4. The HDD activities are isolated and carried out in less than a day. A temporary road closure will be required for HDD operations within the public road corridor.

Based on the above, the effects on the receiving environment and the expected driver delays associated with the GCR construction works, are considered to be **slight to moderate** without appropriate mitigation and **short-term** in duration.

During the overall construction programme, the site preparation and ground works, including the GCR cabling works, will generate additional traffic on the local highway network. This will be adverse, resulting in an increase in traffic levels by up to 19.85% on the L5302, L5523 local roads. The receptor sensitivity for this road network would be High (roads without footways that are used by pedestrians), and the Impact Magnitude Criteria would be Low (Increase in total traffic flows of 30% or under). Hence, the overall scale of effect on the L5302, L5523 local roads would be **temporary**, **slight** and **not significant**.

It is considered that the above effects represent a worst-case daily scenario, based on the estimated construction program and the assumption that all deliveries are made via one route.

In accordance with IEMA Guidelines, projected changes in traffic flows of greater than 10%, in this case, are considered to create a slight to moderate discernible environmental effect. Therefore, the effects to transport and access during construction would be temporary, slight and adverse in EIAR terms for:

- Pedestrian Severance, Delay, Amenity, Fear and Intimidation; and
- Driver Delay.

For Accidents and Safety, the effects to transport and access during construction would be temporary, moderate and adverse, and not significant after mitigation measures are implemented as described in EIAR.

16.6.1.3 Turbine delivery route

Impacts along the TDR will be limited to specific locations where temporary accommodation works are required and on occasions where large turbine component deliveries are brought to the site. Temporary accommodation works are at isolated locations and will not generate high levels of construction traffic.

Adverse effects on the receiving environment associated with the TDR are considered to be **slight to moderate** without appropriate mitigation and **temporary** in duration.

16.6.2 Operational phase

The vehicle movements for the Project once operational is anticipated to be minimal as both the wind farm and substation will be operated remotely.

Effects on the receiving environment associated with the operational phase of the Project are considered to be **neutral**, **long-term** and **not significant.**

For unforeseen or unplanned works, it is predicted that negative or adverse effects on the receiving environment will be **temporary**, **slight** and **not significant**.

16.6.3 Decommissioning phase

As described, a decommissioning plan will be prepared at the end of operation. The decommissioning plan will include details on material recycling/disposal and a Traffic

Management Plan. This will be prepared for agreement with the Local Authority prior to decommissioning of the wind farm.

16.7 Mitigation measures

This section outlines the mitigation measures that will reduce, minimise or eliminate any likely significant effects created by the Project and outlined above.

16.7.1 Construction phase

16.7.1.1 Wind farm site

The following mitigation measures are proposed to reduce the impact of the construction activity in relation to the construction phase of the Project:

16.7.1.2 Traffic management plan

The Construction Traffic Management Plan (CTMP) in EIAR **Volume III, Appendix 5.2** will be updated and agreed with the road's authority and An Garda Siochána prior to commencing construction. This includes the following:

- Traffic Management Co-Ordinator – A dedicated Traffic Management Coordinator will be appointed for the duration of the Project and this person will be the main point of contact for all matters relating to traffic management on the Project.
- One-way Systems: as some of the local roads are relatively narrow, the roads authority may want to introduce a system of one-way construction traffic movements during the construction of the development. Any such one-way systems will be identified in the construction phase CTMP in agreement with the roads authority.
- Road Closures: with the use of the local roads network for the GCR, the narrow carriageway widths for some of the roads proposed may require full road closures. Any such road closures will be agreed with the roads authority in advance of construction and diversions will be incorporated into the CTMP.
- Road Condition Survey: a pre-condition survey will be carried out on public roads that will be used in connection with the development to record the condition of the public roads in advance of construction commencing. A post-construction survey will also be carried out after the works are completed. The roads to be surveyed, specification and timing of the surveys will be agreed with the road's authority. Joint surveys will be completed if the roads authority requests.
- Road Reinstatement: All roads will be reinstated expeditiously on completion of the construction works. Roads will be reinstated to their pre-works condition or better and to the satisfaction of the road's authority.
- Site Inductions: All workers will receive a comprehensive site induction which will include a section on traffic management and clear guidance on the routes to be used/not used to access the site.

- 24-Hour Emergency Contact: a 24-hour emergency phone number will be maintained for the duration of the construction works and the number will be noted on temporary signage at each works area (for grid connection) and the site entrance for the wind farm site.
- Traffic Management Guidance: all necessary temporary traffic management will be planned and executed in accordance with best practice, including Chapter 8 of the Traffic Signs Manual published by the Department of Transport.
- Letter Drops: a letter drop will be carried out to notify members of the public living near the Project to advise them of any upcoming traffic related matters e.g., temporary lane/road closure or delivery of turbine components.
- Signage: Clear signage relating to the development, both temporary and permanent, will be provided for accessing the wind farm site.
- Road Sweeper: Appropriate steps will be taken to prevent soil/dirt generated during the works from being transported on the public road. When, if necessary, a road sweeper will be used to maintain the public roads in a clean condition during the construction activities of the Project.
- Wheel Wash: In order to ensure no dirt or debris is brought onto the existing public road, the use of a wheel wash at the site entrance is proposed.
- Site Entrances: The entrances to the wind farm site will be secured when the site is not in use. When necessary, a flagman will be used to assist traffic movements at the wind farm site entrance or in other areas as required.
- Abnormal Load Deliveries: Abnormal loads will require an abnormal load permit prior to delivery and will be delivered at times and frequencies agreed with An Garda Siochána.

This CTMP will have to be updated by the Contractor to incorporate any conditions of planning, should permission be granted.

16.7.1.3 Grid Connection Works

Mitigation measures proposed for the GCR works include:

- Road Opening Licence: The road works associated with the GCR cabling will be completed in line with the requirements of a road opening license as agreed with the local authority.
- Route Proofing: In advance of the main grid connection works an assessment will be carried out to define the precise alignment of the cable route within the corridor which has been assessed. The assessment may include investigative works such as non-intrusive ground penetrating radar (GPR) surveys and may be accompanied by the excavation of temporary trial-pits or slit trenches, where deemed necessary, to confirm existing services in the road. The purpose of the investigations is to minimise construction impacts associated with unforeseen complications arising from uncharted or inaccurately recorded existing services. Maintaining Local Access: reasonable access to local houses, farms and businesses will be maintained at all times during any road closures associated

with the GCR works. The details of this will be agreed with the road's authority in advance of the GCR works commencing.

- Road Cleanliness: Appropriate steps will be taken to prevent soil/dirt generated during the works from being transported on the public road. Road sweeping vehicles will be used, when necessary, to ensure that the public road network remains clean.
- Temporary Trench Reinstatement: Trenches on public roads, once backfilled, will be temporarily reinstated to the satisfaction of the road's authority.
- Haul Route Interface: Aggregates and other materials imported to the wind farm site will be managed to ensure they do not conflict with the GCR works. GCR works will be planned to avoid conflicts with other major activities on the main construction site such as concrete foundation pours and large component deliveries.
- TDR Interface: the delivery of turbine components to the wind farm site will need to be managed to ensure there is no overlap with the GCR works. GCR works are to be scheduled so as not to conflict with turbine deliveries where they share the same section of public road.

16.7.1.4 Turbine Component Delivery Mitigation

The TDR has been assessed using a detailed appraisal of potential routes and the identification of the most appropriate route including the required accommodation works along the route to mitigate the impact of the turbine delivery. The impact of the deliveries on traffic is mitigated by delivering components during off-peak or night-time deliveries.

Mitigation measures proposed for the TDR also include:

- Programme of Deliveries: a programme of deliveries will be submitted to the road's authority in advance of deliveries of turbine components to the wind farm site. The programme will include details of the dates and times of each component delivery along with the route to be taken. Turbine component deliveries will be carried out during off-peak times and will be done using a convoy and a specialist heavy haulage company.
- Garda Escort: Turbine deliveries will be escorted by An Garda Siochána. This will ensure the impacts of the turbine deliveries on the existing road network are minimised.
- Reinstatement: Any area affected by the works to facilitate turbine delivery will be fully reinstated to its original condition.
- Consultation: Consultation with the local residents and Cork County Council will be carried out in advance to manage turbine component deliveries.

16.7.2 Operation

The permanent site entrance at the wind farm site will be maintained continually to ensure conditions at these entrances do not deteriorate. Hedgerow maintenance will be required to ensure continued visibility at the entrance.

16.7.3 Decommissioning

As described, a decommissioning plan will be prepared at the end of operation. The decommissioning plan will include details on material recycling/disposal and a Traffic Management Plan. This will be prepared for agreement with the Local Authority prior to decommissioning of the wind farm.

16.8 Residual effects

The implementation of mitigation measures outlined in section 16.7 will ensure that residual effects are minimised throughout the duration of the proposed activities.

16.8.1 Construction

Adverse effects on the receiving environment associated with the construction works on the main wind farm site are considered to be **short-term** in duration **slight** following mitigation and **not significant**.

Adverse effects on the receiving environment associated with the TDR are considered to be, **temporary** in duration, **slight** following mitigation and **not significant**.

Adverse effects on the receiving environment associated with the construction of the grid connection are considered to be, **short-term** in duration, **slight** following mitigation and **not significant**.

16.8.2 Operation

The trip generation for the Project once operational is anticipated to be minimal.

Effects on the receiving environment associated with the operation phase of the Project are considered to be **neutral**, **long-term** in duration and **not significant**.

For unforeseen or unplanned works such as emergency turbine repair works described in section 16.5.3 it is considered that negative or adverse effects on the receiving environment will be **temporary** in duration and **not significant to slight** following appropriate mitigation.

16.8.3 Decommissioning

To be assessed at decommissioning phase in line with decommissioning plan.

16.9 Cumulative effects

All known existing and proposed projects within the study area that could potentially generate a cumulative impact with the Project in relation to traffic and transportation during construction, operation and decommissioning phases were identified and examined as part of this assessment. EIAR **Chapter 2 EIA Methodology** provides details of the projects within the study area that were considered for cumulative impacts.

If construction of all projects listed in EIAR **Chapter 2 EIA Methodology** was to take place at the same time, there would likely be significant effects on traffic and transport. In the event of any potential effect, the developer for each individual project is responsible for ensuring that the necessary mitigation measures are in place. Mitigation will take place

through the use of the CTMP which will be agreed with the local authority before construction commences and it will include traffic control measures in agreement with the local authority. Therefore, as each project is designed and built to avoid impacts arising, cumulative effects are unlikely to arise.

EIAR Volume II

Main Report

Chapter 17: Air Quality

CONTENTS

17 AIR QUALITY 17-2
17.1 Introduction 17-2
17.2 Statement of authority 17-2
17.3 Assessment methodology 17-2
17.3.1 Construction and decommissioning 17-3
17.3.2 Operational phase 17-10
17.4 Baseline environment 17-11
17.5 Potential effects of the proposed development 17-12
17.5.1 Do-nothing scenario 17-12
17.5.2 Construction phase 17-12
17.5.3 Operational phase 17-15
17.5.4 Decommissioning phase 17-15
17.6 Mitigation measures 17-16
17.6.1 Construction phase 17-16
17.6.2 Operational phase 17-19
17.6.3 Decommissioning phase 17-19
17.7 Residual effects 17-19
17.7.1 Construction phase 17-19
17.7.2 Operational phase 17-19
17.7.3 Decommissioning phase 17-19
17.8 Cumulative effects 17-19
17.8.1 Construction phase 17-19
17.8.2 Operational phase 17-20
17.8.3 Decommissioning phase 17-20

TABLES

Table 17.1: Classification of significant air quality effects (construction and decommissioning) 17-4
Table 17.2: Annual Mean Measured Pollutant Concentrations 17-11
Table 17.3: Summary of Dust Emission Magnitudes (Before Mitigation) 17-12
Table 17.4: Sensitivity of the Area 17-13
Table 17.5: Summary of Dust Risk from Construction Activities 17-14

FIGURES

Figure 17.1: Red line boundary (including GCR option 1) buffer map 17-5
Figure 17.2: GCR option 2 buffer map 17-6
Figure 17.3: TDR option 1 buffer map 17-7
Figure 17.4: TDR option 2 buffer map 17-8
Figure 17.5: Trackout buffer map 17-9

APPENDICES (EIAR Volume III)

Appendix 17.1 Air Quality Standards
Appendix 17.2 Construction Dust Assessment Methodology

17 AIR QUALITY

17.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) for the proposed Tullacondra Green Energy Project ('the Project') details the findings of an assessment of the likely significant effects of the proposed Project upon air quality. The proposed Project includes the construction, operation and decommissioning of a wind energy development consisting of nine wind turbines with foundations and crane pad hardstanding areas; a permanent meteorological mast, an on-site 38kV substation, underground cabling connecting the turbines to the on-site substation; and underground grid connection to the boundary of the Mallow 110kV substation, along with all associated site works including site clearance, temporary compounds and storage areas; a new temporary entrance and upgrade of an existing entrance; upgrade of existing site tracks and construction of new site tracks; site drainage; and ancillary developments including security gates and fencing, lighting and signage, and biodiversity mitigations and enhancements. This chapter includes an assessment of the likely significant effects from both Grid Connection Route (GCR) Options and both Turbine Delivery Routes (TDR) Options.

The site layout plan of the proposed wind farm is shown in **Figure 1.4**, in EIAR **Chapter 1 Introduction.** Further details of the Project, the construction programme and sequencing of works which are used as the basis for assessments in this EIAR is provided in **Chapter 5 Project Description**.

This chapter should be read in conjunction with the following Technical Appendices in EIAR **Volume III**:

- **Appendix 17.1 – Air Quality Standards**
- **Appendix 17.2 – Construction Dust Assessment Methodology**

17.2 Statement of authority

This chapter has been prepared by Phoebe Chan who is a senior air quality consultant at RSK Environment Limited. She is an associate member of the Institute of Environmental Science (AMIEnvSc) and an associate member of the Institute for Air Quality Management (AMIAQM). Phoebe has two years' experience as a project manager for air quality consultancy and modelling for pollution prevention and development planning applications. She prepares environmental impact assessment reports for various solar farms and wind farms.

17.3 Assessment methodology

This air quality assessment has been prepared in accordance with the relevant European, national and local legislation and guidance on the subject of air quality. A full review of the legislation and guidance is given in **Volume III Appendix 17.1**. The methodology employed for this assessment is accepted best practice and accords with guidance.

The assessment addresses effects of the Project on air quality during the construction, operation and decommissioning phases, which has been approached as follows:

- Characterisation of baseline local air quality.
- Qualitative impact assessment of construction and decommissioning phases of the Project.
- Impact assessment of air quality effects of the Project whilst it is operational.
- Cumulative impact assessment of the Project with other permitted projects.
- Mitigation measures to be implemented to ensure any adverse effects on air quality are minimised.

The significance of effects has been assessed in accordance with the Environmental Protection Agency Guidelines on the information to be contained in Environmental Impact Assessment Reports (2022)[1]. With regard to the quality of effects, ratings can be beneficial, negligible or adverse. The significance of an effect on the receiving environment is described in the range between not significant and significant. The duration of effects is presented on a scale between momentary and permanent.

17.3.1 Construction and decommissioning

17.3.1.1 Dust and particulate matter

Dust and particulate matter (PM) generated during the construction and decommissioning phases of the Project may have the potential for an adverse effect on local air quality. This was assessed in accordance with the Institute of Air Quality Management (IAQM) construction dust guidance (2014)[2].

In order to assess the potential effects, construction activities are divided into four types:

- Demolition
- Earthworks
- Construction
- Trackout (defined as the transport of dust and dirt from the construction / demolition sites onto public road network, where it may be deposited and then re-suspended by vehicles using the network).

The first step is to screen the requirement for an assessment. An assessment is required where there are human and/or ecological receptors within certain distances of the Project site boundary. Based on the IAQM construction dust guidance (2014)[2] the study areas are as follows:

- For sensitive human receptors for earthworks and general construction activities it is up to 350m from the Project.

[1] Environmental Protection Agency. 2022. Guidelines on the information to be contained in Environmental Impact Assessment Reports.

[2] Institute of Air Quality Management, 2014. Guidance of the Assessment of dust from demolition and construction.

- For sensitive ecological receptors for earthworks and general construction activities it is up to 50m from the Project.
- For trackout activities, the study area for both sensitive human and ecological receptors will be up to 50m from the trackout route.

There are human receptors within 350m of the boundary of the wind farm site, GCR and TDR, and within 50m of the trackout route. Therefore, construction dust may have the potential to cause an adverse effect in the local area. **Figures 17.1 - 17.5** indicate the buffers for identifying the sensitivity of the area.

There are no designated ecological receptors within 50m of the wind farm site boundary, GCR, TDR and trackout route. Therefore, construction dust impact on ecological receptors has been scoped out from this assessment.

A qualitative impact assessment has been conducted to assess the risk of dust impacts to human receptors and determine appropriate mitigation to adequately control the risk. The level of mitigation that will be implemented for each activity is then determined, being commensurate with the identified risk (high, medium or low risk). Mitigation is recommended for all three risk categories as per the IAQM construction dust guidance, (2014)[2]. 'Negligible' is also a defined risk category, but mitigation is not required for the 'negligible' risk category. The IAQM construction dust guidance (2014)[2] does not recommend assigning the significance of construction activities without mitigation. However, in EIAR terms (and for consistency in wording and terminology for the assessment of impact significance), high, medium, low and negligible (risk) will result in a significant, moderate and slight significance levels, as shown in **Table 17.1.**

Table 17.1: Classification of significant air quality effects (construction and decommissioning)

Risk (IAQM)	Significance (EPA)
High	Significant
Medium	Moderate
Low	Slight
Negligible	Not significant

The full construction dust assessment methodology is presented in EIAR **Volume III, Appendix 17.2**.

