CLIENT: RED ADMIRAL DC LIMITED

PROJECT NAME: ADMIRAL

PROJECT DETAILS: PROPOSED DATA CENTRE FACILITY AND DECENTRALISED ENERGY RESOURCE, AT GNEEVEBANE, OLDTOWN, FARTHINGSTOWN, CASTLELOST, AND KILTOTAN & COLLINSTOWN CO. WESTMEATH

DOCUMENT: ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) CONSOLIDATED – (VOLUME 2)



DATE JUNE 2026

PROJECT REF. SEP-0374

Halston Environmental & Planning Limited
Unit 3, IHub Building, Westport Road, Castlebar Co. Mayo, Ireland F23 K162 Company Registration No. 588685
Tel. +353 (0)94 9010111 email: info@halston.ie Web: www.halston.ie

Document Control

Client:	Red Admiral DC Limited
Project Name	Admiral
Project Ref.	SEP-0374
Document Ref.	SEP-0374/WF/Reports/EIAR

Document Checking:

Originator:	Various	Signed:	-

Checked By:	C Staunton	Signed:	CS

Approved By:	Client	Signed:	RADC

Issue	Date	Status
v1	30.05.2025	Draft
v2	03.06.2025	Draft
v3	06.06.2025	Draft
v4	08.06.2025	Draft
v5	12.06.2025	Draft - Internal Review
v6	20.06.2025	Draft - Client Review
v7	27.06.2025	Revisions
v8	03.07.2025	Revisions
v9	07.07.2025	Final Copy – s.34 app
v10	20.03.2026	EIAR Addendum (v5)
v11	26.06.2026	Final Copy – s.182A app (Consolidated)

This report, its accompanying document(s), or advice which it contains is provided by Halston Environmental & Planning Limited is intended only for internal use and reliance by the client in performance of Halston Environmental & Planning Limited's duties and liabilities under its contract with the client. The contents of the document do not, in any way, purport to include any manner of legal advice or opinion. The advice and opinions in this document are based upon the information made available to Halston Environmental & Planning Limited and on current standards and best practice as at the date of this report. The report should be read and replied upon only in the context of the report and its accompanying documents in full. Unless expressly agreed, any reproduction of material from this report must be requested and authorised in writing from Halston Environmental & Planning Limited. Authorised reproduction of material must include all copyright and proprietary notices in the same form and manner as the original, and must not be modified in any way

TABLE OF CONTENTS

1 INTRODUCTION 1-1

1.1 Structure of the EIAR 1-1
1.2 Project Overview 1-2
1.3 Applicant Company 1-3
1.4 Planning Framework 1-3
1.5 Scoping and Consultation 1-4
1.6 Environmental Impact Assessment (EIA) 1-7
1.6.1 The Requirement for EIA 1-7
1.6.2 The Assessment Approach and Methodology 1-8
1.6.3 Format and Structure of the EIAR 1-10
1.6.4 EIAR Preparation and Contributors 1-12
1.7 Appropriate Assessment 1-21
1.8 Planning Stage Design and Engineering Drawings 1-21
1.9 Authorisations and Licenses 1-21
1.9.1 CRU Authorisations and Licences 1-21
1.9.2 EPA Industrial Emissions Licensing 1-22
1.10 Greenhouse Gas permit 1-22
1.11 Energy Statement & Approach to Sustainable Data Centre Development 1-22
1.12 LEED and Lifecycle Assessment (LCA) 1-24
1.13 Economic Statement 1-24
1.14 Availability of Information & Difficulties Encountered 1-25

2 DESCRIPTION OF THE PROPOSED DEVELOPMENT 2-1

2.1 Introduction 2-1
2.2 Description of Location and Context 2-2
2.3 Description of Development 2-11
2.4 Data Centre Facility 2-13
2.4.1 Description 2-13
2.4.2 Data Centre Buildings 2-17
2.4.3 33kV IPP Building and AIS Compound 2-20
2.4.4 Ancillary Equipment Compounds – DC facility and DER 2-21
2.4.5 Internal Access Roads and Parking 2-24
2.4.6 Lighting 2-24
2.5 Decentralised Energy Resource 2-24
2.5.1 Fuel Cell 2-25
2.5.2 Battery Energy Storage System (BESS) Facility 2-28
2.5.3 Solar PV Farm 2-31
2.5.4 Grid Connection 2-35
2.6 Drainage 2-36
2.6.1 Foul Effluent 2-36

2.6.2 Surface Water Drainage 2-37
2.7 Telecommunications 2-42
2.8 Fire Fighting Strategy 2-43
2.8.1 DC Facility 2-43
2.8.2 DER 2-46
2.9 External Boundary Treatments and Landscaping 2-48
2.10 Description of Construction and Commission Stages 2-50
2.10.1 Duration and Phasing 2-53
2.10.2 Employment 2-58
2.10.3 Accommodation/Facilities 2-58
2.10.4 Construction Operation Hours 2-60
2.10.5 Construction Techniques 2-60
2.10.6 Materials 2-61
2.10.7 Embodied Carbon Optimisation and LCA 2-61
2.10.8 Extension of Infrastructure 2-62
2.10.9 Waste Management 2-63
2.10.10 Fencing and Security 2-63
2.10.11 Noise, Vibration and Dust 2-63
2.10.12 Temporary Environmental Protection Measures 2-64
2.11 Description of Operational Stage 2-65
2.11.1 DC Facility 2-65
2.11.2 DER 2-66
2.12 Decommissioning 2-67
3 NEED FOR THE DEVELOPMENT AND ALTERNATIVES 3-1
3.1 Need and Rationale for the Project 3-1
3.2 Consideration of Alternatives 3-2
3.2.1 Do Nothing 3-3
3.2.2 Alternative Locations 3-5
3.2.3 Alternative Technologies and Processes 3-7
3.2.4 Alternative Layout and Designs 3-10
3.2.5 Alternative Processes and Technologies 3-15
4 PLANNING & POLICY 4-1
4.1 Introduction 4-1
4.2 International and European 4-1
4.2.1 European Green Deal 4-1
4.2.2 Energy Efficiency Directive 4-2
4.2.3 European Union Taxonomy Regulation 4-2
4.3 National Policy 4-3
4.3.1 National Planning Framework (NPF), First Revision (April 2025) 4-3
4.3.2 National Energy and Climate Plan 2021-2030 4-6

4.3.3 Government Statement on the Role of Data Centres in Ireland's Enterprise Strategy (2022) 4-7
4.3.4 Climate Action Plan 2025 4-8
4.3.5 Large Energy User Action Plan (2026) 4-8
4.3.6 National Hydrogen Strategy 2023 4-9
4.3.7 National Biomethane Strategy 2024 4-9
4.4 Regional 4-10
4.4.1 Eastern & Midland RSES (2019-2031) 4-10
4.4.2 Westmeath County Development Plan 2021-2027 4-12
4.4.3 Westmeath County Council Climate Action Plan (2024-2029) 4-15
4.4.4 Planning History at the Site 4-15
4.4.5 Planning and Policy Summary -DC Campus 4-18
5 POPULATION & HUMAN HEALTH 5-1
5.1 Introduction 5-1
5.2 Assessment Methodology & Significance Criteria 5-1
5.2.1 Methodology 5-1
5.2.2 Determination Of Sensitive Receptors 5-3
5.2.3 Significance Criteria 5-5
5.3 Description of Receiving Environment 5-7
5.3.1 Population and Settlement Patterns 5-7
5.4 Assessment of Potential Environmental Effects 5-15
5.4.1 Do Nothing Scenario 5-15
5.4.2 Population and Settlement Patterns 5-15
5.4.3 Severence 5-16
5.4.4 Health and Safety 5-16
5.5 Mitigation Measures 5-17
5.6 Residual Impacts of the Development 5-17
5.7 Cumulative Effects 5-17
6 BIODIVERSITY 6-1
6.1 Introduction 6-1
6.2 Methodology 6-1
6.2.1 Policy and Guidance 6-2
6.2.2 Habitat Survey 6-3
6.2.3 Badger Survey Methodology 6-4
6.2.4 Initial Field Surveys 6-5
6.2.5 Otter Survey Methodology 6-6
6.2.6 Description of the Proposed Development 6-8
6.3 Description of Existing Environment 6-8
6.3.1 General 6-8
6.3.2 Designated Conservation Areas 6-9
6.3.3 Non-Designated Habitats 6-12

6.3.4 Invasive Species 6-15
6.3.5 Fauna 6-16
6.3.6 Habitat Evaluation 6-26
6.4 Potential Effects on Biodiversity 6-28
6.4.1 Potential Direct Effects 6-28
6.4.2 Potential Indirect Effects 6-36
6.5 Mitigation Measures 6-37
6.5.1 Mitigation Measures for Birds 6-37
6.5.2 Mitigation Measures for Bats 6-38
6.5.3 Mitigation Measures for Badgers 6-41
6.5.4 Mitigation Measures for Habitats 6-41
6.6 Residual Impacts 6-42
6.7 Cumulative Effects 6-43
6.8 Monitoring and further works 6-47
6.9 Summary of Significant Effects 6-47
6.10 References 6-47
7 SOILS & GEOLOGY 7-1
7.1 Introduction 7-1
7.2 Methodology & Significance Criteria 7-2
7.2.1 Assessment Methodology 7-2
7.2.2 Assessment Criteria and Impact Assessment Methodology 7-2
7.2.3 Determining Value of Receptor through Baseline Studies 7-3
7.3 Description of the Development 7-13
7.4 Descripion of the Receiving Environment 7-13
7.4.1 Historical land Use 7-14
7.4.2 Soils and Geology 7-14
7.4.3 Field Work 7-20
7.5 Assessment of Potential Environmental Effects 7-27
7.5.1 Receptor Sensitivity 7-27
7.5.2 Construction Phase 7-28
7.5.3 Operational Phase 7-30
7.6 Mitigation Measures 7-32
7.6.1 Construction Phase 7-32
7.6.2 Decommissioning 7-36
7.7 Positive Impacts of the Development 7-36
7.8 Residual Impacts of the Development 7-36
7.9 Cumulative Effects 7-36
7.10 Monitoring and Further Works 7-37
8 WATER ENVIRONMENT 8-1
8.1 Introduction 8-1

8.2 Methodology & Significance Criteria 8-2
8.2.1 Assessment Methodology 8-2
8.2.2 Assessment Criteria and Impact Assessment Methodology 8-3
8.2.3 Determining the Value and Sensitivity of the Receptor through Baseline Studies 8-4
8.3 Description of Proposed Development 8-11
8.4 Description of Receiving Environment 8-12
8.4.1 Historical land Use 8-12
8.4.2 Topography 8-13
8.4.3 Hydrogeological Setting 8-15
8.4.4 Hydrological Setting 8-30
8.5 Assessment OF Potential Environmental Effects 8-37
8.5.1 Receptor Sensitivity 8-37
8.5.2 Construction Phase 8-38
8.5.3 OPERATIONAL PHASE 8-40
8.6 Mitigation Measures 8-41
8.6.1 Construction Phase 8-41
8.6.2 Operational Phase 8-44
8.6.3 Decommissioning 8-48
8.7 Positive Impacts of The Development 8-48
8.8 Residual Impacts of the Development 8-48
8.9 Cumulative Effects 8-48
8.10 Monitoring and Further Works 8-49
9 MATERIAL ASSETS 9-1
9.1 Introduction 9-1
9.2 Assessment Methodology & Significance Criteria 9-1
9.2.1 Methodology 9-1
9.2.2 Significance Criteria 9-2
9.3 Description of Receiving Environment 9-4
9.3.1 Ownership and Access 9-5
9.3.2 Landuse 9-6
9.3.3 Services 9-6
9.3.4 Demolition Works 9-10
9.3.5 Settlements 9-10
9.4 Assessment of Potential Environmental Effects 9-11
9.4.1 Do Nothing Scenario 9-11
9.4.2 Proposed Project 9-11
9.5 Mitigation Measures 9-12
9.6 Residual Impacts of the Development 9-12
9.7 Cumulative Effects 9-12
9.8 Summary of Significant Effects 9-12

10 AIR QUALITY 10-1
10.1 Introduction 10-1
10.2 Characteristics of the Proposed Development 10-1
10.3 Assessment methodology and significance criteria 10-2
10.3.1 Study Area 10-2
10.3.2 Impact Assessment Methodology 10-3
10.3.3 Air Quality Standards 10-10
10.4 Receiving Environment 10-13
10.4.1 Meteorological Conditions 10-13
10.4.2 Influences on Ambient Air Quality 10-15
10.4.3 Existing Ambient Air Quality 10-16
10.4.4 Site specific ambient air quality monitoring 10-19
10.5 Identification of Likely Significant Impacts 10-21
10.5.1 Introduction 10-21
10.5.2 Construction Phase Impacts 10-21
10.5.3 Operational Phase Impacts 10-22
10.5.4 Traffic Impacts 10-23
10.5.5 Do Nothing Impact 10-23
10.6 Air Quality Impact Assessment 10-23
10.6.1 Construction Phase Impacts 10-23
10.6.2 Operational Phase Impacts 10-26
10.6.3 Impact of emissions on ecosystems 10-29
10.6.4 Impact of nitrogen deposition from the proposed facility on ecosystems .. 10-31
10.7 Do Nothing Scenario 10-32
10.8 Potential Cumulative Impacts 10-33
10.9 Mitigation Measures 10-33
10.10 Residual Impacts 10-35
10.11 Interactions Arising 10-35
10.12 Human Health 10-37
10.13 Monitoring 10-37
10.14 Difficulties Encountered 10-38
10.15 Accidents or Unplanned Events 10-38
10.16 References 10-38
11 NOISE & VIBRATION 11-1
11.1 Introduction 11-1
11.2 Assessment Methodology & Significance Criteria 11-1
11.2.1 Characterisation of the Receiving Environment 11-1
11.2.2 Desk-based Study 11-4
11.2.3 Impact Assessment 11-4
11.2.4 Definitions 11-9

11.3 Description of Receiving Environment 11-10
11.3.1 Site Context..... 11-10
11.3.2 Ambient Sound Survey Summary Results 11-12
11.3.3 Desk-Based Study 11-14
11.3.4 Vibration 11-15
11.4 Assessment of Potential Environmental Effects 11-16
11.4.1 Short Term Site Development & Construction Phase..... 11-16
11.4.2 Long term Operational Phase 11-24
11.4.3 Receptors north-east of the R446: 11-29
11.5 Mitigation Measures 11-30
11.5.1 Site Development and Construction Phases..... 11-30
11.5.2 Operational Phase 11-31
11.6 Residual Impacts of the Development 11-33
11.7 Cumulative Effects.....11-33
11.7.1 Construction Phase 11-33
11.7.2 Operational Phase 11-33
11.8 Monitoring and Further Works 11-37
11.9 Summary of Significant Effects.....11-37
11.9.1 Short-term Construction Phase..... 11-37
11.9.2 Long-term Operational Phase 11-37
11.10 REFERENCES 11-38
12 LANDSCAPE & VISUAL..... 12-1
12.1 Introduction..... 12-1
12.1.1 Approach..... 12-1
12.1.2 Description of the Proposed Development 12-2
12.2 Assessment Methodology & Significance Criteria..... 12-2
12.2.1 Scope of the Assessment..... 12-3
12.2.2 Study Area 12-3
12.2.3 Landscape Impact Assessment Criteria..... 12-4
12.2.4 Magnitude of Change – Landscape..... 12-5
12.2.5 Visual Impact Assessment Criteria 12-6
12.2.6 Magnitude of Change – Visual 12-9
12.2.7 Significance of Effect..... 12-10
12.2.8 Quality and Duration of Effects 12-12
12.3 Description of Receiving environment.....12-12
12.3.1 Westmeath County Development Plan 2021-2027..... 12-12
12.3.2 Offaly County Development Plan 2021-2027 12-14
12.3.3 Views of Recognised Scenic Value – Westmeath County Development Plan 2021-2027 12-15
12.4 Existing Environment 12-16
12.4.1 Landscape Baseline..... 12-16

12.4.2 Visual Baseline 12-19
12.5 Impact Assessment 12-35
12.5.1 Do-nothing scenario 12-35
12.5.2 Assessment of Receptor Sensitivity – Landscape 12-35
12.5.3 Assessment of Receptor Sensitivity – Visual 12-36
12.5.4 Magnitude of Landscape Effects – Construction Stage 12-38
12.5.5 Magnitude of Visual Effects – Construction Stage 12-39
12.5.6 Magnitude of Landscape Effects – Operational Stage 12-41
12.5.7 Magnitude of Visual Effects – Operational Stage 12-42
12.5.8 Cumulative Impact Assessment 12-62
12.5.9 Monitoring 12-62
12.6 Conclusions 12-63
12.6.1 Overall Significance of Effect 12-66
12.7 References 12-67
13 TRAFFIC & TRANSPORT 13-1
13.1 Introduction 13-1
13.1.1 Overview of Development Proposals 13-1
13.2 Assessment Methodology & Significance Criteria 13-2
13.2.1 Legislation and Guidance 13-2
13.2.2 Approach to Assessment 13-2
13.2.3 Consultations 13-3
13.2.4 Significance Criteria 13-3
13.3 Description of Receiving Environment 13-4
13.3.1 Site Location 13-4
13.3.2 Existing Site Traffic Characteristics 13-4
13.3.3 Current Traffic Volumes 13-4
13.3.4 Proposed Traffic Schemes 13-6
13.3.5 Committed Development 13-6
13.4 Assessment of Potential Environmental Effects 13-6
13.4.1 Traffic Capacity Effects 13-6
13.4.2 Trip Generation 13-6
13.4.3 Trip Distribution and Assignment 13-7
13.4.4 Traffic Modelling Approach 13-7
13.4.5 Road Structure Effects 13-8
13.4.6 Road Safety Effects 13-9
13.5 Mitigation Measures 13-9
13.5.1 Road Structure Mitigation 13-10
13.5.2 Road Safety Mitigation 13-10
13.6 ResidualTraffic Effects 13-10
13.7 Do Nothing' Scenario 13-10

13.8 CUumulative Effects....13-10
13.9 Trans-Border /International Effects....13-11
13.10 Difficulties Encountered in Compiling Information....13-11
13.11 References....13-11
14 ARCHAEOLOGICAL AND CULTURAL HERITAGE.... 14-1
14.1 Introduction.... 14-1
14.2 Assessment Methodology & Significance Criteria.... 14-2
14.2.1 Desktop Study.... 14-2
14.2.2 RMP and SMR.... 14-2
14.2.3 National Monuments.... 14-2
14.2.4 Protected Structures & NIAH sites.... 14-3
14.2.5 The Topographical Files of the National Museum of Ireland.... 14-3
14.2.6 Cartographic Sources and Aerial Imagery.... 14-3
14.2.7 Excavations Database.... 14-4
14.1.1 Archaeological Reports.... 14-4
14.2.8 Documentary research.... 14-6
14.2.9 Standards and Guidelines.... 14-7
14.2.10 Significance Criteria.... 14-7
14.3 Description of Receiving Environment.... 14-8
14.3.1 Introduction.... 14-8
14.3.2 Historical and Archaeological Background.... 14-9
14.3.3 Recorded Archaeological Monuments (RMP/SMR Sites).... 14-14
14.3.4 Recorded Archaeological Monuments (RMP/SMR Sites).... 14-14
14.3.5 National Monuments.... 14-15
14.3.6 Previously Unrecorded Sites.... 14-15
14.3.7 Previous Archaeological Investigations.... 14-17
14.3.8 RPS and NIAH.... 14-22
14.3.9 Cartographic Sources and Aerial Imagery.... 14-22
14.3.10 Topographical Files.... 14-24
14.3.11 Field Inspection.... 14-24
14.4 Assessment of Potential Environmental Effects....14-24
14.4.1 Archaeological Heritage.... 14-24
14.4.2 Architectural and Cultural Heritage.... 14-25
14.4.3 Indirect Effects.... 14-26
14.5 Mitigation Measures....14-26
14.5.1 Archaeological Heritage.... 14-26
14.5.2 Architectural and Cultural Heritage.... 14-28
14.6 Residual Impacts of the Development....14-29
14.7 Cumulative Effects....14-30
14.8 Monitoring and Further Works....14-31

14.9 Summary of Significant Effects 14-31
14.10 References 14-31
15 CLIMATE 15-1
15.1 Introduction 15-1
15.2 Characteristics of the Proposed Development 15-1
15.3 Assessment Methodology 15-1
15.3.1 Study Area 15-1
15.3.2 International Guidance 15-2
15.3.3 Greenhouse Gas Assessment 15-2
15.3.4 Vulnerability to Climate Change 15-7
15.4 Legislation and Policy 15-9
15.4.1 National Legislation and Policy 15-10
15.4.2 Local Policy 15-13
15.5 Receiving Environment 15-15
15.5.1 Climate Baseline 15-15
15.5.2 Greenhouse Gas Emissions Baseline 15-18
15.6 Identification of Likely Significant Impacts 15-20
15.6.1 Construction Phase 15-20
15.6.2 Operation Phase 15-24
15.6.3 Impacts on Climate Change (Greenhouse Gases) 15-25
15.7 Mitigation Measures 15-30
15.7.1 Construction Phase 15-30
15.7.2 Operation Phase 15-31
15.8 Whole Life Carbon Impact Assessment 15-32
15.9 Residual Impacts 15-34
15.9.1 Construction Phase 15-34
15.9.2 Operational Phase 15-34
15.10 Cumulative Impact Assessment 15-35
15.11 Interactions Arising 15-35
15.12 Monitoring 15-35
15.13 Compliance with Principles for Sustainable Data Centre Development 15-36
16 INTERACTIONS AND CUMULATIVE EFFECTS 16-1
16.1 Introduction 16-1
16.2 Approach 16-1
16.3 Cumulative Effects 16-3
17 MAJOR ACCIDENTS AND DISASTERS 17-1
17.1 Introduction 17-1
17.2 Background and Purpose 17-1
17.3 Guidance and Legislation 17-1
17.4 Scope and Methodology 17-2

17.5 Categorisation of the Baseline Environment 17-2
17.6 Impact Assessment Methodology 17-3
17.6.1 Identification of potential risks 17-3
17.6.2 Risk classification - likelihood 17-3
17.6.3 Risk classification - consequence 17-4
17.6.4 Risk Evaluation 17-4
17.7 Receiving Environment and Environmental Receptors 17-5
17.8 Identification of Relevant Major Accident and Disaster Scenarios 17-5
17.9 Risk Assessment 17-6
17.10 Residual Effects and Conclusion 17-10
18 SCHEDULE OF MITIGATION 18-1
18.1 Introduction 18-1
18.2 Strategy and Implementation 18-1
18.3 Schedule of Measures by Environmental Factor 18-2
18.3.1 Population and Human Health 18-2
18.3.2 Biodiversity 18-3
18.3.3 Soils and Geology 18-5
18.3.4 Water Environment 18-6
18.3.5 Material Assets 18-8
18.3.6 Air Quality 18-9
18.3.7 Noise and Vibration 18-10
18.3.8 Landscape and Visual 18-11
18.3.9 Traffic and Transport 18-13
18.3.10 Archaeological and Cultural Heritage 18-15
18.3.11 Climate 18-16

TABLE OF TABLES

Table 1.1 List of EIAR Contributors
Table 1.2 Supporting Specialist Reports
Table 2.1 DC Building Description
Table 5.1 Description of Effects [Magnitude]
Table 5.2 Castlelost ED Statistics
Table 5.3 Ballykilmore ED Statistics
Table 6.1 European Sites located within a potential Zone of Influence of the Proposed Development
Table 6.2 Details of Habitats Recorded and their Corresponding Fossitt Codes
Table 6.3 Designated species recorded within the 2km squares; N43U, N43P and N44K.