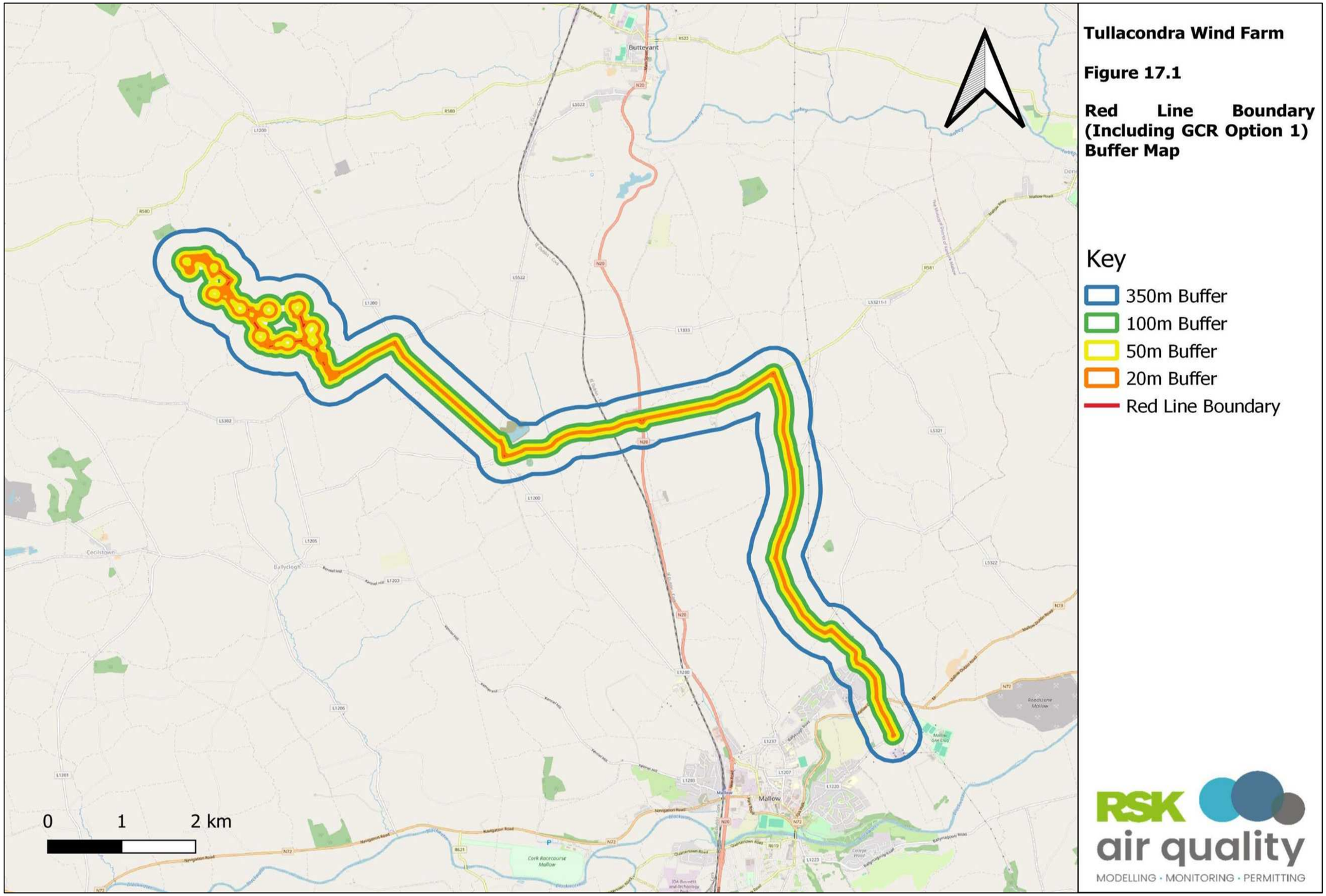

Figure 17.1: Red line boundary (including GCR option 1) buffer map

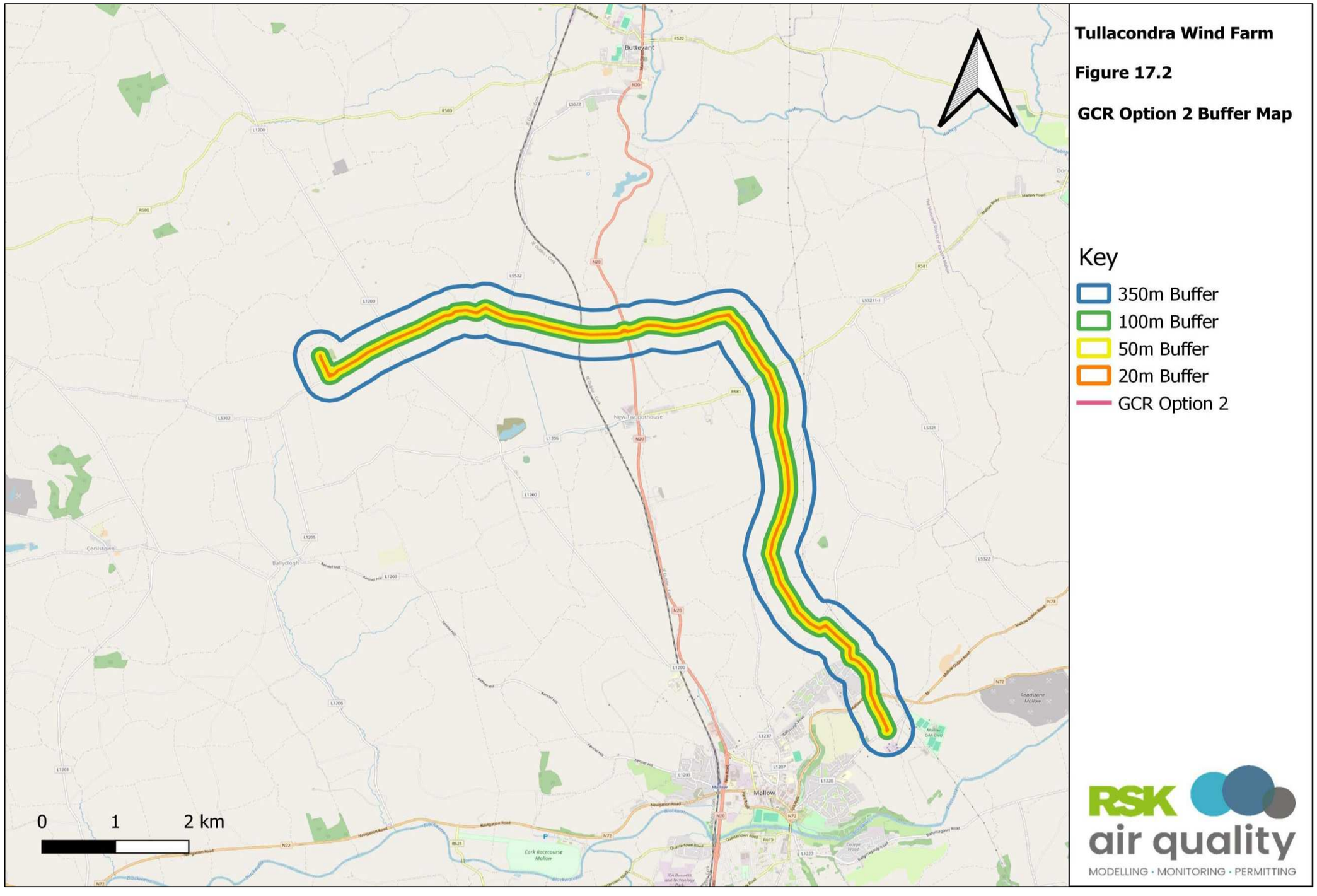

Figure 17.2: GCR option 2 buffer map

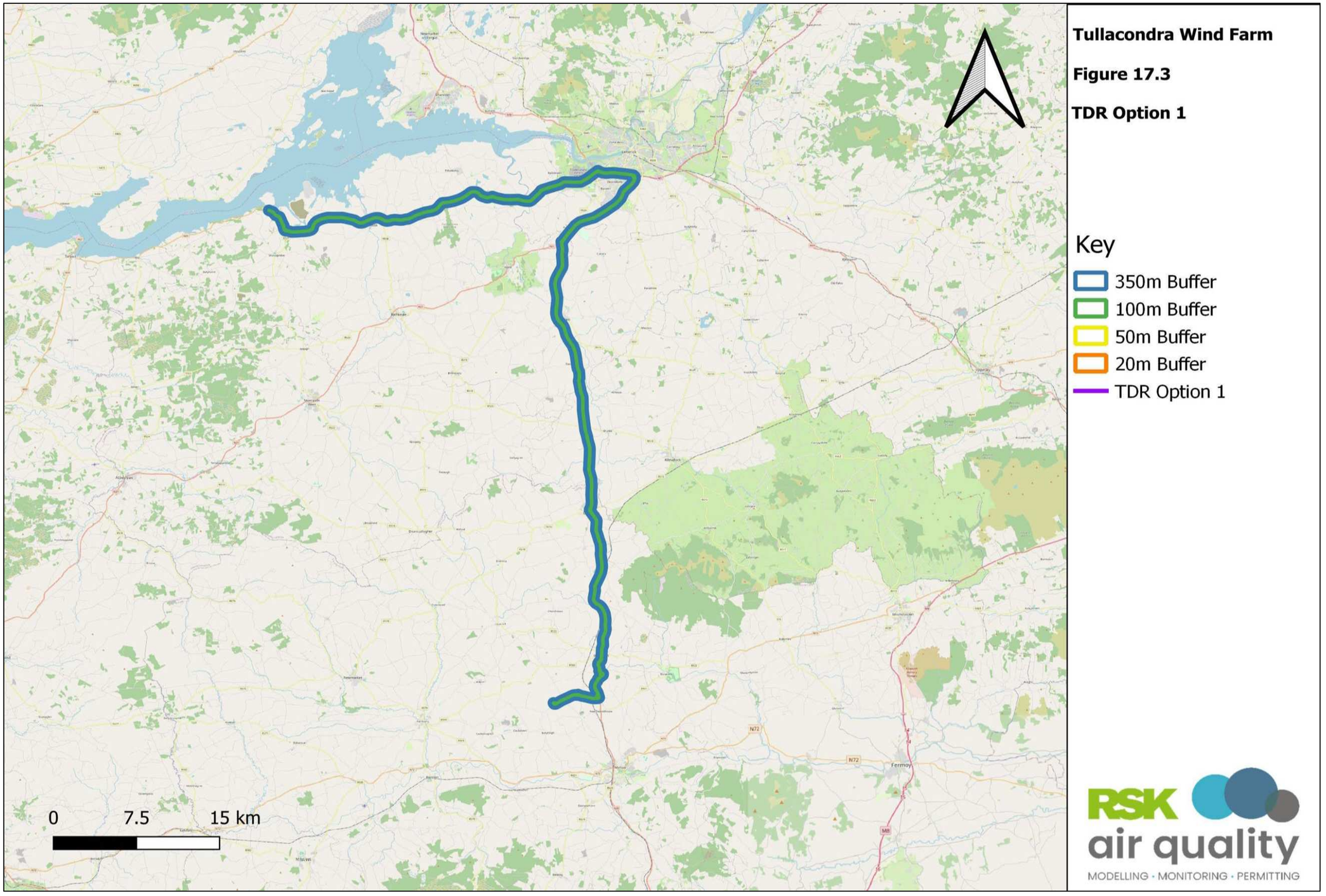

Figure 17.3: TDR option 1 buffer map

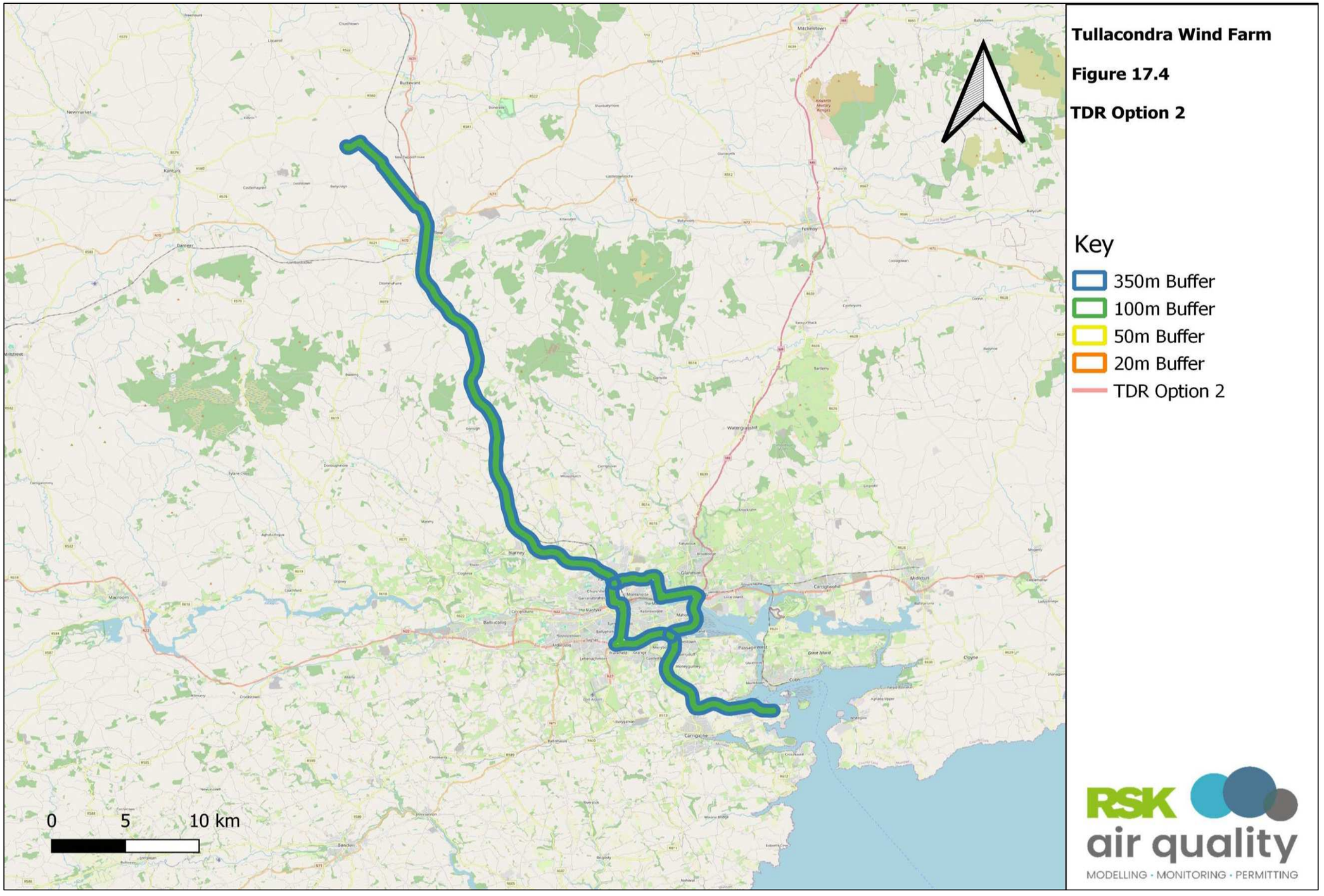

Figure 17.4: TDR option 2 buffer map

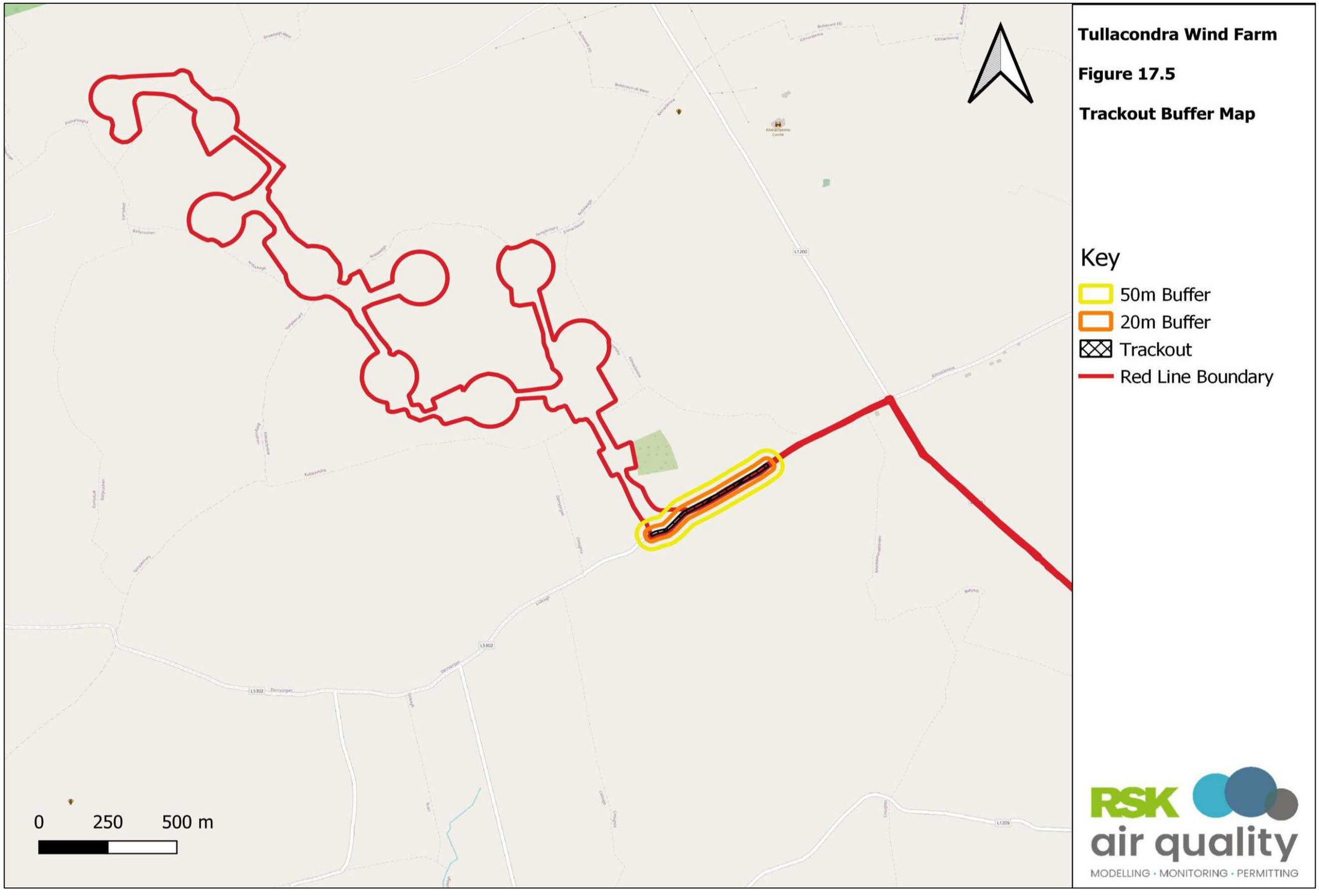

Figure 17.5: Trackout buffer map

17.3.1.2 Emissions to air from construction and decommissioning traffic and plant

Exhaust emissions from construction and decommissioning phase vehicles and plant may have an impact on local air quality adjacent to the routes used by these vehicles to access the Project. A qualitative impact assessment has been undertaken using the approach as detailed in section 17.3.2, and based on professional judgement and considering the following factors:

- The likely duration of the construction / decommissioning phase.
- The potential number and type of construction / decommissioning traffic and plant that could be required.
- The number and proximity of sensitive receptors to the Project and along the likely construction / decommissioning vehicle routes.

17.3.2 Operational phase

LA 105 of the Highways England Design Manual for Roads and Bridges (DMRB) (November 2019)[3] sets out the requirements for assessing and reporting the effects of highway projects on air quality. The DMRB, on which the Transport Infrastructure Ireland (TII) guidance (2022)[4] is based, states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the air quality assessment:

- Road alignment change of 5m or more.
- Daily traffic flow changes of 1,000 Annual Average Daily Traffic (AADT) or more.
- Heavy Duty Vehicle (HDV) flow changes of 200 AADT or more.
- Daily average speed change by 10kph or more.
- Peak hour speed change by 20kph or more.

The TII guidance (2022) also states that a detailed modelling assessment will be required if:

- Existing air quality exceeds 90% of the air quality standard. **or**
- Sensitive receptors exist within 50m of a complex road layout (e.g., grade separated junction or hills with gradients > 2.5%).

For routes which pass within 2km of a designated area of conservation (Natura 2000 sites), TII requires consultation with an Ecologist. However, in practice the potential for impact to an ecological site is highest within 200m of the proposed scheme.

A qualitative assessment against the screening criteria above has been undertaken to assess the impacts of the Project on air quality due to operational phase traffic.

[3] Highways England, 2019. LA 105 Air Quality of the Design Manual for Roads and Bridges.

[4] Transport Infrastructure Ireland (TII) Publications, 2022. Air Quality Assessment of Specified Infrastructure Projects – Overarching Technical Document. [online] Available at https://www.tiipublications.ie/library/PE-ENV 01106-01.pdf [Accessed October 2023].

17.4 Baseline environment

Existing or baseline air quality refers to the concentrations of relevant substances that are already present in ambient air. These substances are emitted by various sources, including road traffic, industrial, domestic, agricultural and natural sources.

The principal air quality pollutants relevant to this assessment are considered to be nitrogen dioxide (NO_2), particulate matter ≤10 micrometres in diameter (PM_{10}) and particulate matter ≤2.5 micrometres in diameter ($PM_{2.5}$), generally regarded as the three most significant air pollutants released by vehicular combustion processes, or subsequently generated by vehicle emissions in the atmosphere through chemical reactions (IAQM, 2023)[2]. These pollutants are generally considered to have the greatest potential to result in human health impacts and are the substances of most concern in terms of existing levels in the area, as discussed below.

A desk-based study was undertaken using data obtained from the EPA Air Quality website[5]. The Mallow, Co. Cork monitoring site (Station 82) located approximately 9km to the southeast is the nearest air quality monitoring station to the Project. The next nearest station is the Macroom, Co. Cork monitoring site (Station 67), which is approximately 35km to the southwest of the Project (this site monitors PM_{10} and $PM_{2.5}$ only). The NO_2, PM_{10} and $PM_{2.5}$ levels recorded at these two stations in 2022 are presented in **Table 17.2**.

Table 17.2: Annual Mean Measured Pollutant Concentrations

Monitoring site	2022 Annual mean concentrations (µg/m^3)		
	NO_2	PM_{10}	$PM_{2.5}$
Mallow, Co. Cork (Station 82)	15.9	13.5	7.5
Macroom, Co. Cork (Station 67)	-	16.2	11.1
Air Quality Standard (AQS)	**40**	**40**	**20**

Source: http://airquality.ie

No exceedances of the relevant air quality standards (AQS) were recorded at the sites in closest proximity to the Project. Therefore, exceedances of the relevant AQS at the Project is not expected.

The National Parks and Wildlife Service (NPWS) website[6] indicates that there are no ecological designated sites (i.e., Special Protection Areas, Special Areas of Conservation or Natural Heritage Areas) within 50m of the Project or potential routes along which dust from trackout could arise. Therefore, impacts on ecological receptors are not considered applicable and have not been considered further.

[5] Environmental Protection Agency, 2023, Air Quality. [online] Available at https://airquality.ie/ [Accessed April 2023].

[6] National Parks & Wildlife Service, 2023. National Parks & Wildlife Service. [online] Available at https://www.npws.ie/ [Accessed April 2023].

17.5 Potential effects of the proposed development

17.5.1 Do-nothing scenario

According to the EPA's Air Quality in Ireland Report (2022)[7] air quality in Ireland is generally good. Ireland met all the EU legal limit values for selected pollutants, including NO_2, PM_{10} and $PM_{2.5}$, measured in 2022.

Air quality across the study area in the absence of the Project is anticipated to remain largely unchanged from the levels in the current baseline conditions.

Baseline air pollutant concentrations is expected to fall with time because of the reduction in emissions to air resulting from newer technology vehicles (for example, improved engine performance, electric vehicles and improvement in fuel quality) and renewable energy, and therefore baseline air pollutant concentrations in future years are not expected to exceed their respective annual mean standards.

17.5.2 Construction phase

17.5.2.1 Potential dust emissions magnitude

With reference to the IAQM construction dust guidance (2014)[2] outlined in EIAR **Volume III, Appendix 17.2**, the estimation of dust emissions magnitudes (before mitigation) for earthworks, construction and trackout activities are presented in **Table 17.3**. No demolition work will be undertaken as part of this Project, therefore potential air quality impacts from demolition work has been scoped out from this assessment.

Table 17.3: Summary of Dust Emission Magnitudes (Before Mitigation)

Activity	IAQM Criteria	Dust Emission Magnitude
Demolition	No demolition will take place	N/A
Earthworks	Total site area where earthworks may occur is >10,000m^2. Moderately dusty soil type The number of heavy earth-moving vehicles active at any one time will be <5 The height of stockpiles on site will be <4 m	Medium
Construction	Total building volume is estimated to be <25,000m^3. On-site concrete batching and sandblasting are not proposed. Construction materials are expected to be potentially dusty	Medium
Trackout	Number of heavy vehicles per day out of the site is estimated to be 18.	Large

[7] Environmental Protection Agency (EPA), 2022. Air Quality in Ireland Report 2022. [online] Available at https://www.epa.ie/publications/monitoring--assessment/air/Air_Quality_Report_22_v8v2.pdf [Accessed October 2023].

Activity	IAQM Criteria	Dust Emission Magnitude
	A new, temporary construction entrance will be created, and an existing entrance will be upgraded along the L5302 local road at Croughta Site surface contains high clay content	

17.5.2.2 Sensitivity of the area

As per the IAQM construction dust guidance (2014)[2], the sensitivity of the area takes into account a number of factors, including:

- The specific sensitivity of receptors in the area.
- The proximity and number of those receptors.
- For the human health assessment, the local background annual mean PM_{10} concentration.
- Site specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

Consideration is given to humans from the impact of the construction site boundary and routes along which HGVs may facilitate Trackout. Details of the designated haul routes and turbine delivery routes (TDR) are outlined in section 16.4 of EIAR **Chapter 16 Traffic and Transport**.

Figure 17.1 to **Figure 17.5** indicate the buffers for identifying the sensitivity of the area.

Table 17.4 presents the determined sensitivity of the area with the factors itemised which have helped to define this.

Table 17.4: Sensitivity of the Area

Potential Impact		Demolition	Earthworks	Construction	Trackout
Dust Soiling	Receptor sensitivity	N/A	High	High	High
	Number of receptors	N/A	10-100	10-100	1-10
	Distance from the source	N/A	<20m	<20m	<20m
	Overall Sensitivity of the Area	N/A	**High**	**High**	**Medium**
Human health	Receptor sensitivity	N/A	High	High	High
	Number of receptors	N/A	10-100	10-100	1-10

Potential Impact		Demolition	Earthworks	Construction	Trackout
	Distance from the source	N/A	<20m	<20m	<20m
	Overall Sensitivity of the Area	N/A	**Low**	**Low**	**Low**
Ecological	N/A				

Construction activities are considered relevant up to 350m from the proposed wind farm site boundary, grid connection route (GCR) and TDR whereas Trackout activities are only considered relevant up to 50m of the Trackout route, as per the IAQM construction dust guidance (2014)[2].

The NPWS website[6] was used and EIAR **Chapter 7 Biodiversity** was referenced to identify sensitive ecological receptors near the Project. There are no ecologically designated sites within 50m of the proposed wind farm site boundary, GCR, TDR or potential routes along which Trackout could arise.

Human receptors were identified within 350m of the proposed wind farm site boundary, GCR and TDR and within 50m of the Trackout route by reference to online publicly available satellite imagery and EIAR **Chapter 2 EIA Methodology** and **Volume III Appendix 2.2**.

17.5.2.3 Likelihood of dust impacts

The dust emission magnitude summarised in **Table 17.3** has been combined with the sensitivity of the area in

Table 17.4 to determine the likelihood of dust impacts from construction activities before mitigation. These have been evaluated based on risk categories of each activity (**Appendix 17.2**).

The risk of dust impacts from arising from construction of the Project (before mitigation) is identified as ranging between low and medium (equivalent to **slight to moderate effect** in EIA terms), as shown in **Table 17.5**. Mitigation measures to reduce construction phase effects are defined based on this assessment.

Table 17.5: Summary of Dust Risk from Construction Activities

Potential effects	Demolition	Earthworks	Construction	Trackout
Dust soiling	N/A	Medium risk	Medium risk	Medium risk
Human health	N/A	Low risk	Low risk	Low risk
Ecological	N/A			

17.5.2.4 Exhaust emissions from plant and vehicles

During the construction phase, the number of HGV and light goods vehicles (LGV) movements associated with the development has been estimated to be 18 HGV and 11 LGV per day on average; the Project has been estimated to generate a maximum of 34 HGV and 20 LGV per day (as per EIAR **Chapter 16 Traffic and Transport**). These do not exceed the DMRB screening criteria and therefore it is considered that further assessment of the construction phase traffic emissions is not required. The short-term increase in vehicle emissions during the construction phase is therefore **not significant**.

The operation of construction site equipment and machinery will result in emissions to atmosphere of exhaust gases. In accordance with UK Department for Environment, Food and Rural Affairs (DEFRA) Local Air Quality Management Technical Guidance, (2022)[8], with suitable controls and site management, such emissions will be **short-term** and **not significant.**

17.5.3 Operational phase

The assessment of baseline air quality in the region of the Project has shown that current levels of key pollutants are significantly lower than their limit values. Due to the nature of the Project, the principal operational phase air quality impact is likely to be associated with traffic emissions as a result of any changes in traffic flows or flow composition the development may bring. The vehicle trip generation for the Project once operational is anticipated to be minimal as both the wind farm and substation will be operated remotely.

The Project is not expected to generate traffic exceeding the DMRB screening criteria once operational. Therefore, it is considered that further assessment of the operational phase traffic emissions is not required. The increased road traffic emissions resulting from the Project on air quality during the operational phase is **not significant**.

Furthermore, considering the renewable electricity to be generated by the wind farm, which is a clean, sustainable source of energy, the Project will help reduce the energy requirements from fossil fuels, which emit harmful air emissions, such as carbon dioxide, nitrogen dioxide, sulphur dioxide and particulate matters. The project will have a **major beneficial effect** on national air quality.

17.5.4 Decommissioning phase

Vehicles and generators associated with the removal of the turbines have the potential to cause a temporary negative impact on local air quality in the short term. As per EIAR **Chapter 16 Traffic and Transport**, the traffic impact associated with the decommissioning phase in the absence of mitigation, is considered to be **temporary** in duration and **slight** in significance. The Project is not expected to generate traffic exceeding the DMRB screening criteria during decommissioning phase and therefore it is considered that further assessment of the decommissioning phase traffic is not required.

Based on the temporary nature of the decommissioning activities and low background pollutant concentrations in the vicinity of the wind farm site, it is considered unlikely that the effect of dust and particulate matter emissions and exhaust emissions from plant and

[8] Department for Environment, Food and Rural Affairs, 2022. Part IV of the Environment Act 1995 as amended by the Environment Act 2021: Local Air Quality Management: Technical Guidance LAQM.TG.22.

vehicles during the decommissioning phase will result in a significant effect on local air quality. It should be noted that measures implemented during the construction phase are also relevant for the decommissioning phase. Therefore, the effect of decommissioning of the Project on local air quality during the decommissioning phase is **not significant.**

17.6 Mitigation measures

17.6.1 Construction phase

17.6.1.1 Fugitive dust emissions

The dust emitting activities outlined in section 17.5.2 above can be effectively controlled by appropriate dust control measures and any adverse effects can be greatly reduced or eliminated. The mitigation measures described below will be used to control potential fugitive emissions during the construction phase. [2]

Prior to commencement of construction activities, the CEMP for the construction phase will be agreed with the Local Authority to control dust emissions. The CEMP (included in EIAR **Volume III, Appendix 5.1**) includes measures for controlling dust and general pollution from site construction operations.

The dust risk categories identified have been used to define appropriate, site-specific mitigation measures, which are divided into general measures and measures specific to earthworks, construction and trackout. Depending on the level of risk, different mitigation measures are assigned, in accordance with the IAQM construction dust guidance (2014) For this Project, the 'low risk' and 'medium risk' mitigation measures have been applied, as determined by the dust risk assessment. For those mitigation measures that are general, the highest risk assessed has been applied. [2]Table 17.517.3.1.2

[2]Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on the Project.
- Display the name and contact details of people accountable for air quality and dust issues with respect to the Project. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.

Dust Management

- Implement a CEMP (included in EIAR **Volume III, Appendix 5.1**) (and CTMP (included in EIAR **Volume III, Appendix 5.2**)), which include measures to control all emissions, to be approved by the Local Authority.
- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken.
- Make the complaints log available to the Local Authority if requested.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off site, and the action taken to resolve them in the logbook.

Monitoring

- Undertake regular on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, and record inspection results in a log which will be made available to the local authority if requested. Monitoring should, where possible, include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100m of the Project boundary in agreement with the relevant homeowners / landowners.
- Increase the frequency of site inspections by the Environmental Clerk of Works (EnvCoW) when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Agree dust deposition, dust flux, or real-time PM10 continuous monitoring locations and duration (including baseline monitoring) with the Local Authority.

Preparing and maintaining the site

- Plan site layout so that machinery and dust causing activities are located as far away from receptors as possible.
- Erect solid screens or barriers around dusty activities.
- Avoid site runoff of water or mud (e.g., establish clean water interception drains and/or soil berms to direct/divert surface water runoff from development areas) (Refer to EIAR **Chapter 9 Hydrology and Hydrogeology** and the Surface Water Management Plan contained in EIAR **Volume III, Appendix 5.1 Construction Environmental Management Plan**).
- Keep site fencing, barriers and scaffolding clean.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- All temporary stockpiles will be positioned on established and existing hardstand areas or in designated areas which are appropriate for short term storage and will be managed in terms of potential for solids entrainment by runoff (Refer to EIAR **Chapter 10 Soils and Geology**).

Operating vehicles/machinery and sustainable travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Produce a construction logistics plan to manage the sustainable delivery of goods and materials.

Construction operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction (e.g., suitable local exhaust ventilation systems).
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible.
- Use enclosed chutes and conveyors and covered skips.

- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Specific to Earthworks (management and mitigation for earthworks is covered in further detail in EIAR **Chapter 10 Soils and Geology**)

- Re-vegetate earthworks to stabilise surfaces.

Specific to construction

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.

Specific to trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the Project.
- Avoid any dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect site access tracks for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site logbook.
- Install hard surfaced site access tracks, which are regularly cleaned and damped down with mobile sprinkler systems and/or mobile water bowsers.
- Implement a washout station wheel washing system.

17.6.1.2 Exhaust emissions from plant and vehicles

Any effects on air quality from traffic during construction of the Project will be temporary (i.e., during the construction period only) and can be suitably controlled by the employment of mitigation measures (described above), including a construction logistics plan.

Any emissions from Non-Road Mobile Machinery (NRMM) can be reduced by ensuring that any plant used on-site comply with the nitrogen oxides (NO_x), particulate matter and carbon monoxide emissions standards specified in the Regulation (EU) 2016/1628 (as amended)[9] as a minimum, where they have net power of between 37kW and 560kW. The emissions standards vary depending on the net power the engine produces.

[9] European Union, 2016. Regulation (EU) 2016/1628 (as amended) of the European Parliament and of the Council of 14 September 2016 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery, amending Regulations (EU) No 1024/2012 and (EU) No 167/2013, and amending and repealing Directive 97/68/EC.

17.6.2 Operational phase

No specific operational phase mitigation measures are required.

17.6.3 Decommissioning phase

Mitigation measures outlined above for the construction phase are also relevant for the decommissioning phase to control potential fugitive emissions from the decommissioning works and exhaust emissions from plant and vehicles.

17.7 Residual effects

17.7.1 Construction phase

All construction effects are **not significant** provided that appropriate dust control and construction phase mitigation measures are applied as listed in the mitigation measures section. Residual effects are therefore **not significant**.

17.7.2 Operational phase

The residual effects of the development on air quality, whilst it is in operation, are **not significant**. Furthermore, the Project will result in a reduction in ambient air which will be brought about by the displacement of fossil fuel energy sources by the renewable energy produced by the Project. With reference to **Table 2.1** in EIAR **Chapter 2 EIA Methodology**, given that baseline air pollutant concentrations are expected to fall with time because of the reduction in emissions to air resulting from newer technology vehicles and renewable energy, a **major beneficial effect** on national air quality is anticipated.

17.7.3 Decommissioning phase

The measures implemented during the construction phase are also relevant for the decommissioning phase. With the implementation of the specified mitigation measures, the residual effects during decommissioning will be **not significant**.

17.8 Cumulative effects

17.8.1 Construction phase

The phasing/commencement of any other committed (i.e., permitted and proposed) developments in the locality could potentially result in a scenario where a number of other construction sites are in operation at the same time as the Project, and concurrently generating emissions to air.

The IAQM construction phase methodology states that beyond 350m from a site boundary, the risk of impact from activities carried out on-site during the construction phase can be considered to be negligible. The committed developments identified in EIAR **Chapter 2 EIA Methodology** are all >350m from the Project except the Ballinrea Solar Farm (modification) and 110kV substation and connection (within 200m of TDR Option 2), Coom Wind Park (a portion of the west TDR and along the N20 as far as Rathduff is the same Project TDR Option 2), Ballinagree Wind Farm (a portion of the TDR is the same as Project TDR Option 1 until the turnoff at New Twopothouse), Hazelbrook Housing Development (within 200m of GCR Option 1), Clonmore Housing Development

(within 200m of GCR Option 1), Student Housing development (within 200m of TDR Option 2), and Cois Sruthain Housing Development (within 200m of TDR Option 1).

There is no potential for cumulative effects on air quality, given the residual effect associated with the Project is predicted to be **not significant**. All permitted developments are expected to agree and follow a site-specific CEMP and Construction Traffic Management Plans (CTMP) that will adequately control emissions from construction. Therefore, with appropriate mitigation measures in place, the construction phase cumulative effect is **not significant**.

17.8.2 Operational phase

Traffic volumes to the wind farm site during the operational phase will be low. As with construction phase impacts, any other permitted developments are expected to follow best practice mitigation measures to minimise emissions to air. Therefore, exceedance of the relevant AQS is unlikely and cumulative operational phase effects are considered **not significant**. Together with the existing and proposed renewable projects in the wider area, a major beneficial effect from reduction in the reliance on fossil fuel generated electricity will be reduced. The cumulative operational effect of the Project is likely to be **major beneficial**.

17.8.3 Decommissioning phase

As with construction phase impacts, all permitted developments to follow site specific decommissioning plans, to be agreed with the Local Authority, that will adequately control emissions from decommissioning. Therefore, with appropriate mitigation measures in place, the decommissioning phase cumulative effect is **not significant**.

EIAR Volume II

Main Report

Chapter 18: Climate

CONTENTS

18 CLIMATE 18-1

18.1 Introduction 18-1

18.2 Statutory and planning context 18-1

18.2.1 The 2015 Paris Agreement 18-1

18.2.2 The Glasgow Climate Pact 18-2

18.2.3 The Kyoto Protocol 18-2

18.2.4 European Green Deal 18-2

18.2.5 The European Climate Law 18-3

18.2.6 The European Climate Pact 18-3

18.2.7 The 'Fit for 55' Package 18-3

18.2.8 The REPowerEU Plan 18-3

18.2.9 Programme for Government: Our Shared Future 18-4

18.2.10 Climate Action and Low Carbon Development (Amendment) Act 2021 18-4

18.2.11 Climate Action Plan 2024 18-4

18.2.12 Clean Air Strategy for Ireland 18-5

18.2.13 Cork County Development Plan 2022-2028 18-5

18.2.14 Institute of Environmental Management and Assessment Guide: Assessing Greenhouse Gas Emissions and Evaluating their Significance 2022 18-6

18.2.15 Royal Institution of Chartered Surveyors Whole Life Carbon Assessment for the Built Environment 2023 18-6

18.2.16 Publicly Available Specification 2080: 2016 Carbon Management in Infrastructure 18-6

18.3 Statement of authority 18-7

18.4 Scope and Methodology 18-7

18.4.1 Scope 18-7

18.4.2 Methodology 18-8

18.5 Present and future baseline conditions 18-11

18.5.1 Future baseline conditions (do nothing scenario) 18-12

18.6 Potential effects of the Project 18-13

18.6.1 Assumptions 18-13

18.6.2 Direct effects (construction) 18-13

18.6.3 Direct effects (operation) 18-14

18.6.4 Direct effects (decommissioning) 18-14

18.6.5 Interactions and cumulative effects 18-15

18.7 Mitigation and enhancement measures 18-15

18.7.1 Construction and decommissioning 18-15

18.8 Monitoring 18-16

18.9 Residual effects 18-17

TABLES

Table 18.1: Anticipated key emissions sources during the before use stage 18-8
Table 18.2 Anticipated key emissions sources during the end of life stage 18-8
Table 18.3: Global warming potential of Kyoto Protocol gas groups 18-9
Table 18.4: GHG assessment significance criteria 18-10
Table 18.5: Estimated GHG Emissions from the Construction of the Project 18-14
Table 18.6: Estimated GHG emissions from the decommissioning of the proposed Project 18-15

APPENDICES (EIAR Volume III)

Appendix 18.1: Emission factors
Appendix 18.2: Input and output data for the calculation of emissions

18 CLIMATE

18.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) for the proposed Tullacondra Green Energy Project ('the Project') details the findings of an assessment of the likely significant effects of the Project upon the climate. It takes the form of:

- A greenhouse gas (GHG) assessment; determining the effects of the emission of GHGs arising from the Project, upon the climate.
- An assessment of in-combination effects; determining the cumulative impacts of the Project on the climate as a result of:
    - Interaction with other permitted developments within the area.
    - Interaction with other impacts resulting from the same Project.

The Project includes the construction, operation and decommissioning of a wind energy development consisting of nine wind turbine generators with foundations and crane pad hardstanding areas; a permanent meteorological mast; an on-site 38kV substation, underground cabling connecting the turbines to the on-site substation; and underground grid connection to the boundary of the Mallow 110kV substation; along with all associated site works including site clearance, temporary compounds and storage areas; a new temporary entrance and upgrade of an existing entrance; upgrade of existing site tracks and construction of new site tracks; site drainage; and ancillary developments including security gates and fencing, lighting and signage; and biodiversity mitigations and enhancements. This chapter includes an assessment of the likely significant effects from both Grid Connection Route (GCR) Options and both Turbine Delivery Routes (TDR) Options.

The site layout plan of the proposed wind farm is shown in **Figure 1.4**, in EIAR **Chapter 1 Introduction**. Further details of the Project, the construction programme and sequencing of works which are used as the basis for assessments in this EIAR are provided in **Chapter 5 Project Description**.

18.2 Statutory and planning context

This chapter has been prepared in accordance with the relevant legislation and guidance, as set out below.

18.2.1 The 2015 Paris Agreement

The Paris Agreement is a legally binding international treaty which commits Parties to the United Nations Framework Convention on Climate Change (UNFCCC)[1] to objectives to reduce greenhouse gas (GHG) emissions, with the view to limiting the global average temperature rise to well below 2˚C above pre-industrial levels, whilst "pursuing efforts to limit the temperature increase to 1.5˚C". The Agreement is revisited every five years to

[1] UNFCCC. The Paris Agreement. Unfccc.Int Available from: unfccc.int/process-and-meetings/the-paris-agreement. [Accessed 10 May 2023].

allow Parties to the Convention to evaluate and enhance the level of ambition of their climate action plans, known as Nationally Determined Contributions (NDCs).

18.2.2 The Glasgow Climate Pact

The Glasgow Climate Pact[2] is an agreement adopted by nations in 2021 at COP26, providing further details on the operationalisation of the 2015 Paris Agreement. Four highlights of the Pact include the first-ever commitment to 'phase down' the use of unabated coal, a call for developed countries to double their provision of adaptation finance from 2019 levels by 2025, the finalisation of the "Paris Agreement rulebook" which sets out rules for how Parties will be held accountable for their climate action commitments and targets within their NDCs, and the establishment of new market mechanisms to support emissions reductions and private-sector investment into climate-friendly solutions. The Glasgow Climate Pact reaffirms global commitment to the low-carbon energy transition in line with the 2015 Paris Agreement.

18.2.3 The Kyoto Protocol

The Kyoto Protocol[3], adopted in 1997, set binding emission reduction targets for 37 countries. These commitments added up to around 5% emission reductions relative to a 1990 baseline from 2008-2012. An international emissions trading scheme was established by the Protocol to provide a market-based mechanism that would incentivise and finance country-level emission reductions.

18.2.4 European Green Deal

The European Green Deal, 2019[4] is a flagship climate initiative of the European Commission that aims to transform Europe into a climate-neutral, fair, and prosperous society with a modern, resource-efficient, and competitive economy. It also aspires to protect, conserve, and enhance the EU's natural capital, and protect the health and well-being of citizens from environment-related risks and impacts. Announced in 2019, the Green Deal commits to delivering net-zero GHG emissions at the EU level by 2050 and reducing GHG emissions by at least 55% by 2030 compared to the 1990 levels. The European Commission's European Climate Law, 2018[5], European Climate Pact, 2021[6], the REPowerEU Plan[7] and the European Council's 'Fit for 55' Package, 2022[8] are some of the ancillary commitments subsumed under the ambitious European Green Deal. In

[2] UNFCCC. 2021. Glasgow Climate Pact. Available from: https://unfccc.int/sites/default/files/resource/cma2021_10_add1_adv.pdf [Accessed 21 Nov 2023].

[3] UNFCCC. 1997. Kyoto Protocol to the United Nationals Framework Convention on Climate Change. Available from: https://unfccc.int/documents/2409 [Accessed 21 Nov 2023].

[4] European Commission. 2019. A European Green Deal. Available from: europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en. [Accessed 10 May 2023].

[5] European Commission. 2018. European Climate Law. Climate Action. Available from: climate.ec.europa.eu/eu-action/european-green-deal/european-climate-law_en. [Accessed 10 May 2023]

[6] European Commission. 2021. What Is the European Climate Pact? European Climate Pact, Available from: climate-pact.europa.eu/index_en. [Accessed 10 May 2023].

[7] IEA. 2022. Repowereup Plan: Joint European Action on Renewable Energy and Energy Efficiency – Policies. IEA, Available from: www.iea.org/policies/15691-repowereu-plan-joint-european-action-on-renewable-energy-and-energy-efficiency. [Accessed 10 May 2023].

[8] European Council. 2022. Fit for 55 - the EU's Plan for a Green Transition. Consilium Europa, Available from: www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/.[Accessed 10 May 2023].

particular, the recent REPowerEU Plan[7] proposes to expand the target for renewable energy from 20% by 2020 to 45% by 2030, so as to facilitate accelerated clean energy transition and increased energy independence.

18.2.5 The European Climate Law

The European Climate Law, 2018[5] is a legal framework adopted by the European Union to establish climate neutrality in Europe through the legally binding target of net zero GHG emissions by 2050. The law also states an intermediate target of at least 55% reduction of net greenhouse gas emissions by 2030, as compared to 1990 levels. The law is a key element in the European Green Deal[4] which aims to make Europe's economy sustainable. The primary objectives of the European Climate Law[5] are to create long-term direction for meeting the 2050 climate neutrality goal through all policies as well as create a system for monitoring progress and mobilise further action if required, based on governance processes for Member States' energy and climate plans, reports by the European Environment Agency and the growing evidence on climate change and its effects. The law includes the recognition of the need to enhance EU's carbon sink, create a process to establish 2040 climate targets, target negative emissions after 2050 and an establishment of the European Scientific Advisory Board on Climate Change.

18.2.6 The European Climate Pact

The European Climate Pact, 2021[6] is an initiative of the European Commission that supports implementation of the European Green Deal. It is a movement that aims to encourage sustainability in Europe by providing a platform for people, communities and organisations to participate in climate action across Europe. European stakeholders can identify and mobilise climate and environmental action in a measurable way by pledging to the Pact. The Pact is an open and inclusive initiative that invites regions, local communities, industries and civil society to participate and share their transition journey as well as collaborate on climate action to reach common targets.

18.2.7 The 'Fit for 55' Package

The Fit for 55 Package, 2022[8] is a set of proposals by the European Union to revise and update existing legislation and introduce initiatives to ensure that EU policies are in line with the climate goals agreed on by the Council and European Parliament to reduce net greenhouse gas emissions by 55% by 2030. An element within the Fit for 55 Package is the aim to reform the EU ETS by improving its functioning and broadening its scope to maritime transport, road transport and buildings. Additionally, the package aims to track and reduce methane and includes the uptake of greener, low-carbon fuels in the aviation and maritime sectors. The package also stipulates a revision in the renewable energy directive (EU) 2018/2001 (as amended) to increase the current EU-level target of 32% renewable energy sources within the energy mix to at least 40% by 2030. The package aims to reform policies across more areas ranging from infrastructure, energy performance of buildings and energy taxation. The European Commission proposed the package in 2021 and it became law in 2022.

18.2.8 The REPowerEU Plan

The REPowerEU Plan, 2022[7] is an EU Initiative aimed at reducing the EU's dependency on Russian fossil fuels and increasing the use of renewable energy sources. The

REPowerEU aims to save energy, produce clean energy and diversify energy supplies in the face of unstable geopolitical and energy landscapes in light of the Russian invasion of Ukraine. It includes targets for a 45% renewable energy share across EU. Short-term measures of the REPowerEU Plan includes purchases of hydrogen via the EU Energy Platform for all Member States, roll out of solar and wind energy projects and increasing production of biomethane. Medium term measures include boosting industrial decarbonisation with 3 billion Euros of frontloaded projects, legislation and recommendations for faster permitting of renewables in areas of low environmental risk, and a hydrogen accelerator to build 17.5GW of electrolysers to fuel the EU industry with 10 million tonnes of hydrogen.

18.2.9 Programme for Government: Our Shared Future

The Programme for Government: Our Shared Future[9] is a five-year programme that lays out what the government of Ireland aims to achieve over its time in power. It includes policies for areas such as healthcare, the economy, transport, housing, immigration, education and more. Adopted by the coalition government in 2020, the Programme also contains several key policy commitments on climate change as it acknowledges that Ireland has a major role to play in combating climate change. Some of these commitments are a legal target to reduce an average of 7% carbon emission per annum from 2021 to 2030, no new issuing of licenses for gas exploration and extraction, a ban in the registration of new petrol and diesel cars after 2030, and a carbon tax increase from €80 per tonne to €100 per tonne.

18.2.10 Climate Action and Low Carbon Development (Amendment) Act 2021

The Climate Action and Low Carbon Development (Amendment) Act 2021[10] or the Climate Act 2021, commits Ireland to a legally binding target of net-zero GHG emissions no later than 2050, and a reduction of 51% of emissions by 2030 (relative to the 2018 baseline). Under the Act, Ireland needs to pursue and achieve, by no later than the end of 2050, a transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy. The Act also mandates each local authority to develop Climate Action Plans addressing both mitigation and adaptation measures, to be updated every five years. The 2021 Act amends the 2015 Act to significantly strengthen the statutory framework for governance of climate actions to realise Ireland's national, EU and international climate goals and obligations.

18.2.11 Climate Action Plan 2024

The Climate Action Plan 2024 (CAP24)[11] provides a detailed plan for the Republic of Ireland to take decisive action towards achieving 51% reduction in overall GHG emission by 2030 and net-zero GHG emissions no later than 2050. CAP24 is the second statutory update to the CAP since the Climate Action and Low Carbon Development (Amendment) Act 2021 was signed into law, committing Ireland to 2030 and 2050 targets for reducing

[9] Gov.ie (n.d), Programme for Government: Our Shared Future. Available from www.gov.ie/en/publication/7e05d-programme-for-government-our-shared-future/. [Accessed 10 May 2023].

[10] IEA. 2022. Climate Action and Low Carbon Development Law – Policies. IEA, Available from: www.iea.org/policies/13181-climate-action-and-low-carbon-development-law. [Accessed 10 May 2023].

[11] Gov.ie (n.d). Climate Action Plan 2024. Gov.ie, Available from: https://www.gov.ie/en/publication/79659-climate-action-plan-2024/. [Accessed 10 June 2024].

greenhouse gas (GHG) emissions. Among the most critical measures in the plan is to increase the proportion of renewables to reach 80% of electricity demand by 2030, including targets for a total of 9GW of onshore wind energy.

It builds on CAP23 and outlines how Ireland will accelerate the action required to respond to the climate crisis, putting climate solutions at the centre of Ireland's social and economic development.

18.2.12 Clean Air Strategy for Ireland

Published and adopted in 2023, the Clean Air Strategy[12] sets out high-level strategic frameworks to secure Ireland's air quality improvements, building upon the EU-mandated National Air Pollution Control Programme (NAPCP). Within its strategic framework, the Strategy outlines a commitment to review policy to take into account new World Health Organization's (WHO) guideline limits for ambient air quality and proposed changes to the EU Ambient Air Quality Directive, and further outlines the development of Ireland's own Clean Air Act (expected in Q3 2024) and an update to the existing Air Pollution Act 1987. Ireland also set a target to reach the WHO's interim target of 15 µg/m^3 for annual $PM_{2.5}$ by 2026 and 10 µg/m^3 for annual $PM_{2.5}$ by 2030. Targets for other air pollutants were also set.

18.2.13 Cork County Development Plan 2022-2028

The Cork County Development Plan (CDP)[13] is a six-year development plan that sets out the policy objectives and the overall strategy for the proper planning and sustainable development of County Cork between 2022 to 2028. The CDP is centred on the core principle of sustainability with a focus on creating vibrant, liveable and climate resilient communities. With climate change recognised as one of the more crucial aspects affecting the future of County Cork, the Council is committed to shaping the CDP as an important climate action tool. It will ensure that all development considers climate change mitigation and adaptation, and that the location of development will promote climate action and maximise climate action opportunities. Additionally, while acknowledging the importance of transitioning towards sustainable renewable energy, especially with regard to wind energy, the CDP also recognises the need to maintain and protect the ecological, landscape, amenity, recreational and settlement aspects of the county.

Cork Couty Council's first Climate Action Plan 2024-2029[14] was adopted on the 12th February 2024. This Action Plan strengthens the links between national and international climate policy and the delivery of effective climate action at a local and community level, through 'Place-based' climate action. The Action Plan highlights the need for supporting the development of renewable energy infrastructure in accordance with the CDP.

[12] Gov.ie. 2023. Clean Air Strategy. Available from: https://www.gov.ie/en/publication/927e0-clean-air-strategy/ [Accessed 21 Nov 2023].

[13] Cork County Council (n.d). Cork County Development Plan 2022-2028. Available from: www.corkcoco.ie/en/resident/planning-and-development/cork-county-development-plan-2022-2028. [Accessed 10 May 2023].

[14] Cork County Council. 2024. Cork County Council. Climate Action Plan 2024 – 2029.

18.2.14 Institute of Environmental Management and Assessment Guide: Assessing Greenhouse Gas Emissions and Evaluating their Significance 2022

The Institute of Environmental Management and Assessment (IEMA) Guide: Assessing Greenhouse Gas Emissions and Evaluating their Significance 2nd Edition (2022)[15] assists GHG practitioners in addressing GHG emissions assessment, mitigation, and reporting in statutory and non-statutory EIA. It complements the IEMA Guide on Climate Change Resilience and Adaptation (2020)[16] and is a revision from the 2017 guidance. The revised guide sets out areas for consideration at all stages of the assessment and offers methodological options to be explored. It also presents a new scale for describing significant CO_2 emissions and relates the significance to the rate of emission reduction needed to achieve an applicable net-zero trajectory at the sectoral or economy wide level.

18.2.15 Royal Institution of Chartered Surveyors Whole Life Carbon Assessment for the Built Environment 2023

Royal Institution of Chartered Surveyors (RICS) Whole Life Carbon Assessment for the Built Environment 2023[17] addresses the need for technical details of the numerous aspects influencing whole life carbon calculations for built projects. It emphasises on the practical implementation of the EN 15978: 2011 Sustainability of Construction Works[18] principles and sets out more reliable and detailed calculation and reporting requirements. By providing practical guidance for the interpretation and implementation of the carbon calculation methodology stated in EN 15978, coherent and comparable whole life carbon assessment can be achieved to benchmark the performance of built assets.

18.2.16 Publicly Available Specification 2080: 2016 Carbon Management in Infrastructure

Publicly Available Specification (PAS) 2080:2016 Carbon Management in Infrastructure[19] specifies requirements for the accounting and management of whole life carbon in infrastructure in line with international and sectoral norms, relevant standards, and guidance, with the view to promoting the reduction of whole life GHG emissions. It sets out the emissions boundaries to be considered in the 'before use stage', the 'use stage', and the 'end of life' stage.

[15] IEMA. 2022. Launch of the Updated EIA Guidance on Assessing GHG Emissions - February 2022. IEMA, Available from: www.iema.net/resources/blog/2022/02/28/launch-of-the-updated-eia-guidance-on-assessing-ghg-emissions. [Accessed 10 May 2023].

[16] IEMA. 2020. EIA Guide to: Climate Change Resilience and Adaptation. Available from: https://www.iema.net/resources/reading-room/2020/06/26/iema-eia-guide-to-climate-change-resilience-and-adaptation-2020. [Accessed 10 May 2023].

[17] RICS.org. 2023. Whole Life Carbon Assessment for the Built Environment. Rics.Org, Available from: www.rics.org/profession-standards/rics-standards-and-guidance/sector-standards/building-surveying-standards/whole-life-carbon-assessment-for-the-built-environment. [Accessed 10 May 2023].

[18] British Standards Institution. 2011. BS EN 15978:2011 Sustainability of construction works. Assessment of environmental performance of buildings. Calculation method.

[19] BSI. 2016. Carbon Management in Infrastructure. BSI Available from: knowledge.bsigroup.com/products/carbon-management-in-infrastructure/standard. [Accessed 10 May 2023].

18.3 Statement of authority

Danielle King

Danielle is the Head of Climate Change Strategy and Decarbonisation at the RSK Centre for Sustainability Excellence. She is responsible for leading a team of climate change adaptation, mitigation, and finance specialists to deliver services in line with the Paris Agreement and UN Sustainable Development Goals. Regarding her own skills and experience, Danielle specialises in the delivery of climate change impact assessment and management. In particular, she is responsible for greenhouse gas assessment and verification services, climate change risk and opportunity assessment and disclosure services, and the development of sustainability strategy and policy. In support of these services, Danielle has undertaken postgraduate studies in International Energy Law and Policy, and in Resilience and Change Management. She has further undertaken a course in Climate Services for Adaptation delivered through partnership of the Wageningen University, The European Commission and the European Centre for Medium-Range Weather Forecasts.

Jamie Blunden

Jamie is a Senior Environmental Consultant within Nature Positive's Carbon & Sustainability team. He assists clients with building and infrastructure life cycle carbon assessments, company carbon footprint assessments, BREEAM assessments, and construction carbon management plans. He has experience in completing whole life carbon assessments for large scale infrastructure projects and interacting with design teams to provide bespoke carbon and sustainability consultancy. Jamie has created custom tools to assist construction projects in identifying carbon hotspots and reporting their carbon emissions to clients. Before RSK, he worked within construction environmental management, developing experience in environmental management systems and monitoring compliance obligations. He is also experienced in the coordination and submission of BREEAM assessments to support development consent applications to local authorities.

18.4 Scope and Methodology

18.4.1 Scope

This EIA Chapter presents an assessment of GHG emissions arising from construction activities (i.e., 'before use stage') within the footprint of the Project, including any temporary land take and compounds. It examines the emissions associated with the extraction, manufacture, and transportation of materials to the construction site, and the management of any waste arising from construction processes and earthworks within the site boundary of the Project. The methodology and approach adopted for the GHG assessment is consistent with the modular framework set out in PAS2080:2016 and BS EN 15978.

Table 18.1 indicates the key emissions sources which are anticipated during the construction phase of the Project.

Table 18.1: Anticipated key emissions sources during the before use stage

Life cycle boundary	Emissions source	Description
Product stage (A1-A3)	Raw material extraction	Embodied emissions associated with the production of material used for construction of the proposed Project
	Precursor product processing	
	Product manufacture	
	Transport to factory gate	
Construction process stage (A4-A5)	Transport to site	Emissions associated with the transport of equipment, materials and members of staff to the Project
	Construction activities	Emissions associated with the consumption of fuels onsite for the purposes of construction of the Project
	Waste	Emissions associated with the disposal of waste generated onsite

Once operational, the Project has the potential to result in a very limited amount of emissions associated with monitoring and maintenance of wind turbines and associated infrastructure. Based on available research by Mello et al., 2020[20] such emissions are considered to account for only 3.5% of the total life cycle emissions. Therefore, the 'use stage' is not considered as part of this GHG assessment.

Table 18.2 provides an indication of the key emissions sources which are anticipated during the decommissioning phase (i.e., 'end of life stage') of the Project.

Table 18.2 Anticipated key emissions sources during the end of life stage

Life cycle boundary	Emissions source	Description
End of Life stage (C1-4)	Deconstruction	Emissions associated with the decommissioning of the Project
	Transport	
	Waste processing	
	Disposal	

18.4.2 Methodology

The assessment of the effects of GHG emissions arising from the Project has been carried out in accordance with the IEMA Guide: Assessing Greenhouse Gas Emissions and Evaluating their Significance (2022)[15]; having consideration also for PAS 2080 Carbon Management in Infrastructure[19] and the RICS Whole life carbon assessment for the built environment (2017)[17].

The approach of PAS 2080:2016 is the same as that provided by the Transport Infrastructure Ireland Carbon Tool. The tool was not used in the assessment of emissions for this Project because it applies directly to rail and road infrastructure, as opposed to wind energy infrastructure. Similarly, the Scottish Natural Heritage (SNH) tool, provided

[20] Mello, G., Dias, M.F. and Robaina, M., 2020. Wind farms life cycle assessment review: CO2 emissions and climate change. Energy Reports, 6, pp.214-219.

by the Scottish Government, was also not used. The reason being that, whilst commonly applied to wind infrastructure projects in Ireland, the purpose of the SNH tool is to assess the GHG impacts associated with building such infrastructure on areas of peatland. Since there is no peat located on the wind farm site, and no forestry, the SNH tool does not apply.

Instead, the assessment of Before Use stage (i.e., operational phase) GHGs of the Project quantifies the Kyoto Protocol GHGs, as applicable, and measures them in terms of tonnes of carbon dioxide (tCO_2) equivalence (tCO_2e), where equivalence means having the same warming effect as CO_2 over 100 years.

The six Kyoto Protocol gas groups are carbon dioxide CO_2, methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), sulphur hexafluoride (SF_6) and perfluorocarbons (PFCs). The global warming potential (GWP) of each is presented in **Table 18.3**.

Table 18.3: Global warming potential of Kyoto Protocol gas groups

Greenhouse gas/group	Chemical formula	GWP (CO_2e)
Carbon dioxide	CO_2	1
Methane	CH_4	25
Nitrous oxide	N_2O	298
Hydrofluorocarbons	HFCs	Depends on specific gas
Sulphur hexafluoride	SF_6	22,800
Perfluorocarbons	PFCs	Depends on specific gas

Data associated with the activities such as estimated material quantities and construction fuel use that will contribute towards the construction of the Project has been provided by the appropriate design and planning teams. Using this data, GHG emissions have been quantified by applying the most relevant and up-to date emission factors. These factors have been sourced from published reputable sources, such as those by the Environmental Protection Agency (EPA).

An emission factor is a representative value that relates the quantity of a pollutant released into the atmosphere with an activity associated with the release of that pollutant. Emission factors are typically available from government publications, independent agencies, and scientific research journals. However, the quality and accuracy of such factors can vary significantly depending on the research body and/or underlying methodologies applied. It is therefore good practice to apply emission factors only from reputable sources. The emission factors used in the GHG assessment of the Project are included in EIAR **Volume III, Appendix 18.1**.

In terms of determining the significance of GHG emissions, the IEMA Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance (2022)[15] sets out three overarching principles:

- The GHG emissions from all projects will contribute to climate change, the largest interrelated cumulative environmental effect.
- The consequence of a changing climate has the potential to lead to significant environmental effects on all topics in the EIA Directive (e.g., human health, biodiversity, water, land use, air quality).

- GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit, as such any GHG emissions or reductions from a project might be considered to be significant.

Building on these principles, the IEMA Guide (2022) acknowledges that:

- Some projects may replace existing development or baseline activity with a higher GHG profile, and thus, the significance of a project's emissions should be based on its net impact over its lifetime which may be positive, negative or negligible.
- If GHG emissions cannot be avoided, the goal of the EIA process should be to reduce the project's residual emissions at all stages.
- If GHG emissions remain significant but cannot be further reduced, approaches to compensate for the project's remaining emissions should be considered.

The IEMA Guide (2022) therefore recommends providing the context for the magnitude of GHG emissions reported in the EIA, with five levels of significance in line with objectives of the Paris Agreement (**Table 18.4**).

- Projects with significant moderate or major adverse effects follow a 'business-as-usual' or 'do minimum' approach and thus fall short of making meaningful contributions towards Ireland's trajectory towards net zero.
- Projects compatible with the budgeted, science-based 1.5°C trajectory and which comply with up-to-date policy have a minor adverse effect that is not significant. Projects that achieve emissions mitigation substantially beyond the reduction trajectory, or substantially beyond existing and emerging policy compatible with the trajectory, and have minimal residual emissions, are assessed as having a negligible effect that is not significant.
- Finally, projects that are considered to have beneficial effects that are significant are those that have caused GHG emissions to be avoided or removed from the atmosphere.

Table 18.4: GHG assessment significance criteria

Significance Criteria	Description of Criteria	Significance of Effect
Major adverse	- GHG impacts are not mitigated - Only compliant with do-minimum standards set through regulations - Do not provide further reductions required by existing local and national policy for projects of similar type - Does not make a meaningful contribution to Ireland's trajectory towards net zero	Considered to be **Significant**
Moderate adverse	- GHG impacts are partially mitigated - Partially meet the applicable existing and emerging policy requirements - Would not fully contribute to decarbonisation in line with local and national policy goals for projects of similar type	Considered to be **Significant**

Significance Criteria	Description of Criteria	Significance of Effect
	- Falls short of fully contributing to Ireland's trajectory towards net zero	
Minor adverse	- GHG impacts fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of similar type - Fully in line with measures necessary to achieve Ireland's trajectory towards net zero	Considered to be **Not Significant**
Negligible	- GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of similar type - GHG performance is well 'ahead of the curve' for the trajectory towards net zero and had minimal residual emissions	Considered to be **Not Significant**
Beneficial	- Net GHG impacts are below zero and the project causes a reduction in atmospheric GHG concentration, whether directly or indirectly - Substantially exceeds net zero requirements with a positive climate impact	Considered to be **Significant**

The accuracy of a GHG assessment depends on the quality of the data provided. Primary data (such as known quantities of materials for construction) should always be used where available. Where it has not been possible to collect this data, in view of the fact that this assessment represents a forecast of emissions and some information may not yet be known, secondary data (including estimates, extrapolations, benchmarks and proxy data such as distance travelled) have been used. Assessments such as this, based largely on secondary data, should only be viewed as an estimate of GHG emissions impact, as actual emissions may vary.

18.5 Present and future baseline conditions

The baseline conditions for this GHG assessment are a business-as-usual scenario whereby the Project does not go ahead. Specifically, the baseline is primarily mixed farmland habitat with hedgerows and occasional areas of scrub, ponds and lakes, and man-made drains and ditches.

Three internationally designated sites, two Special Areas of Conservation (SACs) and one Special Protection Area (SPA) are within 15km of the Project. This radius has been applied as a starting point for the purpose of defining a boundary to the assessment, however it is acknowledged that the climate is the principal receptor with regard to this study and thus far extends beyond (globally) the given boundary. A review of the National Parks and Wildlife Service (NPWS) website indicates that there are seven Proposed Natural Heritage Areas (pNHAs) located within 15km of the Project with the closest being Eagle Lough pNHA, located 7.3km from the Project. During the desk study, one Annex 1 priority habitat was identified within 5km of the wind farm site boundary, namely residual alluvial woodland occurring approximately 4.8km to the southwest of the wind farm site – an important carbon store.

The proposed wind farm site footprint predominantly includes modified habitat types associated with intensive farming systems and includes improved agricultural grassland, tilled earth, and arable land, although semi-natural habitat such as hedgerows and treelines, emerging scrub and wet grassland occur to a lesser extent throughout the wind farm site.