Table 6.4 Summary of Vantage Points 'Species of Interest' Results
Table 6.5 Summary of Vantage Point Non-Target Results
Table 6.6 Summary of Vantage 'Species of interest' Results
Table 6.7 Summary of Vantage Non-Target Transect Results
Table 6.8 Summary of Breeding Season Species of Interest Results
Table 6.9 Summary of Breeding Season Non-Target Results
Table 6.10 Summary of Thermal Survey Results
Table 6.11 Details of TII Guidelines (formerly NRA) for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009)
Table 6.12 Impacts on bird species of interest
Table 6.13 Planning applications granted permission in the vicinity of the Proposed Development.
Table 7.1 Receptor Sensitivity and Typical Descriptors
Table 7.2 Assessment Criteria for Magnitude
Table 7.3 Impact Significance Assessment
Table 7.4 Impact Significance Definitions
Table 7.5 Receptor Sensitivity
Table 7.6 Construction Phase Potential Environmental Effects
Table 7.7 Operational Phase Potential Environmental Effects
Table 7.8 Mitigation of Potential Environmental Effects during the Construction Phase
Table 7.9 Mitigation of Potential Environmental Effects during the Operational Phase
Table 8.1 Receptor Sensitivity and Typical Descriptors
Table 8.2 Assessment Criteria for Magnitude
Table 8.3 Impact Significance Assessment
Table 8.4 Impact Significance Definitions
Table 8.5 GSI Groundwater Vulnerability Guidelines
Table 8.6 Receptor Sensitivity
Table 8.7 Construction Phase Potential Environmental Effects
Table 8.8 Operational Phase Potential Environmental Effects
Table 8.9 Mitigation of Potential Construction Environmental Effect
Table 8.10 Mitigation of Potential Operational Environmental Effect
Table 9.1 Description of Effects
Table 9.2 Matrix for Determining Significance
Table 10.1 Describing the Significance and Magnitude of Environmental Effects (EPA 2022)
Table 10.2 Quantitative Determination of the Magnitude of Dust Emissions for Demolition and Construction Activities (IAQM 2024)
Table 10.3 Area Sensitivity to the Effects of Dust Soiling (IAQM 2024)

Table 10.4 Ambient Air Quality Standards Regulations 2022 (based on EU Clean Air for Europe [CAFE] Directive 2008/50/EC)
Table 10.5 WHO Air Quality Standards
Table 10.6 Summary Background Air Quality for Stations in Zone D (2021-2023)
Table 10.7 Ambient air quality survey 2024-2025 (NO_2, NO_x [$\mu g/m^3$])
Table 10.8 Ambient air quality survey 2024 (SO_2, NH_3 [$\mu g/m^3$])
Table 10.9 Assessment of Magnitude of dust emissions and area sensitivity for Construction Programme
Table 10.10 Assessment of Significance of dust emissions for Construction Programme
Table 10.11 Dust Risk Table
Table 10.12 Predicted NO_2 concentrations for Normal Operation (Scenario #1)
Table 10.13 Predicted NO_x concentrations for Worst Case Operation
Table 10.14 Total Nitrogen deposition at designated ecological sites as a result of emissions from the proposed facility
Table 10.15 Table of Mitigation Measures
Table 11.1 Noise Monitoring Points
Table 11.2 Monitoring Equipment
Table 11.3 Atmospheric Attenuation Assumed
Table 11.4 Accuracy of Calculation Method 9613-2:2024
Table 11.5 Nearest NSRs
Table 11.6 Summary Results NMP1
Table 11.7 Summary Results NMP2
Table 11.8 Summary Results NMP3
Table 11.9 Summary Results NMP4
Table 11.10 Summary Results NMP2 – 10th - 12th November 2023
Table 11.11 Summary Results NMP6 – 23rd Sept - 4th October 2022
Table 11.12 Summary Results NMP7 – 10th -16th November 2023
Table 11.13 Threshold of Significant Effect at Dwellings
Table 11.14 Magnitude of Impact & Construction Noise Descriptors
Table 11.15 Magnitude of Impact at NSRs for Construction Traffic
Table 11.16 Source Data Used for Construction Noise Impact
Table 11.17 Distance from NSRs to Construction Works
Table 11.18 Conservative Estimated Construction Noise at NSR9
Table 11.19 Transient Vibration Guide Values for Cosmetic Damage
Table 11.20 Vibration Criteria – Human Beings
Table 11.21 Noise Source Data
Table 11.22 Predicted Noise Levels at each NSR as a result of the Proposed Development
Table 11.23 Mode Values for $L_{A90,15min}$ During the Night-time

Table 11.24 Breakdown of Source Contributions to Total Predicted Noise Level at NSR36
Table 11.25 Breakdown of Source Contributions to Total Predicted Noise Level at NSR27
Table 11.26 Predicted Cumulative Noise Levels at each NSR
Table 11.27 Mode Values for $L_{A90,15min}$ During the Night-time
Table 11.28 Cumulative impact at NSRs 1-35 and NSR36 (additional)
Table 12.1 Landscape Value and Sensitivity
Table 12.2 Magnitude of Change - Landscape
Table 12.3 Magnitude of Change - Visual
Table 12.4 Significance Matrix
Table 12.5 Indicative significance of effect criteria descriptions
Table 12.6 Outline Description of Selected Viewshed Reference Points (VRPs)
Table 12.7 Assessment of Viewpoints
Table 13.1 Maximum RFC values at junctions without and with the proposed development
Table 14.1 Residual Impacts
Table 15.1 Significance Criteria for GHG Emissions
Table 15.2 Likelihood Categories
Table 15.3 Consequence Categories (adapted for the proposed project)
Table 15.4 IEMA Significance Matrix
Table 15.5 Ireland Carbon Budgets 2021 - 2035
Table 15.6 Sectoral Emissions Ceilings
Table 15.7 National Greenhouse Gas Emissions 2023
Table 15.8 Updated Construction Phase Embodied Carbon Emissions
Table 15.9 Updated GHG Impact Assessment (assessed against Irelands Carbon Budgets)
Table 15.10 Updated Summary of Operational Phase GHG Emissions – Worst-Case Scenario
Table 15.11 Updated GHG Impact Assessment (assessed against Ireland's Carbon Budgets)
Table 15.12 Whole Lifetime Carbon Emissions Summary
Table 15.13 Whole Lifetime GHG Impact Assessment (assessed against Irelands Carbon Budgets)
Table 16.1 Interactions between Environmental Factors
Table 16.2 Summary of Interactions
Table 16.3 Cumulative Effects
Table 17.1 Risk Classification - Likelihood
Table 17.2 Risk Classification - Consequence
Table 17.3 Risk Evaluation

Table 17.4 Principal Scenarios
Table 17.5 Construction Phase
Table 17.6 Operational Phase
Table 17.7 Risk Summary

TABLE OF FIGURES

Figure 1.1 Principles for Sustainable Data Centre Development
Figure 1.2 Development Layout (Section 34 planning application)
Figure 1.3 Development Layout (Section 182A planning application)
Figure 1.4 Site Layout showing DC Facility and DER
Figure 1.5 Landscape and Biodiversity Mitigation Plan – DC Facility and Western Part of DER)
Figure 1.6 Landscape Plan – Proposed DC Plaza
Figure 1.7 Landscape and Biodiversity Mitigation Plan – Solar Farm
Figure 1.8 Landscape and Biodiversity Mitigation Plan – Solar Farm
Figure 1.9 Landscape and Biodiversity Mitigation Plan – Solar Farm
Figure 2.1 Aerial View of the Castlelost Flexgen and GIS Substation (June 2025)
Figure 2.2 Drawing of sheds and outhouses to be demolished
Figure 2.3 Photograph of sheds and outhouses to be demolished
Figure 2.4 Drawing of Derelict dwelling to be demolished
Figure 2.5 Photograph of derelict dwelling to be demolished
Figure 2.6 Photograph shed and derelict structure to be demolished
Figure 2.7 Site Location (1:50,000)
Figure 2.8 Site Location Map (1:2,500)
Figure 2.9 Site Location Map (1:2,500)
Figure 2.10 Project Site Access Locations
Figure 2.11 Temporary Access 06 to L51251
Figure 2.12 Proposed metal veil on the R446 facing side of the proposed data halls
Figure 2.13 CGI imagery of the newly design internal plaza with stepped planters and native and pollinator friendly plantings
Figure 2.14 DC facility entrance
Figure 2.16 3D illustration of Security Control Building
Figure 2.17 DC Facility Layout
Figure 2.18 DC Building Elevations; Drawing Ref CLDC-HAL-DC-XX-PL-1102
Figure 2.19 DC Building Ground Floor Layout
Figure 2.20 DC Building Ground Floor Layout
Figure 2.21 3D impression of 33kV IPP Building
Figure 2.22 – Layout showing 33kV IPP Building and AIS Compound

Figure 2.23 Modular Energy Servers positioned at ground level
Figure 2.24 Section of Power Tower
Figure 2.25 3D impression of BESS including IPP and AIS Compound
Figure 2.26 High-Level Diagram of a BESS
Figure 2.27 Solar PV Elevation
Figure 2.28 Solar PV Table Plan Details
Figure 2.29 MVPS Details
Figure 2.30 3D impression of Solar IPP Building and AIS Compound
Figure 2.31 220kV IPP GIS
Figure 2.32 Surface Water Drainage Features (Data Centre)
Figure 2.33 Surface Water Drainage Features (Fuel Cell & Ancillary)
Figure 2.34 Dark Fibre Network Map at the Proposed DC Facility
Figure 2.35 Indicative Construction Programme
Figure 2.36 Layout showing locations of temporary construction compounds
Figure 2.37 Proposed Construction Phasing
Figure 3.1 Proposed Site Location
Figure 3.2 Summary of Benefits of Proposed Project Location
Figure 3.3 Admiral DER Energy Mix
Figure 3.4 DC Facility Site Layout Iteration #1
Figure 3.5 DC Facility Site Layout Iteration #2
Figure 3.6 DC Facility Site Layout Iteration #3
Figure 3.7 Site Layout Iteration #5 (DC Facility and DER Layout)
Figure 3.8 DC Facility and DER Project Layout (April 2024)
Figure 3.9 DC Facility and DER Project Layout
Figure 3.10 Fuel Cell – Tower without external screens (iteration #1)
Figure 3.11 Fuel Cell – Tower with external screen (iteration #2)
Figure 3.12 Visual consideration of Fuel Cell elevations (external screens)
Figure 3.13 Typical section through two-panel table
Figure 3.14 Typical section through two-panel table
Figure 4.1 National Strategic Outcomes of the NDP
Figure 5.1 Westmeath County Council Area
Figure 5.2 Westmeath County Council - Population
Figure 5.3 Setting – Electoral Division
Figure 5.4 Castlelost ED - Population Breakdown
Figure 5.5 Ballykilmore ED - Population Breakdown
Figure 5.6 Castlelost ED Deprivation Indices Map
Figure 5.7 Ballykilmore ED Deprivation Indices Map
Figure 5.8 Small Areas Map – Radius of 1km

Figure 5.9 Small Areas: A237012002 (176 males, 166 females)
Figure 5.10 Small Areas: A237012003 (132 males, 133 females)
Figure 5.11 Small Areas: A237024001 (122 males, 116 females)
Figure 5.12 Setting – Townlands
Figure 6.1 Showing European Sites & NHAs/pNHAs within the wider Potential Zone of Influence
Figure 6.2 Showing habitats recorded at the proposed development site.
Figure 6.3 DC facility layout with retained monolith trees
Figure 6.4 Lighting Zones
Figure 6.5 Proposed Compensatory Woodland
Figure 7.1 Location of Development Lands
Figure 7.2 Corine Land Cover 2018
Figure 7.3 Distribution of soil associations adjacent to the development site
Figure 7.4 Quaternary deposits at the development site
Figure 7.5 Illustration of the bedrock geology adjacent to the development site
Figure 7.6 Distribution of trial pits (SA01-SA06) across the western part of the development area
Figure 7.7 Location of boreholes across the development lands.
Figure 7.8 Distribution of dolines (highlighted by yellow circles) across the northern section of the proposed development area
Figure 7.9 Distribution of dolines (highlighted by yellow circles) to the west of the proposed development area
Figure 8.1 Location of Development Lands
Figure 8.2 Ground Elevation in the vicinity of the development lands
Figure 8.3 Distribution of conservation areas adjacent to the development lands
Figure 8.4 Distribution of groundwater bodies adjacent to the development lands
Figure 8.5 Aquifer Classification
Figure 8.6 Aquifer Vulnerability
Figure 8.7 Location of borehole BH01, BH08, BH12, BH13 and BH15 across the development lands.
Figure 8.8 Water level (mOD) and Rainfall (mm/hr) records for BH01
Figure 8.9 Water level (mOD) and Rainfall (mm/hr) records for BH12.
Figure 8.10 Water level (mOD) and Rainfall (mm/hr) records for BH13.
Figure 8.11 Water level (mOD) and Rainfall (mm/hr) records for BH15.
Figure 8.12 Groundwater flow direction (blue arrow)
Figure 8.13 Groundwater flow direction (blue arrow)
Figure 8.14 Groundwater wells and springs adjacent to the development lands

Figure 8.15 Source Protection Area for the Toberdaly Public Water Scheme (green shaded area)
Figure 8.16 Groundwater Recharge at the development lands.
Figure 8.17 Location of the development lands within the Monagh River catchment (blue shaded area).
Figure 8.18 Location of the development lands within the Monagh River catchment (blue shaded area).
Figure 8.19 Site location map showing the location of drainage ditches (dashed lines) across the development area.
Figure 8.20 Site location map showing local surface water features. Drainage across the development area flows towards the River Monagh to the southwest.
Figure 8.21 WFD Catchment (Boyne (07))
Figure 8.22 WFD Subcatchment (Yellow [Castlejordan]_SC_010))
Figure 8.23 WFD River Sub Basin (Castlejordan_020)
Figure 8.24 Locations of trial pits within the development lands.
Figure 9.1 Map showing layout within development lands
Figure 9.2 Map of EirGrid Transmission System (source–EirGrid All-Island Transmission System)
Figure 9.3 Natural Gas Transmission Line Map (Source-Gasnetworks.ie)
Figure 10.1 Construction Phase Study Area
Figure 10.2 Designated Sites
Figure 10.3(a) Windrose for Dublin Airport (2018-2022)
Figure 10.4 Comparison of Zone D Background Air Quality Data with Ambient Air Quality Standards
Figure 10.5 Locations of diffusion tubes
Figure 10.6 Ecological receptors for detailed study
Figure 11.1 Noise Monitoring Points (NMP 1- 4)
Figure 11.2 Location of Nearest NSRs
Figure 11.3 Historic Noise Monitoring Points (2022-2023)
Figure 12.1 5km Extent of the Study Area
Figure 12.2 Excerpt from the current Westmeath CDP (2021-2027) showing the location of the proposed development in relation to landscape character areas in County Westmeath.
Figure 12.3 Landscape Context of the study area
Figure 12.4 Typical contained pastoral views afforded throughout the study area
Figure 12.5 Views of the existing Castlelost development from the M6 motorway corridor
Figure 12.6 Standard (bare-ground) ZTV map - SOLAR FARM (Refer to Appendix 12.1 for larger scale version)

Figure 12.7 Standard (bare-ground) ZTV map - MAIN SITE (Refer to Appendix 12.1 for larger scale version)
Figure 12.8 Digital Surface Model (DSM) based ZTV map (Solar Farm) accounting for screening by surface elements such as hedgerows, trees lines and forestry.
Figure 12.9 Digital Surface Model (DSM) based ZTV map (Main Site) accounting for screening by surface elements such as hedgerows, trees lines and forestry.
Figure 12.10 Viewpoint location map (showing viewing extents and direction of view)
Figure 12.11 Hedgerow Type 1: indicative boundary planting detail showing the approach to inter-planting and under-planting of existing hedgerows (where consolidation is needed).
Figure 12.12 Indicative boundary planting detail showing the introduction of new boundary hedgerow TYPE 2
Figure 12.13 Integration of visual mitigation measures on the proposed fuel cell structures
Figure 12.14 Mitigation ZTV illustrating the effect of proposed mitigation planting (Solar Farm)
Figure 12.15 Mitigation ZTV illustrating the effect of proposed mitigation planting (Main Site)
Figure 12.16 Updated Photomontage Booklet: VP2 located to the immediate north of the site showing the effectiveness of the proposed mitigation screen planting once fully established
Figure 13.1 Site Location
Figure 15.1 Percentage Breakdown of Sectoral GHG Emissions (Westmeath Co Co 2024)
Figure 15.2 Project power demand and energy sources for Project lifetime

APPENDICES (TO BE READ IN CONJUNCTION WITH EIAR VOLUME 3)

Appendix 1.1 Landowner Consent Letters
Appendix 1.2 An Bord Pleanála SID Pre-application Consultation Letters & EIA Portal Confirmation
Appendix 1.3 Applicant Consent Letters to Agent
Appendix 1.4 Uisce Éireann COF Letter - Wastewater
Appendix 1.5 Uisce Éireann COF Letter – Water
Appendix 2.1 Proposed Development Layout – (Superseded by Appendix 2.4)
Appendix 2.2 Construction Environmental Management Plan (CEMP) - (Superseded by Appendix 2.6)
Appendix 2.3 Decommissioning Plan
Appendix 2.4 Revised Proposed Development Layout - See Halston Drawing No. CLDC-HAL-DC-XX-PL-1000

Appendix 2.5 Architects Design Statement
Appendix 2.6 Revised Construction Environmental Management Plan (CEMP)
Appendix 2.7 Planning Statement
Appendix 3.1 Energy Statement and Approach to Sustainable Data Centre Development
Appendix 3.2 LEED Assessment and Life Cycle Assessment
Appendix 3.3 Carbon Impact Statement & Alignment with LEU Policies
Appendix 5.1 Economic Assessment Report
Appendix 5.2 Lighting Study - (Superseded by Appendix 5.3)
Appendix 5.3 Revised Lighting Study and Design
Appendix 5.4 Community Benefit Framework Report
Appendix 6.1 Bat Survey Report
Appendix 6.2 Bird Survey Report
Appendix 6.3 Ecology Report
Appendix 7.1 Ground Investigation Report
Appendix 8.1 Flood Risk Assessment Report - (Superseded by Appendix 8.2)
Appendix 8.2 Revised Flood Risk Assessment Report (FRA)
Appendix 8.3 Envirologic Report Ref. 3151C (FI Request Response 12(i))
Appendix 8.4 Water Framework Directive (WFD) Assessment Report
Appendix 9.1 Telecommunication Report
Appendix 10.1 Ambient Air Quality Survey Data – Passive Certs
Appendix 10.2 Air Quality Dispersion Modelling Report
Appendix 11.1 Noise Photologs
Appendix 11.2 Noise Monitoring Data
Appendix 12.1 Landscape and Biodiversity Mitigation Plans - - (Superseded by Appendix 12.4)
Appendix 12.2 Photomontages - - (Supplemented by Appendix 12.5)
Appendix 12.3 Glint and Glare Assessment Report
Appendix 12.4 Revised Landscape and Biodiversity Mitigation Plans
Appendix 12.5 Additional Photomontages
Appendix 12.6 Landscape Architect Design Statement
Appendix 12.7 Landscape Architect FI Response Statement
Appendix 13.1 Traffic Counts
Appendix 13.2 Trip Generation
Appendix 13.3 Traffic Calculations
Appendix 13.4 PICADY Analysis
Appendix 13.5 Road Safety Audit Report (RSA)
Appendix 13.6 Mobility Management Plan (MMP)

Appendix 13.7 Outline Construction Traffic Management Plan (CTMP)
Appendix 14.1 Archaeological & Cultural Heritage - Figures
Appendix 14.2 Archaeological & Cultural Heritage - Plates
Appendix 14.3 Archaeological & Cultural Heritage - Geophysical Report
Appendix 15.1 Project Carbon Management Plan (PCMP)

1 INTRODUCTION

This Environmental Impact Assessment Report (EIAR) has been prepared by Halston Environmental & Planning Limited (Halston) on behalf of Red Admiral DC Limited (the Applicant) to support both a planning application to Westmeath County Council under Section 34 of the Planning and Development Act 2000, as amended, (hereafter referred to as "the Act") and a planning application to An Coimisiún Pleanála (formerly An Bord Pleanála and hereafter referred to as "the Commission") under Section 182A of the Act.

This document represents a consolidated EIAR for the proposed development (Project Admiral). It allows the original EIAR (dated July 2025) and the EIAR Addendum (dated March 2026) to be read as a single document, describing the proposed development as it stands following the Section 34 further information (FI) process[1]. Therefore, this consolidated EIAR should be read as a standalone post-FI document.

1.1 STRUCTURE OF THE EIAR

The structure of this consolidated EIAR follows, as far as practicable, the structure of the original EIAR Volume 2 and the EIAR Addendum. Following this introductory chapter, which outlines the background and the rationale for the preparation of this EIAR, Chapter 2 provides a current description of the proposed development. Chapter 3 reaffirms the overall need for the development and provides an assessment of the reasonable alternatives considered. In recognition of the time elapsed since lodgement of the planning application in July 2025, Chapter 4 updates and confirms the alignment of the proposed development with current national, regional and local policy and the applicable regulatory framework. Chapters 5-15 assess the project described in Chapter 2 under the relevant environmental disciplines and set out conclusions on the likely significant environmental effects arising from those changes. Chapter 16 identifies and summarises any cumulative effects and significant interactions associated with the proposed development. Chapter 17 provides a description of the expected significant adverse effects on the environment of the proposed development deriving from its vulnerability to risks of major accidents and /or disasters which are relevant to it. Chapter 18 provides a schedule of all mitigation measures proposed for offsetting likely significant adverse effects, as identified, for each environmental factor.

[1] The Section 34 planning application was lodged with Westmeath County Council (Planning Case Ref. 256344) on 08 July 2025. Westmeath County Council issued a further information (FI) request on 01 September 2025. The applicant submitted a full response to the FI request.

1.2 PROJECT OVERVIEW

The proposed project includes two main elements contained within an overall development boundary area of 243 hectares (ha), namely:

1. The Data Centre (DC) facility, comprising six two-storey Data Centre buildings, car parking, landscaping, drainage and other associated works. The DC facility will be constructed and secured within a secured 39ha campus. Each DC building will contain:

    (a) Data halls fitted with server racks and distribution units,
    (b) Mechanical and electrical (M&E) plant rooms /spaces which will house advanced cooling equipment, pumps, piping and medium voltage (MV) and low voltage (LV) switchgear, and
    (c) Administration and support areas including, reception, offices, meeting rooms and welfare facilities.

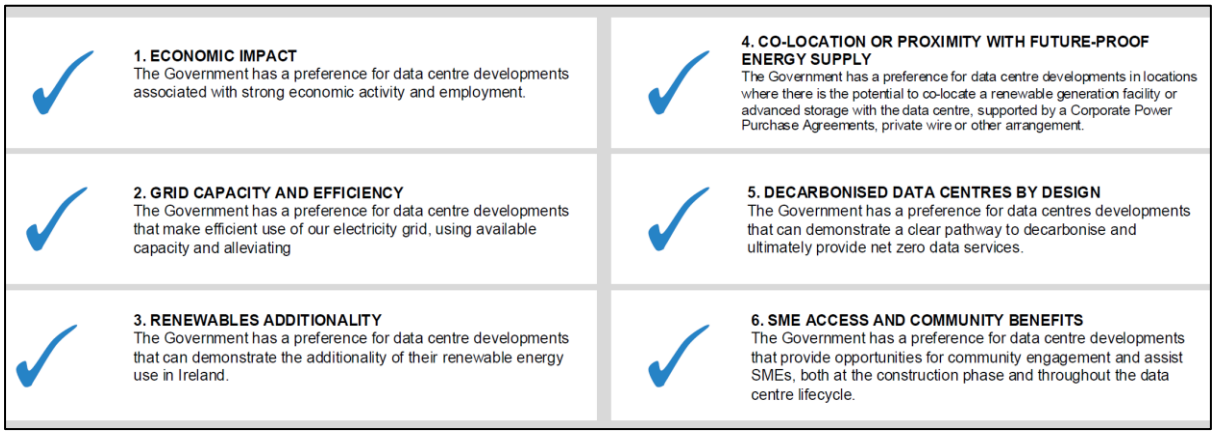
2. Decentralised Energy Resource (DER), which will be constructed on lands adjoining the DC facility. The DER incorporates several power assets which will generate, store and manage electricity close to the DC facility. The DER comprises the following assets:

    (a) Solid Oxide Fuel Cell (SOFC) Power System (hereafter referred to as Fuel Cell) – nominal capacity of 160MWe
    (b) Battery Energy Storage System (BESS) - nominal capacity of 250MWe
    (c) Solar PV farm - nominal capacity of 180MWp
    (d) Grid connection to the 220kV Castlelost GIS substation which adjoins the proposed development site.

The DER will optimise the use of these assets to support operations at the DC facility and provide clean, dedicated power that tracks the DC facility's load requirements. The project has been designed to conform with the Irish Government's *Principles for Sustainable Data-Centre Development*[2] which details a set of national principles that should inform and guide decisions on future data centre development.

[2] Government of Ireland, Department of Enterprise, Trade and Employment (2022) *Government Statement on the Role of Data Centres in Ireland's Enterprise Strategy: Principles for Sustainable Data-Centre Development*. Dublin: Department of Enterprise, Trade and Employment.

Figure 1.1 Principles for Sustainable Data Centre Development



1.3 APPLICANT COMPANY

The Applicant Company, Red Admiral DC Limited, is part of the Lumcloon Energy group of companies which was established in November 2008 as a project development company which specialises in innovative and scalable clean energy and low carbon solutions. Based in Tullamore, County Offaly, Lumcloon Energy has become a pivotal developer, applying a practical approach to advancing transformative clean energy projects in Ireland. The company develops, owns, and operates some of Europe's largest clean energy resources. and is focused on new pathways between clean electricity and the broader economy.