As stated in **Volume II Chapter 7, Biodiversity,** biodiversity varies throughout the wind farm site. The improved grassland and arable land have been found to have a low diversity and biomass of native flora. However, cattle have created 'rubs' where vegetation has been removed from road verges, creating sandy banks where the red listed buffish mining bee (*Andrena nigoaena*) and the orange legged furrow bee (*Halictus rubicundus*) have been found. The hedgerows can be overmanaged and have gaps within the farm. Between landownerships the hedgerows are taller, thicker, of greater conservation value, and transition to a treeline in some places. A separate treeline grows along two sections of the wind farm site. The dense bracken has low biodiversity but has been used as a resting or breeding site for red fox (*Vulpes vulpes*). The scrub habitat is associated with wetter areas of the wind farm site that are unfarmed. The wet grassland is undergrazed and considered of local importance, with an abundance of botanical indicator species. These include Glaucous sedge (*Carex flacca*), Devil's-bit scabious (*Succisa pratensis*), Silverweed (*Potentilla anserina*) and Meadowsweet (*Filipendula ulmaria*). An artificial lake has been created that has the potential to support freshwater species including dragonflies, damselflies, hoverflies and amphibians. A eutrophic lake in a different section of the wind farm site has been shown to have an abundance of Damselflies (*Zygoptera* sp.) with a low diversity of species. The wind farm site has the potential to be habitat for badger sets and hedgehogs have been sighted there before.

These habitats vary in their carbon storge and sequestration potential. Given the age of the improved grassland and arable land, these are likely to have reached a carbon storage saturation point where any carbon being removed from the atmosphere and entering these systems is in balance with the carbon being lost from these systems. They will be important carbon stores but are unlikely to be sequestering further carbon. If these land types were taken out of production, the carbon in the soils could be lost, depending on the next land use. The scrub habitat and wet grassland are both important carbon stores. The hedgerows will be sequestering carbon to varying degrees, depending on their management intensity. Where the hedgerows are being intensely managed there will be less opportunity for carbon sequestration. Unmanaged hedges that are increasing in height and width will be sequestering carbon, though this carbon can be lost should the hedge height and width be reduced in the future. The treelines will also sequester carbon, but the amount will vary depending on the age and species of the trees.

18.5.1 Future baseline conditions (do nothing scenario)

If the Project were to not go ahead, it is assumed that the use of the Project area would remain as it is. In this case emissions are likely to remain as they are at present.

18.6 Potential effects of the Project

18.6.1 Assumptions

The following reasonable assumptions have been applied to this assessment, in the absence of certainty at this stage. This is based upon preliminary design that is the subject of this EIAR:

- Steel, turbine parts, concrete, construction compounds and plant/equipment delivered in arctic lorries. Assumed average laden and diesel powered.
- Aggregates, fencing and cables delivered by 8-wheeler with capacity of up to 20t. Assumed average laden and diesel powered.
- 32.2km distance for waste transported off-site, for example earthwork quantities from pre-construction demolition and disposal during site decommissioning. Assumed average laden and diesel powered. This distance has been estimated by calculating the average distance to all local waste disposal facilities identified in EIAR **Volume II Chapter 16 Traffic and Transport**.
- Delivery distance for concrete/steel: 19km, Fencing/cabling: 45km, aggregates: 12.75km, plant/equipment: 22km. This is based on information provided in EIAR **Chapter 16 Traffic and Transport,** section 16.4.2.
- For materials sourced from Europe, a total delivery distance of 100km via sea, and 1500km via road has been assumed. This is based on RICS guidance.
- Wind turbines will have approximately the following material composition: 73% steel, 14% fiberglass, 11% cast iron, 1% copper, 1% aluminium.
- Assume a weight of 1500t per wind turbine structure.
- All above-ground wind turbine parts will be reused/recycled at end of life.
- All transformers and switchgear materials will be recycled at end of life.
- Assume an 80:20 recycling to landfill ratio for disposal of felled vegetation.
- Assume a 70:30 landfill to recycle ratio for disposal of all other materials for end of life and during pre-construction demolition.
- An average of 775 litres of fuel per week assumed for the 2-way movements of the construction workers during construction phase.
- An average of 7416 litres of fuel week assumed to be the fuel use of all construction plant/equipment during construction phase.

18.6.2 Direct effects (construction)

The total GHG emissions estimated to arise from construction of the Project is approximately 69,145tCO_2e. **Table 18.5** provides a breakdown of the primary GHG emission sources considered in the assessment together with the results of the assessment.

The assessment was carried out using the methodology stated in section 18.3. Input data was provided and where assumptions were applied, these are outlined in section 18.6.1.

The emission factors and input data used to arrive at the below-stated results are detailed in EIAR **Volume III, Appendix 18.1** and **Appendix 18.2**.

Table 18.5: Estimated GHG Emissions from the Construction of the Project

Lifecycle Module	Emissions source	Emissions (tCO_2e)	% of construction emissions
A1 – A3	Embodied carbon of products	63,168	91
A4	Transport of materials and equipment to site	3,148	5
A5	Construction activities	2,828	4
Total		69,145	

Average annual construction emissions across an anticipated 18-month construction period are estimated as 69,145tCO_2e. This accounts for approximately 0.02% of Ireland's 2021-2025 carbon budget of 295MtCO_2e. This would constitute a **minor, not significant, adverse effect**.

18.6.3 Direct effects (operation)

Excluding emissions associated with operation of the Project, the total GHG emissions estimated to arise from the operation of the Project is 0tCO_2e.

By displacing approximately 125,947MWhs per annum, equal to more than* 47,495tCO_2e of fossil fuel-based electricity each year, the Project will contribute a **major beneficial significant effect** on climate during its operation.

**Please note that the emission factor used to calculate this sum is representative of the energy mix of the Republic of Ireland in its entirety and is therefore a conservative assessment of the emissions which may be displaced (not limited to fossil fuels alone).*

18.6.4 Direct effects (decommissioning)

The total GHG emissions estimated to arise from decommissioning of the Project is approximately 3,773tCO_2e as shown in **Table 18.6**.

This constitutes 5% of the overall lifecycle emissions of the Project, and constitute a **negligible, not significant, adverse effect**.

Table 18.6: Estimated GHG emissions from the decommissioning of the proposed Project

Life Cycle Module	Emissions Source	tCO_2e	% of decommissioning emissions
C1	Demolition	1,577	42
C2	Transport	1,483	39
C3-4	Waste processing and disposal	713	19
Total		3,773	

18.6.5 Interactions and cumulative effects

All known existing and proposed projects within the study area that could potentially generate a cumulative effect with the Project during construction, operation and decommissioning phases were identified and examined as part of this assessment. The full list of projects is contained in EIAR **Chapter 2 EIA Methodology** – section 2.4.3.3.

GHG emissions are inherently cumulative, as all emissions have the same impact on the same ultimate receptor (i.e. the global climate). Most developments result in the release of GHGs, and consequently have the potential to result in a cumulative effect. Conversely, renewable energy developments such as this have a net beneficial effect, in that they cause the reduction of GHG emissions.

As the receptor is not geographically constrained it is not appropriate to undertake a conventional cumulative effects assessment. However, consideration of cumulative GHG emissions is inherent within this assessment as the emissions of the Project are assessed within the context of local, national and international (EU) carbon budgets.

Together with the existing and proposed renewable projects in the wider area, a significant beneficial effect is anticipated as reliance on fossil fuel generated electricity will be reduced. The cumulative effect of the Project is likely to be a **significant beneficial effect**.

18.7 Mitigation and enhancement measures

18.7.1 Construction and decommissioning

Whilst the effects of the construction and decommissioning phase are assessed as not significant, it is prudent to consider mitigation measures as best practice in a project such as this, where an important driver is the delivery of net zero emissions nationally. Measures to mitigate the impacts of the GHG emissions generated by the construction and decommissioning of the Project are summarised below:

- Maximise opportunities for the reuse of excavated material and other materials which could be considered waste within the Project or at a local donor site in line

with A Waste Action Plan for a Circular Economy: Ireland's National Waste Policy 2020-2025 and the Circular Economy and Miscellaneous Provisions Act 2022[21].

- Embed carbon reduction practices as a core principle for the design team. Where reduction ideas are suggested, they should be recorded, and potential impact quantified. Earlier engagement with carbon reduction allows for the greatest returns. This should include designing for decommissioning, enabling reuse and recycling at end of life.
- Minimise transport-related inefficiencies, including with respect to business travel and staff commuting to and from the Project and other relevant locations. Where possible, transport should be avoided unless necessary, e.g., through proactive measures such as car-pooling etc.
- Where technical specifications allow, maximise the recycled content of construction materials such as concrete and steel.
- Maximise the specification of materials with an environmental product declaration with the aim of reducing embodied carbon emissions.
- Incentivise use of local suppliers with a view to shorten project supply chains and environmental footprint.
- Where grid connections are not possible hybrid generators using solar power or Hydrotreated Vegetable Oil (HVO) should be used to reduce consumption of fossil fuels.
- Onsite mobile and non-mobile plant should conform to the latest emissions standards, with mobile vehicles conforming to EURO 6 standards (European Emissions Standards sixth iteration) as a minimum.
- All plant should investigate the option of using HVO fuels or electric versions where possible.
- Require main contractors to report on energy data, water usage and waste disposal and their GHG emissions as part of the Project's Construction Environmental Management Plan (CEMP).
- Use of prefabricated options for on-site facilities during construction to minimise waste and reduce on-site construction activities.
- Implement a proactive maintenance and monitoring regime to maximise the lifecycle of components.
- Areas of high biodiversity, and areas for mitigation and enhancement should be agreed with the landowner (as per EIAR **Chapter 7 Biodiversity** and the Habitat Management Plan as presented in EIAR **Volume III, Appendix 7.3**).

18.8 Monitoring

The Construction Environmental Management Plan (CEMP) in EIAR **Volume III, Appendix 5.1**. sets out details of the monitoring to be undertaken during these phases of the Project to determine whether mitigation measures are being appropriately

[21] Government of Ireland. 2022. Circular Economy and Miscellaneous Provisions Act 26 of 2022.

implemented. These will correspond with the mitigation measures outlined in section 18.7. Specifically, they will include no less than the minimisation of transport and materials-related inefficiencies, conformance of plant to relevant standards, the use of low-carbon fuels, where possible, and the appropriate management of on-site and construction waste.

18.9 Residual effects

The sensitivity of the climate is high and the magnitude of change, following mitigation, is low. For this reason, there is likely to be a **direct, long-term minor, not significant adverse effect** upon the global climate, following the implementation of mitigation measures, due to the emission of GHGs during the construction and decommissioning activities (with emissions remaining in the atmosphere for a long period of time (years, decades and beyond).

However, this minor adverse effect is likely to be largely outweighed by the direct, long-term (significant) beneficial effect of operation of the Project upon the global climate, such that the overall net effect of the Project, following the implementation of mitigation measures, is likely to be a **significant beneficial effect**. This is because the net GHG effects of the Project will be below zero and the Project will result in a reduction in atmospheric GHG concentration. This reduction will be brought about by the displacement of fossil fuel energy sources by the renewable energy produced by the Project.

EIAR Volume II

Main Report

Chapter 19: Interactions and Cumulative Effects

CONTENTS

19 INTERACTIONS AND RESIDUAL CUMULATIVE EFFECTS 19-1
19.1 Introduction 19-1
19.1.1 Impact interactions 19-1
19.1.2 Cumulative effects 19-2
19.2 Statement of authority 19-2
19.3 Assessment methodology 19-2
19.3.1 Guidance 19-2
19.3.2 Interactive effects 19-3
19.3.3 Cumulative effects 19-3
19.4 Summary of interactive effects 19-4
19.5 Summary of cumulative effects 19-6
19.5.1 Biodiversity 19-7
19.5.2 Ornithology 19-7
19.5.3 Hydrology & hydrogeology 19-7
19.5.4 Land, soils & geology 19-8
19.5.5 Material assets 19-8
19.5.6 Shadow flicker 19-8
19.5.7 Noise & vibration 19-8
19.5.8 Landscape & visual 19-9
19.5.9 Archaeology & cultural heritage 19-9
19.5.10 Traffic & transport 19-9
19.5.11 Air quality 19-10
19.5.12 Climate 19-10

TABLES

Table 19.1: Interactive effects summary matrix 19-5

19 IMPACT INTERACTIONS AND RESIDUAL CUMULATIVE EFFECTS

19.1 Introduction

The EU *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions*[1] acknowledge that the assessment of cumulative impacts and impact interactions should not be considered as a separate stage in the EIA process. Instead, these are an integral part of all stages of the process. This chapter of the Environmental Impact Assessment Report (EIAR) for the proposed Tullacondra Green Energy Project ('the Project') summarises the potential for interactions between impacts on different environmental factors arising from the Project on the receiving environment as identified in the EIAR. It also includes a summary of the assessment of potential cumulative effects in combination with other projects that was carried out for each environmental factor in the respective chapters in Part II of this EIAR.

19.1.1 Impact interactions

Impact interactions are reactions between impacts, whether it is between the impacts of just one project *i.e*., the project or between the impacts of multiple projects. For each environmental factor there could be interactions or interdependencies with other environmental factors, whereby impacts may interact to create a greater effect or different type of effect.

Article 3 of the EIA Directive 2011/92/EU as amended by 2014/52/EU requires that:

The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

(a) Population and human health;

(b) Biodiversity, with particular attention to species and habitats under Directive 92/42/EEC and Directive 2009/147/EC;

(c) Land, soil, water, air and climate;

(d) Material assets, cultural heritage and the landscape;

(e) The interaction between the factors referred to in points (a) to (d).

Where relevant, environmental factor chapters in this EIAR already address potential environmental interactions. These are considered in this chapter and addressed collectively here.

[1] EC (European Commission) 1999. Guidelines for the assessment of indirect and cumulative impacts as well as impact interactions.

19.1.2 Cumulative effects

The EIA Directive makes specific reference to the consideration of cumulation of effects. Annex IV of the EIA Directive (2011/92/EU as amended by 2014/52/EU) requires that an EIAR provides a *description of the likely significant effects of the project on the environment resulting from…the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources.*

Noting that the Directive requires consideration of cumulative effects with existing and/or approved projects, this chapter also considers (i) projects that are currently going through the planning application system; and (ii) projects that may be envisaged through a plan/programme although there has not been any application submitted yet (*i.e.*, consideration of future development). It should be noted that the level of detail available per project will reflect the stage within which it sits in the planning application process. Crucially, therefore, it follows that the level of detail of cumulative assessment is reflective of the level of detail of information available at time of assessment.

Also, as per the Landscape Institute's guidance, an assessment of cumulative effects should focus on whether there are any potential cumulative impacts which are reasonably foreseeable and which are likely to influence the decision making of the proposed development, rather than an assessment of every potential cumulative effect[2]. Similarly, the EC's 1999 guidance[1] also refers to the assessment considering reasonably foreseeable actions.

19.2 Statement of authority

This chapter was prepared by Krista Farrugia, Principal Environmental Consultant with Nicholas O'Dwyer, who has 20 years of experience in the field of EIA. Krista holds a Master of Science in Integrated Environmental Management from the University of Bath, a Post Graduate Diploma in Wildlife Biology and Conservation from Edinburgh Napier University, and a Bachelor of Science (Hons) in Chemistry and Biology from the University of Malta. She is a Practitioner with the Institute of Environmental Management with extensive experience in EIA with extensive experience in EIA coordination, environmental auditing, Strategic Environmental Assessment (SEA), ecological studies and Appropriate Assessment, and landscape and visual assessment. Projects have included the assessment of a wide range of developments, including residential and commercial, waste management facilities, roads, port development, coastal infrastructure, and aquaculture. Krista has worked extensively in Malta and more recently in Ireland.

19.3 Assessment methodology

19.3.1 Guidance

The following guidance documents were referred to when selecting the appropriate approach for assessment of interactions effects and cumulative effects.

[2] GLVIA3 page 121 paragraph 7.5.

- Environmental Protection Agency. 2022. *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*[3].
- European Commission. 1999. *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions*. Office for Official Publications of the European Communities[1].
- European Commission. 2017. Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU)[4].
- Government of Ireland. 2018. Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment[5].
- Landscape Institute & Institute for Environmental Management and Assessment (IEMA). 2013. 3rd edition. *Guidelines for Landscape and Visual Impact Assessment*[6].
- Scottish Natural Heritage (SNH) guidance on *Assessing the Cumulative Impacts of onshore Wind Energy Developments* (2012, and subsequent updates)[7].

19.3.2 Interactive effects

The consideration of interactive effects was an integrated part of the assessment process. The EIA coordinator and environmental specialists working on the various environmental factors consulted each other as needed during the design process. The impact interactions are assessed as relevant within the specific environmental factor chapters and therefore, no additional assessment is included in this chapter. However, in accordance with EPA Guidance (2022)[3], the assessment of impact interactions is summarised in this chapter in the form of a matrix. Refer to **Table 19.1.**

19.3.3 Cumulative effects

SNH guidance[7] describes cumulative effects as arising from two or more developments, which may be:

- Additive (i.e., multiple independent additive model).
- Antagonistic (i.e., the sum of impacts is less than in a multiple independent additive model).
- Synergistic (i.e., the cumulative impact is greater than the sum of the multiple individual effects).

For this EIAR, assessment of cumulative effects was carried out using the following approach:

[3] EPA. 2022. Guidelines on the information to be contained in Environmental Impact Assessment Reports.

[4] European Union. 2017. Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report.

[5] Department of Housing, Planning and Local Government. 2018. Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.

[6] Landscape Institute (LI) and the Institute for Environmental Management and Assessment (IEMA) (2013), Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA 3).

[7] Scottish Natural Heritage (SNH). 2012, and subsequent updates. Assessing the Cumulative Impacts of onshore Wind Energy Developments.

1. Identification of a long list of other projects that could result in environmental effects that could result in significant cumulative effects with effects arising from the Project.
2. Identification of a shortlist of other projects.
3. Desk study for the shortlisted projects.
4. Assessment.

Section 2.4.3.3 of EIAR **Chapter 2 EIA Methodology** describes the method employed in compiling the long list of projects for consideration in the cumulative assessment. Planning research was conducted in relation to all relevant projects within 10km from the wind farm site boundary and 200m from the proposed Turbine Delivery Route (TDR) and Grid Connection Route (GCR) options (where these lie outside the 10km study area) and all wind farms within 20km of the wind farm site.

Throughout the compilation and preparation of this planning application submission, in-depth planning history searches were conducted[8]. For any planning history documentation that was not readily available for review online, the RSK consultant team reviewed the planning files at Cork Council Offices.

The list of projects (excluding wind farm projects) and proposals considered for cumulative assessment are set out in EIAR **Chapter 2 EIA Methodology**, **Table 2.2**. The final column in **Table 2.2** provides a reasoning for inclusion of the project for cumulative assessment.

Each environmental factor chapter includes a cumulative assessment of the Project with other proposed projects as may be relevant to that factor depending on the interaction and likelihood of cumulative effects within the relevant Zone of Influence (ZoI). This chapter summarises the findings from the cumulative assessment carried out for each environmental factor.

Table 2.3 in EIAR **Chapter 2 EIA Methodology** lists the existing and proposed wind farms within a 20km radius of the Project which were identified as having the potential to give rise to cumulative LVIA effects and thus were scoped in for assessment. It also provides details on the two wind farm projects currently at planning stage which were scoped in for cumulative assessment.

19.4 Summary of interactive effects

This section summarises interaction and interdependencies between one factor and another. The matrix provided in **Table 19.1** provides a snapshot summary of the findings from the assessment of interacting effects, where relevant, as addressed within each of the environmental factor chapters of the EIAR.

[8] Planning searches were conducted until 20/03/24 after which the EIAR was being closed out.

Table 19.1: Interactive effects summary matrix

Interaction With	Pop & Human Health	Biodiversity	Birds	Hydrology/Hydrogeology	Land, Soils & Geology	Material Assets	Shadow Flicker	Noise & Vibration	Landscape & Visual	Archaeology & Cultural Heritage	Traffic & Transport	Air Quality	Climate
Population & Human Health				✓	✓	✓	✓	✓	✓		✓	✓	✓
Biodiversity			✓	✓	✓			✓			✓		
Birds		✓			✓			✓			✓		
Hydrology & Hydrogeology	✓	✓			✓						✓		
Land, Soils & Geology	✓	✓	✓	✓				✓		✓	✓		
Material Assets	✓										✓		✓
Shadow Flicker	✓												
Noise & Vibration	✓	✓	✓		✓					✓	✓		
Landscape & Visual	✓									✓	✓		
Archaeology & Cultural Heritage					✓			✓	✓		✓		
Traffic & Transport	✓	✓	✓	✓	✓					✓		✓	✓
Air Quality	✓										✓		✓
Climate	✓					✓					✓	✓	
Key: √ =Interactive Effect													

As described and assessed in the environmental factor chapters of the EIAR, during the construction phase, the Project is likely to impact on the local environment (i.e., noise, traffic disruption, dust). However, implementation of mitigation measures specified in the relevant EIAR factor chapters and summarised in EIAR **Chapter 20 Summary of Mitigation Measures**, including good site management and best construction practices as identified in the Construction Environmental Management Plan (CEMP) and Construction Traffic Management Plan (CTMP) (EIAR **Volume III, Appendix 5.1** and **Appendix 5.2**) will mitigate and reduce identified effects so as not to be significant.

The interactions between Traffic & Transport and other aspects such as Population & Human Health, Biodiversity, and Archaeology are expected to be greatest during construction phase (refer to EIAR **Chapter 6 Population & Human Health**, EIAR **Chapter 7 Biodiversity** and EIAR **Chapter 15 Archaeology and Cultural Heritage**, respectively). Interactions between Land, Soils & Geology, Hydrology & Hydrogeology, and Traffic & Transport are also key during construction. The mitigation measures specified in EIAR **Chapter 9 Hydrology & Hydrogeology**, EIAR **Chapter 10 Land, Soils and Geology** and EIAR **Chapter 16 Traffic and Transport** and identified in the CEMP and CTMP (EIAR **Volume III, Appendix 5.1** and **Appendix 5.2**) are required to ensure effects are not significant.

Interactive effects are also described between hydrology and biodiversity (refer to EIAR **Chapter 9 Hydrology and Hydrogeology** and EIAR **Chapter 7 Biodiversity**). For instance, impacts on water quality, if significant, could have an effect on habitats and/or species of interest. Hydro-morphological changes can also have an effect on aquatic ecology. Mitigation measures include design measures such as Sustainable Drainage Systems (SuDS) and nature-based solutions that aim to have net beneficial effects on the water environment that contributes to biodiversity enhancement, for example, creation of runoff stilling ponds and check dams to manage runoff velocity.

During operation, potential interactions are considered likely in terms of Population & Human Health mainly in terms of the consideration of sensitive receptors (EIAR **Chapter 6**). A combined effect of noise (EIAR **Chapter 13 Noise and Vibration**), shadow flicker (EIAR **Chapter 12 Shadow Flicker**), disruption and change of current land use practices (EIAR **Chapter 10 Land, Soils and Geology**), and changes to visual amenity and landscape (EIAR **Chapter 14 Landscape and Visual**), can adversely affect the population in terms of current use of the area.

On the other hand, as highlighted in EIAR **Chapter 6 Population & Human Health**, the presence of the wind farms can also serve as a landmark indicating the shift towards renewable energy and the move away from polluting energy sources, which, with improved air quality and contributing to mitigating climate change, can result in a positive effect on wellbeing both at the community level, as well as on a national scale.

19.5 Summary of cumulative effects

As described in section 19.3.3, the final column in **Table 2.2, Chapter 2 EIA Methodology**, includes an evaluation of projects that were scoped in for cumulative assessment and assessed in each environmental factor chapter as relevant. The findings are summarised hereunder.

19.5.1 Biodiversity

In assessing cumulative effects on designated sites, EIAR **Chapter 7 Biodiversity** identified a single hydrological effect pathway between the Project and identified designated sites. The assessment concluded that none of the identified projects would result in cumulative effects upon the local terrestrial ecology (habitats and species) of the identified designated sites during all phases of the Project.

In terms of potential impacts to habitats and flora on site, the constraints-led design approach, the avoidance of direct impacts on high-value habitats and identification of mitigation and offsetting measures, means that no significant residual effects were identified.

With specific reference to bats, the assessment identified that other wind farms are outside the core sustenance zones of all resident bat species in Ireland that are known to be roosting and active within, and in the vicinity of the Project. Therefore, no significant cumulative residual effects were identified on bats associated with the Project. Similarly, no cumulative significant residual effects were identified for other faunal species.

19.5.2 Ornithology

In assessing potential cumulative effects for Special Protection Areas (SPA) under the Birds Directive, EIAR **Chapter 8 Ornithology** considered Kilcolman Bog SPA as a key ornithological feature. It was identified that the wind farm site is not functionally linked to the Kilcolman Bog SPA and therefore cumulative significant effects with other developments are considered unlikely to be significant.

Given that the wind farm site is not situated along any regular commuting corridors for key species, potential cumulative significant displacement/barrier and collision effects with other wind farms were considered unlikely to be significant.

19.5.3 Hydrology & hydrogeology

The cumulative assessment on hydrology in EIAR **Chapter 9 Hydrology and Hydrogeology** considered the Project will likely have cumulative effects on the surface water network in the catchments associated with nearby developments. With mitigation measures in place, the cumulative assessment identified an effect of slight significance during the construction phase.

Potential cumulative effects on the surface water network were considered in particular as a result of the limestone quarry c. 2.7km southwest of the wind farm site, and restoration works on a disused quarry 4.5km south of the wind farm site, whereby potential contamination of surface water bodies and groundwater bodies was considered in the case of an accidental release. It was identified that with mitigation measures in place, cumulative effects will be not significant.

With respect to the other wind farms included as part of the assessment, potential slight residual effects presuming SuDS and mitigation measures are implemented, monitored and followed using the relevant guidelines and legislation were identified. Likely significant cumulative effects are anticipated to be not significant.

19.5.4 Land, soils & geology

Of the scoped in projects outlined in **Table 2.2** EIAR **Chapter 2 EIA Methodology**, three projects were considered in EIAR **Chapter 10 Land, Soils and Geology** to be relevant for cumulative assessment in terms of soils and geology; those not considered were excluded due to distance from the Project.

Residual effects with N/M20 Cork to Limerick improvement scheme were considered with regard to land take in relation to the TDR route options. It was identified that if the road were to be upgraded prior to works along the TDR, this may reduce some the land take needs along the TDR. Thus, the cumulative effects anticipated from the improvement to the N/M20 corridor, and the proposed TDR are not significant.

Cumulative effects on the land, soils and geology with residual effects from housing developments in Mallow as a result of the replacement of natural materials, such as soil, with construction materials, such as concrete, were considered in relation to GCR Option 1 (located within 200m). The assessment identified a slight cumulative effect (not significant).

19.5.5 Material assets

EIAR **Chapter 11 Material Assets** identified that if several of the proposed projects were to coincide with the Project, there is the potential for short-term, slight and adverse effects on telecommunications and utilities. However, engagement with all relevant services providers by each developer as early on as the design phase should ensure that there will not be cumulative effects.

19.5.6 Shadow flicker

EIAR **Chapter 12 Shadow Flicker** assessed shadow flicker on sensitive receptors. The nearest operational and proposed wind turbines are 9km from the Project turbines. Owing to this distance, in respect of shadow flicker, the 10 times rotor diameter (1,500m) study area of the Project does not overlap with the 10 rotor diameter study areas of any other operational, consented, or planned wind turbines. It was therefore concluded that there is no potential for cumulative shadow flicker effects.

19.5.7 Noise & vibration

There are no operational or permitted wind turbines in the vicinity of the proposed wind farm site that would be expected to result in cumulative noise and/or vibration impacts. The closest proposed wind farm to the Project is the Annagh Wind Farm (Planning Ref. 217246) which is approximately 12km from the proposed wind farm site. As identified in EIAR **Chapter 13 Noise and Vibration**, at this distance cumulative noise effects will not occur i.e., the Annagh wind farm will be inaudible to noise sensitive receptors in the vicinity of the Project, and vice versa because there are no sensitive receptors where the 35dB noise contour from the Annagh Wind Farm encroaches upon the 25dB noise contour from the Project**.**

The proposed N/M20 upgrade works will be constructed approximately 6km to the west of the wind farm site and to the east of the existing N20. It is not expected that there will be any significant cumulative effects of the proposed N/M20 upgrade and the Project, at noise sensitive receptors in the vicinity of the Project.

The Scart Quarry and the Ballyhest Quarry are located to the west of the wind farm site, at distances of approximately 2.9km and 3.9km from the closest proposed turbines, respectively. No potential significant cumulative effects in terms of noise are expected at the noise sensitive receptors due to distances between projects.

19.5.8 Landscape & visual

As described in detail in EIAR **Chapter 14 Landscape and Visual Impact Assessment** and summarised here, cumulative effects have been considered with all operational, consented and proposed wind farms within the 20km study area. Operational and consented developments are included as part of the landscape and visual baseline and considered within the main assessment of effects. The two developments at planning stage: Annagh wind farm and Ballinagree wind farm are at distances of greater than 10km. These sites would affect mainly the locality in which they are situated and cumulative effects resulting from the addition of the Project would be very limited and no greater than the effects assessed for the Project in the baseline of operational and consented sites.

The assessment has also considered the cumulative effects arising from the addition of the Project to other development including Scart Limestone Quarry Extension, Ballyroe Solar Farm, Fiddane Solar Farm and Mallow Solar Farm. Given the localised effects of these other developments and the separation distance to the Project, cumulative effects resulting from the addition of the Project would be very limited and no greater than the effects assessed for the Project in the baseline of operational and consented wind farm sites and proposed wind farm developments. Consequently, no significant cumulative effects are predicted.

19.5.9 Archaeology & cultural heritage

EIAR **Chapter 15 Archaeology and Cultural Heritage** provides a detailed assessment of cumulative effects and considers potential cumulative effects of the N/M20 upgrade with the TDR route options, the Scart Limestone Quarry Extension, Ballyroe Solar Farm, Fiddane Solar Farm or Mallow Solar Farm, the Dublin to Cork Railway upgrades with the GCR and TDR route options, and other proposed and consented wind farms.

In summary, with the implementation of the proposed archaeological mitigation for the Tullacondra wind farm Project, it is anticipated that all potential direct and indirect effects on buried archaeology, upstanding earthworks and upstanding structures of historic and architectural interest will be either mitigated or avoided. Therefore, the cumulative significance of effects during the construction phase after mitigation will be – no significant effects (neutral to not significant adverse).

19.5.10 Traffic & transport

In assessing the potential for cumulative effects on traffic and transport, EIAR **Chapter 16 Traffic and Transport** identified that if the construction phase for all scoped in projects were to take place at the same time, there would likely be significant effects on traffic and transport. In the event of any potential effect, the developer for each individual project is responsible for ensuring that the necessary mitigation measures are in place. Mitigation will take place through the use of the CTMP which will be agreed with the local

authority before construction commences and it will include traffic control measures in agreement with the local authority. Therefore, as each project is designed and built to avoid impacts arising, cumulative effects are unlikely to arise.

19.5.11 Air quality

EIAR **Chapter 17 Air Quality** assesses cumulative effects on air quality. As considered above, the phasing/commencement of any other committed (i.e., permitted and proposed) developments in the locality could potentially result in the scenario where a number of other construction sites are in operation at the same time as the Project and concurrently generating emissions to air. The IAQM construction phase methodology states that beyond 350m from a site boundary, the risk of impact from activities carried out on-site during the construction phase can be considered to be negligible. The developments that lie within that distance include the Ballinrea Solar Farm (modification) and 110kV substation and connection (within 200m of TDR Option 2), Coom Wind Park (a portion of the west TDR and along the N20 as far as Rathduff is the same Project TDR Option 2), Ballinagree Wind Farm (a portion of the TDR is the same as Project TDR Option 1 until the turnoff at New Twopothouse), Hazelbrook Housing Development (within 200m of GCR Option 1), Clonmore Housing Development (within 200m of GCR Option 1), Student Housing development (within 200m of TDR Option 2), and Cois Sruthain Housing Development (within 200m of TDR Option 1). However, it is noted that there are no significant residual effects on air quality from the Project. As a result, and ensuring all appropriate mitigation measures in place, including for the developments described above, cumulative adverse effects arising during construction are considered to be not significant.

Together with the existing and proposed renewable projects in the wider area, a moderate beneficial effect is anticipated as reliance on fossil fuel generated electricity will be reduced. The cumulative operational effect of the Project is likely to be moderate beneficial.

19.5.12 Climate

A significant beneficial effect is anticipated as reliance on fossil fuel generated electricity will be reduced. The cumulative impact of the Project is likely to be significantly beneficial in the long term when considered with other renewables projects and once the carbon payback period[9] for construction of the Project has lapsed.

[9] The carbon payback period is an estimate of how long it will take a renewable energy project to offset the greenhouse gases emitted as a result of its construction (i.e., the carbon cost) and begin displacing grid-based electricity generated from non-renewable energy sources (i.e., the carbon saving).

EIAR Volume II

Main Report

Chapter 20: Summary of Mitigation Measures

CONTENTS

20 SUMMARY OF MITIGATION MEASURES 20-1
20.1 Introduction 20-1
20.2 Summary table 20-2

TABLES
Table 20.1: Summary of Mitigation Measures 20-3

20 SUMMARY OF MITIGATION MEASURES

20.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) for the proposed Tullacondra Green Energy Project ('the Project') contains a summary of the mitigation which will be implemented during the pre-commencement, construction, operational and decommissioning phases of the Project. All mitigation and monitoring measures relating to the pre-commencement, construction, operational and decommissioning phases of the Project are also set out in the relevant chapters of this EIAR. The mitigation measures have been grouped together according to their environmental field/topic and are presented under the following headings:

- Project Description
- Biodiversity
- Ornithology
- Hydrology and Hydrogeology
- Land, Soils, and Geology
- Material Assets
- Shadow Flicker
- Noise and Vibration
- Landscape and Visual
- Archaeology and Cultural Heritage
- Traffic and Transport
- Air Quality
- Climate

As stated in **Volume II**, **Part 1**, **Chapter 5 Project Description**, a Construction Environmental Management Plan (CEMP) has been prepared for the Project and is included in EIAR **Volume III, Appendix 5.1 of** this EIAR. The CEMP sets out the key environmental management measures associated with the construction phase of the Project, to ensure that during these phases of the Project, the environment is protected, and any potential effects are minimised. The CEMP includes an Emergency Response Plan, Spoil Management Plan, Surface Water Management Plan, Water Quality Management Plan and Resource and Waste Management Plan. A separate Construction Traffic Management Plan (CTMP) has been prepared and is included in EIAR **Volume III, Appendix 5.2**.

An Environmental Manager / Ecological Clerk of Works (ECoW) with appropriate experience will be appointed for the duration of the construction phase to oversee the implementation of the CEMP. The following sections describe key activities which, if unmitigated against, may cause harm or nuisance to the public.

It is intended that the CEMP will be updated where required prior to the commencement of construction to include all mitigations and monitoring measures, conditions and or alterations to the EIAR and application documents should they emerge during the course of the planning process and will be submitted to the Planning Authority for written approval.

20.2 Summary table

Table 20.1 displays a list of the mitigation measures proposed in the EIAR chapters and forms part of the Project.

Table 20.1: Summary of Mitigation Measures

Ref No.	Reference Heading	Reference Location	Mitigation Measure
EIAR Chapter 5 –Project Description			
Construction Phase			
MM1	**Environmental Management of Construction Activities**	**5.3.1.1**	• A CEMP has been prepared for the proposed development and is included in EIAR **Volume III, Appendix 5.1** of this EIAR. The CEMP sets out the key environmental management measures associated with the construction of the Project, to ensure that during these phases of the Project, the environment is protected, and any potential effects are minimised. A separate CTMP has been prepared and is included in EIAR **Volume III, Appendix 5.2** of this EIAR. • The final CEMP and CTMP will be developed further upon planning approval, to address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned.
MM2	**Refuelling**	**5.3.1.2**	• Wherever possible, vehicles will be refuelled off-site. In instances where refuelling of vehicles on site is unavoidable, a designated and controlled refuelling area will be established at the site. The designated refuelling area will be bunded to 110% volume capacity of fuels stored at the site. The designated refuelling area will be located a minimum distance of 50m from any surface water or site drainage features. The bunded area will be drained by an oil interceptor that will be controlled by a penstock valve that will be opened to discharge storm water from the bund depending on the quality of the water. Management and maintenance of the oil interceptor and associated drainage will be carried out by a suitably licensed contractor on a regular basis. For large machinery such as cranes, a drip tray will be used, and spill kits and fuel absorbent pads will be on hand. Suitable storage for contaminated materials will be provided pending offsite removal of contaminated material.
MM3	**Concrete Management**	**5.3.1.3**	• Concrete will be delivered from local batching plants in sealed concrete delivery trucks, as required. • When concrete is delivered to site, only the chute of the delivery truck will be cleaned in a dedicated bunded area, using the smallest volume of water necessary, before leaving the wind farm site. Concrete trucks will then exit the wind farm site and return to the supply plant to wash out the mixer itself.

Ref No.	Reference Heading	Reference Location	Mitigation Measure

			• The concrete pours at the turbine locations will be planned in advance and proposed mitigation measures are detailed in EIAR **Chapter 9: Hydrology and Hydrogeology** and are summarised as follows:
			  ○ Using weather forecasting to assist in planning large concrete pours, and avoiding large pours where prolonged periods of heavy rain is forecast.
			  ○ Ensuring that excavations are sufficiently dewatered before concreting begins and that dewatering continues while concrete sets.
			  ○ Only the chutes will be cleaned prior to departure from site, and this will take place at a designated area at the temporary construction compound. The contents will be allowed to settle, and the supernatant will be removed off site by licenced contractor.

MM4	**Dust Suppression**	**5.3.1.4**	• In periods of extended dry weather, dust suppression may be required to ensure dust does not cause a nuisance. If necessary, damping down of site compounds will be undertaken to prevent the generation of dust. • To reduce mud and debris from getting onto the local road network, a wheel wash facility will be employed at exiting points on-site which will wash mud and debris from vehicles egressing the site.
MM5	**Traffic Management**	**5.3.1.5**	• Traffic management at the site will be coordinated by an appointed Traffic Manager for the duration of the construction phase of the Project. • A pre-condition survey will be carried out on all public roads that will be used in connection with the development to record the condition of the public roads in advance of construction commencing. • A post construction survey will also be carried out after the works are completed. • All roads will be reinstated in a timely manner upon completion of the construction works. • Letter drops will be carried out to notify members of the public living near the proposed works to advise them of any particular upcoming traffic related matters. Clear signage relating to the development, both temporary and permanent, will be provided for accessing the site.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• The entrances to the wind farm site will be secured when the wind farm site is not in use. • When necessary, a flagman will be used to assist traffic movements at the wind farm site entrance or in other areas as required. • For the grid connection construction, cable trenching will be carried out with the aid of either lane closures or road closures, which will ensure that the trenching works are completed as expeditiously as possible. • Road closures will be applied for by the appointed contractor and will outline local diversions whilst maintaining local access at all times for residents, farms and businesses, and restrictions during school drop off and collection times, where applicable. • Road closures will be subject to the applicable statutory processes as implemented by the Local Roads Authority. 'Rolling road closures' will be implemented, whereby the works will progress each day along a road, which will have the effect of reducing the impact for local residents. • A traffic management plan for the cable trenching will be adopted, in consultation with Cork County Council, to provide a safe environment for road users and construction workers. • Turbine delivery will require the transportation of abnormal loads. This will be undertaken at off-peak times under agreement with the local authority and An Garda Síochána and in accordance with the Abnormal Load Permit. • A Construction Traffic Management Plan (CTMP) has been prepared for the Project and is presented in EIAR **Volume III, Appendix 5.2** of the EIAR. In the event planning permission is granted for the Project, the final CTMP will address the requirements of any relevant planning conditions, including any additional mitigation measures which are conditioned.
MM6	**Spoil Management**	**5.3.1.6**	• Any soil excavated for the construction of site tracks within the wind farm site will be re-used on site in berms and for landscaping purposes associated with the Habitat Management Plan (EIAR **Volume III, Appendix 7.3**) and along the margins of the site access tracks.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• Berms will be created from suitable excavated material and located on the opposite side of infrastructure to any interceptor drains. The berms will therefore not obstruct flow or risk siltation to interceptor drains. • Berms will be placed outside the roadside drains which drain the new site tracks. • Further details related to management of soil during the construction phase can be found in EIAR **Chapter 10 Soils and Geology** and within the CEMP in EIAR **Volume III, Appendix 5.1**. • Spoil arisings during construction works will be stored at a height of maximum of 1.5m for topsoil and 2m for subsoil and a will be kept outside of any sensitive buffers. • Following completion of construction, all plant and machinery will be removed from the wind farm site. The temporary works/assembly areas needed for the construction period will be reinstated using the original spoil material removed and stockpiled close to the location from where it was excavated as explained in EIAR **Chapter 7 Biodiversity** and EIAR **Chapter 10 Soils and Geology**.
MM7	**Waste Management**	**5.3.1.7**	• A Resource and Waste Management Plan (RWMP) has been prepared for the Project and is presented in EIAR **Volume III, Appendix 5.1**. The RWMP outlines the methods of waste prevention and minimisation by recycling, recovery and reuse at each phase of construction of the Project. Disposal of waste will be a last resort. • The developer, in conjunction with appointed contractor, will reduce, reuse and recover as much of the waste generated on site as practicable and ensure the appropriate transport and disposal of residual waste off site to licensed facilities. This is in line with the relevant National Waste Management Guidelines and the European Waste Management Hierarchy, as enshrined in the Waste Management Act 1996, as amended, and circular economy principles. • Prior to the commencement of the development, a construction Waste Manager will be appointed by the contractor. The role of the waste manager will be to record, oversee and manage everyday handling of waste on the wind farm site. The waste manager or delegate will record the following:

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			○ Waste taken for reuse off-site. ○ Waste taken for recycling. ○ Waste taken for disposal. ○ Reclaimed waste materials brought on-site for reuse. • Wastewater from the staff welfare facilities will be collected in a sealed storage tank. All wastewater will be tankered off-site by an authorised waste collector to a wastewater treatment plant.
NM8	**Monitoring**	**5.3.2**	• The baseline monitoring undertaken at the wind farm site will be repeated periodically before, during and after the construction phase to monitor any deviations from baseline water quality that occur at the wind farm site. • During the construction phase, daily inspection of silt traps, buffered outfalls and drainage channels and daily measurement of total suspended solids, electrical conductivity, and pH at selected water monitoring locations on the wind farm site (locations close to active working zones). Monitoring of same during times when excavations are being dewatered (likely high in solids) will be completed. Physiochemical properties will be monitored at baseline sampling locations and thresholds established in line with water quality reference concentrations/limits which will be set using relevant instruments for example, Surface Water Quality Regulations, <25mg/l Total Suspended Solids (TSS). • Site water runoff quality at all surface water monitoring locations will be monitored on a continuous basis during the construction phase of the development. • Continuous monitoring at downstream baseline surface water monitoring locations will be carried out during the construction phase. • During the construction phase of the Project, the development areas will be monitored daily for evidence of groundwater seepage, which presents as water ponding and wetting of previously dry spots, and visual monitoring of the effectiveness of the constructed drainage and attenuation system so that it does not become blocked, eroded or damaged during the construction process. • During the construction phase of the Project, the development areas and adjacent receiving drainage systems will be monitored daily for evidence of erosion and other adverse effects to natural drainage channels and existing

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			degraded areas whereby soils/subsoils are exposed and prone to enhanced degradation. • During the construction phase of the Project watercourse crossings will be monitored frequently (daily during construction phase). The water course crossings will be monitored in terms of structural integrity and in terms of their effect on respective watercourses. • Monitoring will be carried out at each significant construction location along the GCR (HDD, any excavation >2.0m) and at significant environmental receptors including the following Environmental Monitoring Locations: ○ Upstream and downstream of surface water crossings on mapped rivers. ○ Groundwater abstraction points within buffer zones (mapped wells, source protection areas, and/or associated Regionally Important Karst Aquifer). ○ Similar to the wind farm site baseline monitoring, baseline surface water samples will be obtained at upstream and downstream sampling locations at each significant construction location over mapped rivers. Baseline surface water samples will be obtained at accessible locations such as existing bridges on public roads. Where upstream access is poor, the upstream baseline sampling location will be directly/immediately upstream of the construction location (e.g., existing bridge / culvert). ○ At construction areas requiring drilling (HDD) and/or significant excavations (launch pits, cable joint bays), and in the management of general excavations, arisings will be managed carefully with a view to containing and treating all drained water and runoff which will likely be laden with suspended solids. Active continuous monitoring will be required at these locations. The monitoring location will be at the outfall or discharge point of the treatment train at any respective location. • A Geotechnical Clerk of Works will be employed during the construction phase to monitor excavation activities, to verify that safety standards are being met and monitor for any potential stability issues, particularly in areas of deeper excavations, and areas with the potential to encounter weathered limestone or karst features.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• All major sub-surface groundworks associated with the Project (as identified in EIAR **Chapter 15 Archaeology and Cultural Heritage**), buffer zones will be fenced off and will be subject to a programme of archaeological monitoring. • Agree dust deposition, dust flux, or real-time PM10 continuous monitoring locations and duration (including baseline monitoring) with the local authority.
MM9	**Working hours for construction**	**5.3.3**	• Working hours for construction will generally be from 07:00 to 19:00 on weekdays, with reduced working hours from 08:00 to 14:00 on a Saturday. It should be noted that it may be necessary to commence turbine base concrete pours earlier due to time constraints incurred by the concrete curing process. Also, turbine deliveries will generally be early morning working hours.
Operational Phase			
MM10	**Monitoring**	**5.4.2**	• Monitoring of bat boxes, rocket boxes and tubes to be monitored from installation to years 1, 2, 3, 5, 10, 20, 30, 34. • A fatality monitoring programme for birds and bats will be implemented during the operation of the Project. Monitoring will involve monthly searches of carcasses within monitoring years (January-December), ensuring that bat carcasses are discovered during periods of time when bats are active (between March-October), and within the wintering and breeding seasons for birds. Monitoring will take place within the first three years of operation and subsequently in years 5,7,10,15,20,25, and 30 as part of the curtailment monitoring schedule. For most habitat management prescriptions in the HMP (EIAR **Volume III, Appendix 7.3**) monitoring is proposed within the first three years of operation and then subsequently in years 5, 7, 10, 15, 20, 25, 30 and 35. • Post commissioning noise monitoring shall be carried out, at locations agreed with the local authority, to ensure compliance with the relevant noise criteria. • During the operational phases of the Project, watercourse crossings will be monitored frequently (i.e., weekly/monthly inspections initially and reduced gradually in line with observed stability and confidence in longer term data obtained). The water course crossings will be monitored in terms of structural integrity and in terms of their effect on respective watercourses.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• Continuous monitoring at baseline surface water monitoring locations will continue into the operational phase until stable conditions are observed e.g., stable conditions in line with baseline conditions for 6 months. • During the operational phase of the Project the stilling ponds and buffered outfalls will be periodically inspected e.g., weekly during maintenance visits to the site initially and gradually reduced based on observed stability of conditions.
EIAR Chapter 6 – Population and Human Health - No specific mitigation measures required			
EIAR Chapter 7 – Biodiversity			
Pre-Commencement Phase			
MM11	**Ecological Clerk of Works (ECoW)**	**7.8.3**	• An Ecological Clerk of Works (ECoW) will be appointed to address issues relating to ecological features during the construction and decommissioning phases, as described within the CEMP. ○ Undertaking pre-construction surveys to ensure that significant effects to ecological features will be avoided. ○ Inform and educate site personnel of sensitive ecological features within the wind farm site and how effects on these features could occur. ○ Oversee management of ecological issues during the construction and decommissioning period and advise on ecological issues as they arise. ○ Provide guidance to contractors to ensure legal compliance with respect to protected habitats and species on site. ○ Liaise with officers from consenting authorities and other relevant bodies and contractors with regular updates in relation to construction and/or decommissioning progress.
Construction Phase			
MM12	**Hedgerow loss mitigation**	**7.10.3**	• Replacement hedgerow habitat will be created in proportion with the type and extent of habitat loss during construction. Hedgerows that will be temporarily lost in order to facilitate construction works will be reinstated on a like-for-like basis in the same location, where they fall outside of the proposed bat buffers.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			In total, this amounts to the reinstatement of 20m of hedgerows where temporary losses would occur. Where new gaps in hedgerows need to be created in order to facilitate permanent site access then existing gaps within those hedgerows, which are present to facilitate farm access, will be planted in order to minimise potential fragmentation effects. This equates to approximately 15m of replacement hedgerow planting. • In areas where hedgerows cannot be reinstated (i.e., due to permanent works or around bat buffer zones) then they will be created elsewhere within the wind farm site. To accommodate the Project, 411m of hedgerows will be permanently lost, primarily due to avoiding reinstating in-situ those hedgerows that need to be removed to accommodate temporary works, where they fall within bat buffer areas and where in the interest of road safety sight lines need to be maintained at the site entrance. To offset for these losses an additional 2,911m of new hedgerow will be planted across the wind farm site, which represents a significant increase in hedgerow habitat, over and above the extent of which will be affected, and an overall net gain for biodiversity. • Planting is proposed to be distributed across the site in areas where potential enhancement would provide significant benefits to the heterogeneity of the area, and improve connectivity to bat foraging, commuting, and roosting areas along other hedgerows and woodlands off-site. Planting will ensure that collision risk to bats does not increase by strategically placing these newly created habitats away from turbines. Hedgerow planting will be arranged following single row and double row planting methodologies, utilising old field boundaries wherever possible and incorporating hedgerow trees to offset the small losses of some tree habitat. The proposals and management of this is detailed within the HMP which additionally describes the monitoring techniques to ensure this habitat remains viable (see EIAR **Volume III, Appendix 7.3**).
MM13	**Habitat creation and enhancements**	**7.10.6.1**	• Hedgerow planting and enhancement to provide additional nesting, foraging, and commuting habitats for a range of species, namely pygmy shrew, hedgehogs, bats, birds, and badgers. Proposals will position hedgerows in a way that will create commuting corridors for bats that will decrease the risk of collisions with turbines. Planting will use native plant species of known value to wildlife, whilst rotational management regimes will be adopted to newly planted

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			and existing hedgerows to create varying age structures which will be favoured by different species and at different times of the year. • Woodland planting and enhancement to further provide additional nesting, foraging, and commuting habitats. Planting will take place in three areas along the peripheries of the wind farm site and will incorporate a varying mosaic of different species and age structures, using native species of known value to the local ecology. Management will include rotational coppicing as well as the creation of glades and rides to benefit butterfly and other invertebrate species. • Wildflower meadow creation to improve the botanical diversity of the wind farm site as well as increasing available habitat for invertebrate species. Two areas are proposed with one being in the area of improved grassland just south of the woodland in the north and the other in the vicinity of the proposed substation toward the south of the wind farm site. • Scrub enhancement will aim to improve current condition of the scrub to be more beneficial for wildlife by varying the age structure and developing the ground flora. This will be done through the provision of coppicing, natural regeneration, grazing management, and bracken control. • Wet grassland management to improve botanical diversity and provide further foraging and breeding habitat for species such as butterflies and other invertebrates. It is proposed that the two areas of wet grassland will be expanded into one larger area that will be fenced off to reduce grazing pressure. • Enhancement of existing ponds. Enhancement of two existing waterbodies on site will include eutrophication management, botanical planting, invasive species management, and the creation of a bund to prevent nutrient enrichment from the surrounding agricultural landscape. Open canopy farmland ponds dominated by aquatic macrophytes are known to be positively associated with many species, such as invertebrates, birds, and mammal species. • Field margin development adjacent to boundary features such as hedgerows and ditches to provide nesting, foraging, and sheltering habitat and to improve habitat connectivity. Flower-rich margins typically support a more diverse invertebrate assemblage, providing food for a range of species.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• Bee bank creation (i.e., sand banks) in two locations to provide additional habitat for the buff mining bee, which was recorded to be present on site. • Bee pole provision to provide additional habitat for the buff mining bee and other solitary insects. Bee poles will be erected in a number of locations within the site adjacent to suitable habitat for invertebrates such as bee banks, wildflower meadows, and ponds. • Bat box provision throughout both pockets of existing woodland to increase roosting habitat for bat species. Bat boxes will be positioned sensitively so as to avoid increasing the risk of collisions with turbines. • Habitat piles (collection of logs and dead wood) will be incorporated into quiet and varied habitats in the site to offer refuge for hedgehogs, hibernating reptiles, and amphibians, as well as deadwood specialist insects. Wherever possible, they will be created using any logs generated from vegetation clearance to reduce waste. • Tree planting will involve planting a line of native trees around the peripheries of the proposed 38kV substation. • Invasive Non-Native Species (INNS) management will involve the control of Japanese knotweed in the southern section of the wind farm site. A further site visit in advance of the pre-construction phase will be undertaken to map Japanese knotweed and any other invasive species that may have spread into new areas since the baseline surveys were conducted, which will inform an appropriate management strategy. On most occasions, a herbicide (Glyphosate) will be used as it is relatively low cost and does not involve the removal of hazardous waste from the wind farm site.
Operational Phase			
MM14	**Bat Mitigation**	**7.10.4**	• Habitat replacement: o Hedgerows will be reinstated and replaced on a like-for-like basis. Additional hedgerows will be created to offset the unavoidable loss of these habitats, along with the creation of pockets of woodland to overall increase the commuting, foraging, and roosting habitats on site for bat species, achieving a net gain for biodiversity. The planting aims to provide substantially improved bat foraging and commuting habitats to both the south and north of the site,

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			influencing bats to utilise these areas rather than fly towards the turbines. ○ Installation of bat boxes in strategic locations will provide further roosting opportunities for bat species. • Feathering of turbine blades (curtailment) during low wind speeds • Curtailment; Year 1 curtailment ○ Cut-in speeds will be increased during the bat activity season (April-October) from 30 minutes prior to sunset and to 30 minutes after sunrise. ○ Cut-in speed restrictions will be operated according to specific weather conditions: ○ For turbines T2, T4, T5, T7 and T8: ▪ When the air temperature is above a 10.5°C at nacelle height. ▪ Wind speeds below 5.0m/s (at nacelle height). ○ For turbines T3, T6 and T9: ▪ When the air temperature is above a 10.0°C at nacelle height. ▪ Wind speeds below 5.0m/s (at nacelle height). A monitoring report will be submitted after the first year of operation to Cork County Council and NPWS • Year 2 curtailment ○ After the first year of operation, bat data. from each of the turbines will be analysed alongside 10-minute interval (or less) weather data in order to establish baseline parameters for the curtailment strategy for the second year of operation. The aim will be to curtail turbines for 80% at turbines T3, T6 and T9 and 78% for turbines T2, T4, T5, T7 and T8. Should collision monitoring establish fatalities occurring at a particular turbine location, these

Ref No.	Reference Heading	Reference Location	Mitigation Measure

			parameters can be adjusted. If a bat fatality occurs at turbine T1 it will be included in the curtailment regime. A monitoring report will then be submitted after the second year of operation to Cork County Council and NPWS.
			• Year 3 onwards curtailment
			  ○ Installation of smart bat detectors at each of the proposed turbines in addition to the curtailment strategy outlined above.
			  ○ Given the proximity to retained hedgerows, turbines T4, T5, T6 and T8 will have an additional microphone installed (at 20m height facing the landscape feature). It is unlikely the detectors mounted at nacelle (100m) would record low flying bats such as brown long-eared (which may still fly high enough to be hit when turbine blades are moving at their lowest extent – 26.34m). Due to the proximity of a brown long eared bat roost, turbine T9 will also have a second detector placed at 20m height.
			  ○ To prevent considerable unnecessary down time resulting from the proposed "blanket curtailment" regime outlined as above for Year 1 and Year 2 and due to the advances in smart curtailment, a focused curtailment regime is further proposed from year three of operation onwards. Smart detectors such as those developed by Wildlife Acoustics can be programmed to interact with the SCADA (Supervisory Control and Data Acquisitions) operating system (or equivalent) to only pause the blades based on real time bat sound analysis. The program will implement curtailment at a value of; four bat passes per minute (bp/min) or higher and turn back on when bat passes reduce to two bp/min or below. Should collision monitoring establish fatalities occurring at a particular turbine location, these parameters will be adjusted in consultation with Cork County Council.