1.4 PLANNING FRAMEWORK

Under the provisions of Section 37B of the Planning and Development Act 2000, as amended, (hereafter referred to as "the Act") the applicant made a pre-application request to the Commission to determine whether the proposed development constitutes Strategic Infrastructure Development (SID). The Commission decided that the proposed development (Data Centre) does not meet the threshold set out in the Seventh Schedule of the Planning and Development Act 2000, as amended, and therefore does not fall within the scope of section 37A (1) of the Act and that the planning application should be made to Westmeath County Council under Section 34 of the Act (Case Number (Case Number ABP-321564-25).

Due to the fact that components of the DER include high voltage (HV) lines (where the voltage is 110 kilovolts or more) and associated electric plant, a separate statutory development consent process for this element pertains. Accordingly, the applicant made a pre-application request to the Commission. Following consultations under section 182E of the Planning and Development Act 2000, as amended, the Commission served notice that it is of the opinion that the proposed development falls within the scope of section

182A of the Planning and Development Act 2000, as amended. Accordingly, the Commission decided that the proposed development would be strategic infrastructure within the meaning of section 182A of the Planning and Development Act 2000, as amended and any application for approval for the proposed development [components of the DER include high voltage (HV) lines (where the voltage is 110 kilovolts or more) and associated electric plant] must therefore be made directly to An Coimisiún Pleanála. Act (Case Number ABP-322430-25).

This approach is expressly required by the Act and is standard practice where a single project combines both Section 34 (permission for development) and section 182A (electricity transmission lines) development.

The DC facility and DER together constitute the "project" for the purposes of Environmental Impact Assessment (EIA) and Appropriate Assessment (AA), and references to the "Project" in this EIAR should be read as references to the two components taken together as one project.

Figure 1.2 and Figure 1.3 below illustrates the extent of proposed development work associated with each planning application. Because the two components are physically interlinked, the same red-line planning boundary is used for both applications, and a single Environmental Impact Assessment Report (EIAR) has been prepared to address the effects of the entire project as proposed within the redline boundary.

1.5 SCOPING AND CONSULTATION

Pre-application planning consultation meetings in relation to the project were undertaken with the Commission on 12 February 2025 (Case No. Ref. PC25M.321564) and 22 May 2025 (Case No. Ref. VC25M.322430) and with Westmeath County Council on 26 February 2025. Consultation, where appropriate, with relevant private and public agencies was undertaken by the various EIA specialists preparing each Chapter of the EIAR. Details of this consultation are provided within each Chapter of the EIAR.

In addition to the pre-application consultations with the planning authorities, consultation and statutory notification of the application to prescribed bodies has been undertaken prior to the lodgement of the SID planning application.

Figure 1.2 Development Layout (Section 34 planning application)

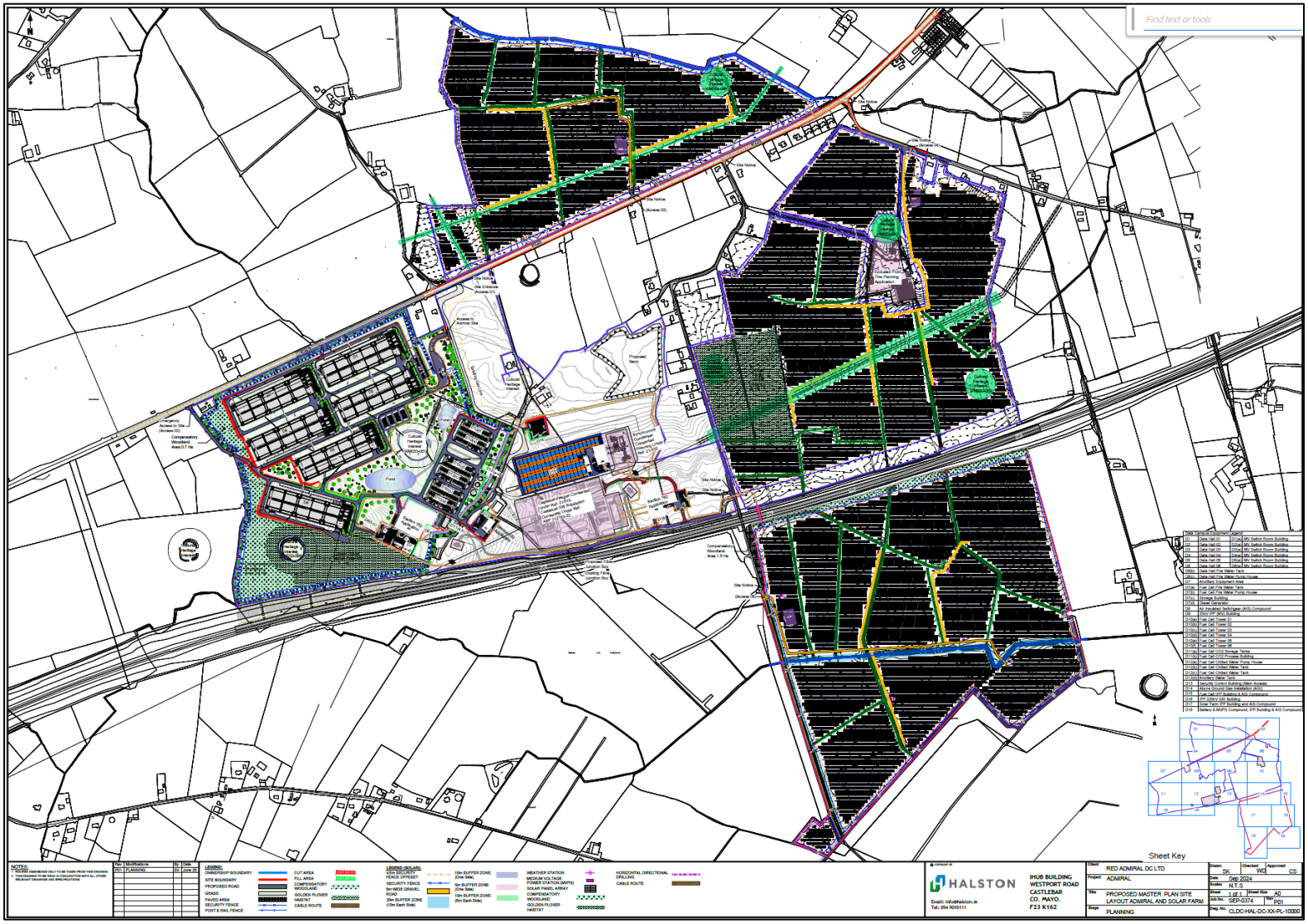
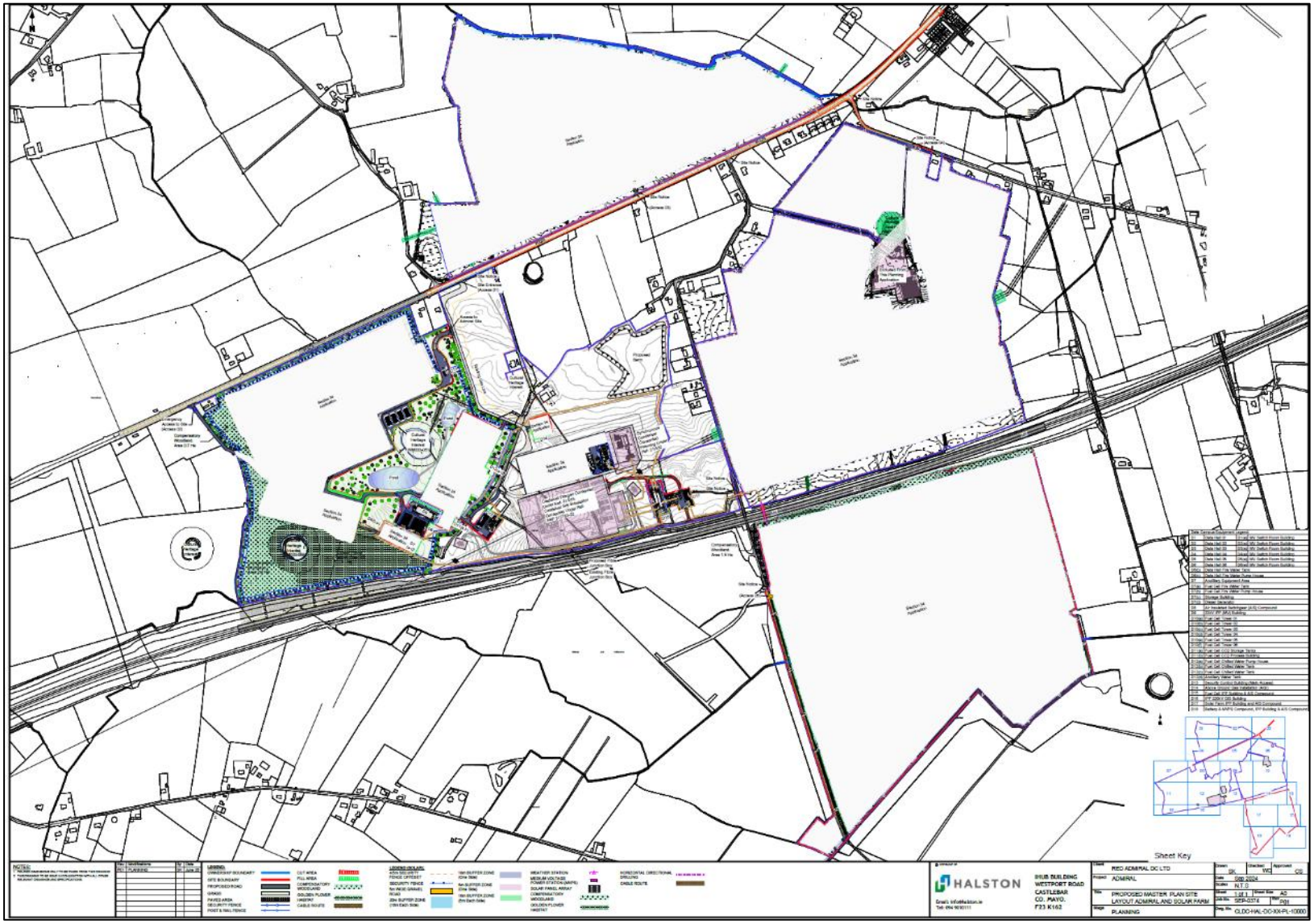


Figure 1.3 Development Layout (Section 182A planning application)



1.6 ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

1.6.1 THE REQUIREMENT FOR EIA

In Irish legislation, Section 172 of the Act establishes the requirement for an Environmental Impact Assessment (EIA), stating that:

"An environmental impact assessment shall be carried out by the planning authority or the Board, as the case may be, in respect of an application for consent for proposed development where either—

(a) the proposed development would be of a class specified in—

(i) Part 1 of Schedule 5 of the Planning and Development Regulations 2001, and either—

(I) such development would equal or exceed, as the case may be, any relevant quantity, area or other limit specified in that Part, or

(II) no quantity, area or other limit is specified in that Part in respect of the development concerned,

or

(ii) Part 2 of Schedule 5 of the Planning and Development Regulations 2001 and either—

(I) such development would equal or exceed, as the case may be, any relevant quantity, area or other limit specified in that Part, or

(II) no quantity, area or other limit is specified in that Part in respect of the development concerned,

or

(b) (i) the proposed development would be of a class specified in Part 2 of Schedule 5 of the Planning and Development Regulations 2001 but does not equal or exceed, as the case may be, the relevant quantity, area or other limit specified in that Part, and

(ii) it is concluded, determined or decided, as the case may be by a planning authority that the proposed development is likely to have a significant effect on the environment."

The classes of development where an EIA is mandatory are specified in the Planning and Development Regulations 2001, as amended ("the Regulations") pursuant to Section 176 of the Act. The Regulations outline the regulatory framework for planning and development activities in Ireland and provide detailed procedures and requirements for various aspects of planning and development, including the need for Environmental Impact

Assessments (EIAs). Specifically, Schedule 5 of these regulations sets out specific thresholds for various types of projects. If a project exceeds these thresholds, an EIA must be carried out as a mandatory requirement. Where a project is of a type listed in the regulations but does not meet or exceed the applicable threshold then the likelihood of the project having significant effects on the environment should be assessment. Criteria to evaluate whether significant effects on the receiving environment will arise from a proposed development are listed under Schedule 7 of the Regulations.

Data-centre projects are not identified as a standalone class of development in Annex I or Annex II of the EIA Directive, nor in Schedule 5 of the Planning and Development Regulations 2001. Instead, they are treated as "urban development" within Class 10(b)(iv) of Part 2 of Schedule 5, which covers:

> *"Urban development that occupies more than 2 hectares in a business district, more than 10 hectares in the other parts of a built-up urban area, or more than 20 hectares elsewhere."*

For this project the relevant threshold is 20 hectares. As the site area exceeds that figure, the project automatically falls within the category of EIA development and requires a mandatory Environmental Impact Assessment.

For completeness, and having regard to the nature, scale and land take of the Proposed Development (as amended), the overall project may also be characterised by reference to one or more of the Part 2, Schedule 5 *"Infrastructure Projects"* classes, in particular:

- Part 2, paragraph 10(a): *Industrial estate development projects, where the area would exceed 15 hectares*; and/or
- Part 2, paragraph 10(b)(iv): *Urban development which would involve an area greater than 2 hectares in the case of a business district, 10 hectares in the case of other parts of a built-up area and 20 hectares elsewhere.*
- *Part 2, paragraph 10 (dd)): All private roads which would exceed 2000 metres in length.*

1.6.2 THE ASSESSMENT APPROACH AND METHODOLOGY

EIA is the process of assessment of the effects of a project or development proposal on the environment. In the planning area, it is undertaken by a Planning Authority or the Commission during the consideration of applications for planning permission, taking account of an Environmental Impact Assessment Report (EIAR).

The main objective of an EIA, as set out in Article 3(1) of the 2014 EIA Directive, is to identify, describe and assess the direct and indirect significant impacts of a proposed project in relation to the following environmental factors:

a) population and human health,
b) biodiversity, with particular emphasis on species and habitats protected under EU Directives,
c) land, soil, water, air and climate,
d) material assets, cultural heritage and the landscape, and
e) the interaction between the factors mentioned in (a - d).

This EIAR has been completed fully in accordance with Article 5(1) and the Directive 2014/52/EU and this is set out as follows in the 2022 EPA *"Guidelines on the information to be contained in Environmental Impact Assessment Reports"*,

a) description of the project comprising information on the site, design, size and other relevant features of the project;
b) a description of the likely significant effects of the project on the environment;
c) a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;
d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;
e) a non-technical summary of the information referred to in points (a) to (d); and
f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected.

Accordingly, this EIAR is a report or statement of the effects, if any, which the proposed project, if carried out, would have on the environment. The EIAR reports on the findings of the EIA process and informs the Planning Authority, statutory consultees, other interested parties and the public in general about the likely effects of the project on the environment.

As required by the EIA Directive, electronic notification was provided to the Department of Housing, Local Government and Heritage about the applications for inclusion on the EIA

portal. A copy of the EIA notification receipts is provided in support of each of the planning applications.

1.6.3 FORMAT AND STRUCTURE OF THE EIAR

The EIAR has been prepared to satisfy the requirements of Schedule 6 of the EIA regulations – *"Information to be contained in EIAR"*. This EIAR is presented as three volumes:

1) **Volume 1 Non-Technical Summary**
2) **Volume 2 Environmental Impact Assessment Report (EIAR)**

- Chapter 1 Introduction – Updated
- Chapter 2 Description of the Proposed Development
- Chapter 3 Need for the Development and Alternatives
- Chapter 4 Planning and Policy
- Chapter 5 Population and Human Health
- Chapter 6 Biodiversity (Updated)
- Chapter 7 Soils and Geology
- Chapter 8 Water Environment
- Chapter 9 Material Assets
- Chapter 10 Air Quality
- Chapter 11 Noise and Vibration
- Chapter 12 Landscape and Visual
- Chapter 13 Traffic and Transport
- Chapter 14 Archaeology and Cultural Heritage
- Chapter 15 Climate
- Chapter 16 Cumulative Effects and Interactions
- Chapter 17 Major Accidents and Disasters
- Chapter 18 Schedule of Mitigation

3) **Volume 3 EIAR Appendices**

- Appendix 1.1 Landowner Consent Letters
- Appendix 1.2 An Bord Pleanála SID Pre-application Consultation Letters & EIA Portal Confirmation
- Appendix 1.3 Applicant Consent Letters to Agent
- Appendix 1.4 Uisce Éireann COF Letter - Wastewater
- Appendix 1.5 Uisce Éireann COF Letter – Water
- Appendix 2.1 Proposed Development Layout – (Superseded by Appendix 2.4)

- Appendix 2.2 Construction Environmental Management Plan (CEMP) - (Superseded by Appendix 2.6)
- Appendix 2.3 Decommissioning Plan
- Appendix 2.4 Revised Proposed Development Layout - See Halston Drawing No. CLDC-HAL-DC-XX-PL-1000
- Appendix 2.5 Architects Design Statement
- Appendix 2.6 Revised Construction Environmental Management Plan (CEMP)
- Appendix 2.7 Planning Statement
- Appendix 3.1 Energy Statement and Approach to Sustainable Data Centre Development
- Appendix 3.2 LEED Assessment and Life Cycle Assessment
- Appendix 3.3 Carbon Impact Statement & Alignment with LEU Policies
- Appendix 5.1 Economic Assessment Report
- Appendix 5.2 Lighting Study - (Superseded by Appendix 5.3)
- Appendix 5.3 Revised Lighting Study and Design
- Appendix 5.4 Community Benefit Framework Report
- Appendix 6.1 Bat Survey Report
- Appendix 6.2 Bird Survey Report
- Appendix 6.3 Ecology Report
- Appendix 7.1 Ground Investigation Report
- Appendix 8.1 Flood Risk Assessment Report - (Superseded by Appendix 8.2)
- Appendix 8.2 Revised Flood Risk Assessment Report (FRA)
- Appendix 8.3 Envirologic Report Ref. 3151C (FI Request Response 12(i))
- Appendix 8.4 Water Framework Directive (WFD) Assessment Report
- Appendix 9.1 Telecommunication Report
- Appendix 10.1 Ambient Air Quality Survey Data – Passive Certs
- Appendix 10.2 Air Quality Dispersion Modelling Report
- Appendix 11.1 Noise Photologs
- Appendix 11.2 Noise Monitoring Data
- Appendix 12.1 Landscape and Biodiversity Mitigation Plans - - (Superseded by Appendix 12.4)
- Appendix 12.2 Photomontages - - (Supplemented by Appendix 12.5)
- Appendix 12.3 Glint and Glare Assessment Report
- Appendix 12.4 Revised Landscape and Biodiversity Mitigation Plans
- Appendix 12.5 Additional Photomontages
- Appendix 12.6 Landscape Architect Design Statement
- Appendix 12.7 Landscape Architect FI Response Statement
- Appendix 13.1 Traffic Counts

- Appendix 13.2 Trip Generation
- Appendix 13.3 Traffic Calculations
- Appendix 13.4 PICADY Analysis
- Appendix 13.5 Road Safety Audit Report (RSA)
- Appendix 13.6 Mobility Management Plan (MMP)
- Appendix 13.7 Outline Construction Traffic Management Plan (CTMP)
- Appendix 14.1 Archaeological & Cultural Heritage - Figures
- Appendix 14.2 Archaeological & Cultural Heritage - Plates
- Appendix 14.3 Archaeological & Cultural Heritage - Geophysical Report
- Appendix 15.1 Project Carbon Management Plan (PCMP)

1.6.4 EIAR PREPARATION AND CONTRIBUTORS

This EIAR has been prepared by Halston Environmental & Planning Limited (Halston), Unit 3, IHub Building, Westport Road, Castlebar, Co. Mayo Ireland, F23 K162, on behalf of the applicant. The Planning Application Stage Works were managed and coordinated by Mr Colm Staunton (Halston). Table 1.1 provides details of the author of each EIAR Chapter, and a statement of authority is provided below.

Table 1.1 List of EIAR Contributors

Chapter No.	EIAR Chapter[Note 1]	Contributor
1	Introduction	Halston Environmental & Planning Ltd IHub Building, Westport Road, Castlebar, Co. Mayo Ireland, F23 K162
2	Description of the Proposed Development	Halston Environmental & Planning Ltd IHub Building, Westport Road, Castlebar, Co. Mayo Ireland, F23 K162
3	Need for the Development and Alternatives	Halston Environmental & Planning Ltd IHub Building, Westport Road, Castlebar, Co. Mayo Ireland, F23 K162
4	Planning and Policy	Halston Environmental & Planning Ltd IHub Building, Westport Road, Castlebar, Co. Mayo Ireland, F23 K162
5	Population & Human Health	Halston Environmental & Planning Ltd IHub Building, Westport Road, Castlebar, Co. Mayo Ireland, F23 K162
6	Biodiversity	Moore Group and Eire Ecology 3 Gort na Rí, Athenry, Co. Galway
7	Soils and Geology	TMS Environment Ltd 53 Broomhill Drive, Tallaght, Dublin 24
8	Water Environment	TMS Environment Ltd 53 Broomhill Drive, Tallaght, Dublin 24
9	Material Assets	Halston Environmental & Planning Ltd IHub Building, Westport Road, Castlebar, Co. Mayo Ireland, F23 K162
10	Air Quality	TMS Environment Ltd 53 Broomhill Drive, Tallaght, Dublin 24

Chapter No.	EIAR Chapter[Note 1]	Contributor
11	Noise and Vibration	Redkite Environmental Huntersmoon, Ballykeane Road, Redcross Co. Wicklow
12	Landscape and Visual	Macroworks Hibernia House, Cherrywood Business Park, Loughlinstown, Dublin 18
13	Traffic and Transport	Traffic Transport and Road Safety Associates Barran, Blacklion, Co. Cavan
14	Archaeology and Cultural Heritage	Archaeological Consultancy Services Unit (ACSU) 21 Boyne Business Park, Greenhills, Drogheda, Co. Louth, A92 DH99
15	Climate	TMS Environment Ltd 53 Broomhill Drive, Tallaght, Dublin 24
16	Interactions and Cumulative Effects	All Contributors inputted and coordinated by Halston.
17	Major Accidents and Disasters	Halston Environmental & Planning Ltd, IHub Building, Westport Road, Castlebar, Co. Mayo Ireland, F23 K162
18	Schedule of Mitigation	Halston Environmental & Planning Ltd, IHub Building, Westport Road, Castlebar, Co. Mayo Ireland, F23 K162

Note 1 Further information provided in Table 1.2

Other supporting specialist reports have been prepared in addition to, and in support of, certain Chapters of the EIAR.

Table 1.2 Supporting Specialist Reports

Chapter No.	EIAR Chapter	Assessment Report	Author
2	Description of the Proposed Development	Preliminary Construction Environmental Management Plan (CEMP)	Halston Environmental & Planning Ltd IHub Building, Westport Road, Castlebar, Co. Mayo Ireland, F23 K162
		Decommissioning Plan	Halston Environmental & Planning Ltd, IHub Building, Westport Road, Castlebar, Co. Mayo Ireland, F23 K162
		Architects Design Statement	JFA Architects The Tree House, 17 Richview Office Park, Clonskeagh, D14 XR82
3	Need for the Development & Alternatives	Energy Statement and Approach to Sustainable Data Centre Development Carbon Impact Statement & Alignment with LEU Policies	Bitpower Energy Solutions, Dublin 7, D07 P9T0

Chapter No.	EIAR Chapter	Assessment Report	Author
		LEED and Life Cycle Assessment	Meehan Green, 15 Clanwilliam Terrace, Grand Canal Dock, Dublin, D02 AK51
5	Population and Human Health	Economic Assessment report	PMG Consult, Castlebar, Co. Mayo
		Community Benefit Framework Report	
		Outdoor Lighting Report	Daramack Exterior Lighting Design 21 Burandell Manor, Lisburn, Co. Antrim, BT28 3AX
6	Biodiversity	Bat and Bird Surveys	Eire Ecology Moyglass, Loughrea, Co. Galway
		Ecology Report	Moore Group and Eire Ecology 3 Gort na Rí, Athenry, Co. Galway
7.	Soils & Geology	Ground Investigation	Ground Investigations Ireland Ltd, Catherinestown House, Hazelhatch Road, Newcastle, Co. Dublin, D22 YD52
8	Waters	Flood Risk Assessment	Envirologic Unit 49 Baldoyle Industrial Estate, Baldoyle, Dublin 13
		Water Framework Directive Assessment	
9	Material Assets	Telecommunications	Lumcloon Energy, Axis Business Park, Tullamore, Co. Offaly
10	Air Quality	Air Quality Dispersion Modelling Report	TMS Environment Ltd 53 Broomhill Drive, Tallaght, Dublin 24
12	Landscape and Visual	Glint and Glare Report and Photomontages	Macroworks Hibernia House, Cherrywood Business Park, Loughlinstown, Dublin 18
		Landscape Architect Design Statement	
13	Roads and Traffic	Outline Construction Traffic Management Plan (CTMP)	Trasky Limited 1 Dara Court, Celbridge, Co. Kildare This report was prepared by Mr Jason Walsh, BEng (Hons) PCert (RSA) CEng MIEI, who has over 20 years of experience in design consultancies in both Ireland and the UK.
15	Climate	Project Carbon Management Plan (PCMP)	Halston Environmental & Planning Ltd

Chapter No.	EIAR Chapter	Assessment Report	Author
			IHub Building, Westport Road, Castlebar, Co. Mayo Ireland, F23 K162 TMS Environment Ltd 53 Broomhill Drive, Tallaght, Dublin 24

Article 5(3)(a) of amended Directive requires that the developer (applicant) shall ensure that the environmental impact assessment report (EIAR) is prepared by competent experts and that sufficient expertise, in the relevant field of the project concerned, is required for the purpose of its examination by the competent authorities in order to ensure that the information provided by the developer is complete and of a high level of quality.

This EIAR was prepared by Halston on behalf of the applicant. In accordance with EIA Regulations, Halston confirms that experts involved in the preparation of this EIAR are fully qualified and competent in their respective fields. Each expert has extensive proven expertise in the relevant field concerned, thus ensuring that the information provided herein is complete and of high quality. Details of the assessment team (including a short biography for each team member) and relevant company, as well as their respective inputs to the EIAR is presented below.

The EIA team was led and managed by Mr Colm Staunton, BSc., is the owner and founder of Halston Environmental & Planning Limited. Colm is a member and Certified Project Management Associate with the International Project Management Association (IPMA®). Colm's experience predominantly relates to Environmental Planning, Project Management of Environmental Impact Assessments (EIA) and Environmental Due Diligence (EDD). Colm has a long track record of ensuring projects are delivered to a high quality and he has worked as an environmental consultant in Ireland for over 23 years of professional experience and is currently finishing a MSc in Spatial Planning at TUD. Through his professional career, Colm has gained the required expertise and project specific technical knowledge from working as lead consultant and a specialist within multidisciplinary teams, dealing with high profile planning applications and providing expert witness testimony at public enquiries, oral hearings, planning appeals and under oath in courts of law.

Colm has prepared and project managed environmental planning and licensing components for various types of large-scale development including, Powergen projects, Solar Farms, Power-to-Gas (P2G) projects, Biogas and Anaerobic Digestion (AD) projects, Biomass fuelled power plants, and grid connected Energy Storage System (ESS) projects. His academic and professional qualifications and ongoing academic studies in Spatial

Planning coupled with his experience gained of delivering planning and licensing consents for small and large-scale complex projects ensures that he has sufficient; (a) knowledge of the specific tasks to be undertaken, (b) understanding of the project type and impacts which may arise, and (c) the experience and ability to fulfil the role and responsibilities required in carrying out duties and actions under the EIA Directive.

1.6.4.1 Need for the Development & Alternatives

This Chapter of the EIAR were prepared by Colm Staunton (Details are provided above). The Section is supported by an Energy Statement and Approach to Sustainable Data Centre Design which was prepared by Bitpower Energy Solutions. Founded in 2017 by Mr David McAuley, a former SEAI energy specialist, Bitpower has worked with Industry and government over the past decade to bridge Ireland's fast-growing data-centre sector with the country's power and sustainability goal. Bitpower provides advice and guidance to various stakeholders including decarbonisation strategies and energy analysis and research reports for industry in Ireland.

The LEED Assessment and Life Cycle Assessment (LCA) was prepared by Meehan Green (MG), an accredited LEED Provider who specialise on high-performance LEED certification and whole-building life-cycle assessment (LCA). Mr Cathal Heneghan, an Associate Director with MG, LEED AP BD+C & O+M, MSc, and Ms Kat Mazur a LEED and WELL AP were responsible for preparing the assessments. Both are experienced practitioners in a diverse range of projects have n-depth knowledge of sustainable design focusing on the three key areas of embodied energy (LCA), climate resilience and designing to achieve certification through the LEED (Leadership in Energy and Environmental Design) green building rating system.

1.6.4.2 Planning and Policy Context

This Chapter of the EIAR were prepared by Colm Staunton (Details are provided above).

1.6.4.3 Population and Human Health

This Chapter of the EIAR was prepared by Colm Staunton (Details are provided above). The chapter is supported by an Economic Assessment Report and a Community Benefit Framework Report which were prepared Mr Padraic McGuinness BSc Econ, MPA, of PMG Consult who is experienced practitioner in the fields of economic and business consultancy. An Economist by profession, Padraic has worked across Ireland and the UK for the past 24 years on a variety of projects in the areas of economics, sector development, feasibility studies, strategy development and project management. Prior to setting up PMG Consult in 2005 Padraic worked for a number of major economics and management consultancy

practices including DTZ Pieda Consulting and Strategem Ltd as well as some small niche players such as New Media Partners Ltd. Since establishing PMG Consult Padraic has concentrated mainly on Strategy development and Implementation and Project Management contracts for both the private sector and partnership-based clients in the public and community sector. An Outdoor Lighting Assessment and Report has also been prepared by Daramack Exterior Lighting Design who are an independent lighting consultant based in Belfast with over 15 years' experience in exterior lighting design working on projects throughout the UK and Ireland.

1.6.4.4 Biodiversity

This chapter was compiled by Mr Ger O'Donohoe M.Sc. of Moore Group providing information on habitats in the study area. Ger is the principal ecologist with Moore Group and has 30 years' experience in ecological impact assessment. He graduated from ATU Galway in 1993 with a B.Sc. in Applied Freshwater & Marine Biology and subsequently worked in environmental consultancy while completing an M.Sc. in Environmental Sciences, graduating from Trinity College, Dublin in 1999. (He also has over 15 years' experience of carrying out bat surveys and has completed the Bat Conservation Ireland, Bat Detector Workshop which is the standard training for the carrying out of bat surveys in Ireland and follows the Bat Conservation Ireland 'Bat Survey Guidelines' - Aughney *et al*., 2008'. In addition, Ger is an active member of the Galway Bat Group and Bat Conservation Ireland, which monitors bat populations in Ireland, and facilitates the education of bat communities to the public.

Éire Ecology was commissioned to carry out preliminary Bat and Bird Surveys. The work was undertaken by Mr John Curtin of Éire Ecology. John Curtin B.Sc. is the principal ecologist with Éire Ecology and has over 10 years of experience in ecological impact assessment having conducted plant, habitats, birds, bats and mammal surveys since 2010 including at windfarm and solar sites. John conducted bird, bat and badger surveys. Shane O'Neill is an experienced ornithologist (Co-author Hen Harrier Survey, NPWS 2015) with a broad knowledge of breeding birds, waders and all aspects of ornithology. Shane has previously conducted I-WeBS surveys and taken part in the Shannon estuary wintering wader surveys. Laura Hynes has a degree in Wildlife Biology from MTU Kerry and has worked as an ecologist since 2022. Laura has worked as a Curlew officer for the NPWS.

1.6.4.5 Soils & Geology and Waters

The Soils & Geology and the Waters chapters have been prepared by Dr Nick Owen (B.Sc. Hons., M.Sc., Ph.D.), TMS Environment. Nick has over 15 years professional experience

for various different types of development and has a doctorate in Geology along with over 15 years of postdoctoral experience in Earth and Environmental science.

These chapters of the EIAR are supported by a ground investigation assessment carried out by Ground Investigations Ireland Ltd (GII) located at Catherinestown House, Newcastle, Co. Dublin. GII has a team of engineering geologists, geotechnical engineers and drillers who deliver intrusive ground investigations and environmental due-diligence services nationwide. Core field techniques include trial pitting, slit trenching, cable-percussion and rotary coring (Geobore-S), dynamic probing, window sampling, groundwater/gas monitoring and in-situ testing; samples are processed in the company's own laboratory for full geotechnical and contamination suites.

Flood Risk Assessment (FRA) reports and a Water Framework Directive (WFD) Assessment Report, supporting the waters chapter, were undertaken by Envirologic. Both reports were prepared by Cian O'Sullivan of Envirologic Ltd and reviewed by Dr Colin O'Reilly. Cian has an undergraduate degree in Earth Sciences and a master's degree in Water, Waste and Environmental Engineering, awarded by the School of Civil Engineering, UCD. He was the recipient of the Michael Mac Carthaigh research project award for his work on hydrological modelling in various climate change scenarios. He has four years' professional and field based experience working in the field of Hydrology. Cian is an active member of the International Association of Hydrogeologists (Irish Group). Dr Colin O' Reilly, who is the founder and owner of Envirologic has over ten years of professional experience as a hydrogeologist, coupled with a doctorate degree (awarded by the Centre for Water Resources Research, School of Architecture, Landscape and Civil Engineering, University College Dublin) and academic research at postdoctoral level. Colin is an active member of the International Association of Hydrogeologists (Irish Group), having sat on the conference sub-committee between 2009-2012 and served as Conference Secretary in 2013 and 2014. Envirologic has key competencies in hydrogeology (groundwater) hydrology (surface water) and Flood Risk Assessments.

1.6.4.6 Material Assets

This Chapter of the EIAR were prepared by Colm Staunton (Details are provided above). The chapter is supported by a telecommunications report prepared by Lumcloon Energy Limited.

1.6.4.7 Air Quality

This Chapter of the EIAR was prepared by Dr Imelda Shanahan TMS Environment Ltd who has over 30 years professional experience in preparing assessments of this type for various

different types of development. Imelda has a BSc (Hons) in Chemistry from University College Dublin and a PhD in Physical Chemistry, she is a Chartered Chemist and a Fellow of the Institute of Chemistry of Ireland and a Fellow of the Royal Society of Chemistry. Imelda was assisted in the preparation of this chapter by Nathaniel Blue, also of TMS Environment Ltd who has four years of post-qualification experience in environmental assessment and holds a BS Environmental Science Seattle University and MSc Environmental Sciences Trinity College Dublin.

1.6.4.8 Noise and Vibration

This Chapter of the EIAR was undertaken by Ms. Siobhán Maher whose qualifications include a B.Sc. in Analytical Science, M.Tech. in Environmental Management and a post graduate Diploma in Acoustics and Noise Control Engineering. Siobhán is a full Member of the Institute of Acoustics (MIOA) since 2002, is a committee member since 2020 and is also a Member of the Association of Acoustic Consultants Ireland (AACI). Siobhán is the Managing Director of Redkite Environmental with over 20 years of experience providing environmental consultancy and environmental assessment services to business, industry and public sectors. In acoustics, she has experience in a range of areas but primarily specialising in noise and vibration impact assessment for new and proposed developments, environmental noise monitoring and prediction modelling and development of mitigation measures for noise abatement and control.

1.6.4.9 Landscape and Visual

This LVIA was prepared by Mr Cian Doughan, Associate Director at Macro Works Ltd of Cherrywood Business Park, Loughlinstown, Dublin 18; a consultancy firm specialising in Landscape and Visual Assessment and associated maps and graphics. Macro Works' relevant experience includes a broad range of infrastructural, renewable energy, industrial and commercial projects since 1999, including numerous urban, residential, and mixed-use development projects. The chapter is supported by Appendices 12.1 to 12.7 also prepared by Macro Works Limited which includes; landscape and biodiversity mitigation plans, photomontages, glint and glare assessment report, landscape architects design statement, and landscape architect FI response statement.

1.6.4.10 Traffic and Transport

This Chapter of the EIAR was undertaken by Mr Matthew Steele BA (Hons) MSc FCILT FRGS MCIHT, company director of Traffic Transport and Road Safety Associates Ltd (TTRSA) and an established specialist traffic and transportation consultant based in Ireland. Matthew: graduated from the University of Westminster in 1998, with a master's degree in Transport

Planning and Management; is a Chartered Fellow of the Chartered Institute of Logistics and Transport; a fellow of the Royal Geographical Society; and a member of the Chartered Institution of Highways and Transportation. Matthew has extensive national and international experience, working on numerous traffic, transport and development related projects in the public and private sectors, including access studies; specialist input into Strategic Environmental Assessments; and preparation of traffic and transportation related sections of Environmental Impact Assessments for specific schemes including extractive industries and energy related developments.

As part of EIAR Addendum works, Mr Jason Walsh, BEng (Hons) PCert (RSA) CEng MIEI, (Trasky Limited) prepared an Outline Construction Traffic Management Plan (CTMP) to support the planning application. Jason has over 20 years of experience in design consultancies in both Ireland and the UK.

1.6.4.11 Cultural Heritage and Archaeology

This chapter was prepared by Mr Donald Murphy and Ms Magda Lyne of Archaeological Consultancy Services Unit. Donald Murphy (BA(Hons), MA, MIAI) is the founder and Managing Director of Archaeological Consultancy Services Unit Ltd, with over 30 years of experience as an archaeological consultant. Donald has completed EIARs for a variety of projects across Ireland and has managed the archaeological work in advance of several large infrastructural schemes, such as the M3 and M4 motorways. Magda Lyne (MA, MIAI) is an Archaeologist with over 15 years of experience. She specialises in research and report production, with extensive experience in preparing cultural heritage impact assessment chapters for Environmental Impact Assessment Reports (EIARs).

1.6.4.12 Climate

This Chapter of the EIAR was prepared by Mr Tom Ryan of TMS Environment Ltd who has over 20 years professional experience in environmental monitoring and consultancy. Tom specialises in Air Quality and Climate Impact Assessment, Noise and Vibration Impact Assessment and also works in Environmental Risk Assessment and Waste Management. Tom has an MSc. in Environmental Science, University College Cork (1995), a BSc. in Chemistry, University College Cork (1993) Certificate of Competency in the measurement and assessment of Occupational Noise (2000). The chapter is supported by the Project Carbon Management Plan (PCMP), the LEED and Life Cycle Assessment Report, the Energy Statement and Approach to Sustainable Data Centre Development Report and the Carbon Impact Statement & Alignment with LEU Policies Report.

1.7 APPROPRIATE ASSESSMENT

Appropriate Assessment (AA) is an assessment carried out under Article 6(3) of the Habitats Directive. Article 6(3) of the Habitats Directive states:

> *"Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."*

Stage 1 AA screening of the projects was completed. A report for the purposes of Appropriate Assessment Screening has been completed for the project and is provided under separate cover in support of the planning applications. An updated report for the purposes of Appropriate Assessment Screening has also been completed and is submitted as part of the response to the further information request issued by Westmeath County Council on 01 September 2025.

1.8 PLANNING STAGE DESIGN AND ENGINEERING DRAWINGS

Design of the proposed development has been undertaken by Halston in association with the applicant company, JFA Architects and Lally Engineering. In addition to the core design team, the design process was informed by contributions from, among others, the EIA specialists, electrical engineering specialists and technology manufacturers and suppliers.

1.9 AUTHORISATIONS AND LICENSES

1.9.1 CRU AUTHORISATIONS AND LICENCES

The Electricity Regulation Act, 1999 as amended (the Act) gives the Commission for Regulation of Utilities (CRU) the necessary powers to licence and regulate the generation, distribution, transmission, and supply of electricity in Ireland. One of the functions of CRU under the Act is to grant or refuse Authorisations to Construct or Reconstruct generating stations and issue generation licences. Therefore, the applicant will, will in due course, apply to the CRU for the necessary authorisations and licences associated with the project.

1.9.2 EPA INDUSTRIAL EMISSIONS LICENSING

Although the fuel cell does not involve combustion, it is expected that it will require an industrial emissions licence from the EPA. EU guidance on both the IED and the ETS makes clear the oxidation of a fuel, not the presence of a flame, that brings an installation into the "combustion" category, i.e., it falls under a class of activity ("*Combustion of fuels in installations with a total rated thermal input of 50 MW or more*") as outlined in the first schedule of the EPA Act 1992, as amended.

When applying to the Environmental Protection Agency (EPA) for an Industrial Emissions licence a number of legislative requirements must be fulfilled. These are largely set out in:

- EPA (Industrial Emissions) (Licensing) Regulations, 2013 (S.I. No. 137 of 2013),
- European Union (Industrial Emissions) Regulations, 2013 (S.I. 138 of 2013),
- The EPA Act 1992, as amended.

The applicant will consult and apply, if necessary, to the EPA for an Industrial Emissions (IE) licence should the planning application for consent be successful.

1.10 GREENHOUSE GAS PERMIT

The EU emissions trading system applies to certain types of activity which produce greenhouse gases. The EPA has been given the responsibility for implementing the Emissions Trading Directive in Ireland. The Directive establishes an allowance-trading scheme for emission to promote reductions of greenhouse gases, in particular carbon dioxide. These activities are listed in Annex 1 of the EU ETS Directive. Annex 1 includes activities which involve combustion of fuels in installations with a total rated thermal input exceeding 20MW. Therefore, the applicant will consult and apply to the EPA for a greenhouse gas permit should the planning application for consent be successful.

1.11 ENERGY STATEMENT & APPROACH TO SUSTAINABLE DATA CENTRE DEVELOPMENT

An Energy Statement and Approach to Sustainable Data Centre Development has been prepared by Bitpower Energy Solutions to support this planning application. The study acknowledges the scale of the site which allows for development of a collocated decentralised energy system (DER). The report presents the results of modelled operational scenarios and calculates the annual energy and emissions characteristics based on grid and solar data for 2023. The model has inputted into design of the project

and provides a rationale for making technology decisions and assisted with optimising the design. Key attributes of the project as outlined in the report are as follows:

1. The project is proposed by a proven utility developer with experience in the Irish energy system.
2. The project is designed to have no adverse impact on the national electricity grid.
3. The project is not in a constrained grid location and because of its proximity (adjoining) the Castlelost Flexgen Power Plant and GIS substation, no new powerlines are needed beyond the site boundary.
4. The proposed DER can help reduce national curtailment of renewables by offering flexibility – It can draw and store electricity at times of high wind generation using the 500 MWh Battery Energy Storage System (BESS) and it can operate off-grid.
5. The project provides at least a 9.7% improvement on emissions per kWh of electricity used, with up to 62.9% improvement at lower demand levels. The project is designed so that hourly emissions data can be monitored and reported.
6. The DER includes a 180 MWp of on-site renewable generation commercial-scale solar photovoltaic farm collocated at the DC facility site
7. The low emissions[3] Fuel Cell ensures efficient electricity generation (58.5%) on site using electro chemical conversion, which converts chemical energy into electricity without combustion. Total efficiencies are further increased (~80%) when exhaust heat is recovered and used for cooling functions at the DC facility. The Fuel Cell technology allows for a smooth transition for integration and use of renewable gas (such as biomethane) and blends of hydrogen in the gas network.

An updated report (dated 27 February 2026) was prepared by Bitpower entitled *"Carbon Impact Statement & Alignment with National Large Energy User Policies".* This (Updated Report) expands on the analysis prepared for the planning application to describe the operational energy demand and carbon emissions. Since the original application was made in July 2025, a number of policy documents have been issued. The CRU issued their new Large Energy User connections policy criteria for data centres in December 2025. The Red Admiral Decentralised Energy Resource (DER) concept generally aligns with the provisions in the new policy, as outlined in this document. This report is provided in Appendix 3.3 to this EIAR.

[3] Eliminates NOx, SOx and particulate matter emissions that arise from combustion-based generation and produces lower CO_2 emissions than conventional natural gas turbines or other fossil fuel base generators.

1.12 LEED AND LIFECYCLE ASSESSMENT (LCA)

To inform the design, project undertook LEED pre-assessment to assist with LEED certification under the LEED BD+C v4 Rating System for Data Centres. The project pursues LEED Campus Approach, which is tailored for the projects involving multiple buildings within a single development site. Campus approach allows for efficiency in certification process as shared site features (e.g., stormwater management, landscaping, renewable energy, parking) can be documented once and applied across multiple buildings. The LEED assessment report is contained in Appendix 3.2 of the EIAR (Volume 3).

To alignment with the project's commitment to evaluate every design alternative against technical feasibility, environmental performance, efficiency, security, reliability and cost, a dedicated piece of embodied-carbon modelling was undertaken. The exercise complements the Energy Statement and Sustainable Data-Centre Development Plan which supports this planning application and, together with the DER strategy, provides a full picture of how the scheme will minimise greenhouse-gas (GHG) emissions across both construction and operation.

A Project Carbon Management Plan (PCMP) has also been prepared and is provided in Appendix 15.1 to this EIAR. The report sets out how greenhouse gas (GHG) emissions will be managed across the whole life of the proposed development. It has been prepared for planning purposes and follows the intent and requirements of PAS 2080 (Carbon Management in Infrastructure).

1.13 ECONOMIC STATEMENT

An Economic Assessment report has been prepared by PMG Consult to support this planning application. The project will provide between 600-650 monthly construction jobs over the five-year construction period and up to 440 workers will be directly employed during operations across the DC facility and DER. The report forecast project will deliver a significant economic contribution to the Local and Midlands regional economy including annual gross value added (GVA)[4] of €118m to the economy.

[4] Gross Value Added (GVA) represents the project's total annual economic contribution, including the additional circulation of investment throughout the local and regional economy. By capturing these spending "multiplier" effects, GVA also serves as a proxy for the indirect and induced jobs sustained during the scheme's operational phase.

1.14 AVAILABILITY OF INFORMATION & DIFFICULTIES ENCOUNTERED

There were no significant difficulties encountered in the preparation of the EIAR.