MM15	**Monitoring - Bats**	**7.10.4.4**	• Bat activity will be measured within monitoring years continuously between April and October at each turbine location, in combination with carcass surveys. In addition, wind speed and temperature data will be recorded at the nacelle height of each turbine. Following two consecutive years of monitoring, a review of the curtailment regime will be undertaken and refined to a "smart

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			curtailment" strategy informed by the continuous monitoring of weather and bat activity data determined from the post-construction monitoring survey data and using software parameters programmed into the SCADA system. This approach will be agreed in consultation with Cork County Council. • If, following the initial three years of post-construction surveys, bat activity increases above the baseline and/or remains consistently high and carcass searches indicate fatalities are occurring (refer below), increased cut-in speeds will continue and be adjusted to reduce effects. This will subsequently be monitored in years 5, 7, 10, 15, 20, 25 and 30 with further review after each monitoring period (should smart curtailment be implemented, bat monitoring will be implemented for the lifespan of the wind farm). • Alternatively, if it is found that the results of bat activity surveys and fatality searches confirm that the level of bat activity at turbine locations is low then consent will be sought from Cork County Council (in consultation with NPWS) for the reduction and / or cessation in the requirement for these cut-in speeds / curtailment measures, or a reduction on the timing restrictions for these measures. • An assessment of static data gathered during operational surveillance will be completed using the online analysis tool Ecobat as recommended by SNH (2021) as a minimum, or other equivalent guidance as dictated by up-to date standards and practices. • Although curtailment is a mitigation strategy proven to lower bat fatalities, a fatality monitoring programme will be implemented within the operational wind farm. This will aim to confirm the accuracy of the collision risk assessment for bats and inform the curtailment strategy as described above. Monitoring will involve monthly searches of carcasses within monitoring years (March-October), ensuring that bat carcasses are discovered during periods of time when bats are active. Monitoring will take place within the first three years of operation and subsequently in years 5, 7, 10, 15, 20, 25, and 30 as part of the curtailment monitoring schedule. • Bat boxes, rocket boxes and tubes to be placed at locations outside the construction and operational footprint of the wind farm as determined by the Project ecologist/ECoW at least 1 season before construction start. These shall be examined by a licensed bat specialist according to NPWS

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			recommendations. Records should be submitted to Bat Conservation Ireland for inclusion in its bat distribution database. If the boxes / tubes are not used within the first three years of deployment re-site if necessary. Annual cleaning required if well used by bats or if used by birds. Replacement if damaged/lost. To be monitored from installation to years 1, 2, 3, 5, 10, 20, 30, 34. • Conduct emergence surveys of Brown Long-eared bat roost throughout the bat active season of first three years of operational phase. Observe if mitigation measures are working and bats are travelling south. Use of thermal cameras for surveys to avoid disturbance. To be monitored from initial operation and during years 1,2, and 3. • Review of static data produced by bat detectors within turbines from initial operation conducted during years 1, 2, 3, 5, 7, 10, 15, 20 25 and 30 post construction. • Corpse searches beneath turbines to assess the effect of operation on bats from initial operation conducted during years 1, 2, 3, 5, 7, 10, 15, 20, 25, and 30 post construction.
MM16	**Monitoring – Enhancement Measures**	**7.10.6.2**	• A monitoring strategy will be developed in order to maintain the viability of the ongoing management of habitat creation and enhancement. Commencing in the first year of operation of the wind farm, the status of habitats created, enhanced, and controlled will be checked following a monitoring regime. For most management prescriptions monitoring will take place within the first three years of operation and then subsequently in years 5, 7, 10, 15, 20, 25, 30 and 34. This will follow implementation of the plan to confirm whether habitats have successfully established and to ascertain if any remedial measures need to take place as identified within a feedback loop. A concise report will be produced following these visits, to ensure documentation of the ongoing success of the HMP, and to identify any actions. A HMP monitoring report will then be submitted to Cork County Council at the end of each monitoring year. A final assessment of the condition of the management prescriptions will be undertaken in the year prior to decommissioning.
Decommissioning Phase			
MM17	**Ecological Clerk of Works**	**7.8.3**	• The ECoW will:

Ref No.	Reference Heading	Reference Location	Mitigation Measure
	(ECoW)		○ Oversee management of ecological issues during the decommissioning period and advise on ecological issues as they arise. ○ Liaise with officers from consenting authorities and other relevant bodies and contractors with regular updates in relation to decommissioning progress.
EIAR Chapter 8 – Ornithology			
Pre-Commencement Phase			
MM18	**Ecological Clerk of Works (ECoW)**	**8.8.4**	An Ecological Clerk of Works (ECoW) will be appointed to address issues relating to birds and other sensitive habitats and species. Their responsibilities will include, but not be limited to: • Undertake a pre-construction walkover survey to ensure that significant effects on breeding and non-breeding birds will be avoided. • Undertake nesting bird checks on any vegetation that needs to be removed within the breeding season. • Inform and educate site personnel of sensitive ornithological features within the wind farm site and how effects on these features could occur. • Oversee management of ornithological issues during the construction and decommissioning period and advise on ornithological issues as they arise. • Provide guidance to contractors to ensure legal compliance with respect to protected bird species on site. • Liaise with officers from consenting authorities and other relevant bodies and contractors with regular updates in relation to construction and/or decommissioning progress.
Construction Phase			
MM19	**Habitat Protection**	**8.10.2**	• Retainment of areas of more important habitat within the landscape design (*e.g.*, waterbodies and woodland). • Minimisation of the extent of habitat loss during construction as much as is possible within the development design.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• Selection of delivery routes which use existing built infrastructure wherever possible, with laying of cables underground. • Presence of an ECoW on site to oversee any ornithological issues during construction.
MM20	**Habitat reinstatement and creation**	**8.10.2.1**	• Habitats will be created in proportion with the type and extent of habitat loss during construction. All temporary habitat loss will be reinstated on a like-to-like basis, including along the turbine delivery and grid connection route. Ideally, vegetation will be allowed to regenerate naturally, but if this is not possible then planting will take place. As hedgerow loss is the main cause of significant effects for passerine species, the replacement of this habitat will be the main focus. In areas where hedgerows cannot be reinstated (i.e., due to permanent works or around bat buffer zones (see EIAR **Volume II Chapter 7 Biodiversity)** then they will be created elsewhere within the wind farm site. To accommodate the Project, 431m of hedgerow habitat will be removed, primarily due to accommodating the temporary working areas in the vicinity of turbine T4 and turbine T8 and in order to maintain safe sightlines for vehicles exiting the wind farm site on to the L5302 public road at Croughta (as detailed in EIAR **Volume II Chapter 7 Biodiversity**). To offset for these losses 2,911m of hedgerow habitat will be planted across the wind farm site. This represents a significant increase in hedgerow habitat, over and above the extent of which is impacted, and an overall gain for biodiversity.
MM21	**Enhancement measures**	**8.10.5**	• Hedgerow planting and enhancement to provide additional nesting, foraging, and commuting habitats for a range of species, primarily scrub dwelling passerine species such as yellowhammer. Planting will use native plant species of local provenance and of known value to wildlife, whilst rotational management regimes will be adopted to newly planted and existing hedgerows to create varying age structures which will be favoured by different species and at different times of the year. • Woodland planting and enhancement to further provide additional nesting, foraging, and commuting habitats. Planting will take place in three areas along the peripheries of the site and will incorporate a varying mosaic of different species and age structures, using native species of known value to the local

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			ecology. Management will include rotational coppicing as well as the creation of glades and rides to benefit butterfly and other invertebrate species. • Wildflower meadow creation to improve the botanical diversity of the site as well as increasing available habitat for invertebrate species, a common prey source for bird species. Two areas are proposed with one being in the area of improved grassland just south of the woodland to the north of the site and the other behind the proposed substation toward the south of the site. • Scrub enhancement will aim to improve current condition of the scrub to be more beneficial for bird species by varying the age structure and developing the ground flora. This will be done through the provision of coppicing, natural regeneration, grazing management, and bracken control. • Wet grassland management to improve botanical diversity and provide further foraging and breeding habitat for species such as waders, butterflies, and other invertebrates. It is proposed that the two areas of wet grassland will be expanded into one larger area that will be fenced off to reduce grazing pressure. • Enhancement of existing ponds. Enhancement of two existing waterbodies on site will include eutrophication management, botanical planting, invasive species management, and the creation of a bund to prevent nutrient enrichment from the surrounding agricultural landscape. Open canopy farmland ponds dominated by aquatic macrophytes are known to be positively associated with many species, such as invertebrates, birds, and mammal species. • Field margin development adjacent to boundary features such as hedgerows and ditches to provide nesting, foraging and sheltering habitat and to improve habitat connectivity. Flower-rich margins typically support a more diverse invertebrate assemblage, providing food for a range of breeding bird species. Use of wild bird seed planting mixtures can be adopted to provide a food source, particularly during winter for species such as yellowhammer. • Bird box provision throughout pockets of existing woodland to increase nesting opportunities for bird species. Bird boxes will be positioned sensitively so as to avoid increasing the risk of collisions.
Operational Phase			

Ref No.	Reference Heading	Reference Location	Mitigation Measure
MM22	**Monitoring**	**7.3**	• Avian fatality monitoring programme will be implemented within the operational wind farm, as detailed within the HMP (see EIAR **Volume III, Appendix 7.3**). ○ Monitoring will involve monthly searches of carcasses within monitoring years (January-December) to ensure non-breeding and breeding species of birds are accounted for. ○ All feather spots and bird carcasses will be photographed and logged in an annual fatality search report, which will be submitted to relevant stakeholders and the Planning Authority for consultation.
Decommissioning Phase			
MM23	**Habitat Reinstatement**	**7.4**	• Any habitat temporarily cleared during the decommissioning phase to accommodate the planned works will be reinstated on a like-for-like basis. Furthermore, where infrastructure is removed, then those areas will be restored to their pre-construction baseline conditions and returned for agricultural use. • Following reinstatement, the site will be monitored on a regular basis to determine the progress of re-vegetation and if necessary to look at introducing supplementary planting with native species. A reassessment of the wind farm site will be carried out at the end of the first-year post-decommissioning to assess the wind farm site's progression over the previous year in relation to vegetation status, drainage management, and general site appearance, to ensure the wind farm site remains favourable to ornithology and wider biodiversity.
Ref No.	**Reference Heading**	**Reference Location**	**Mitigation Measure**
EIAR Chapter 9 – Hydrology and Hydrogeology			
Pre-Commencement Phase			
MM24	**Natured Based Solutions**	**9.6.1**	• Nature Based Solutions (NBS) will be adopted at the wind farm site where possible and have been incorporated into the design. NBS include Sustainable Drainage Systems (SuDS), which will be employed to attenuate runoff and reduce the hydrological response to rainfall at the wind farm site.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
MM25	**Design Features**	**9.6.1**	• Check dams have been incorporated into the design and will be constructed along the drainage network at regular intervals. Check dams will be used in the construction and operational phase, made of suitable locally sourced coarse aggregate (similar geology), and are intended to attenuate (impede) surface water runoff in the drainage channel, therefore slowing the velocity of the runoff in turn reducing the potential for erosion in the channel and allowing suspended solids to settle out if present. • Stilling ponds have been incorporated into the drainage design**,** with buffered outfalls**,** which will be constructed at drainage outfalls associated with the construction runoff drainage network. Buffered outfalls will be established at intervals along the clean water interception ditch. Similar to check dams; some stilling ponds around operational infrastructure will remain (for the life of the Project / drainage network), made of suitable coarse aggregate, and are intended to attenuate surface water runoff in the drainage channel, slowing the velocity of the runoff before discharging to vegetated areas (buffered outfall). Slowing the water velocity allows suspended solids to settle out if present. At low velocity the runoff has increased opportunity to percolate through the coarse aggregate and into the surrounding landscape.
Construction Phase			
MM26	**Increased runoff Proposed Mitigation Measures – Wind Farm and GCR**	**9.6.2.1**	• A Spoil Management Plan will be prepared as part of the Construction & Environmental Management Plan. It will incorporate provision on materials management with a view to establishing material balance (reuse of excavation arisings) during the proposed construction phase, thus minimising the potential for or the length of time excavated materials are exposed and vulnerable to entrainment by surface water runoff. • In sensitive areas for example areas of the GCR or TDR in close proximity to surface waters, excavation of material will be conducted in a controlled manner whereby any temporary deposit of the material in buffer zones can be minimised. For example, vacuum excavation techniques or similar will be used for excavations within Surface Water Buffer zones and other sensitive areas (constraints). All surplus spoil from trenches in public roadways will be removed from site as it is excavated and transported to a licenced facility for disposal.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• Temporary stockpile locations have been identified. Temporary stockpile areas will be managed to facilitate the orderly segregation of material types, be isolated from the receiving surface water network by the use of silt screens etc. and are limited in height (2m), 15m from drains where possible. • Exposed soils (exposed temporary stockpiles) will be covered with plastic sheeting during all heavy rainfall / storm events and during periods where works have temporarily ceased before completion at a particular area (e.g., weekends, overnight, etc). • Stockpiles are located away from drains where possible with silt fencing /silt screen in place. • All drainage infrastructure required for the management of surface water runoff will be established before excavation works commence. Similarly, mitigation measures related to surface water quality will be implemented before excavation works commence. • Clean Water and dirty water interception ditches**,** will be established to direct/divert surface water runoff from development areas, including temporary stockpiles, and direct same into established treatment trains including stilling ponds.
MM27	**Release and Transport of Suspended Solids and Associated Nutrients**	**9.6.2.2**	• The drainage, attenuation and other surface water runoff management systems will be installed concurrent with the main construction activities to control increased runoff and associated suspended solids loads in runoff during intensive construction activities e.g., excavation of turbine base. Conceptual and information graphics associated with mitigating runoff quality. • Diffuse surface water runoff quality will be managed as follows: ○ Silt will be established along the perimeter of source areas e.g., stockpiles, within the drainage network, and in existing natural drains which are likely to receive surface water runoff**.** This will reduce the potential for high suspended solids loadings. Double silt fences / screens will be deployed at outfalls within surface water buffer areas. Silt fences will be temporary features but will remain in place for a period following the completion of the construction phase until such time that site conditions are stable.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• Runoff will be managed as follows: ○ In line Stilling ponds will buffer the run-off discharging from the drainage system during construction, by retaining water, thus reducing the hydraulic loading to watercourses. These stilling ponds are designed to reduce flow velocity to 0.3m/s at which velocity, silt particle settlement occurs. Stilling ponds will remain along the operational infrastructure (life of development at minimum). The locations of stilling pond have been chosen as a part of the drainage design. • In line Check Dams will be constructed across drains. Check Dams will reduce the velocity of run-off in turn facilitating the settlement of solids upstream of the dam. Check Dams will also reduce the potential for erosion of drains. Rock filter bunds may be used for check dams however, wood or straw/hay bales will also be used if properly anchored, that is; supported with rock or fitted timber to reduce potential for material to be swept away by incoming water. Multiple Check Dams will be installed, particularly in areas immediately downgradient of construction areas. Check dams will only be constructed in drainage infrastructure and not in significant surface water features i.e., streams or rivers. Check Dams (comprised of rock) established will remain along the operational infrastructure. The following will be implemented in the design of Check Dams and their deployment (CIRA, 2004): • Check dams will be installed at 50m intervals within the length of drainage channels. This is dependent on the slope angle and height of check dams constructed. • Erosion protection will be established on the downstream side of the check dam i.e., cobbles or boulder (100-150mm diameter) extending at least 1.2m. • Check dams will be constructed as part of the drain i.e., reduce the potential for bypassing between the drain wall and check dam. • Routine inspections and silt removal will take place to present silt building up. • Water pumped from excavations, or any waters clearly heavily laden with suspended solids will be contained and managed and pumped through the pre-established Active Management treatment.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• Active monitoring of water quality by turbidity measurement will be undertaken on a regular basis during rainfall events.
MM28	**Release of Hydrocarbons**	**9.6.2.3**	• In instances where refuelling of vehicles on site is unavoidable, a designated and controlled refuelling area will be established at the site. The designated refuelling area will enable low risk refuelling and storage practices to be carried out during the works. The designated refuelling area will contain the following attributes and mitigation measures as a minimum requirement: • The designated refuelling area will be located a minimum distance of 50m from any surface waters or site drainage features. • The designated refuelling area will be bunded to 110% volume capacity of fuels stored at the wind farm site. • The bunded area will be drained by an oil interceptor that will be controlled by a penstock valve that will be opened to discharge storm water from the bund depending on the quality of the water. • Management and maintenance of the oil interceptor and associated drainage will be carried out by a suitably licensed contractor on a regular basis, including decommissioning following construction. • Any oil contaminated water will be disposed of at an appropriate licensed waste disposal site. As a precautionary measure, to mitigate against potential spills at other areas of the site, the following mitigation measures will be implemented: • Oil absorbent booms and spill kits will be available adjacent to all surface water features associated with the Project. The controls will be positioned downstream of each construction area and at principal surface water drainage features. Oil booms deployed will have sufficient absorbency relative to the potential hazard. • Spill kits will also be available at construction areas such as at turbine erection locations, the temporary construction compound, onsite substation, spoils storage areas and Met Mast location etc. • Spill kits will contain a minimum of oil absorbent pads, oil absorbent booms, oil absorbent granules, and heavy-duty refuse bags for collection and appropriate disposal of contaminated matter.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• Should an accidental spill occur during the construction phase or operational phase of the development, such incidents will be addressed immediately, this will include the cessation of works in the area of the spillage until the issue has been resolved and reporting incidents to the relevant authorities. • A detailed spill response plan will be prepared as part of the site-specific CEMP. • Drainage diversion and silt fencing will be installed between construction and receptors such as the swallow hole or enclosed depressions located on/near site. • For large machinery such as cranes, a drip tray will be used, and spill kits will be on hand.
MM29	**Release of Horizontal Direction Drilling Fluid**	**9.6.2.4**	• Drilling fluids such as Bentonite or Clearbore will be used. Clearbore is an environmentally friendly, Water–Based Mud suitable for tunnelling and drilling operations (Drilling Supplies Europe), or similar will be used in drilling operations. • In the case of a spill, the leak will be stopped, contained and prevented from entering drains or water courses. Any recoverable product will be collected and disposed of properly. If a significant quantity of material enters drains or watercourses, an emergency response will be activated, and Drilling fluid will be contained within the launch pit. **Drill Fluid Disposal** • Drilling mud containing spoil recovered from the bored path can be retrieved at the launch and reception sites of the bore. This spoil can be treated in one of two ways. It can either be transferred off-site to an approved and authorized EPA license facility (in accordance with the Waste Management Act 1996 as amended) to be properly disposed of; or the spoil can be pumped to a mechanical separation container. This involves drill mud being stored within a holding tank until separation of particulates can be achieved, only then can the fluid be discharged to the surrounding area. • Very fine solids, or colloidal particles, are very slow to settle out of waters and the finest of particles require near still water and long periods of time to settle, therefore, such particles are unlikely to settle despite at sufficient rates. To

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			address this, flocculant will be used to promote the settlement of finer solids prior to discharging to surface water networks.
MM30	**Release of Wastewater Sanitation Contaminants**	**9.6.2.5**	• The wastewater/sewerage will be collected and held in a sealed storage holding tank, fitted with a high-level alarm. The high-level alarm is a device installed in the storage tank that is capable of sounding an alarm during a filling operation when the liquid level nears the top of the tank. • All wastewaters will be emptied periodically and tankered off-site by a licensed waste collector to an authorised wastewater sanitation plant for treatment. There will be no onsite treatment of wastewater. • Routine inspection of the temporary facilities will be carried out to ensure no overloading and no leakages are occurring.
MM31	**Release of Construction and Cementitious Materials**	**9.6.2.6**	In order to mitigate the potential effect posed by the use of concrete and the associated effects on surface water in the receiving environment, the following precautions and mitigation measures will be implemented: • The procurement, transport and use of any cement or concrete will be planned fully in advance of commencing works by the contractor's Environmental Manager and supervised at all times by the developer appointed Environmental Clerk of Works (EnvCoW). • Accidental spillages will be directly intercepted by drainage or surface water networks associated with the development. • Precast concrete will be used wherever possible i.e., formed offsite. Elements of the development where the use of precast concrete will be used include structural elements such as cable joint bays. Elements of the development where the use of precast concrete is not possible includes turbine and substation foundations. Where the use of precast concrete is not possible the following mitigation measures will apply. • The use of concrete will be minimised, where possible. The risk of runoff will be controlled and minimised, as concrete will be contained in an enclosed, excavated area. • Vehicles transporting cement or concrete to the wind farm site will exit the wind farm site through a designated wash out station at the batching facility and be visually inspected for signs of excess cementitious material. This will prevent

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			the likelihood of cementitious material being accidentally deposited on the public road network. • Only the chutes from the concrete trucks will be cleaned in bunded areas prior to departure from site, and this will take place at a designated area at the temporary construction compound/storage area. The contents will be allowed to settle, and the supernatant will be removed off site to a licenced wastewater treatment plant. • Concrete will be poured during metrological dry periods/seasons in so far as practical and reasonably foreseeable and will not proceed during any yellow (or worse) rainfall warning issued by Met Éireann. • Excavations will be prepared before pouring of concrete by pumping standing water out of excavations. • Any shuttering installed to contain the concrete during pouring will be installed to a high standard by experienced persons. Additional measures will be introduced where required to minimise potential leaks, for example the use of plastic sheeting or other sealing products at joints. • Temporary storage of cement bound sand (if required for construction of the substation building) will be stored at a dedicated storage area only where there is no direct drainage to surface waters and where the area has been bunded e.g., using sandbags and geotextile sheeting or silt fencing to contain any solids in run-off. • Ground crew will have a spill kit readily available, and any spillages or deposits will be cleaned/removed as soon as possible and disposed of appropriately. Mitigation measures recommended in relation to non-hydrocarbon potential contamination of groundwater: • All other liquid-based chemicals such as paints, thinners, primers and cleaning products etc. will be stored in locked and labelled bunded chemical storage units.
MM32	**Excavation Dewatering - Active Construction Water Management**	**9.6.2.7**	• In all instances where construction water, or runoff has the potential to entrain solids during excavation and other construction activities, runoff will be contained by means of temporary berms (lined geotextile of similar), bunds (lined) and sumps. This will be referred to as dewatering.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• The quality of the water being discharged will be monitored. If discharge water quality is poor (e.g., Total Suspended solids >25mg/l) additional measures will be implemented, for example, pausing works as required and treating construction water by dosing with flocculant to enhance the settlement of finer solids – this will be done in a controlled manner by means of a suitably equipped settlement tank. • Collected and treated construction water will be discharged by gravity / pump to a vegetated area of ground within the wind farm site. • Silt fences will be established at the discharge area to ensure potential residual suspended solids are attenuated and the potential for erosion is reduced. • The quality of water discharged will be monitored in real time (telemetry with 15 min sampling rate), as well as laboratory samples taken, analysed and recorded to ensure no deterioration in water quality at the wind farm site.
MM33	**Excavation Dewatering – Passive Construction Water Management**	**9.6.2.8**	• Passive management systems will include some of the features described in active management treatment trains. • Passive systems are intended to function with minimal supervision, however in the management of construction water on this Project, in many cases the diverted water will likely require active management to ensure sensitive receptors are protected. For example, diverted storm water, if clean can discharge to the receiving vegetated areas or existing drains, but any construction waters effected by contaminants on the site must be managed, and active management / treatment is required.
MM34	**Watercourse Crossings**	**9.6.2.9**	• All watercourse crossings will be designed to facilitate peak, or storm discharge rates so as to avoid localised flooding and associated issues during storm events. • Works in relation to watercourse crossings will be planned and carried out ahead of commencement of any instream works. To mitigate against any potential for onsite flood risk and consequences with regards to some portions of the grid connection route: • Works at this location will be carried out outside of heavy rainfall or flood events, by monitoring the meteorological forecast.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• Monitoring of local weather and flood alerts will be conducted on an ongoing basis. During potential scenarios where flooding is probable, imminent or occurring, the potential for contamination or similar effects will be minimised. This includes limiting exposed soils (in situ / temporarily stored), potentially hazardous materials and equipment, and personnel from the flood 'danger zone' (probable flood area).
MM35	**Construction and Diversion of Drainage**	**9.6.2.10**	• Contracted operators will draft method statements and risk assessments in line with mitigation outlined in this report and in consultation with relevant guidance prior to commencing works (as part of the watercourse crossing consent application). Method statements will be included in the CEMP. The application of the IFI protocol and timing of events to ensure works are undertaken during low/no flow. • Diversion of artificial drainage channels will be required at locations where the development layout intercepts existing artificial drainage networks. • Any newly installed drain will be fully formed prior to the diversion of existing drainage. Twin wall corrugated pipe will be used for in stream works. All areas where dirty water interception ditches are implemented within drainage buffers (15m) will require the addition of silt screens, these areas include all infrastructure units particularly south of T4, and West of T6 and T9. • The construction area will be isolated, this means; the water feature (drains) will be temporarily dammed upstream of the watercourse crossing and flow will be diverted by means of a flume / pipe by gravity or pumped (this is referred to as over pumping) downstream of the watercourse crossing and construction area. • Following the successful upstream damming, a downstream dam or barrier will also be established. The downstream barrier will ensure contaminated runoff in the isolated work area will be contained and managed and will block surface water back flow in lower lying or flatter areas. • In order to ensure isolation and over pumping is carried out effectively, the methodology will ensure that dams are secure / sufficiently supported, and that pumping of water will continue uninterrupted and that pumps are capable of keeping up with the discharge rate of the surface water feature. Pumping systems will require backup and fail-safe protocols e.g., backup pumps and

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			generator. At surface water features e.g., non-mapped drains, isolation and diversion of drainage will be implemented or works undertaken during no flow in the system.
MM36	**Groundwater Extraction**	**9.6.2.11**	• Mitigation measures for increased runoff are outlined in section 9.6.2.1, the release of suspended solids and nutrients are outlined in section 9.6.2.2. All mitigation measures will be applied along with mitigation by avoidance.
MM37	**Monitoring and Emergency Responses– Wind Farm Site and Grid Connection Route**	**9.6.2.12**	• Monitoring of the wind farm site and grid connection route will be carried out by an Environmental Clerk of Works (EnvCoW). The EnvCoW will advise on environmental issues and monitoring compliance, and will not be responsible for implementing measures, the due duty of implementing measures will be held by the developer/contracted construction operator.
Operational Phase			
MM38	**Runoff Rates**	**9.6.3.1**	• Collector drains or 'Proposed Roadside Drain'. Collector drains with in-line attenuation features, such as check dams and flow regulators will serve to reduce discharge rates dramatically, effectively backing up water and regulating the rate of discharge. • Check dams at regular intervals throughout the drainage network (existing, new clean water interception drain and new dirty water interception ditch) will attenuate runoff intercepted by respective drainage channels. • Buffered outfalls to vegetated areas will utilise the infiltration capacity of the ground prior to the rejected rainfall eventually being intercepted by the receiving surface water system. • Clean water interception drains will intercept clean water runoff flowing towards construction areas and will divert runoff away from the construction areas. Clean water runoff will be attenuated by means of check dams and discharged to vegetated intermittent buffered outfalls or reconnecting to the existing drainage network.
Decommissioning Phase			
MM39	**Decommissioning of Infrastructure Phase/s**	**9.6.4.1**	• Mitigation measures outlined for the construction phase are applied to the Decommissioning phase.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• A benefit analysis will be carried out to determine the overall positive outcomes against any potential adverse effects prior to such restoration activities being permitted.
MM40	**Reinstatement of Redundant Site Track and Hardstand Areas**	**9.6.4.2**	• Mitigation measures described to reduce the potential for run-off of elevated suspended solids during the construction phase will be implemented. • The mitigation measures for the preparation of the hardstand area surfaces prior to material being deposited discussed in EIAR Chapter 10 Soils and Geology will be implemented. • Monitoring and maintenance of the reinstated areas will be conducted regularly following the initial stages of establishment to ensure that the potential for excessive surface water runoff eroding deposited material along preferential pathways is minimised. • It is proposed that the operational site tracks will be left in situ for use by the landowners following the decommissioning phase. Any localised sections of site track not required, will be reinstated, will have a covering layer of topsoil (depending on adjacent vegetation) being placed on top of the track surface, with vegetated sods used where available.
EIAR Chapter 10 – Lands, Soils and Geology			
Construction Phase			
MM41	**Construction Environmental Management Plan (CEMP)**	**10.5.2.1**	• All construction works will be managed and carried out in accordance with the Construction Environmental Management, which will be updated by the civil engineering contractor and agreed prior to any works commencing on site.
MM42	**Engineering controls**	**10.5.2.2**	• Pending consent for the Project, confirmatory geotechnical testing will be carried out to tailor the engineering controls, such as use of geotextile membranes, required for each individual element. • If required, piling will be undertaken in areas of weathered rock to ensure stability of foundations. A geotechnical risk register will be completed and maintained as part of the construction works. • Ground settlement, horizontal movement and vibration monitoring will be implemented during construction activities to ensure that the construction does not exceed the design limitations