Figure 1.4 Site Layout showing DC Facility and DER

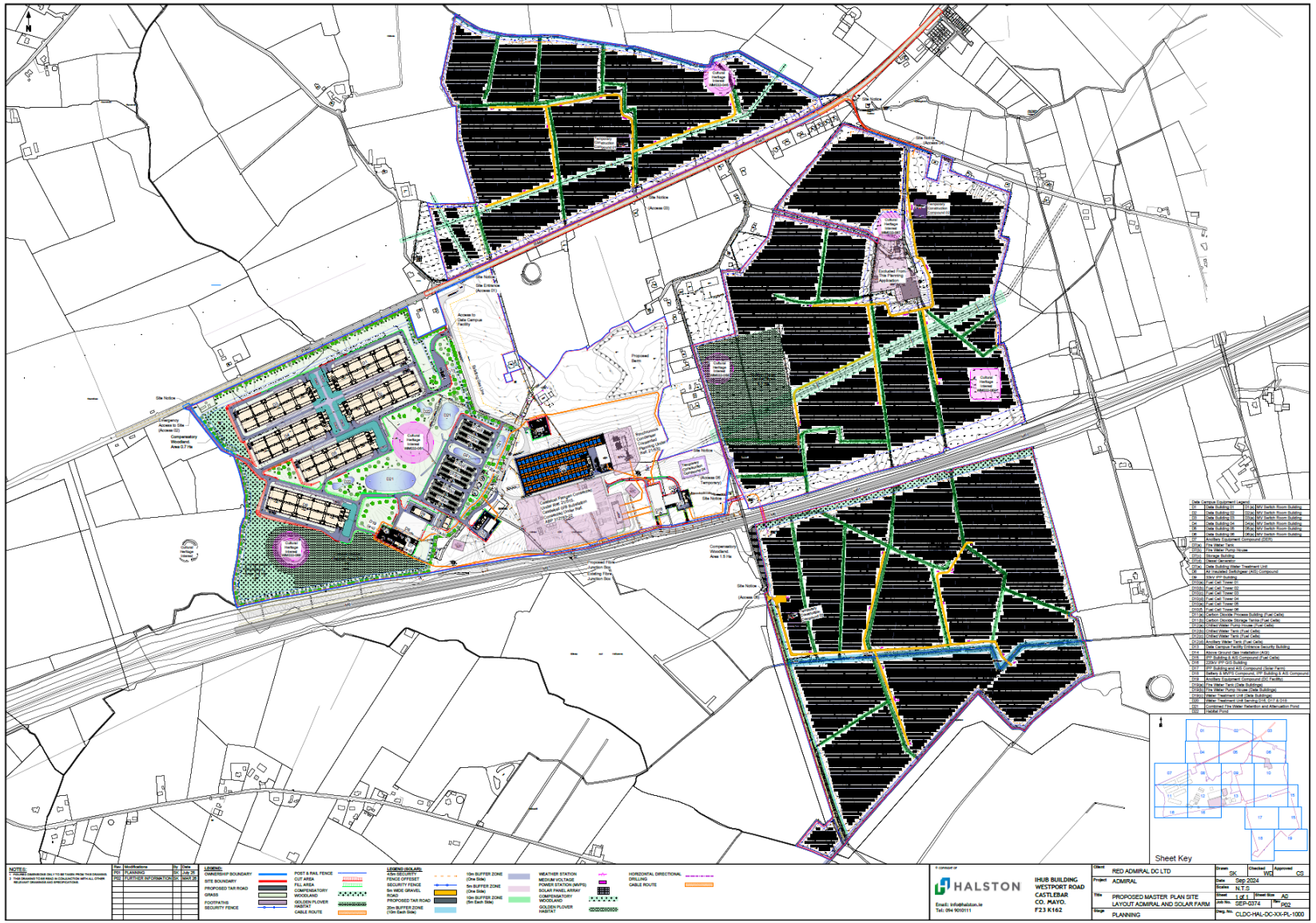


Figure 1.5 Landscape and Biodiversity Mitigation Plan – DC Facility and Western Part of DER)

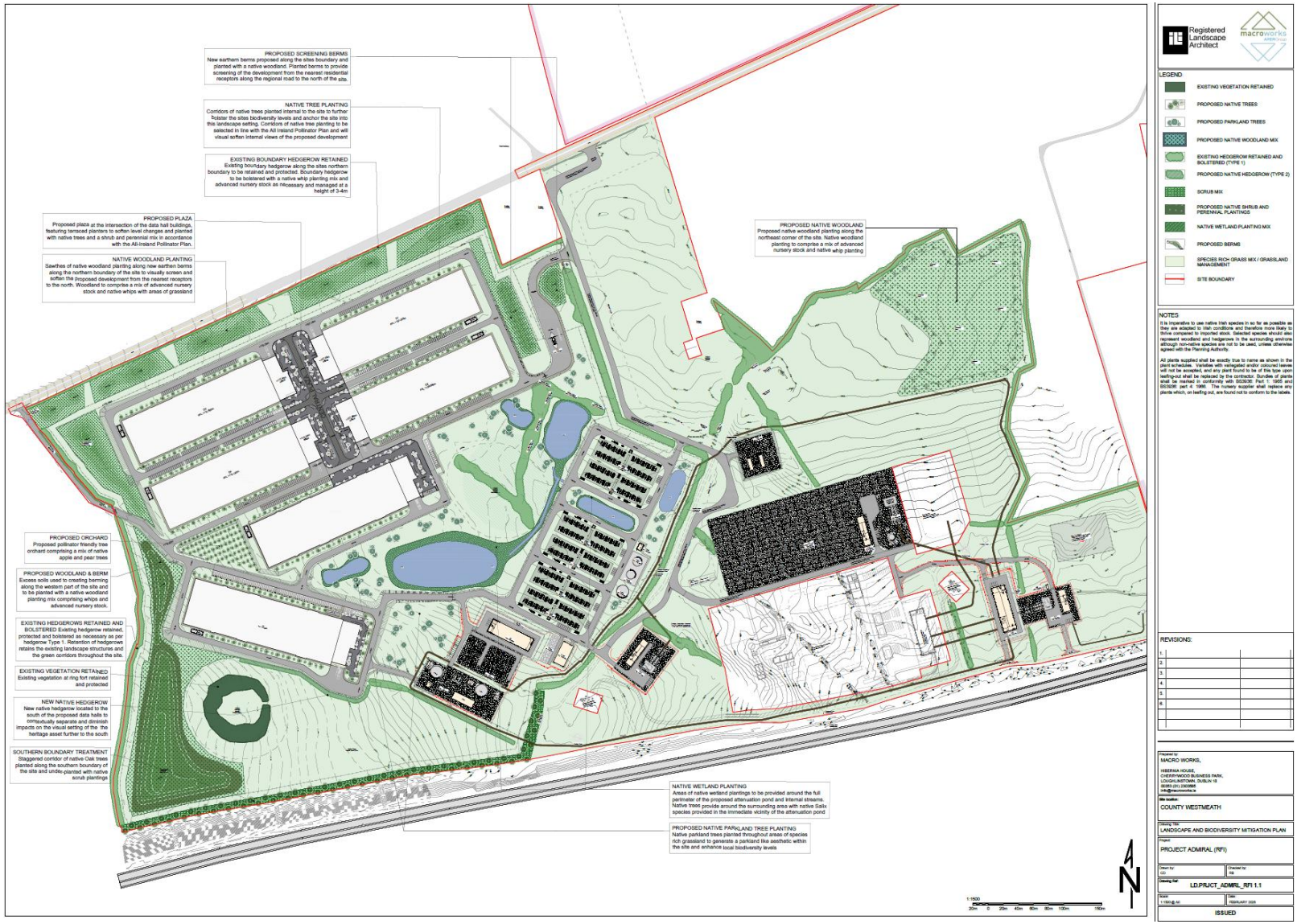


Figure 1.6 Landscape Plan – Proposed DC Plaza

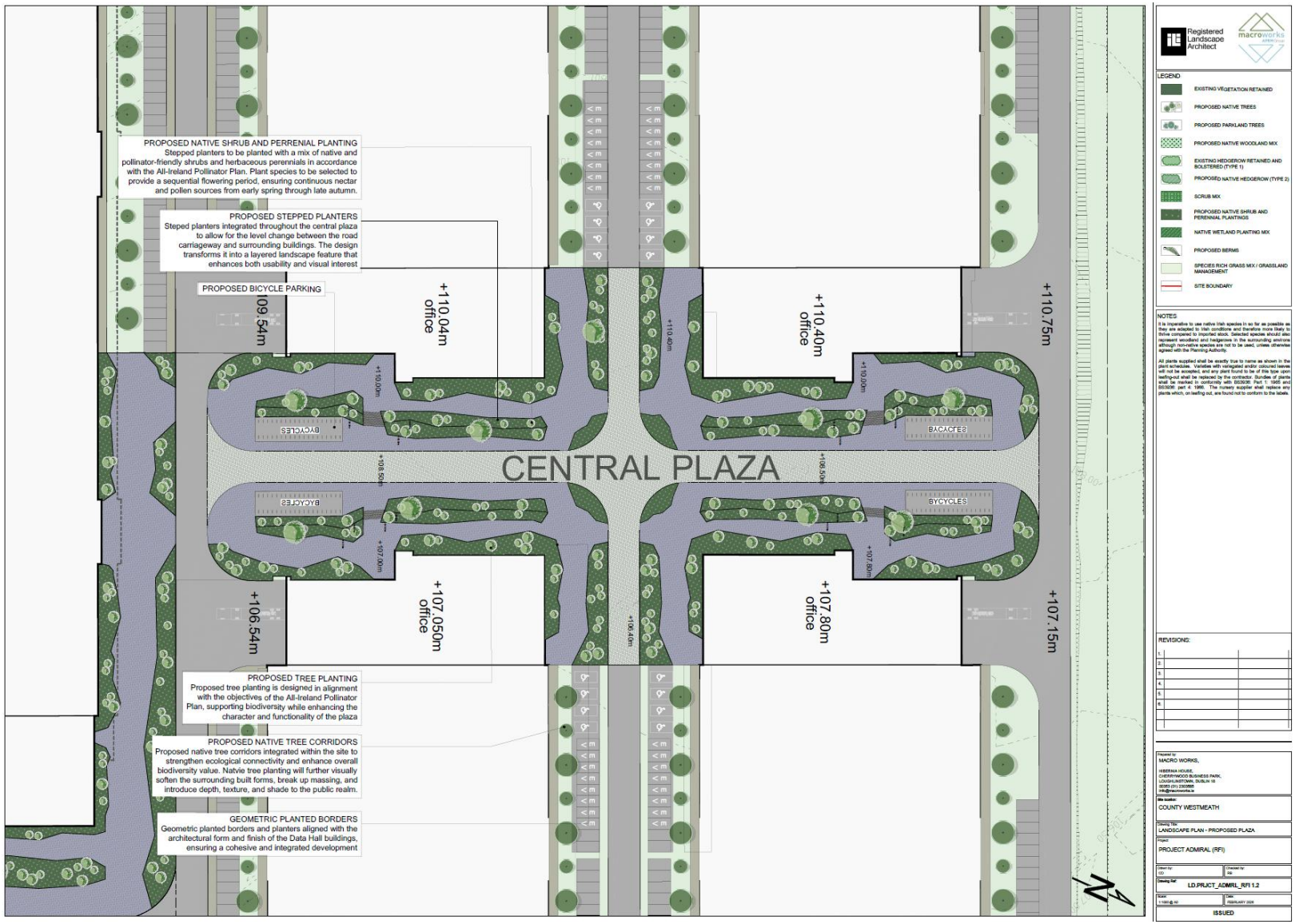


Figure 1.7 Landscape and Biodiversity Mitigation Plan – Solar Farm

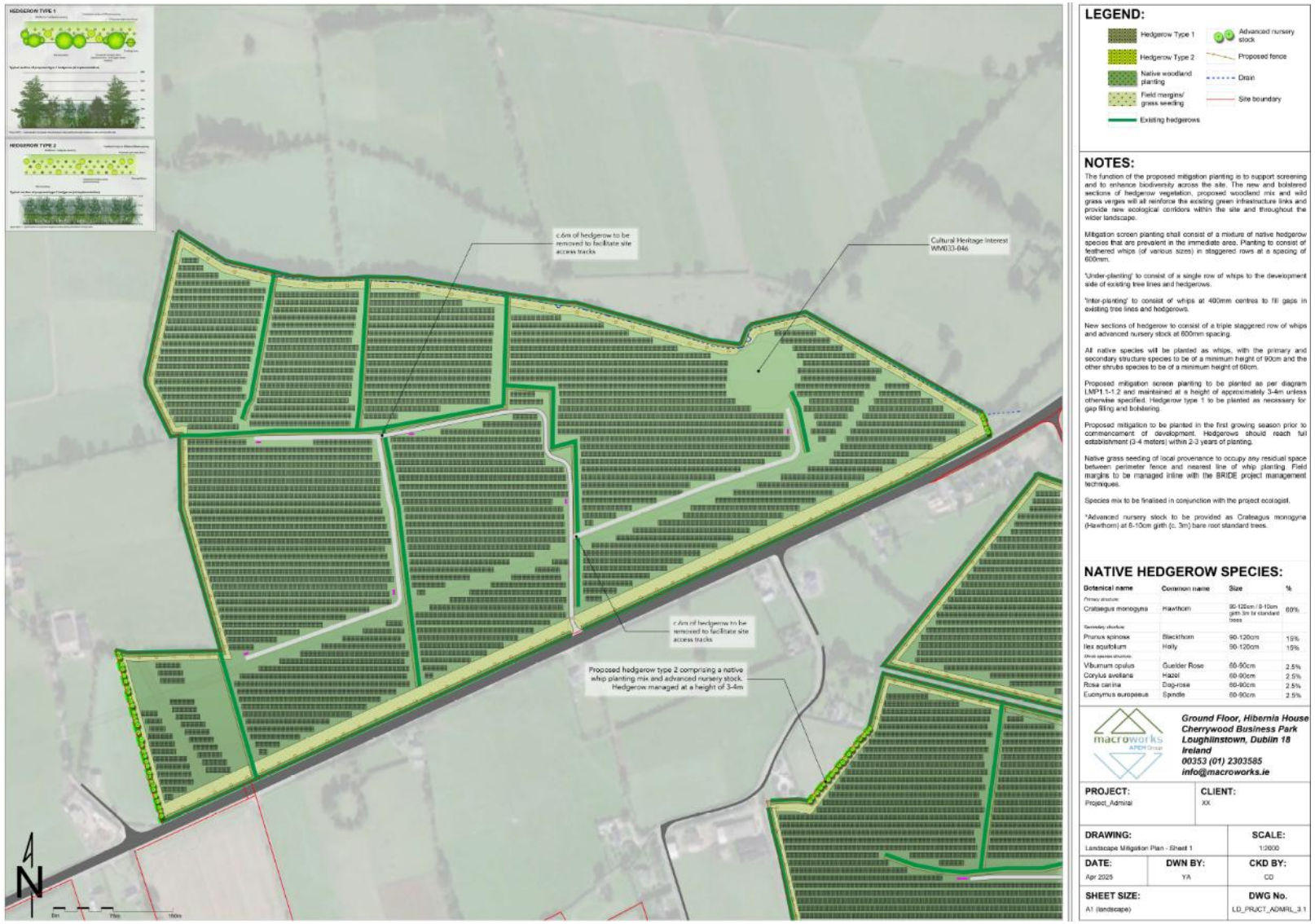
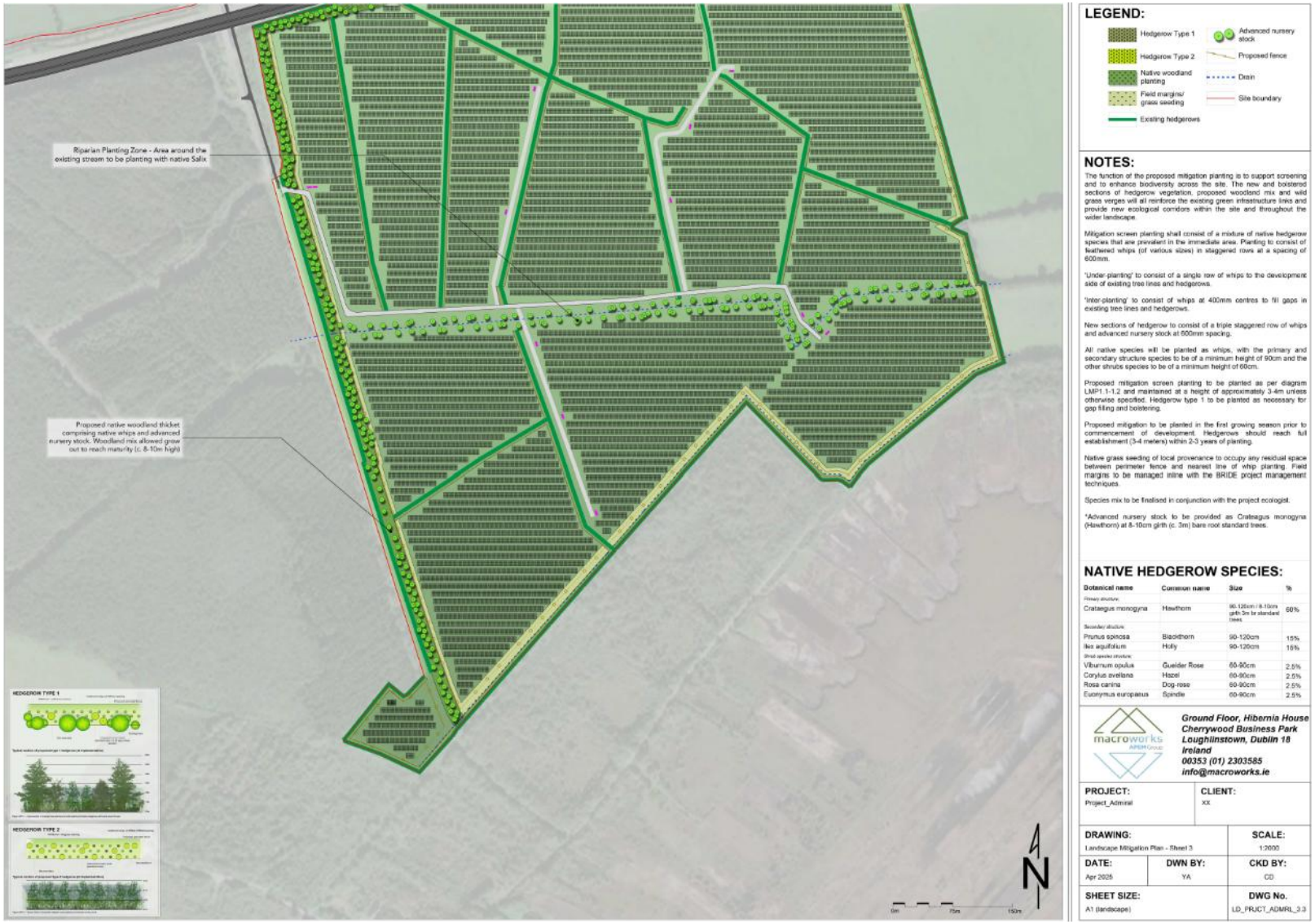


Figure 1.8 Landscape and Biodiversity Mitigation Plan – Solar Farm



Figure 1.9 Landscape and Biodiversity Mitigation Plan – Solar Farm



2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

2.1 INTRODUCTION

This chapter of the EIAR provides of a description of the Project in line with the requirements of the EIA Directive and implementing regulations, and the Environmental Protection Agency (EPA) *Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)* (May 2022).

As set out in Chapter 1, the Admiral Project includes two main elements, namely:

1. The Data Centre (DC) facility, comprising six two-storey Data Centre buildings, car parking, landscaping, drainage and other associated works. The DC facility will be constructed and secured within a 39ha campus. Each DC building will have a footprint of 13,978m^2 (sqm). Each DC building will contain:

    (a) Data halls fitted with server racks and distribution units,

    (b) Mechanical and electrical (M&E) plant rooms /spaces which will house advanced cooling equipment, pumps, piping and medium voltage (MV) and low voltage (LV) switchgear, and

    (c) Administration and support areas including, reception, offices, meeting rooms and welfare facilities.

2. Decentralised Energy Resource (DER), which will be constructed across approximately 200ha of lands adjoining the DC facility. The DER incorporates several power assets which will generate, store and manage electricity close to the DC facility. The DER comprises the following assets:

    (a) Fuel Cell Power System – 160MW,

    (b) Battery Energy Storage System (BESS) – 250MW,

    (c) Solar PV farm (nominal 180MWp), and

    (d) Grid connection to the 220kV Castlelost GIS substation, which adjoins the proposed development site.

The DER will optimise the use of these assets to support operations at the DC facility and provide clean, dedicated power that tracks the DC facility's load requirements. The project has been designed to conform with the Irish Government's *Principles for Sustainable Data-*

Centre Development[5] which details a set of national principles that should inform and guide decisions on future data centre development.

The DC facility and DER together constitute the "project" for the purposes of Environmental Impact Assessment (EIA) and Appropriate Assessment (AA), and references to the "Project" in this EIAR should be read as references to the two applications taken together as one project.

2.2 DESCRIPTION OF LOCATION AND CONTEXT

The proposed project location occupies a strategic position in the Eastern and Midlands region of Ireland. The project site lies midway between the villages of Rochfortbridge and Tyrrellspass and within the Eastern and Midland Regional Assembly's "*Dublin Hinterland*" growth belt. The overall c.243ha project site incorporates lands in the townlands of, Gneevebane, Oldtown, Farthingstown, Castlelost and Kiltotan and Collinstown in the south of County Westmeath, approximately 76km from Dublin city centre and 100km from Galway.

The M6 provides direct motorway access from the development to Dublin and Galway (Junction 3 Rochfortbridge and Junction 4 Tyrrellspass /N52). The R446 regional road (former N6) runs parallel and north of the M6 linking the village of Tyrrellspass and Rochfortbridge. The road was downgraded to a regional road after the M6 was opened and offers an alternative route between Galway and Dublin. The N52 national secondary road routes north from Junction 4 Tyrrellspass (2km west of the development site) connecting Dundalk to Nenagh. It is an important link between the northeast and mid-west of Ireland, providing a route through the midlands. The R400 regional road connects Rochfortbridge to Edenderry and the M4.

The project location and relationship to the regions principal towns as summarised below fits comfortably within the spatial hierarchy of the Eastern and Midlands Regional Assembly (EMRA) Regional Spatial & Economic Strategy (RSES), enabling balanced regional growth.

- Athlone (Regional Growth Centre) lies 50 km west: a key node between Dublin and Galway on the River Shannon, Athlone has direct national connectivity to towns such as Longford, Mullingar, Tullamore, Maynooth, Portlaoise, Ballinasloe and Roscommon. Due to its scale of population, employment and services, Athlone

[5] Government of Ireland, Department of Enterprise, Trade and Employment (2022) *Government Statement on the Role of Data Centres in Ireland's Enterprise Strategy: Principles for Sustainable Data-Centre Development*. Dublin: Department of Enterprise, Trade and Employment.

acts as a key regional centre for an extensive catchment that extends into the Northern and Western Region.

- Mullingar (Gateway Region Key Town), the county town of Wesmeath, is 16km to the north-east and operates as a strong economic driver in the region covering a relatively wide catchment. Mullingar is strategically located on the N4/M4 from Dublin to Sligo, with a national road the N55 to Athlone in proximity. The town is located on the Dublin to Sligo rail line.
- Tullamore (Gateway Region Key Town) is 25km to the south-east and acts as a key population and employment centre for the surrounding hinterland. It is located on the Dublin to Galway rail line, in close proximity to the M6 Dublin/Galway Motorway. The town has a high ratio of jobs to resident workers, reflecting its role as an employment centre and the extent of its area of influence. Continued employment and population growth coupled with placemaking and regeneration are key priorities for Tullamore, as identified in the EMRA RSES, 2019-2031.
- Maynooth (Gateway Region Key Town), is 52km east of the site and extends the corridor to the edge of the Dublin Metropolitan Area, reinforcing the logic of locating new "step-out" investment along high-capacity, multi-modal corridors.
- Kinnegad (Self-Sustaining Growth Town) is 16km east of the site and is strategically located at the junction of the M4 and M6, Kinnegad has witnessed a significant increase in population in recent decades

The development lands are greenfield and described as agricultural farmland laid out in medium to large-sized, geometric fields enclosed by dense, mature hedgerows. The development lands share the gently undulating topography typical of the Midlands low plateau, ranging from c. 90m OD in the south-east and rising to c. 120m OD in the north-west (close to the R446). The highest feature in the general area of the site is Croghan Hill (234 m OD), which is located approximately 6.3km southeast of the site.

According to 2022 Census data, the population of the village of Rochfortbridge is 1,511 and a population of 524 was recorded in the village of Tyrrellspass. Outside these villages, settlement is dispersed and linear, comprising single dwellings and small clusters strung along the R446, R400 N52 and a network of local roads.

The M6 motorway runs defines the southern boundary of the DC facility campus and the R446 regional road defines the northern boundary of campus. The Fuel Cell and BESS power assets of the DER extend east from the DC facility and are positioned on lands surrounding the Castlelost Flexgen Plant and GIS Substation. The Solar PV asset is located east of the L51251 public road and contains solar photovoltaic (PV) panels on ground mounted frames /support structures positioned with existing field boundaries. The Solar

PV farm extends to lands south of the M6 motorway and to lands north of the R446 regional road.

The Castlelost Flexgen Plant, which adjoins the development lands, comprise five (5no.) open cycle gas turbine (OCGT) electrical generating units, totalling approximately 275MWe (megawatts electrical), ancillary plant, buildings and infrastructure. The Flexgen Plant, which is under construction and due to be completed in Q3 of 2025, is designed to operate intermittently and provide generating capacity by combusting natural gas and provided power to the electricity system during periods of high demand or when renewable energy cannot meet demand. The Flexgen Plant is connected to the electricity system via the newly constructed Castlelost 220kV Gas GIS substation.

Figure 2.1 Aerial View of the Castlelost Flexgen and GIS Substation (June 2025)



The development site includes for the demolition and removal of minor agricultural buildings and associated outhouses and farm sheds (see Figure 2.2 to Figure 2.6) within the site.

Figure 2.2 Drawing of sheds and outhouses to be demolished

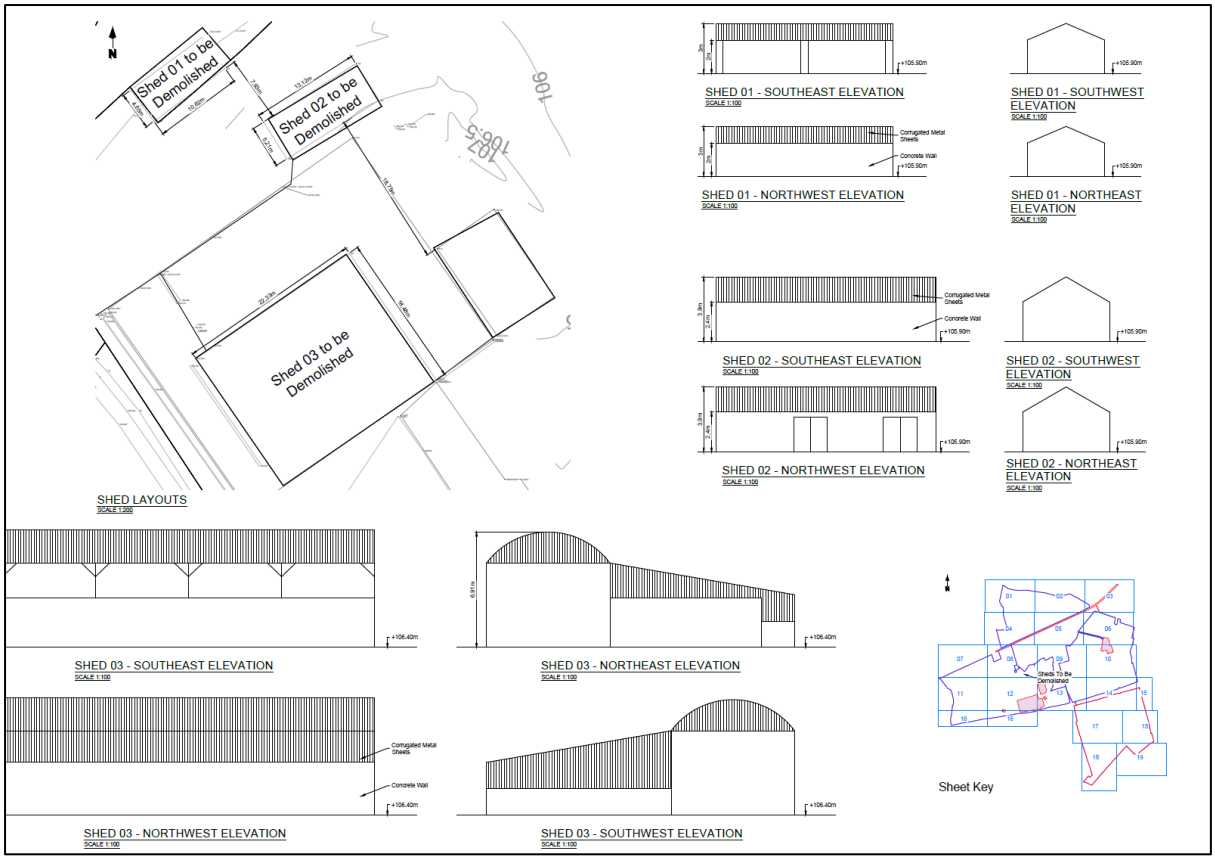


Figure 2.3 Photograph of sheds and outhouses to be demolished



Figure 2.4 Drawing of Derelict dwelling to be demolished

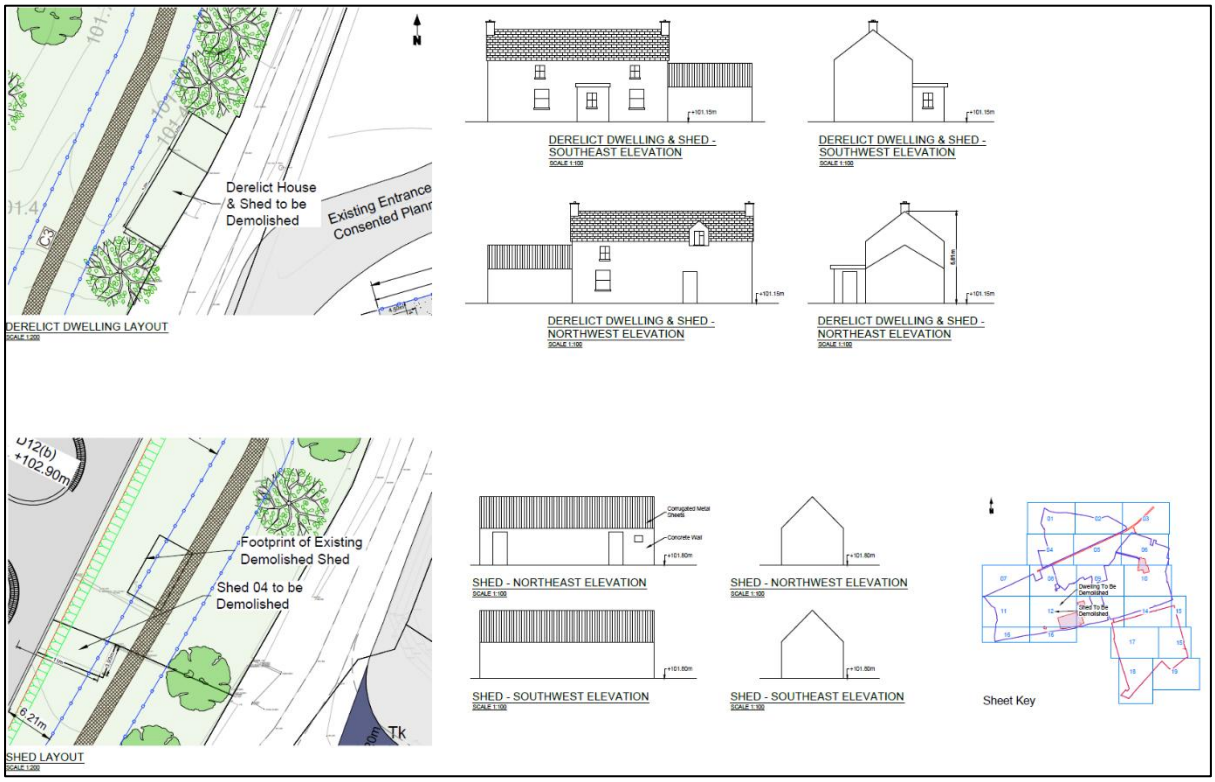


Figure 2.5 Photograph of derelict dwelling to be demolished



Figure 2.6 Photograph shed and derelict structure to be demolished



Figure 2.7 Site Location (1:50,000)



Figure 2.8 Site Location Map (1:2,500)

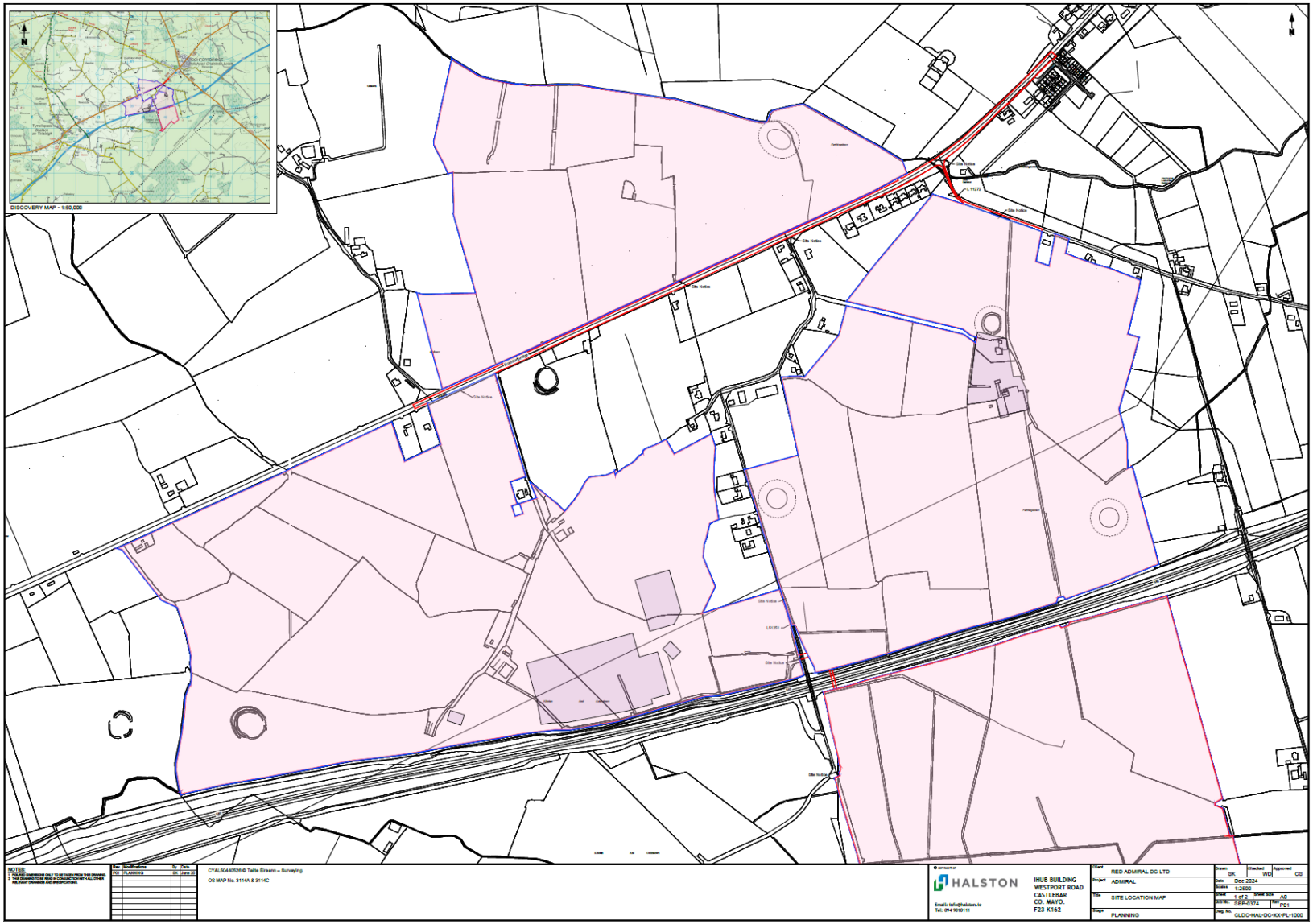
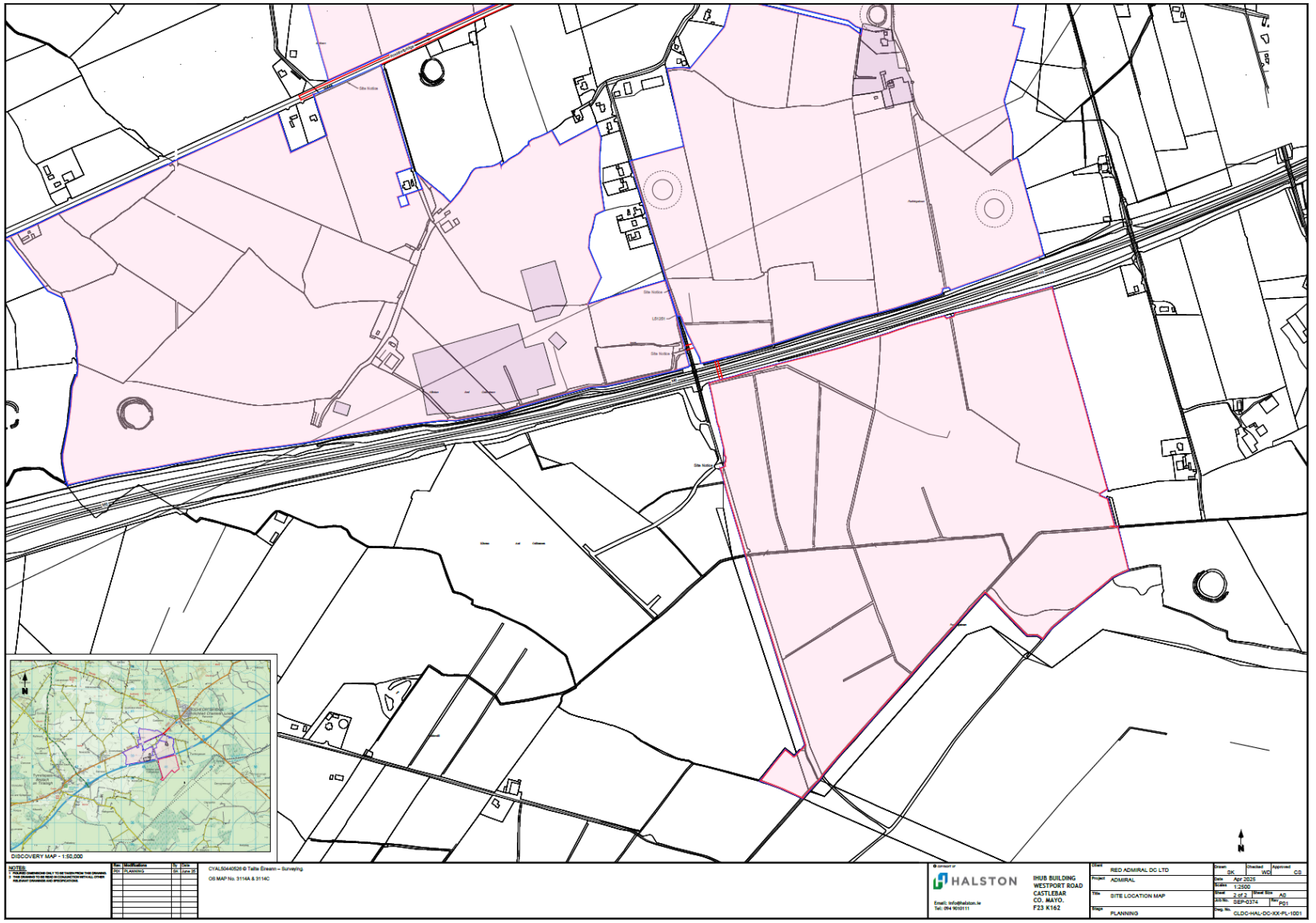


Figure 2.9 Site Location Map (1:2,500)



2.3 DESCRIPTION OF DEVELOPMENT

Red Admiral DC Limited propose to develop a DC facility and DER on lands in the townlands of Gneevebane, Oldtown, Farthingstown, Castlelost and Kiltotan and Collinstown in the south of County Westmeath. The project includes two main elements, namely:

1. The Data Centre (DC) facility, comprising six two-storey Data Centre buildings, car parking, landscaping, drainage and other associated works. The DC facility will be constructed and secured within a 39ha campus. Each DC building will have a footprint of 13,978 m^2 (sqm) and have a gross floor area of 26,871 sqm. Each DC building will contain:

    - Data halls fitted with server racks and distribution units,
    - Mechanical and electrical (M&E) plant rooms /spaces which will house advanced cooling equipment, pumps, piping and medium voltage (MV) and low voltage (LV) switchgear, and
    - Administration and support areas including, reception, offices, meeting rooms and welfare facilities.

2. Decentralised Energy Resource (DER), which will be constructed across approximately 200ha of lands adjoining the DC facility. The DER incorporates several power assets which will generate, store and manage electricity close to the DC facility. The DER comprises the following assets:

    - Fuel Cell Power System – 160MW,
    - Battery Energy Storage System (BESS) – 250MW,
    - Solar PV farm (nominal 180MWp), and
    - 220kV IPP GIS Grid connection to the 220kV Castlelost GIS substation which adjoins the proposed development site.

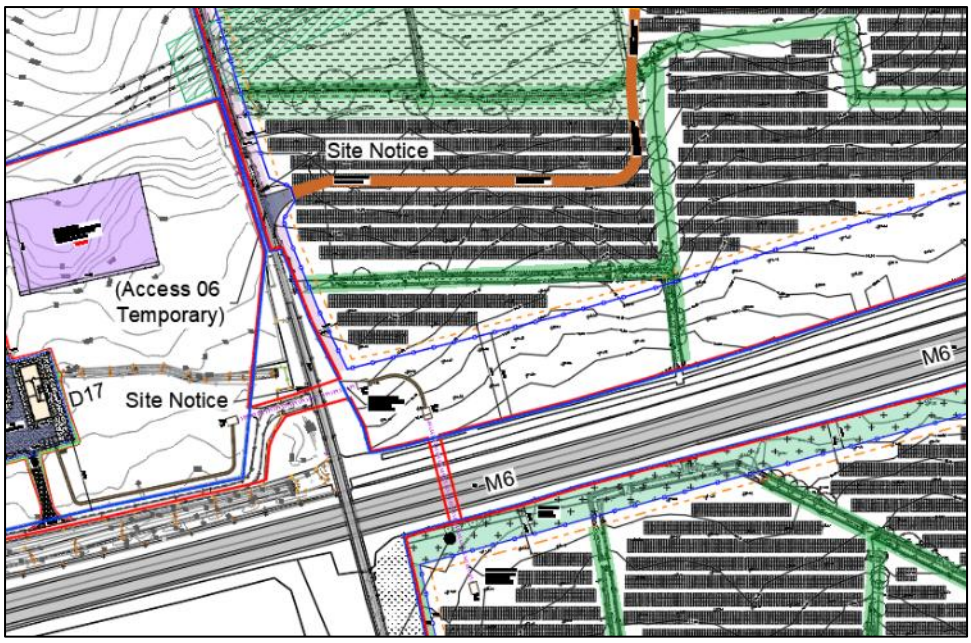
The DC facility and components of the DER (Fuel Cell, BESS and 220kV IPP) project will be accessed from the R446 regional road via an existing private lane, which currently provides access to the Castlelost Flexgen Power Plant and Castlelost GIS. An emergency access to the DC facility in the northwestern corner of the development lands is also provided but will remain closed, i.e. it is designed for fire-service use and will be subject to security inspections. It therefore has no material impact on local traffic, noise, or residential amenity. Three separate entrances are proposed providing access to the Solar Farm (from the R446 for the northern parcel, from the L11272 for the middle parcel and from a private laneway south of the publicly owned L51251 for the southern parcel).

Figure 2.10 Project Site Access Locations



Rather than routing construction traffic south along the L51251 from the R446, it is proposed to provide an access way through the middle parcel (Phase 1) of the solar farm exiting onto the L51251 (shown as temporary access point 06) south of residential properties further north. No construction traffic will be permitted to route from or to the R446 from the proposed new access point along the L51251.

Figure 2.11 Temporary Access 06 to L51251



2.4 DATA CENTRE FACILITY

2.4.1 DESCRIPTION

The Data Centre (DC) facility comprises six (6no.) data centre buildings, associated medium-voltage (MV) switchroom buildings, car parking, a 33kV IPP Building and AIS Compound, ancillary equipment compounds, internal access roads, landscaping, drainage and all associated site development works. The DC facility will be developed within an overall site area of approximately 48 hectares, with the principal campus arranged within a secure area of approximately 39 hectares.

The layout of the DC campus has been refined in order to improve the relationship of the development with the R446 corridor, adjoining residential boundaries and the surrounding rural landscape, while maintaining the operational, traffic and emergency access requirements of the facility. The arrangement increases the setback of the data centre buildings closest to the R446 from approximately 49 metres (m) to 75m. This has been achieved through rationalisation of the internal campus arrangement, including refinement of building spacing, internal service routes and associated parking and circulation areas. The additional separation enables a materially wider landscape buffer along the R446 frontage and in the vicinity of nearby residential boundaries. That buffer will accommodate enhanced structural planting, native tree and shrub species, retained hedgerows where feasible, and soft landform modelling /berming so that the campus presents a more recessive and better-screened edge to the public road corridor.

The architectural design of the DC campus layout includes a reduction in the parapet height of the data centre blocks fronting the R446 from 18m to 16m. The parapet profile is set back toward the centre of the roof to assist in screening roof-level plant and to reduce the apparent scale and massing of the buildings when viewed from the surrounding road network and nearby properties. In addition, an architectural veiling system in the form of a simple metal mesh screen is proposed to selected primary elevations in order to soften the appearance of the larger building volumes, introduce depth and shadow, and improve the visual integration of the buildings within the maturing landscape framework.

Figure 2.12 Proposed metal veil on the R446 facing side of the proposed data halls



The DC campus design seeks to break the linear repetition previously perceived along the R446 frontage. This is achieved through enhanced architectural treatment to the office and administration elements, variation in façade composition, and a stronger campus hierarchy within the site. These office components will be clad in a mix of glazing and timber battens, introducing variation in materiality, texture, and tone. These measures subdivide the overall building mass and reduce the perceived extent and scale of the Data Halls, particularly in views from the R446. The office component is intended to act as an organising element within the development, supported by hard and soft landscaping, so that the data centre campus reads as a coordinated contemporary campus environment rather than as a continuous industrial frontage.

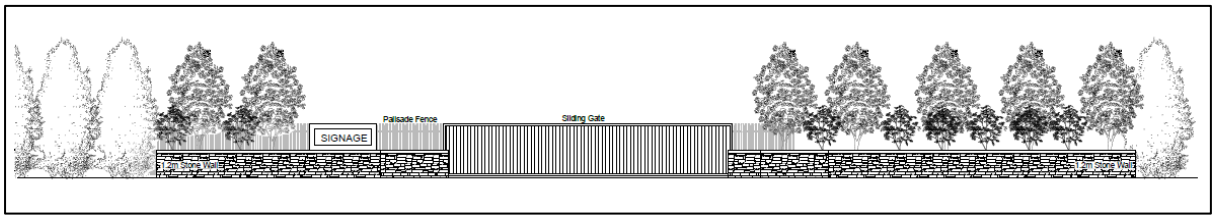
A centrally designed landscaped plaza (Figure 2.13 refers) will surround this central space, incorporating geometric raised planters and structured planting beds that reflect and complement the angular form of the metal veil. The plaza has been designed across a series of graduated levels to respond sensitively to the changes in ground levels between the proposed buildings and the adjacent road carriageway. This terraced approach will assist in integrating the development into the existing topography while reducing abrupt level transitions. With regard to planting, the plaza will incorporate a mix of native and pollinator-friendly tree and shrub species to soften the visual interface between the buildings and the road corridor. The planting design will enhance biodiversity value within the site while contributing to visual amenity. The proposed tree and planting strategy has been developed in alignment with the objectives of the All-Ireland Pollinator Plan, thereby supporting biodiversity enhancement while strengthening the character, functionality, and environmental performance of the plaza space.

Figure 2.13 CGI imagery of the newly design internal plaza with stepped planters and native and pollinator friendly plantings



The DC campus arrangement ensures that the technical and security requirements of the development can be met in a manner that provides greater setback, more effective landscape mitigation and an improved architectural response to the site context. The entrance to the DC facility is controlled from the Security Control Building, which forms the principal point of ingress and egress for personnel, visitors and vehicles.

Figure 2.14 DC facility entrance



This building contains a small office /admin room for security personnel, an IT room and a WC room. The security control building is the primary point of ingress and egress for all personnel, visitors and vehicles. Although compact in footprint, the building is a critical node in the overall layout of the campus. The building is positioned on the inner side of the secure perimeter fence, centred between two dedicated carriageways, one inbound and one outbound. Each lane is controlled by an electrically actuated rising-arm barrier with LED boom lighting and induction-loop anti-tailgate logic. The area will also contain control access /egress point or pedestrians. During normal conditions one worker occupies the operations room around the clock, with a second worker present during peak-delivery periods.

Figure 2.15 3D illustration of Security Control Building

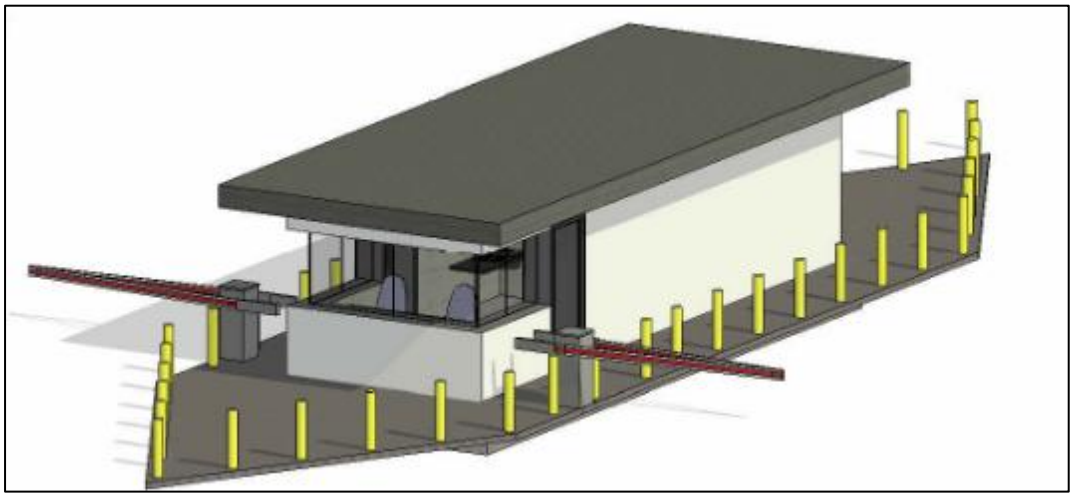
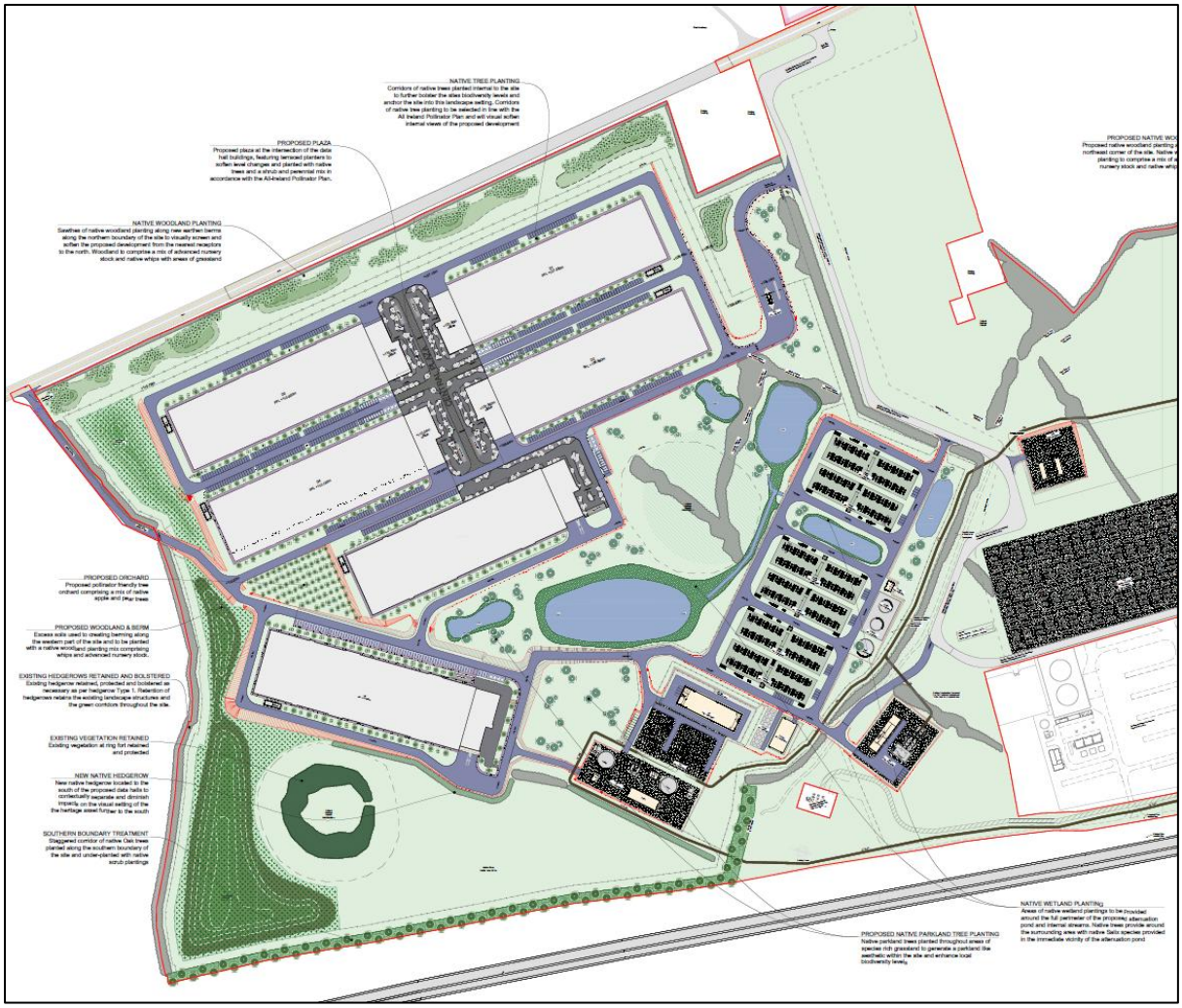


Figure 2.16 DC Facility Layout



2.4.2 DATA CENTRE BUILDINGS

The DC facility consists of six (6no.) identical data centre buildings (labelled D1-D6 on the site layout drawing) and share the same layout. Each building is 228.19m long and 62.2m wide and have dedicated car parking. The outer building edge of each DC building is 16.0m high, while the stepped-back roof parapet, which conceals the roof-mounted plant, rises to an overall height of 18.0m. A medium voltage (MV) switchroom building is collocated with each DC building.