Ref No.	Reference Heading	Reference Location	Mitigation Measure
MM43	**Land Take**	**10.5.2.3**	• Following construction, the areas where hardstand, crane pads etc. are in place, will be covered over in topsoil and will be reintroduced for current agricultural practices. This will reduce the land take during the operational phase.
MM44	**Ground or Soil Sealing**	**10.5.2.4**	• Soil sealing will be mitigated using a geotextile membrane on top of soils, this material will likely lead to a degree of subsidence with time. This will reduce the changes the geotechnical and hydrogeological attributes of the wind farm site.
MM45	**Erosion and degradation**	**10.5.2.5**	• Limiting the amount of exposed soil at any one time. • Limiting vehicular movement to established infrastructure as far as practicable. • Ceasing construction activities during periods of sustained significant rainfall events, or directly after such events. • Covering exposed temporary stockpiles with plastic sheeting during periods where works have temporarily ceased (e.g., weekends / overnight) and ahead of heavy rainfall / storm alerts. • Reusing soils and subsoils as quickly as possible. • Any areas not required for operation will be reinstated including drainage to minimise future erosion of the soils.
MM46	**Erosion and degradation**	**10.5.2.5**	• Limiting the amount of exposed soil at any one time. • Limiting vehicular movement to established infrastructure as far as practicable. • Ceasing construction activities during periods of sustained significant rainfall events, or directly after such events. • Covering exposed temporary stockpiles with plastic sheeting during periods where works have temporarily ceased (e.g., weekends / overnight) and ahead of heavy rainfall / storm alerts. • Reusing soils and subsoils as quickly as possible. • Any areas not required for operation will be reinstated including drainage to minimise future erosion of the soils.
MM47	**Subsoil and Bedrock Removal**	**10.5.2.6**	• Best practice will be applied during construction which will minimise the amount of soil and rock excavation.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• All works will be managed and carried out in accordance with the CEMP, which will be updated by the civil engineering contractor and agreed prior to any works commencing on site. • Excavated subsoils and bedrock will be managed in such a way that separate temporary stockpiles will be designated as to not mix induvial soils horizons which will, in turn will facilitate reuse on site. • Subsoil and bedrock which are excavated as part of the initial decommissioning and construction phase will be reused onsite wherever possible. • Plate bearing tests on compressive rock strength will be undertaken during intrusive ground study before works commence to aid in the assessment of mitigation by reuse of bedrock material. • Geotechnical testing on imported material will be carried out prior to its reuse onsite particularly for reuse as a running or load bearing surface and will only be reused for those purposes if the suitability of same is conforms to relevant standards. • After construction, any areas not required for operation will be reinstated. • Drainage measures will be reinstated as required in order to minimise future erosion of the soils.
MM48	**Storage of Stockpiles**	**10.5.2.7**	Mitigation measures for stockpiles related to construction of the wind farm are as follows: • All temporary stockpiles will be positioned on established and existing hardstand areas or in designated areas which are appropriate for short term storage. • Temporary stockpiles will be managed similarly to active excavation areas in terms of potential for solids entrainment by runoff (silt screens). See EIAR **Chapter 9 Hydrology & Hydrogeology** for further details. • Temporary stockpiles will be limited in height (1.5m for topsoil and 2m for subsoil) and shall have side slopes battered back to a safe angle of repose. • Exposed temporary stockpiles will be covered in plastic sheeting during periods where works have temporarily ceased (e.g., weekends / overnight) and ahead of heavy rainfall / storm alerts.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• Temporary stockpile areas will be managed to facilitate the orderly segregation of material types where practical. Separate temporary stockpiles will be designated so as to not mix individual soils horizons which will, in turn will facilitate reuse on site. • Excavated topsoil, subsoil and rock will be re-used on the site as soon as possible, thereby reducing the need for double handling, reducing the requirements of stockpiles and reducing the potential for soil erosion. • Surplus material will be transported to a nearby storage area for longer term storage and subsequently used for soil spreading during reinstatement. • No stockpiles will remain on site following the construction phase of the development and are therefore both temporary and reversible. • Any excavated material will be later used to backfill the trench where appropriate, any surplus material will be transported to a licensed facility in accordance with the Circular Economy Act.
MM49	**Vehicle Movements**	**10.5.2.8**	• Excavated material will only be moved short distances from the point of extraction (as far as practicable) and will be used locally for reinstatement, landscaping of improvement areas, reducing the on-site traffic. • Ancillary machinery will be kept on established turbine hardstands, and no vehicles will be permitted outside of the footprint of the development and will not move onto land that is not proposed for the development if it can be avoided. • No vehicular movement will be permitted in archaeological buffers (refer also to EIAR **Chapter 15 Archaeology, Architecture & Cultural Heritage** • Where vehicular movement is necessary outside of the development, ground conditions will be maintained as well as possible. This includes for example replacing sods, smoothing over with excavator bucket etc. • For the grid connection route, before starting construction, the area around the edge of each joint bay which will be used by heavy vehicles will be surfaced with a terram cover (if required) and stone aggregate to minimise ground damage.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
MM50	**Soil contamination**	**10.5.2.9**	• Construction activities will be restricted to the footprint of the development, therefore the potential for contaminants reaching soils is likely limited to the footprint of the development or construction area. • Dedicated, bunded storage areas will be used for all fuels or hazardous substances. • Any and all contaminants including any contaminated soil will be removed from the site in an appropriate manner if and when they should be produced or observed, and suitable remediation work undertaken. • In the event of a significant contamination or pollution incident e.g., discharge or accidental release of hydrocarbons / fuel, contamination occurrences will be addressed immediately, this includes the cessation of works in the area of the spillage until the issue is resolved. If necessary, the relevant authorities will be notified, and stakeholders will also be promptly informed. *Release of Hydrocarbons* • A fuel management plan will be prepared (and included in the CEMP) which provides a list of mitigation measures to reduce the potential effects on soils from the release of hydrocarbons. This plan includes how hydrocarbons are to be stored and monitoring and maintenance measures. • Any vehicles coming onto the site will be required to be inspected and cleaned before leaving the temporary construction compound and advancing to the destined construction area. • In the event of an accidental spill, contamination occurrences will be addressed immediately, this includes the cessation of works in the area of the spillage until the issue is resolved. No materials contaminated or otherwise will be left on the wind farm site. Suitable receptacles for hydrocarbon contaminated materials will also be at hand. Upon usage, spill kits will be promptly replaced. *Imported aggregate* • To mitigate against the potential effects of importing contaminated aggregate to the land and soils, only verified clean, inert material will be used.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• Imported rock will be locally sourced and conform to relevant standards, will not change the baseline conditions. *Invasive Species* • Areas which have been identified as containing non-native invasive species (see EIAR **Chapter 7 Biodiversity, Figure 7.4**) will be avoided and fenced off. • The removal, treatment and disposal of any identified invasive non-native plants including contaminated soils will be undertaken in accordance with the latest guidance by the Appointed Contractor to prevent further growth or spread beyond the wind farm site.
MM51	**Material and waste management**	**10.5.2.10**	• A Resource and Waste Management Plan has been prepared as part of the CEMP. All excavated earth materials, wherever possible, will either be re-used in an environmentally appropriate and safe manner e.g., reinstatement, landscaping or removed from the site at the end of the construction phase. • Any surplus of natural materials (e.g., soils) to be used as backfill or deposited elsewhere in the wind farm site will not be deposited to above existing / original ground level for the area in question. Surplus natural materials may be utilised to aid in the development of habitat enhancement for a number of recorded species on site e.g., bee banks for endangered bee species identified on site, see EIAR **Chapter 7 Biodiversity.** • Excavated materials onsite will be reused and recycled according to the Waste Hierarchy. Where it is not possible to reuse onsite, any excess materials will be taken offsite and reused as a by-product where appropriate or disposed of at a licensed facility at the end of the construction phase in accordance with the Waste Management Act 1996 (as amended), the Waste Management (Collection Permit) Regulations 2007 (as amended) and the Waste Management (Facility Permit & Registration) Regulations 2007 (as amended).
MM52	**Ground stability**	**10.5.2.11**	• A Geotechnical Clerk of Works will be employed during the construction phase to monitor excavation activities, to verify that safety standards are being met and monitor for any potential stability issues, particularly in areas of deeper excavations, and areas with the potential to encounter weathered limestone or karst features.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• Geotechnical investigation will be carried out at each proposed infrastructure unit location prior to works commencing. Surveying will include the drilling of boreholes by rotary core to depth within competent bedrock to determine the strength of rock and assess the potential for karst or weathered rock at each location by a qualified geotechnical engineer to inform foundation design. Piling will be undertaken in areas of weak rock to ensure long term stability. • The Contractor's methodology statement and risk assessment will be in line with the CEMP and will be reviewed and approved by a suitably qualified geotechnical engineer/engineering geologist prior to site operations. • Particular attention and pre-construction assessment (developer / sub-contractor site specific risk assessment and method statement (RAMS) and on-site toolbox talks etc.) • An emergency response system will be developed for the construction phase of the Project, particularly during the early excavation phase. This, at a minimum, will involve 24-hour advance meteorological forecasting (Met Éireann download) linked to a trigger-response system. • Construction activities will not occur during periods of sustained significant rainfall events, or directly after such events to allow time for work areas to drain. Following heavy rainfall events, and before construction works recommence, the site will be inspected and corrective measures implemented to ensure safe working conditions, for example dewatering of standing water in open excavations, etc. • Vehicular movements will be restricted to the footprint of the proposed development. • Temporary stockpiles will be restricted to the footprint of the proposed development and adhere to mitigation measures. • In the unlikely event of a stability issue the assigned geotechnical engineer will assess each scenario and will escalate to the following mitigation scope as the need arises.
Operational Phase			

Ref No.	Reference Heading	Reference Location	Mitigation Measure
MM53	**General Overview Mitigation Measures**	**10.5.3**	• The operational team will carry out maintenance works (to site tracks, onsite substation and turbines) and will put in place control measures to mitigate the risk of hydrocarbon or oil spills during the operational phase of the wind farm. • Any vehicles utilised during the operational phase will be maintained on a weekly basis and checked daily to ensure any damage or leakages are corrected. • Regular monitoring, similar to the construction phase but on a less frequent basis will be required. For example, the development will be inspected on a routine quarterly basis and following storm events. Any potential issues arising will be noted and remedial action taken in line with construction phase mitigation.
Development Decommissioning and Reinstatement Phase			
MM54	**Decommissioning of Infrastructure**	**10.5.4.1**	• All physical infrastructure (turbines, substation, mast etc.) will be removed, re-used or recycled as appropriate. Turbine foundations will be left in situ and covered in topsoil and allowed to revegetate. • Reinstatement, at the site in place of turbine hardstand areas, and successful habitat management, revegetating and rewilding of those areas will have beneficial effects and or revert to baseline conditions preconstruction phase.
EIAR Chapter 11 – Material Assets			
Construction Phase			
MM55	**Waste**	**11.5.1**	A Resource and Waste Management Plan (RWMP) will be prepared which will cover all aspects of waste management during the construction phase. • The objective of the RWMP will be to maximise the reuse of construction materials either onsite or offsite. • All waste generated during the construction phase will be managed in accordance with the relevant waste management regulations. • Waste generation on site during construction works will be properly supervised with designated waste storage and segregation areas. • Materials required will be ordered only as needed to reduce excess materials leading to waste.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• Where excess materials do arise, these will be returned to the supplier where possible. • Hazardous waste during construction, such as waste oils and lubricants, will be segregated, stored appropriately, classified, transported and disposed of by appropriately permitted waste contractors in accordance with all relevant national and international waste legislation.
MM56	**Utilities**	**11.5.1**	Ongoing consultation with Uisce Éireann, Bord Gáis EirGrid, ESBN and other relevant service providers within the locality, and all works will comply with any requirements or guidelines they may have. The works contractor will be obliged to ensure there are no interruptions to these utility services unless this has been agreed in advance. Coordination and consultation will be had between the project team and ESBN and Uisce Éireann, and other relevant service providers within the locality, as the design of the Project progresses.
MM57	**Telecommunications**	**11.5.1**	A mitigation measure of re-routing delivery of service into Vodafone Base Station Shinanagh from an alternative Vodafone Feeder/POP site was put forward to Vodafone, who agreed to the proposal. Refer to **Volume III Appendix 11.1 Telecommunications Impact Study**.
Operational Phase			
MM58	**Waste**	**11.4.3**	• All waste will be stored appropriately and safely from wind, rain and wild animals that often tear apart rubbish bags. • Wastewater from the staff welfare facilities will be collected in a sealed storage tank. All wastewater will be tankered off-site by an authorised waste collector to a wastewater treatment plant.
MM59	**Aviation**	**11.5.1**	• If planning consent is granted for the Project, the applicant will liaise with the Irish Aviation Authority to ensure all aviation requirements, such as a warning lighting scheme, are implemented.
Chapter 12 – Shadow Flicker			
Operational Phase			
MM60	**Shadow Flicker**	**12.9**	To mitigate shadow flicker effects, a shadow flicker control system will be used to shut down responsible turbines when shadow flicker has the potential to occur. In this system, one or more light sensors measure the intensity of sunlight and in

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			combination with a calculation of the position of the sun, the wind turbine(s) are curtailed when the conditions for shadow flicker are met. When the conditions for shutdown are identified, the turbine will come to a stop. It is recognised that there will be a short period of time before the turbine(s) stop rotating once the conditions above are met.
EIAR Chapter 13 – Noise and Vibration			
Pre-Commencement Phase			
MM61	**Community Notification**	**13.10.1**	Prior to the commencement of construction an active community engagement exercise shall be undertaken by the community liaison officer. Letter drops shall take place in advance of the works. The nature of the information letters provided details of the Project, specifically: • Contractor name and contact details. • Project description. • Expected duration of works. • A commitment to implement procedures and measures to minimise noise and vibration. This community notification exercise should be repeated in the event of an expected intensification of works in any area and/or in advance of works that occur outside of the permitted construction operating hours (any such works will be subject to prior agreement with the Local Authority).
Construction Phase			
MM62	**General Overview of Works Mitigation Measures**	**13.10.1**	Best Practicable Means as defined in BS 5228-1: 2009+A1: 2014 should be employed at all times to reduce noise and vibration to a minimum. The client and the chosen contractor shall ensure that the following guidelines will be applied where applicable: • The quietest reasonably available equipment should be selected for use on site. The methods of works shall be carefully considered, and appropriate noise and vibration control measures put in place to ensure that the relevant noise/vibration criteria are achieved.

Ref No.	Reference Heading	Reference Location	Mitigation Measure

			• As far as reasonably practicable, the noise from reversing alarms will be controlled or limited. This will be undertaken through following a hierarchy of techniques:
			  ○ The site layout will be designed to minimise reversing.
			  ○ Banksmen will be utilised to avoid so far as reasonably practicable the use of reversing alarms.
			  ○ Reversing alarms will incorporate where reasonably practicable features such as broadband signals or 'smart alarms' to reduce the level of noise.
			• Where an enclosure is in place it should be used.
			• Where reasonably practicable, vehicles and mechanical plant associated with the construction works will be fitted with effective exhaust silencers and shall be maintained in good working order.
			• Machines and vehicles in intermittent use will be shut down or throttled down to a minimum during periods between works.
			• The movement of delivery materials outside of normal working hours shall be kept to a minimum and handled in a manner that minimises noise.
			• All plant, equipment and noise control measures applied to plant and equipment shall be maintained in good working order and operated such that noise emissions are minimised as far as reasonably practicable.
			• All employees shall be provided with an appropriate induction and ongoing briefings regarding the management of environmental issues. This will involve emphasising the need for employees to show consideration to nearby noise sensitive receptors, including residential neighbours. They will be briefed on not generating unnecessary noise when on site or when leaving and arriving to the site.
			• The hours of construction activity will be limited to avoid unsociable hours where possible. Construction operations shall generally be restricted to between 7:00hrs and 19:00hrs weekdays and between 7:00hrs and 14:00hrs on Saturdays. However, to ensure that optimal use is made of good weather periods or at critical periods within the programme (*i.e.*, concrete pours and

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			turbine assembly) it could occasionally be necessary to work out of these hours.
Operational Phase			
MM63	**Curtailment Strategy**	**13.10.2**	• Turbine curtailment strategy will be implemented which has been designed to ensure a reduction in noise output by the level of potential exceedances at receptor H17. The mitigation measures proposed shall be implemented at 6m/s (v10) wind speed, during daytime periods (07:00 to 23:00hrs), when wind directions are 220 to 340 degrees from north (i.e., broadly westerly winds).
Decommissioning Phase			
MM64	**General Overview of Works Mitigation Measures**	**13.10.1**	• Mitigation measures suggested for construction phase (described above) are also relevant for the decommissioning phase to reduce noise and vibration to a minimum.
EIAR Chapter 14 – Landscape and Visual – No mitigation measures required			
EIAR Chapter 15 – Archaeology and Cultural Heritage			
Pre-Commencement Phase			
MM65	**Establishment of buffer zones**	**15.10**	• The buffer zones will be fenced off as agreed with the Cork County Archaeologist prior to the start of the construction phase.
MM66	**Archaeological Testing**	**15.10**	• As part of an advance works programme prior to construction, advance archaeological test trenching will be carried out for within the areas of major groundworks proposed on the site around each turbine location, the location of the proposed substation and along the parts of the site tracks that are located in agricultural fields closest to areas of highest archaeological potential. If any significant buried archaeological remains are identified during this testing, further mitigation in the form of targeted archaeological strip, map and sample excavation will be agreed with Cork County Council and the National Monuments Service to preserve by record any buried archaeological remains which can't be preserved in situ by detailed design mitigation/micro siting. This advanced test trenching will: ○ Be carried out by a suitably qualified archaeologist under licence.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			○ Result in a detailed report setting out any findings and outlining any further measures, within the parameters assessed in this EIAR, that should be employed in relation to the proposed development. This report will be submitted to the National Monuments Service (DHLGH).
Construction Phase			
MM67	**General Overview of Works Mitigation Measures**	**15.10.2**	• No groundworks, construction vehicle movements or storage of materials will be carried out within the buffer zones around the recorded monuments and unregistered 19th century-built heritage structures identified closest to the wind farm site boundary. • The ruins of the historic farm buildings and 19th century structures identified within the windfarm site boundary, T1, T7 and T9 will be preserved in situ. • Upstanding historic field boundaries within the site will be preserved in situ wherever possible (this has already been achieved as part of embedded design mitigation). If a section of a historic field boundary must be removed to facilitate the construction then: ○ A representative cross-section of the boundary will be investigated and recorded by a suitably qualified archaeologist prior to removal • All major sub-surface groundworks associated with the proposed Project works will be subject to a programme of archaeological monitoring. These groundworks include: ○ turbine and substation locations ○ site access tracks through the wind farm site ○ off-road open-cut trenching along the chosen grid connection route option ○ Off-road groundworks required along the chosen turbine delivery route option ○ Groundworks associated with two sections of Horizontal Directional Drilling along the chosen Grid Connection Route ○ Groundworks associated with construction of the grid connection route along Ballyviniter Railway Bridge (131)

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			○ Groundworks associated with the construction of the grid Connection route under Grange Bridge (35) ○ Groundworks associated with the grid connection route and/or turbine delivery route along the public road adjacent to Knockaunavaddre ringfort (128) • The programme of archaeological monitoring will be carried out as follows: ○ This will be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2004. ○ If significant archaeological material is encountered during the course of archaeological monitoring, then resolution of any such significant material will be determined in consultation with the National Monuments Service (DHLGH) and Cork County Council. ○ Where possible, every reasonable effort will be made to preserve in situ or reduce the impact on any identified archaeological material. Where preservation in situ cannot be achieved, either in whole or in part, then a programme of full archaeological excavation will be implemented to ensure the preservation by record of the portion of the site that will be directly impacted upon. This work will be carried out by a suitably qualified archaeologist under license and in accordance with the provisions of the National Monuments Acts 1930-2004. ○ A written report will be prepared detailing the results of all archaeological work undertaken.
EIAR Chapter 16 – Traffic and Transport			
Pre-Commencement & Construction Phase			
MM68	**Traffic Management - Main Wind farm site**	**16.7.1**	The CTMP in EIAR **Volume III, Appendix 5.2** will be updated and agreed with the road's authority and An Garda Siochána prior to commencing construction. This includes the following: • Traffic Management Co-Ordinator – A dedicated Traffic Management Coordinator will be appointed for the duration of the Project and this person will

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			be the main point of contact for all matters relating to traffic management on the Project. • One-way Systems: as some of the local roads are relatively narrow, the roads authority may want to introduce a system of one-way construction traffic movements during the construction of the development. Any such one-way systems will be identified in the construction phase CTMP in agreement with the roads authority. • Road Closures: with the use of the local roads network for the grid connection route, the narrow carriageway widths for some of the roads proposed may require full road closures. Any such road closures will be agreed with the roads authority in advance of construction and diversions will be incorporated into the CTMP. • Road Condition Survey: a pre-condition survey will be carried out on public roads that will be used in connection with the development to record the condition of the public roads in advance of construction commencing. A post-construction survey will also be carried out after the works are completed. The roads to be surveyed, specification and timing of the surveys will be agreed with the road's authority. Joint surveys will be completed if the roads authority requests. • Road Reinstatement: All roads will be reinstated expeditiously on completion of the construction works. Roads will be reinstated to their pre-works condition or better and to the satisfaction of the road's authority. • Site Inductions: All workers will receive a comprehensive site induction which will include a section on traffic management and clear guidance on the routes to be used/not used to access the site. • 24-Hour Emergency Contact: a 24-hour emergency phone number will be maintained for the duration of the construction works and the number will be noted on temporary signage at each works area (for grid connection) and the site entrance for the wind farm site. • Traffic Management Guidance: all necessary temporary traffic management will be planned and executed in accordance with best practice, including Chapter 8 of the Traffic Signs Manual published by the Department of Transport.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• Letter Drops: a letter drop will be carried out to notify members of the public living near the Project to advise them of any upcoming traffic related matters e.g., temporary lane/road closure or delivery of turbine components. • Signage: Clear signage relating to the development, both temporary and permanent, will be provided for accessing the wind farm site. • Road Sweeper: Appropriate steps will be taken to prevent soil/dirt generated during the works from being transported on the public road. When, if necessary, a road sweeper will be used to maintain the public roads in a clean condition during the construction activities of the Project. • Wheel Wash: In order to ensure no dirt or debris is brought onto the existing public road, the use of a wheel wash at the site entrance is proposed. • Site Entrances: The entrances to the wind farm site will be secured when the site is not in use. When necessary, a flagman will be used to assist traffic movements at the wind farm site entrance or in other areas as required. • Abnormal Load Deliveries: Abnormal loads will require an abnormal load permit prior to delivery and will be delivered at times and frequencies agreed with An Garda Siochána.
MM69	**Traffic Management - Grid Connection route**	**16.7.1**	• Road Opening Licence: The road works associated with the grid connection cabling will be completed in line with the requirements of a road opening license as agreed with the local authority. • Route Proofing: In advance of the main grid connection works an assessment will be carried out to define the precise alignment of the cable route within the corridor which has been assessed. The assessment may include investigative works such as non-intrusive ground penetrating radar (GPR) surveys and may be accompanied by the excavation of temporary trial-pits or slit trenches, where deemed necessary, to confirm existing services in the road. The purpose of the investigations is to minimise construction impacts associated with unforeseen complications arising from uncharted or inaccurately recorded existing services. Maintaining Local Access: reasonable access to local houses, farms and businesses will be maintained at all times during any road closures associated with the grid connection works. The details of this will be agreed with the road's authority in advance of the grid connection works commencing.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• Road Cleanliness: Appropriate steps will be taken to prevent soil/dirt generated during the works from being transported on the public road. Road sweeping vehicles will be used, when necessary, to ensure that the public road network remains clean. • Temporary Trench Reinstatement: Trenches on public roads, once backfilled, will be temporarily reinstated to the satisfaction of the road's authority. • Haul Route Interface: Aggregates and other materials imported to the wind farm site will be managed to ensure they do not conflict with the grid connection works. Grid connection works will be planned to avoid conflicts with other major activities on the main construction site such as concrete foundation pours and large component deliveries. • Turbine Delivery Route Interface: the delivery of turbine components to the site will need to be managed to ensure there is no overlap with the grid connection works. Grid Connection works are to be scheduled so as not to conflict with turbine deliveries where they share the same section of road.
MM70	**Traffic Management - Turbine component delivery**	**16.7.1**	• Programme of Deliveries: a programme of deliveries will be submitted to the road's authority in advance of deliveries of turbine components to the wind farm site. The programme will include details of the dates and times of each component delivery along with the route to be taken. Turbine component deliveries will be carried out during off-peak times and will be done using a convoy and a specialist heavy haulage company. • Garda Escort: Turbine deliveries will be escorted by An Garda Siochána. This will ensure the impacts of the turbine deliveries on the existing road network are minimised. • Reinstatement: Any area affected by the works to facilitate turbine delivery will be fully reinstated to its original condition. • Consultation: Consultation with the local residents and Cork County Council will be carried out in advance to manage turbine component deliveries.
Operational Phase			
MM71	**Operation**	**16.7.2**	• The permanent site entrance at the wind farm site shall be maintained continually to ensure conditions at these entrances do not deteriorate.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• Hedgerow maintenance will be required to ensure continued visibility at the entrance.
Decommissioning Phase			
MM72	**Decommissioning**	**16.7.3**	• A decommissioning plan will be prepared at the end of operation. The decommissioning plan will include details on material recycling/disposal and a Traffic Management Plan. This will be prepared for agreement with the Local Authority prior to decommissioning of the wind farm.
EIAR Chapter 17 – Air Quality			
Pre-Commencement Phase			
MM73	**Dust Management**	**17.6.1**	Prior to commencement of construction activities, a final CEMP for the construction phase will be agreed with the local authority to ensure that the potential for adverse environmental effects on local receptors is minimised. The CEMP will include measures for controlling dust and general pollution from site construction operations. Controls will be applied throughout the construction period to ensure that emissions are reduced or eliminated.
MM74	**Communications**	**17.6.1**	• Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. • Display the name and contact details of people accountable for air quality and dust issues with respect to the Project. This may be the environment manager/engineer or the site manager. • Display the head or regional office contact information.
Construction Phase			
MM75	**Dust Management**	**17.6.1**	• Implement a CEMP (and CTMP), which include measures to control other emissions, to be approved by the local authority. • Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. • Make the complaints log available to the local authority if requested. • Record any exceptional incidents that cause dust and/or air emissions, either on- or off site and the action taken to resolve the situation in the logbook.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• Undertake regular on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100m of site boundary in agreement with the relevant homeowners / landowners. • Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions. • Agree dust deposition, dust flux, or real-time PM10 continuous monitoring locations and duration (including baseline monitoring) with the local authority.
MM76	**Site Maintenance**	**17.6.1**	• Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. • Erect solid screens or barriers around dusty activities. • Avoid site runoff of water or mud (e.g., establish collector drains and/or soil berms to direct/divert surface water runoff from development areas) (Refer to EIAR **Chapter 9 Hydrology and Hydrogeology** and EIAR **Volume III, Appendix 5.1 Construction Environmental Management Plan, Appendix A Surface Water Management Plan**). • Keep site fencing, barriers and scaffolding clean. • Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below. • All temporary stockpiles will be positioned on established and existing hardstand areas or in designated areas which are appropriate for short term storage and will be managed in terms of potential for solids entrainment by runoff (Refer to EIAR **Chapter 10 Soils and Geology**).
MM77	**Operating Vehicles/Machinery and Sustainable Travel**	**17.6.1**	• Ensure all vehicles switch off engines when stationary - no idling vehicles. • Produce a construction logistics plan to manage the sustainable delivery of goods and materials.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
MM78	**Construction Operations**	**17.6.1**	• Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, (e.g., suitable local exhaust ventilation systems). • Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible. • Use enclosed chutes and conveyors and covered skips. • Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods. **Specific to Earthworks** (management and mitigation for earthworks is covered in further detail in EIAR **Chapter 10 Soils and Geology**) • Re-vegetate earthworks to stabilise surfaces. *Specific to Construction* • Avoid scabbling (roughening of concrete surfaces) if possible. • Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place. • For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust. *Specific to Trackout* • Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. • Avoid any dry sweeping of large areas. • Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport. • Inspect site access tracks for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• Record all inspections of haul routes and any subsequent action in a site logbook. • Install hard surfaced site tracks, which are regularly cleaned and damped down with fixed or mobile sprinkler systems, or mobile water bowsers. • Implement a washout station wheel washing system.
MM79	**Exhaust Emissions from Plants and Vehicles**	**17.6.1**	• Any emissions from Non-Road Mobile Machinery (NRMM) can be reduced by ensuring that any plant used on-site comply with the NOx, particulate matter and carbon monoxide emissions standards specified in the Regulation (EU) 2016/1628 (as amended) of the European Parliament and of the Council of 14 September 2016 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery, amending Regulations (EU) No 1024/2012 and (EU) No 167/2013, and amending and repealing Directive 97/68/EC as a minimum, where they have net power of between 37kW and 560kW. The emissions standards vary depending on the net power the engine produces.
Decommissioning Phase			
MM80	**General Overview of Works Mitigation Measures**	**17.6.3**	• Mitigation measures suggested for construction phase (described above) are also relevant for the decommissioning phase to control potential fugitive emissions from the decommissioning works and exhaust emissions from plants and vehicles.
EIAR Chapter 18 – Climate			
Construction Phase			
MM81	**Construction**	**18.8.1**	• Maximise opportunities for the reuse of excavated material and other materials which could be considered waste within the Project or at a local donor site in line with A Waste Action Plan for a Circular Economy: Ireland's National Waste Policy 2020-2025. • Embed carbon reduction practices as a core principle for the design team. Where reduction ideas are suggested, they should be recorded, and potential impact quantified. Earlier engagement with carbon reduction allows for the greatest returns. This should include designing for decommissioning; enabling reuse and recycling at end of life.

Ref No.	Reference Heading	Reference Location	Mitigation Measure
			• Minimise transport-related inefficiencies, including with respect to business travel and staff commuting to and from site and other relevant locations. Where possible, transport should be avoided unless necessary, e.g., through proactive measures such as car-pooling etc. • Where technical specifications allow, maximise the recycled content of construction materials such as concrete and steel. • Maximise the specification of materials with an environmental product declaration with the aim of reducing embodied carbon emissions. • Incentivise use of local suppliers with a view to shorten project supply chains and environmental footprint. • Where grid connections are not possible hybrid generators using solar power or Hydrotreated Vegetable Oil (HVO) should be used to reduce consumption of fossil fuels. • Onsite mobile and non-mobile plant should conform to the latest emissions standards, with mobile vehicles conforming to EURO 6 standards (European Emissions Standards sixth iteration) as a minimum. • All plant should investigate the option of using HVO fuels or electric versions where possible. • Require main contractors to report on energy data, water usage and waste disposal and their GHG emissions as part of the Project's Construction Environmental Management Plan (CEMP). • Use of prefabricated options for on-site facilities during construction to minimise waste and reduce on-site construction activities. • Implement a proactive maintenance and monitoring regime to maximise the lifecycle of components. • Areas of high biodiversity, and areas for mitigation and enhancement should be agreed with the landowner (as per EIAR **Chapter 7 Biodiversity** and the Habitat Management Plan as presented in EIAR **Volume III, Appendix 7.3**).

TABLE OF CONTENTS

1 INTRODUCTION AND BACKGROUND 1-1

1.1 Introduction 1-1
1.2 Background to the Project 1-4
1.3 Site location 1-4
1.4 Description of the site and surrounding area 1-7
1.5 The proposed development 1-7
1.6 The planning application 1-10
1.7 The applicant 1-10
1.8 Landowners 1-11
1.9 The EIAR 1-11
1.10 The EIAR team 1-11
1.11 Availability of the EIAR 1-23

2 EIA METHODOLOGY 2-1

2.1 Introduction 2-1
2.2 The requirement for an EIAR 2-1
2.3 Purpose of the EIAR 2-2
2.4 Approach to EIA 2-2
2.5 EIA process 2-3
2.5.1 Screening 2-4
2.5.2 Scoping 2-4
2.5.3 Assessment of effects 2-6
2.5.4 Preparation of the EIAR 2-38
2.6 Definitions of site area, zone of influence and study area 2-40
2.7 Sensitive receptors 2-40
2.8 Approach to Department guidance on wind energy development 2-43

3 SCOPING, CONSULTATIONS, COMMUNITY ENGAGEMENT AND KEY ISSUES 3-1

3.1 Introduction 3-1
3.2 EIAR scoping 3-3
3.3 Pre-planning consultations 3-21
3.3.1 Pre-planning consultation 1 3-21
3.3.2 Subsequent pre-planning consultations 3-23
3.4 Community engagement 3-24
3.4.1 Community Engagement Report 3-24
3.4.2 Community Liaison Officer 3-24
3.4.3 Timeline of community engagement activities 3-25
3.4.4 Project website 3-26
3.4.5 Public exhibition 3-27
3.4.6 Key issues raised 3-27
3.4.7 Planned future engagements 3-28

4 PROJECT NEED AND ALTERNATIVES CONSIDERED 4-1

4.1 Introduction 4-1

4.2 Project Need 4-1
4.2.1 Renewable energy targets 4-2
4.2.2 Reduction of carbon emissions 4-2
4.2.3 Economic benefits 4-3
4.3 Policy context 4-3
4.3.1 Climate Action Plan 2024 4-4
4.3.2 Project Ireland 2040: The National Planning Framework 2018 4-4
4.3.3 National Development Plan 2021-2030 4-7
4.3.4 Ireland's Greenhouse Gas Emission Projections 2022-2040 4-7
4.3.5 Southern Regional Spatial & Economic Strategy 2020 4-8
4.3.6 Cork County Development Plan 2022-2028 4-9
4.3.7 Cork County Council Climate Action Plan 2024-2029 4-15
4.4 Consideration of alternatives 4-17
4.4.1 Introduction 4-17
4.4.2 Methodology 4-18
4.4.3 'Do-nothing' alternative 4-19
4.4.4 Alternative locations – the site selection process 4-19
4.4.5 Alternative turbine heights and turbine models 4-24
4.4.6 Alternative site layouts and evolution of design 4-24
4.4.7 Alternative grid connection points and routes 4-39
4.4.8 Alternative turbine delivery routes 4-47
4.4.9 Alternatives for site access 4-48
4.5 Summary and conclusion 4-60
5 PROJECT DESCRIPTION 5-1
5.1 Introduction 5-1
5.2 Proposed Project elements 5-2
5.2.1 Wind farm 5-2
5.2.2 The turbines 5-3
5.2.3 Wind farm site access 5-6
5.2.4 Site tracks 5-7
5.2.5 Site drainage 5-8
5.2.6 Materials requirements for project elements 5-10
5.2.7 On-site electrical and communications components 5-11
5.2.8 Temporary works 5-13
5.2.9 Grid connection 5-15
5.2.10 Proposed biodiversity enhancements 5-21
5.2.11 Community benefit fund 5-22
5.3 Construction of the Project 5-23
5.3.1 Environmental management of construction activities 5-23
5.3.2 Monitoring 5-27
5.3.3 Proposed construction schedule 5-29
5.4 Operation of the Project 5-31
5.4.1 Maintenance 5-31
5.4.2 Monitoring 5-31
5.5 Decommissioning of the proposed wind energy project 5-32
5.5.1 Use of the site following development and decommissioning 5-32

5.6 Vulnerability of the Project to risk of major accidents and/or disasters 5-32
5.6.1 Risk of flooding 5-33
5.6.2 Risk of major incidents involving dangerous or hazardous substances 5-33
5.6.3 Risk of pollution from hydrocarbons, chemicals and wastes 5-33
5.6.4 Risk of fire 5-33
5.6.5 Risk of catastrophic events 5-34
5.6.6 Conclusion 5-34
6 POPULATION AND HUMAN HEALTH 6-1
6.1 Introduction 6-1
6.2 Statement of authority 6-1
6.3 Methodology 6-2
6.3.1 Introduction 6-2
6.3.2 Study area definition 6-3
6.3.3 Information sources 6-6
6.3.4 Assessment of effects 6-6
6.4 Existing environment 6-7
6.4.1 Population 6-7
6.4.2 Employment 6-14
6.4.3 Land use 6-18
6.4.4 Recreation and tourism 6-22
6.4.5 Human health 6-26
6.4.6 Amenity 6-27
6.5 Potential effects - construction 6-27
6.5.1 Population 6-27
6.5.2 Employment 6-28
6.5.3 Land use 6-28
6.5.4 Recreation and tourism 6-29
6.5.5 Human health 6-30
6.5.6 Amenity 6-31
6.6 Potential effects - operation 6-32
6.6.1 Population 6-32
6.6.2 Employment 6-33
6.6.3 Land use 6-33
6.6.4 Recreation and tourism 6-34
6.6.5 Human health 6-36
6.6.6 Amenity 6-38
6.7 Potential effects - decommissioning 6-40
6.7.1 Population 6-41
6.7.2 Employment 6-41
6.7.3 Land use 6-41
6.7.4 Recreation and tourism 6-41
6.7.5 Human health 6-41
6.8 Mitigation measures and residual effects 6-42
6.8.1 Population 6-42
6.8.2 Employment 6-42
6.8.3 Land use 6-42

6.8.4 Recreation and tourism 6-42
6.8.5 Human health 6-42
6.8.6 Amenity 6-43
7 BIODIVERSITY 7-1
7.1 Introduction 7-1
7.1.1 Purpose of this report 7-1
7.1.2 Site overview 7-1
7.2 The Project 7-2
7.3 Legislation, policy, and guidance 7-2
7.3.1 Legislative context 7-2
7.3.2 Policy framework 7-2
7.3.3 Guidance and resources 7-3
7.4 Statement of authority 7-3
7.5 Consultation 7-4
7.6 Assessment approach and methodology 7-4
7.6.1 Scope of the assessment 7-5
7.6.2 Determining the Zone of Influence 7-5
7.6.3 Determination of the ecological baseline 7-6
7.6.4 Assessment methodology 7-13
7.7 Ecological baseline 7-19
7.7.1 Desk study 7-19
7.7.2 Habitats on the wind farm site 7-26
7.7.3 Protected or priority flora 7-33
7.7.4 Fauna 7-33
7.7.5 Aquatic ecology 7-38
7.7.6 Future baseline ('Without Scheme' scenario) 7-42
7.7.7 Evaluation of ecological features 7-42
7.8 Embedded mitigation 7-54
7.8.1 Construction methods 7-54
7.8.2 Operational methods 7-55
7.8.3 Ecological Clerk of Works 7-56
7.8.4 Embedded bat mitigation 7-56
7.8.5 Embedded aquatic ecology mitigation 7-59
7.9 Assessment of effects 7-62
7.9.1 Scope of assessment 7-62
7.9.2 Assessment of effects on designated sites 7-62
7.9.3 Assessment of effects on key ecological features 7-63
7.10 Mitigation and enhancement 7-98
7.10.1 Scope 7-98
7.10.2 Mitigation of significant effects 7-98
7.10.3 Hedgerow loss mitigation 7-102
7.10.4 Bat mitigation 7-107
7.10.5 General mitigation measures 7-112
7.10.6 Enhancement measures 7-113
7.11 Residual effects 7-116

8 ORNITHOLOGY 8-1
8.1 Introduction 8-1
8.1.1 Purpose of this report 8-1
8.1.2 Site overview 8-1
8.2 The Project 8-1
8.3 Legislation, policy, and guidance 8-6
8.3.1 Legislative context 8-6
8.3.2 Policy framework 8-6
8.3.3 Guidance and resources 8-6
8.4 Statement of authority 8-7
8.5 Consultation 8-11
8.6 Assessment Approach and Methodology 8-11
8.6.1 Scope of the assessment 8-11
8.6.2 Determining the Zone of Influence 8-12
8.6.3 Determination of the ornithological baseline 8-13
8.6.4 Assessment methodology 8-18
8.6.5 Constraints and limitations 8-25
8.7 Ornithological Baseline 8-26
8.7.1 Designated sites 8-26
8.7.2 Protected and notable bird species 8-26
8.7.3 Future baseline ('Without Scheme' scenario) 8-31
8.7.4 Evaluation of ornithological features 8-31
8.8 Embedded Mitigation 8-40
8.8.1 Construction methods 8-40
8.8.2 Operational methods 8-40
8.8.3 Timing of works 8-41
8.8.4 Ecological Clerk of Works 8-41
8.9 Assessment of Effects 8-42
8.9.1 Scope of assessment 8-42
8.9.2 Assessment of effects on designated sites 8-42
8.9.3 Assessment of effects on bird species 8-43
8.9.4 Cumulative effects 8-56
8.10 Mitigation and enhancement measures 8-59
8.10.1 Scope 8-59
8.10.2 Mitigation of likely significant effects during construction 8-59
8.10.3 Mitigation of likely significant effects during operation 8-60
8.10.4 Mitigation of likely significant effects during decommissioning 8-61
8.10.5 Enhancement measures 8-61
8.11 Residual effects 8-63
9 HYDROLOGY AND HYDROGEOLOGY 9-1
9.1 Introduction 9-1
9.1.1 Assessment structure 9-1
9.1.2 Project description 9-2
9.1.3 Statement of authority 9-8
9.2 Assessment methodology and significance criteria 9-9

9.2.1 Introduction 9-9
9.2.2 Relevant legislation and guidance 9-9
9.2.3 Study area 9-10
9.2.4 Desk study 9-10
9.2.5 Consultations 9-11
9.2.6 Field work 9-11
9.2.7 Evaluation of effects 9-12
9.3 Assessment of significance of effects 9-17
9.3.1 Assessing the potential magnitude of effects 9-17
9.4 Baseline description 9-18
9.4.1 Site description and location 9-18
9.4.2 Topography 9-18
9.4.3 Regional and local hydrology 9-18
9.4.4 Groundwater bodies 9-23
9.4.5 Water Framework Directive water body status, risk & objectives 9-23
9.4.6 Drainage & hydrological regime 9-29
9.4.7 Surface water hydrochemistry 9-46
9.4.8 Hydrogeology 9-46
9.4.9 Flood risk identification 9-71
9.4.10 Wells 9-75
9.4.11 Groundwater levels, flow direction & groundwater hydrochemistry 9-78
9.4.12 Designated sites 9-80
9.4.13 Water resources 9-83
9.4.14 Receptor sensitivity 9-83
9.5 Assessment of likely significant effects 9-86
9.5.1 Do nothing scenario 9-86
9.5.2 Construction phase likely significant effects 9-87
9.5.3 Operational phase likely significant effects 9-101
9.5.4 Decommissioning phase 9-101
9.6 Mitigation measures and residual effects 9-102
9.6.1 Design phase 9-102
9.6.2 Construction phase 9-122
9.6.3 Operational phase 9-136
9.6.4 Development decommissioning & reinstatement 9-137
9.6.5 Residual effects 9-138
9.6.6 Cumulative effects 9-139
10 LAND, SOILS AND GEOLOGY 10-1
10.1 Introduction 10-1
10.1.1 Assessment structure 10-1
10.1.2 Project description 10-2
10.1.3 Statement of authority 10-2
10.2 Assessment methodologies and significance criteria 10-3
10.2.1 Assessment methodologies 10-3
10.2.2 Relevant legislation and guidance 10-3
10.2.3 Study area 10-3
10.2.4 Source-Pathway-Receptor 10-4

10.2.5 Desk study 10-4
10.2.6 Consultations 10-4
10.2.7 Field work 10-4
10.2.8 Evaluation of potential effects 10-5
10.2.9 Assumptions and limitations 10-9
10.3 Baseline description 10-9
10.3.1 Site description and location 10-9
10.3.2 Land use 10-9
10.3.3 Soils 10-13
10.3.4 Subsoils 10-16
10.3.5 Bedrock geology 10-19
10.3.6 Geophysical survey results 10-24
10.3.7 Economic geology 10-30
10.3.8 Geological heritage 10-30
10.3.9 Designated & protected areas 10-30
10.3.10 Geohazards 10-30
10.3.11 Receptor sensitivity 10-33
10.4 Assessment of likely significant effects 10-34
10.4.1 Do nothing effect 10-34
10.4.2 Construction phase likely effects 10-34
10.4.3 Operational phase likely effects 10-45
10.4.4 Decommissioning phase likely effects 10-46
10.5 Mitigation measures and residual effects 10-46
10.5.1 Design phase 10-47
10.5.2 Construction phase 10-47
10.5.3 Operational phase 10-54
10.5.4 Development decommissioning and reinstatement phase 10-54
10.5.5 Cumulative effects 10-55

11 MATERIAL ASSETS 11-1
11.1 Introduction 11-1
11.1.1 Statement of Authority 11-1
11.2 Methodology 11-2
11.2.1 Materials and Waste 11-3
11.2.2 Utilities 11-5
11.2.3 Telecommunications 11-5
11.2.4 Aviation 11-6
11.2.5 Description and Significance of Effects 11-6
11.3 The Baseline Environment 11-7
11.3.1 Waste 11-7
11.3.2 Utilities 11-10
11.3.3 Telecommunications 11-10
11.3.4 Aviation 11-10
11.4 Potential Effects of the Project 11-11
11.4.1 “Do-nothing” Scenario 11-11
11.4.2 Construction Phase 11-11
11.4.3 Operational Phase 11-13
11.4.4 Decommissioning Phase 11-15
11.5 Mitigation Measures 11-15
11.6 Potential Cumulative Effects 11-16
11.7 Residual Effects 11-17
12 SHADOW FLICKER 12-1
12.1 Introduction 12-1
12.2 Statement of authority 12-2
12.3 Policy and guidance 12-2
12.4 Consultation 12-4
12.5 Scope of assessment 12-4
12.5.1 Study area 12-4
12.5.2 Identification of sensitive receptors 12-5
12.5.3 Assessment of effects 12-5
12.5.4 Identification of measures to avoid and mitigate effects 12-5
12.6 Assessment methodology 12-6
12.6.1 Sunshine hours 12-6
12.7 Baseline conditions 12-7
12.8 Assessment of effects 12-10
12.8.1 Do-nothing scenario 12-10
12.8.2 Construction phase effects 12-10
12.8.3 Operational phase effects 12-10
12.8.4 Decommissioning phase effects 12-16
12.8.5 Cumulative effects 12-16
12.9 Mitigation of effects 12-17
12.10 Residual effects 12-18
13 NOISE AND VIBRATION 13-1
13.1 Introduction 13-1

13.2 Statement of authority 13-1
13.3 Consultations 13-2
13.4 Noise and vibration criteria 13-2
13.4.1 Construction/decommissioning phase 13-2
13.4.2 Operational phase 13-6
13.5 Methodology 13-11
13.5.1 Introduction 13-11
13.5.2 Baseline noise 13-11
13.5.3 Construction noise 13-11
13.5.4 Operational noise 13-12
13.6 Receiving environment 13-15
13.6.1 Equipment and choice of measurement locations 13-15
13.6.2 Measurement periods and procedure 13-18
13.6.3 Baseline noise measurement results 13-20
13.7 Significance/sensitivity 13-32
13.7.1 Construction/decommissioning phase 13-32
13.7.2 Operational phase 13-32
13.8 Likely significant effects (including cumulative effects) 13-33
13.8.1 Construction/decommissioning phase 13-33
13.8.2 Operational phase 13-39
13.9 Do Nothing scenario 13-56
13.10 Mitigation and monitoring measures 13-56
13.10.1 Construction/decommissioning phase 13-56
13.10.2 Operational phase 13-57
13.11 Residual effects 13-60
13.11.1 Construction / decommissioning phase 13-60
13.11.2 Operational phase 13-60
13.12 Conclusion of Significance 13-61
14 LANDSCAPE AND VISUAL 14-1
14.1 Introduction 14-1
14.1.1 Background 14-1
14.1.2 The site and proposals 14-1
14.1.3 Statement of authority 14-2
14.1.4 Chapter structure and terminology 14-2
14.2 Statutory and planning context 14-14
14.2.1 Local planning policy – County Cork 14-14
14.2.2 Local planning policy – County Limerick 14-18
14.3 Methodology 14-20
14.3.1 Study area 14-20
14.3.2 Methodology 14-20
14.3.3 Cumulative assessment 14-23
14.3.4 Distances 14-25
14.3.5 Site visits 14-25
14.3.6 Visual aids 14-25
14.4 Consultation undertaken 14-25
14.5 Existing landscape and visual context 14-26

14.5.1 Introduction 14-26
14.5.2 Landscape character 14-26
14.5.3 Visual receptors 14-29
14.5.4 Recreational receptors 14-30
14.5.5 Recreational facilities and heritage sites 14-31
14.5.6 Landscape designations and value 14-32
14.6 Design considerations and embedded mitigation 14-32
14.7 Visibility analysis 14-33
14.7.1 ZTV analysis 14-33
14.7.2 Viewpoint assessment summary 14-34
14.8 Assessment of landscape and visual effects 14-36
14.8.1 Introduction 14-36
14.8.2 Do-nothing scenario 14-36
14.8.3 Construction and decommissioning phase effects 14-36
14.8.4 Effects on site fabric 14-37
14.8.5 Effects on landscape character 14-37
14.8.6 Visual effects 14-43
14.8.7 Designated landscapes 14-52
14.8.8 Cumulative effects 14-52
14.8.9 Summary of effects 14-61
15 ARCHAEOLOGY AND CULTURAL HERITAGE 15-1
15.1 Introduction 15-1
15.1.1 Project description 15-1
15.2 Statement of authority 15-1
15.3 Consultations 15-2
15.4 Planning and legislation background 15-2
15.4.1 Current guidelines 15-2
15.4.2 Current legislation 15-3
15.4.3 National planning framework 15-5
15.4.4 Cork County Development Plan 2022-2028 15-5
15.4.5 Limerick Development Plan 2022-2028 15-13
15.5 Methodology 15-14
15.5.1 Baseline surveys/ data gathering 15-14
15.5.2 Desktop study 15-10
15.5.3 Geographic information systems 15-10
15.5.4 Zone of theoretical visibility 15-11
15.5.5 Wireframes and photomontages 15-11
15.5.6 Record of monuments and places and sites and monuments record 15-11
15.5.7 Cartographic sources and aerial photography 15-11
15.5.8 Topographical files of the national museum of Ireland 15-11
15.5.9 Archaeological inventory series 15-12
15.5.10 Cork County Development Plan 15-12
15.5.11 Excavation database 15-12
15.5.12 National inventory of architectural heritage 15-12
15.5.13 Field inspection 15-12
15.6 Receiving environment 15-13

15.6.1 Location and topography 15-13
15.6.2 UNESCO World Heritage Sites and those on the tentative list 15-14
15.6.3 National monuments 15-16
15.6.4 Recorded monuments within the site boundary 15-18
15.6.5 Site and monument records within 1km of the site boundary 15-18
15.6.6 Protected structures within 5km of the site boundary 15-22
15.6.7 NIAH within 5km of the wind farm site boundary 15-24
15.6.8 Grid connection routes 15-24
15.6.9 Turbine delivery route options 15-27
15.6.10 Archaeological and cultural background 15-30
15.6.11 Prehistoric period 15-30
15.6.12 Early medieval period (AD 500 – 1100) 15-32
15.6.13 Medieval period (AD 1100 – 1600) 15-34
15.6.14 Post-medieval period (AD 1600 – 1800) 15-34
15.6.15 Undated 15-35
15.6.16 Excavation index 15-36
15.6.17 Cartographic evidence 15-37
15.6.18 Aerial photographic analysis 15-40
15.6.19 LiDAR analysis 15-40
15.6.20 Place-name and folklore analysis 15-43
15.7 Do nothing scenario 15-43
15.8 Construction phase effects 15-43
15.8.1 Indirect effects 15-43
15.8.2 Direct effects 15-44
15.9 Operational phase effects 15-49
15.9.1 Indirect effects 15-49
15.10 Mitigation measures 15-55
15.10.1 ‘Do-nothing’ scenario 15-55
15.10.2 Construction phase 15-55
15.10.3 Operational phase 15-57
15.10.4 Decommissioning phase 15-57
15.11 Residual effects 15-57
15.11.1 ‘Do nothing’ scenario 15-57
15.11.2 Construction phase 15-57
15.11.3 Operational phase 15-58
15.11.4 Decommissioning phase 15-58
15.12 Cumulative effects 15-58
15.12.1 ‘Do-nothing’ scenario 15-59
15.12.2 Construction phase 15-59
15.12.3 Operational phase 15-59
15.12.4 Decommissioning phase 15-61
16 TRAFFIC AND TRANSPORT 16-1
16.1 Introduction 16-1
16.1.1 Statement of authority 16-1
16.1.2 Study area 16-2
16.2 Assessment methodology 16-4

16.2.1 Receptor sensitivity/value criteria 16-8
16.2.2 Assumptions and limitations 16-11
16.2.3 Consultation 16-12
16.3 Existing environment 16-12
16.3.1 Existing road network 16-12
16.3.2 Traffic volumes 16-18
16.4 The Project 16-19
16.4.1 Site access 16-20
16.4.2 Construction haul routes 16-24
16.4.3 Turbine delivery route options 16-28
16.4.4 Grid connection route options 16-33
16.4.5 Pedestrians / public transport / safety 16-35
16.5 Identification of likely effects of the Project 16-36
16.5.1 Do-nothing scenario 16-36
16.5.2 Construction phase effects 16-36
16.5.3 Operational phase effects 16-38
16.5.4 Decommissioning phase effects 16-39
16.6 Assessment of effects 16-39
16.6.1 Construction Phase 16-39
16.6.2 Operational phase 16-63
16.6.3 Decommissioning phase 16-63
16.7 Mitigation measures 16-64
16.7.1 Construction phase 16-64
16.7.2 Operation 16-66
16.7.3 Decommissioning 16-67
16.8 Residual effects 16-67
16.8.1 Construction 16-67
16.8.2 Operation 16-67
16.8.3 Decommissioning 16-67
16.9 Cumulative effects 16-67
17 AIR QUALITY 17-2
17.1 Introduction 17-2
17.2 Statement of authority 17-2
17.3 Assessment methodology 17-2
17.3.1 Construction and decommissioning 17-3
17.3.2 Operational phase 17-10
17.4 Baseline environment 17-11
17.5 Potential effects of the proposed development 17-12
17.5.1 Do-nothing scenario 17-12
17.5.2 Construction phase 17-12
17.5.3 Operational phase 17-15
17.5.4 Decommissioning phase 17-15
17.6 Mitigation measures 17-16
17.6.1 Construction phase 17-16
17.6.2 Operational phase 17-19
17.6.3 Decommissioning phase 17-19

17.7 Residual effects 17-19
17.7.1 Construction phase 17-19
17.7.2 Operational phase 17-19
17.7.3 Decommissioning phase 17-19
17.8 Cumulative effects 17-19
17.8.1 Construction phase 17-19
17.8.2 Operational phase 17-20
17.8.3 Decommissioning phase 17-20
18 CLIMATE 18-1
18.1 Introduction 18-1
18.2 Statutory and planning context 18-1
18.2.1 The 2015 Paris Agreement 18-1
18.2.2 The Glasgow Climate Pact 18-2
18.2.3 The Kyoto Protocol 18-2
18.2.4 European Green Deal 18-2
18.2.5 The European Climate Law 18-3
18.2.6 The European Climate Pact 18-3
18.2.7 The 'Fit for 55' Package 18-3
18.2.8 The REPowerEU Plan 18-3
18.2.9 Programme for Government: Our Shared Future 18-4
18.2.10 Climate Action and Low Carbon Development (Amendment) Act 2021 18-4
18.2.11 Climate Action Plan 2024 18-4
18.2.12 Clean Air Strategy for Ireland 18-5
18.2.13 Cork County Development Plan 2022-2028 18-5
18.2.14 Institute of Environmental Management and Assessment Guide: Assessing Greenhouse Gas Emissions and Evaluating their Significance 2022 18-6
18.2.15 Royal Institution of Chartered Surveyors Whole Life Carbon Assessment for the Built Environment 2023 18-6
18.2.16 Publicly Available Specification 2080: 2016 Carbon Management in Infrastructure 18-6
18.3 Statement of authority 18-7
18.4 Scope and Methodology 18-7
18.4.1 Scope 18-7
18.4.2 Methodology 18-8
18.5 Present and future baseline conditions 18-11
18.5.1 Future baseline conditions (do nothing scenario) 18-12
18.6 Potential effects of the Project 18-13
18.6.1 Assumptions 18-13
18.6.2 Direct effects (construction) 18-13
18.6.3 Direct effects (operation) 18-14
18.6.4 Direct effects (decommissioning) 18-14
18.6.5 Interactions and cumulative effects 18-15
18.7 Mitigation and enhancement measures 18-15
18.7.1 Construction and decommissioning 18-15
18.8 Monitoring 18-16
18.9 Residual effects 18-17

19 INTERACTIONS AND RESIDUAL CUMULATIVE EFFECTS 19-1
19.1 Introduction 19-1
19.1.1 Impact interactions 19-1
19.1.2 Cumulative effects 19-2
19.2 Statement of authority 19-2
19.3 Assessment methodology 19-2
19.3.1 Guidance 19-2
19.3.2 Interactive effects 19-3
19.3.3 Cumulative effects 19-3
19.4 Summary of interactive effects 19-4
19.5 Summary of cumulative effects 19-6
19.5.1 Biodiversity 19-7
19.5.2 Ornithology 19-7
19.5.3 Hydrology & hydrogeology 19-7
19.5.4 Land, soils & geology 19-8
19.5.5 Material assets 19-8
19.5.6 Shadow flicker 19-8
19.5.7 Noise & vibration 19-8
19.5.8 Landscape & visual 19-9
19.5.9 Archaeology & cultural heritage 19-9
19.5.10 Traffic & transport 19-9
19.5.11 Air quality 19-10
19.5.12 Climate 19-10
20 SUMMARY OF MITIGATION MEASURES 20-1
20.1 Introduction 20-1
20.2 Summary table 20-2

Tullacondra Green Energy Limited

Environmental Impact Assessment Report

Volume II – Main Report

Tullacondra Green Energy Project, Co. Cork

604162

JUNE 2024