The DC buildings have a footprint of 13,978m^2 (sqm). The buildings will be steel frame construction with metal deck first floor and proprietary insulated metal cladding. The buildings will be fitted with loading docks. Proprietary engineered acoustic louvres are incorporated into the facade of the (mechanical, electrical and plumbing (MEP) areas) and at roof level to provide for air flow and ventilation from air handling units (AHU) and electric chiller units positioned internally.

Each data centre building will contain the following:

- An administration block with a height of 13.75m, split across two floors and providing; reception offices, kitchen, welfare, toilets, security, stores, loading /receiving area, mechanical rooms and stairwells. The gross floor area of the administration block on each DC building is 2,478sq.m. The administration block's facade will combine curtainwall glazing, selected brickwork, and insulated metal cladding in complementary dark and light tones.
- Data Halls are split across two floors (10no. on each of the ground floor and first floor) and have a combined floor area of 16,403 sqm. The data halls are separated by a central circulation corridor which runs from the administration block to the opposite end of the building. Electrical (ground floor) and ventilation (first floor) rooms separate the data halls across the building's width.
- MEP plant rooms are incorporated within the shell /superstructure of the building (gross floor area of 4,772sqm) and run either side along the full length of the building interrupted by stair cores providing access between floors. The MEP areas will house advanced cooling equipment, (AHU), pumps, piping and electrical equipment.
- Single storey MV switchroom building (15.95m long x 4.95m wide x 4.1m high) will contain two room and house electrical switchgear associated with each DC building.

Figure 2.17 DC Building Elevations; Drawing Ref CLDC-HAL-DC-XX-PL-1102

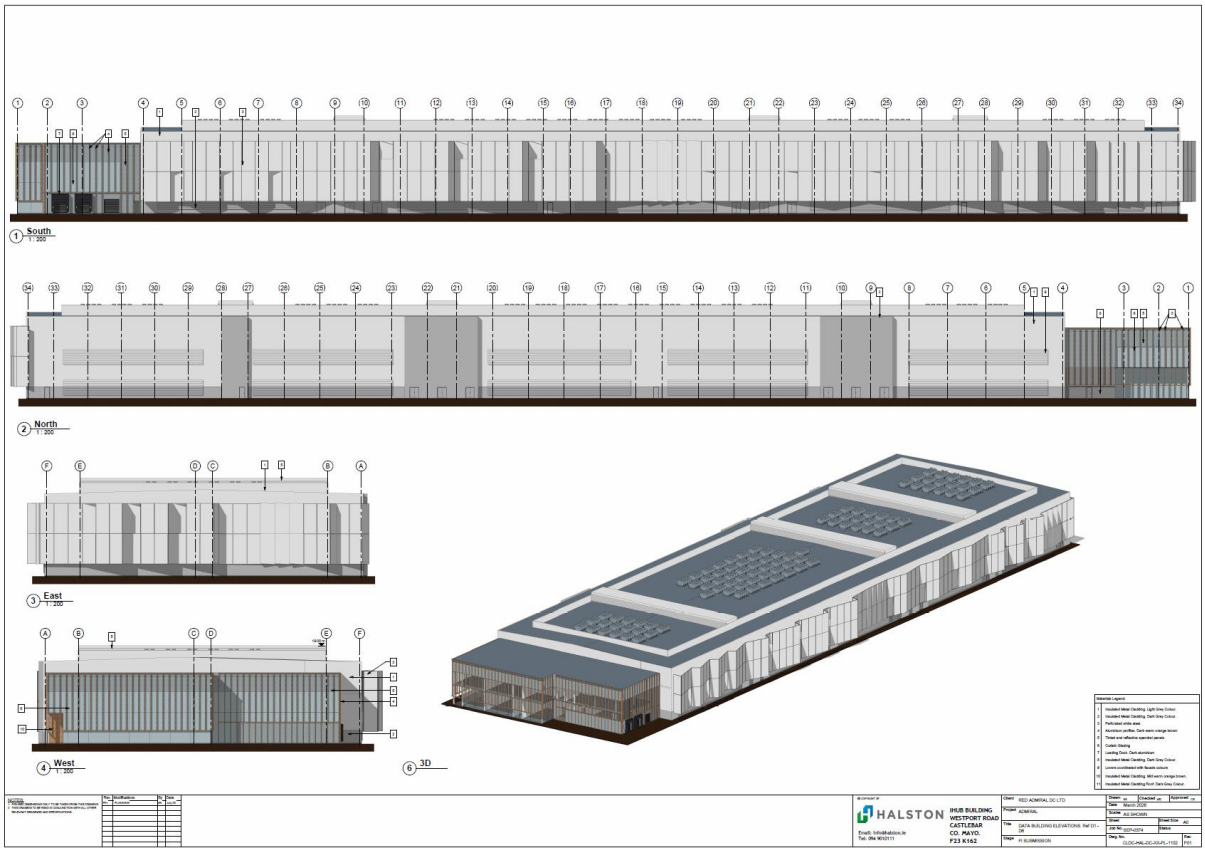


Figure 2.18 DC Building Ground Floor Layout

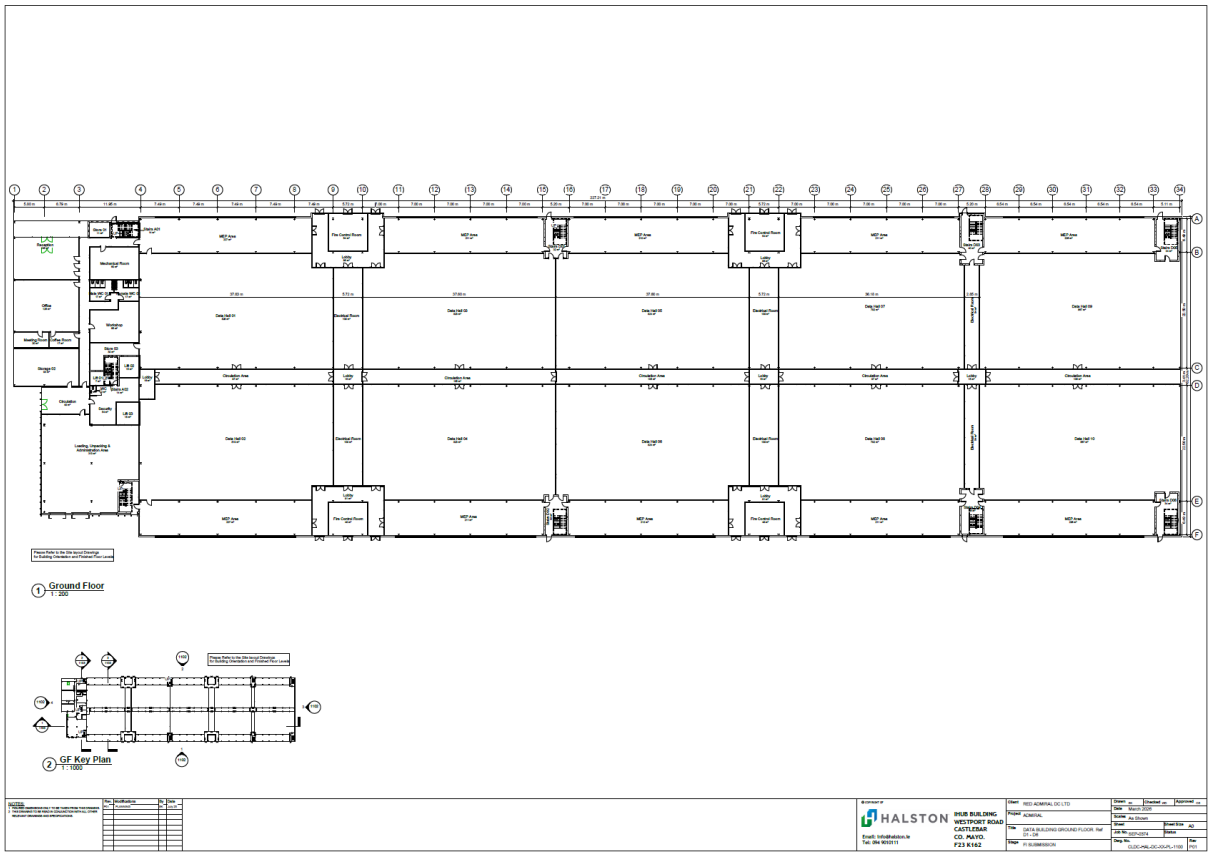
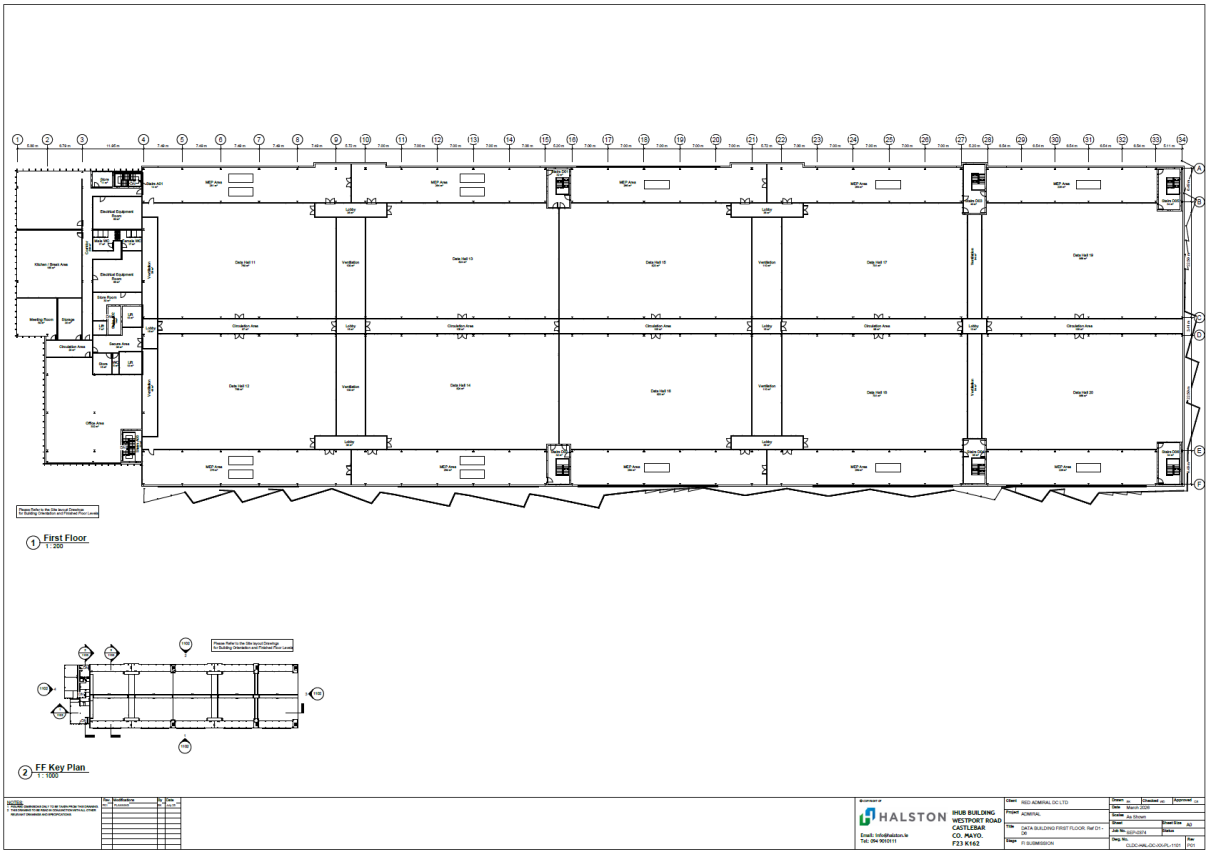


Figure 2.19 DC Building Ground Floor Layout



2.4.2.1 DC Cooling

The cooling system on for the DC facility comprises non-evaporative fresh-air cooling, closed-loop variable-speed electric chillers, and SOFC-driven absorption chillers, achieves high thermodynamic efficiency with minimal water footprint.

Under prevailing Irish climatic conditions, the data halls will be conditioned almost exclusively by a non-evaporative fresh-air system. Ambient air is filtered, temperature-controlled via modulating dampers and heat-exchange matrices and supplied to the cold aisles; return air is extracted through electronically commutated fan arrays. Annual water usage will be negligible because no adiabatic or spray evaporation is employed. This translates into a considerably lower Power Usage Effectiveness (PUE) and Water Usage Effectiveness (WUE) aligning with the principles of sustainable design.

As ambient temperatures rise during summer months, or when transient high-density computational workloads occur, the data centre facility will use mechanical cooling. Each data centre building will house electric chillers capable of supplying 7°C chilled water to the air-handling units. The chiller condenser circuit is entirely closed-loop and rejects heat to dry coolers equipped with variable-speed fans; consequently, the process introduces no

significant evaporative or blowdown water demand. Variable-frequency drives on both primary and secondary pumps will minimise parasitic power consumption.

The Fuel Cells (SOFC) will generate high-grade thermal energy concurrent with electrical output. When available this heat will be transferred to a double-effect lithium–bromide absorption chiller, producing chilled water at 7–10 °C. The absorption chiller is hydraulically coupled to the chilled-water header downstream of the electric chiller array. During fuel cell operation, recovery of waste heat using absorption chillers will displace mechanical compression needs associated with the electric chillers. Integration of the absorption stage raises overall fuel-utilisation efficiency to approximately 80%.

The proposed cooling is designed in accordance with:

- Climate Neutral Data Centre Pact- WUE and PUE requirements,
- LEEDv4 (EA and WE credits) through reduced process water and advanced energy recovery and,
- Ireland's Climate Action Plan 2025, circular-economy resource efficiency and large-user demand mitigation.

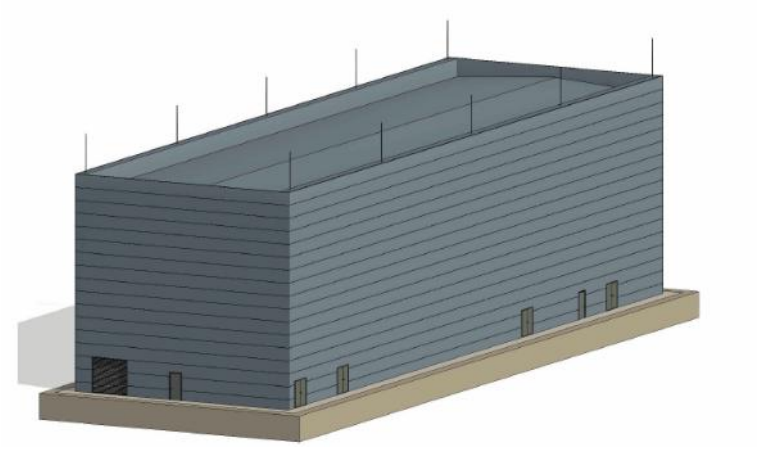
The design ensures operational resilience under variable climatic and computational conditions while substantiating compliance with sustainability frameworks for design of data centres.

2.4.3 33KV IPP BUILDING AND AIS COMPOUND

This component of the project will provide the point of common coupling between the proposed 220kV IPP GIS Building and the DC facility. To achieve gird redundancy three independent power feeds will route underground from the proposed 220kV IPP GIS Building to the 33kV IPP Building and AIS Compound located on the DC facility.

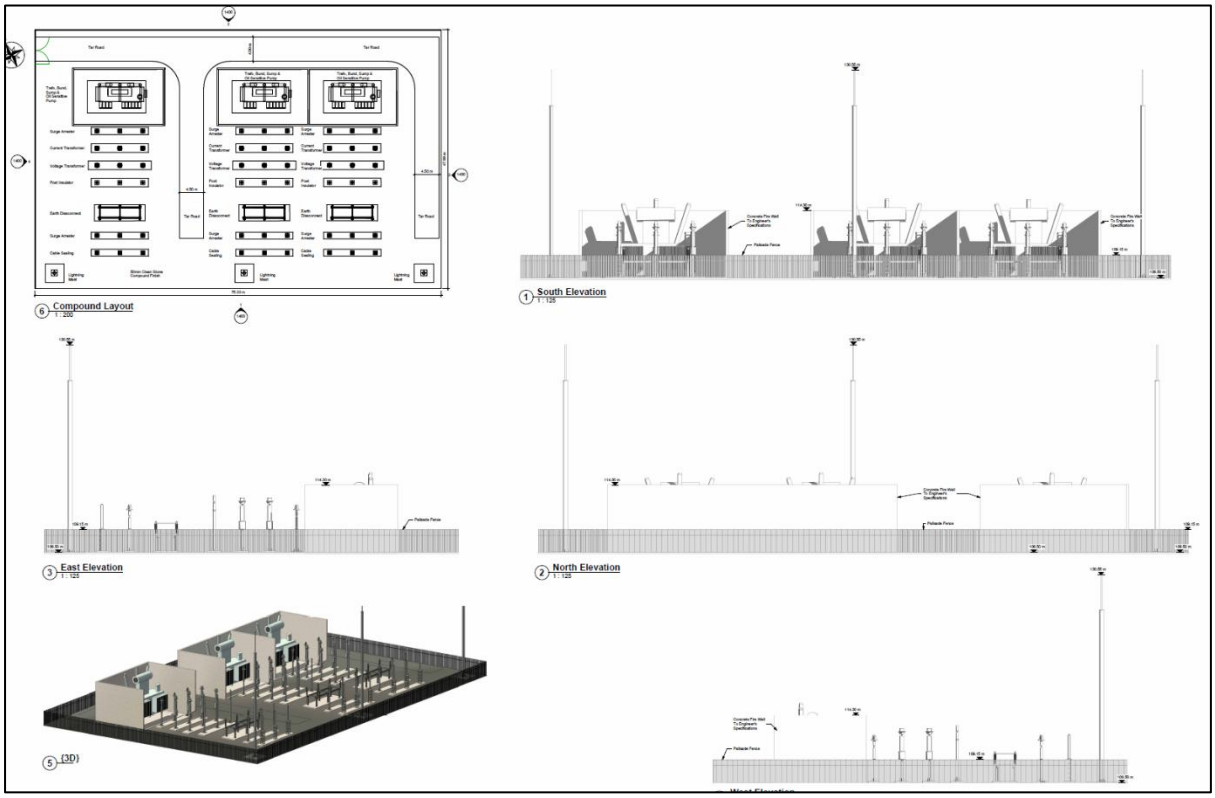
The 33kV IPP will supply and route double redundant feeders to each of the six (6no.) DC buildings. The two-storey (16.8m high) 33kV IPP Building and adjoining AIS compound will be owned and operated by the DC facility but designed and run in accordance with EirGrid Grid Code and ESB Networks specifications. The compound accommodates metering, protection and control equipment for import and generation synchronisation from the DER.

Figure 2.20 3D impression of 33kV IPP Building



The AIS Compound is positioned to the south of the 33kV IPP building and measures 75.33m x 48.00m. The compound will contain three (3no.) bunded transformers with drainage (to oil water separator) and associated above ground electrical cabling.

Figure 2.21 – Layout showing 33kV IPP Building and AIS Compound



2.4.4 ANCILLARY EQUIPMENT COMPOUNDS – DC FACILITY AND DER

An ancillary equipment compound is proposed south of the DC facility and Fuel Cell. The overall ancillary equipment compound is subdivided in two providing independent ancillary

supporting equipment to the DC facility and DER. A description of the equipment and plant contained in each compound is outlined below.

2.4.4.1 Ancillary Equipment Compound (DER)

2.4.4.1.1 Diesel Generators

Two (2no.) emergency generators will be installed in the compound to provide electricity instantly and reliably and allow the operator to put components of the DER into a verified *failsafe* state and keep safety systems alive until mains power returns. Both generators will be capable of starting unassisted and will be configured to accept essential loads and hold voltage /frequency within equipment limits.

2.4.4.1.2 Package Water Treatment Plant

A single-container water treatment module incorporating aeration, filtration, pH correction, softener and UV/chlorine disinfection will be positioned in the compound to supply potable water to welfare facilities across the DER. The water will be supplied from a proposed groundwater abstraction well[6] which will be drilled close to the ancillary equipment area.

2.4.4.1.3 Fire Water Tank and Pump House

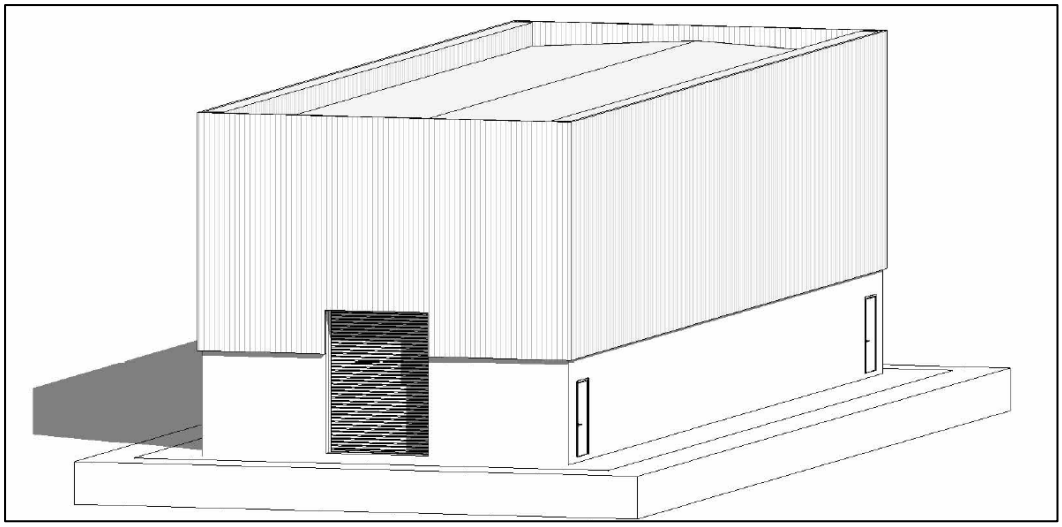
A 2,000m^3 firewater storage tank will be located in the compound which will be filled from the proposed groundwater well. Once filled, the normal demand for water arising from its existence is insignificant; the tank will be topped up automatically from the site's groundwater bore whenever the level falls below 90%, ensuring that the strategic reserve is never eroded by routine testing or minor call-offs.

Together, the fire water reservoir, redundant diesel pump sets and valved ring main form a robust, self-contained fire-water infrastructure. They guarantee that, even during the worst-case scenario, hydrants and fixed suppression systems are fed with steady pressure and ample flow for the full duration of the emergency, independent of mains supply or site power conditions.

2.4.4.1.4 Storage Building

A storage building (30.7m long x 10.74m wide x 9.65m high) will be constructed in the ancillary equipment compound. This building will be used to store materials, spares, small chemicals (in volumes <1m^3) and service equipment.

[6] An existing well with a reported depth of 60.9m within the project lands has a reported source yield of 76.30m^3/day – classed as moderate (GSI unique ID IE_GSI_GW_Well_32279).



2.4.4.2 Ancillary Equipment Compound (DC facility)

2.4.4.2.1 Package Water Treatment Plant

A single-container water treatment module incorporating, filtration, pH correction, softener and UV disinfection will be positioned in the compound to supply potable water to DC facility. The water will be supplied from a proposed groundwater abstraction well[7] which will be drilled within the DC facility. The treated water will be stored in a 70m^3 tank which provides at least 1.5 days treated water storage. Uisce Éireann has also issued a Confirmation of Feasibility (CoF) to the applicant confirming that 10m^3 per day can be supplied from to the data centre development from the public water network.

2.4.4.2.2 Fire Water Tank and Pump House

A 2,000m^3 firewater storage tank will be located in the compound which will be filled from the proposed groundwater well. Once filled, the normal demand for water arising from its existence is insignificant; the tank will be topped up automatically from the site's groundwater bore whenever the level falls below 90%, ensuring that the strategic reserve is never eroded by routine testing or minor call-offs.

Together, the fire water reservoir, redundant diesel pump sets and valved ring main form a robust, self-contained fire-water infrastructure for the DC facility. They guarantee that, even during the worst-case scenario, hydrants and fixed suppression systems are fed with steady pressure and ample flow for the full duration of the emergency, independent of mains supply or site power conditions.

[7] An existing well with a reported depth of 60.9m within the project lands has a reported source yield of 76.30m^3/day – classed as moderate (GSI unique ID IE_GSI_GW_Well_32279).

2.4.5 INTERNAL ACCESS ROADS AND PARKING

The internal roads within the development will be privately owned and will be maintained by the operator /owner. The main internal road network through the DC comprises a 7.0m wide network. Autotrack analysis has been undertaken for the site access road and the internal roads. Road arrangements have been provided at the security entrance (additional road width of 25m) so that there is no queuing of vehicles so that any rejected traffic (including HGV's) can safely turn and exist the site without blocking or causing a road safety issue.

Internal access road with separate pedestrian footpath, provide a safe and uncomplicated access to building within the campus. Car parking is located at each DC building (80no. spaces including EV and disabled spaces) near each administration block for all visitors and staff arriving by car. Bicycles shelters are also located for each DC building.

An emergency entrance is located to the north-west corner of the site the 7.0m wide internal road (185m in length) is secured with gates at two locations which will be permanently closed except in emergency circumstances. The internal road layout has been configured for security to be able to patrol this part of the site.

2.4.6 LIGHTING

The project has been designed where minimal lighting is only used when required in order to avoid *light spill* beyond the site boundary and disturbance of receptors including wildlife. Internal road lighting at the DC facility is designed to the recommendations of BS5489-1:2020 and Lighting Class P4 for roads. This is based on a safe movement of traffic level for motorised and pedestrians in an Environmental Zone 3 (sparsely inhabited rural areas), speed limit <30mph, quiet traffic flow, occasional vehicles which can be applied to the site roads.

Lighting columns are arranged to achieve the required minimum lighting levels while avoiding excessive light spill onto the site perimeter. These lighting columns are installed with luminaires mounted at 6m, with factory fitted rear shields, a 0° tilt angle and a G3 rating. This is a rating (G1 -G6) of the control of obtrusive light and upward light output with G6 being the highest.) Glare is controlled by the use of glare rated luminaires (G3). Therefore, Back-light, Upward light and Glare (BUG) has been considered to a high level.

2.5 DECENTRALISED ENERGY RESOURCE

The Decentralised Energy Resource (DER), which will be constructed across approximately 200ha of lands adjoining the DC campus facility. The DER incorporates several power

assets which will generate, store and manage electricity close to the DC facility. The DER comprises the following assets:

(a) Fuel Cell Power System – 160MW,

(b) Battery Energy Storage System (BESS) – 250MW,

(c) Solar PV farm (nominal 180MWp), and

(d) Grid connection to the 220kV Castlelost GIS substation which adjoins the proposed development site.

2.5.1 FUEL CELL

The project includes a fuel cell that will generate low-carbon electricity, chilled water and recoverable heat and carbon dioxide from natural gas without combustion. Natural gas will be delivered to the fuel cell power system from a proposed above ground installation (AGI) /gas receiving station which will be located within the site[8].

The proposed use of natural gas is in line with recent EU and Irish Government direction on the use of gas for generation as a transitional fuel. The proposed generation of electricity using collocated utility scale fuel cell power system at the site avoids any negative impact from the Project on the public electricity system.

The fuel cell is designed to provide variable power to the DC facility. Generation from the fuel cell will be delivered by 330kW modular energy units (energy servers) positioned and stacked in a compact steel frame structure (power tower). Six power towers located east of the DC facility will deliver utility-scale output (160MW) of electricity as and when required. Control and electric equipment will be positioned at ground level and energy servers will be positioned on levels 1 and 2 of each structure. Absorption chillers will be positioned on Level 3 and used for recovering waste heat arising from the process.

[8] The proposed AGI will connect to the gas transmission supply serving the adjoining Castlelost Flexgen Power Plant.

Figure 2.22 Modular Energy Servers positioned at ground level[9]

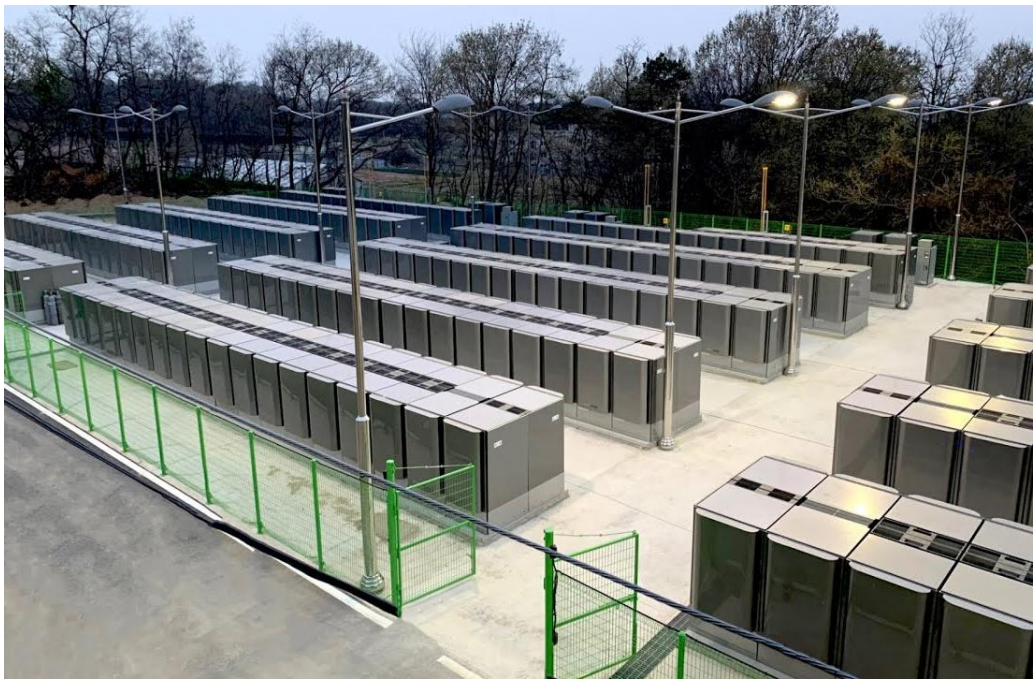
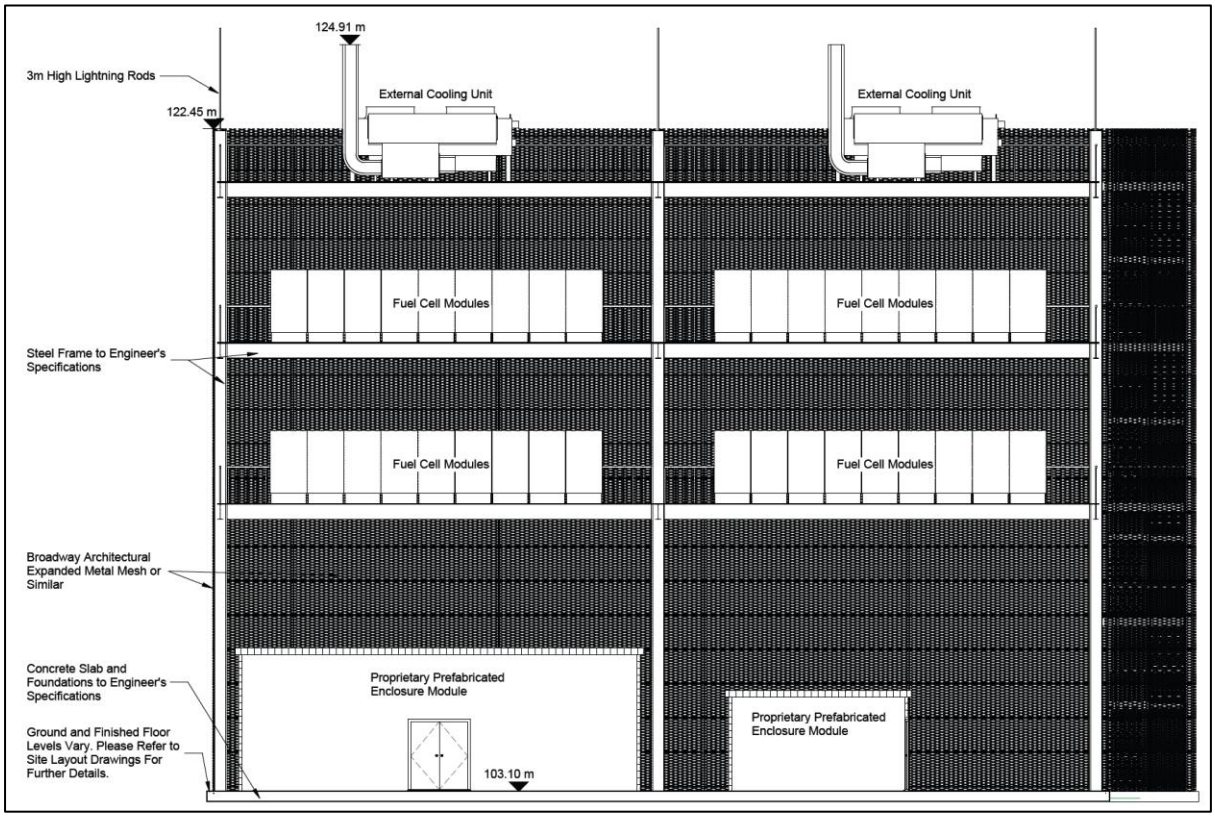


Figure 2.23 Section of Power Tower



[9] Source: https://www.bloomenergy.com/technology/

2.5.1.1 Fuel Cell Operating Principle

Fuel cells convert natural gas into electricity without combustion. Ambient air is first drawn through a recuperative heat-exchanger that raises the temperature to roughly 700°C before it reaches the cathode. Simultaneously, natural gas supplied from the proposed AGI on site enters the anode side of the fuel cell, where catalyst generate a hydrogen-rich fuel stream. Within the cell, hydrogen is oxidised at the anode electrolyte interface and the electrons released flow through an external circuit to the cathode, creating direct current. The accompanying oxygen ions migrate through the ceramic electrolyte and react with the hydrogen to form water vapour and carbon dioxide (CO_2)[10]. Integrated power electronics then invert the direct current to alternating current and step it up to the required voltage. The high temperature waste heat will be recovered to drive absorption chillers during periods where increased cooling is required at the DC facility. The fuel cell power system will be capable of simultaneously producing electricity, usable heat and chilled water and increasing overall efficiencies to approximately 80% (up from ~60%).

2.5.1.2 Resiliency, Predictability, Flexibility and Sustainability

Each energy server is an electrically independent string, so if a single unit is taken off-line for maintenance, the remaining energy servers continue to operate uninterrupted, yielding availability in excess of 99.5 per cent. Because generation is co-located with the primary electrical load, power is delivered without the losses or outage risks associated with long transmission routes and overhead lines. The energy servers are designed and future proofed to run on biomethane or green hydrogen in future, without wholesale redesign of the balance-of-plant.

High-grade exhaust heat from the fuel-cell stacks will be captured to drive double-effect lithium-bromide absorption chillers, yielding chilled-water capacity and increasing trigeneration efficiency of the power system. At the same time the anode exhaust provides a single high-purity CO_2 stream, free of nitrogen contaminants, that will be captured and dried using proprietary technology. Carbon dioxide recovery and purification equipment will be contained within a CO_2 process building and compressed CO_2 will be temporarily stored in 16no. insulated and vertically aligned proprietary tanks prior to being transported off site as a valuable product to end-users.

2.5.1.3 Carbon Dioxide Process Building and Storage

It is proposed to recover, purify and store carbon dioxide generated by the fuel cells during periods of operation. Recovery of the by-product reduces emissions and provides a value

[10] Ranging from 15-30% less CO_2 than produced by a gas turbine

product to down-stream users (food grade CO_2). The CO_2 recovery process will operate in a dedicated steel-framed structure measuring 15.67m in width, 30.74m in length and 11.25m in height. Once purified (desiccant and carbon beds) and condensed, the liquid carbon dioxide is transferred to a bank of sixteen vertical, vacuum-insulated tanks. Each vessel stands just over fifteen metres tall and 3.6 m in diameter, with an internal design pressure of 22 bar(g). The tanks are arrayed in two rows on a reinforced concrete plint. Over-pressure protection is provided by dual relief valves.

2.5.1.4 Fuel Cell Chilled Water Storage and Pump House

A Fuel-Cell chilled water reservoir consists of two (2no.) 1,000m^3 well-insulated cold-water tanks. The chilled-water tanks, pumps and pipework form a fully closed-circuit (closed-loop) system: the same inhibited water continuously recirculates between the fuel-cell chillers, the stratified storage tank and the campus distribution ring-main, with no direct exchange to atmosphere or potable supplies. The function of this is to support the chilling function during period of warm weather.

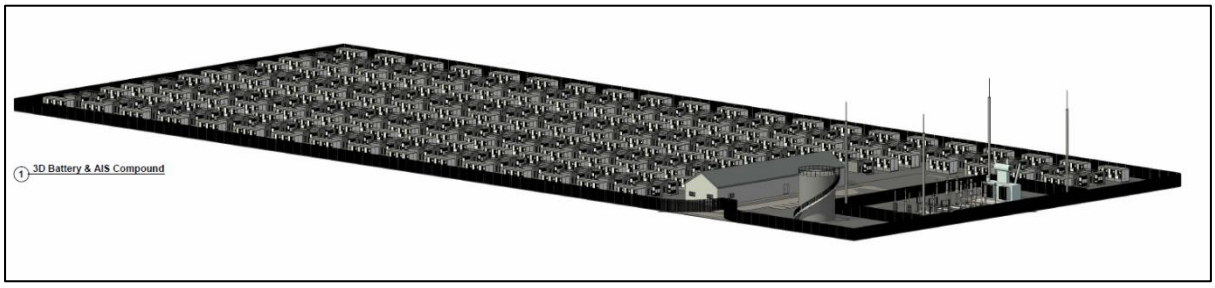
2.5.1.5 Above Ground Installation

Natural gas will be supplied from the Gas Network Ireland transmission system located within the development site at a minimum guaranteed pressure of 19 bar gauge (bar(g)) and 15^oC via an Above Ground Installation (AGI). The pressure of the gas will be conditioned and regulated to approximately 35 bar(g) in the proposed on-site AGI. The Fuel Cell will use natural gas to produce electricity.

2.5.2 BATTERY ENERGY STORAGE SYSTEM (BESS) FACILITY

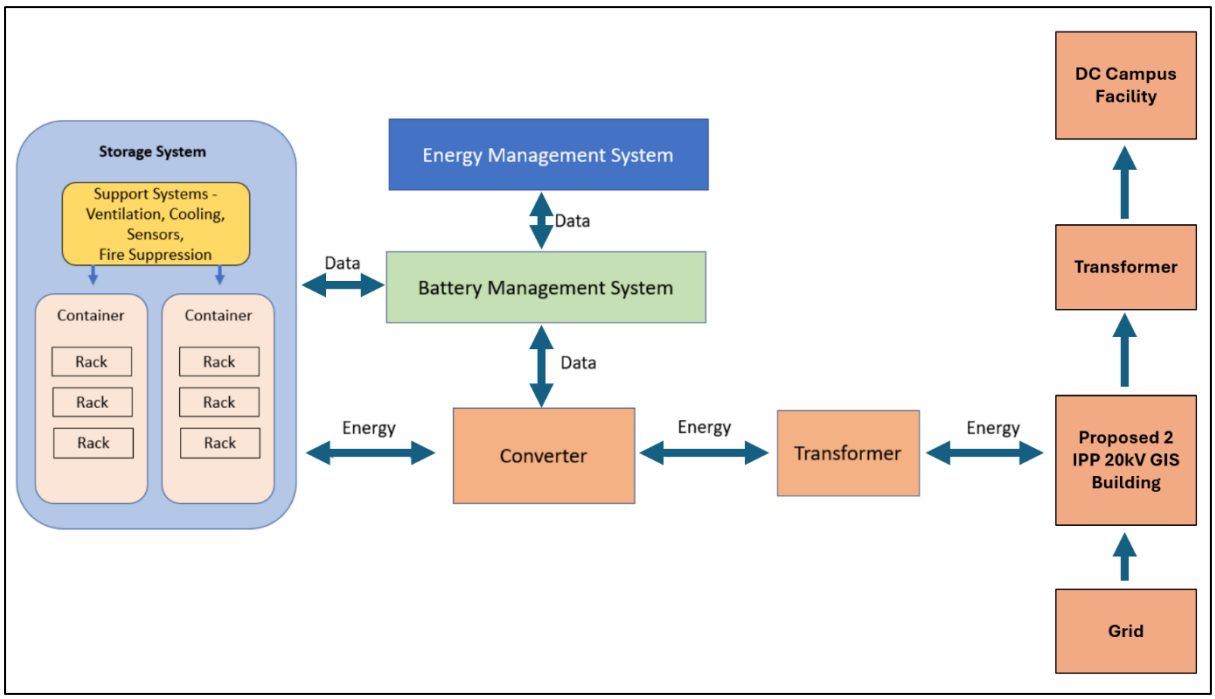
The BESS facility comprises a total of 276no modular single storey battery enclosures and medium voltage power stations (MVPS). The IPP building and AIS compound (containing transformer) will electrically connect the BESS to the proposed 220kV IPP GIS substation using underground HV cables. The proposed 138no. battery enclosures (7.0m long x 2.6m wide) and 138no. MVPS enclosures (6.1m long x 2.4m wide) will be positioned on concrete plinth foundations. Once positioned the top of the battery enclosures will be a height of 3.1m above the finished ground level (FGL) of the BESS compound and the top of the MVPS enclosures will be a height of 2.94m above the compound FGL. The enclosures will be connected by underground ducts and cables.

Figure 2.24 3D impression of BESS including IPP and AIS Compound



The battery enclosures will house the modular array of lithium-ion (Li-ion) battery units. Li-ion battery units will be assembled to form modules and will be self-contained and certified for intrinsic safety. The battery cell is the smallest subpart of the BESS system, and the cells store the energy. The cells are aggregated into modules which has a positive and negative terminal and are contained in hard casing with a battery management system (BMS-analyser that continuously checks module parameters such as voltage, current, temperature and State of Charge (SoC)). The modules are then aggregated into a pack (or string), again with one positive and one negative terminal. MVPS (or Power Control System (PCS)) units and small transformers will be positioned in self-contained weather-proof enclosures. The plant will absorb and inject energy as demanded by the system numerous times over short-duration events. The MVPS units on each pack deliver information on the state of the pack to the superior control system for the battery ESS. A high-level diagram of a BESS is illustrated in Figure 2.25 below.

Figure 2.25 High-Level Diagram of a BESS



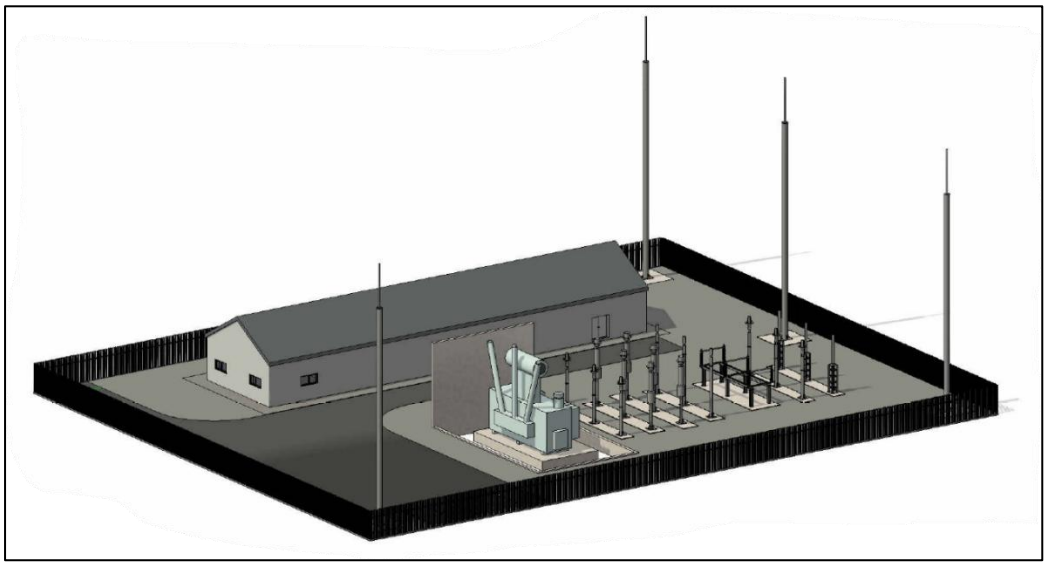
Source: Adapted from https://www.energystorageireland.com/

Battery energy storage systems are designed to prevent a problem in one battery cell from spreading to others in the system. The safety systems for a battery storage project operate on multiple layers from the individual battery cell right up to the whole storage system and this is managed by the battery management system (BMS). As soon as the BMS detects that a specific battery cell, or group of cells, is acting in a way that it should not it can instantly reduce the flow of electricity through the cell, switch it off or disconnect it from the power supply completely depending on the severity of the problem. This minimises the risk of a problem escalating in a cell or group of cells and spreading to others. These techniques help to dissipate heat in the event of a cell failure, and subsequent overheating, and prevent adjacent cells or modules from being affected.

The batteries for energy storage are housed in separate enclosures (containers) to prevent the risk of a problem in one container spreading. Sufficient clearance between enclosures is included within the design to provide for this and it also allows for safe access and replacement of modules. Each module includes control equipment, to provide for ventilation, air conditioning and fire suppression equipment (inert gas and detectors). A firewater tank (500m^3) is also contained in the BESS facility as an additional safeguard. In the event of a fire within an enclosure the water can be applied to nearby enclosures as a cooling agent to prevent escalation.

An IPP control building and AIS compound will be east of the battery and MVPS enclosures. The IPP building (40.0m x 9.79m) will contain a control room, stores, switchgear room and WC. The AIS compound will contain a bunded transformer with fire wall, lightning masts and a series of electrical equipment supported on plinths (e.g. surge arresters, post insulator, disconnects, cable sealing.).

2.5.2.1 BESS IPP Building and AIS Compound



Surface finishes within the BESS compound will comprise clean 50mm permeable stone fill. Stormwater collected from impervious areas such as the IPP building and limited bitumen macadam roads will be directed to a below ground oil interceptor and attenuation structure (volume of c.90m^3) before being discharged via a hydrobrake to the open drain /stream which runs to the southeast of the compound. Foul wastewater generated from welfare facilities within the BESS compound will be discharged to a sealed foul holding tank. The holding tank will be emptied and suitably disposed of periodically by a local waste permitted contractor. A foul holding tank is recommended due to low occupancy of the facility once operational. There is no requirement for the use of water in the process.

2.5.3 SOLAR PV FARM

2.5.3.1 Layout

The development footprint is entirely confined within existing fields structures with no hedgerow removal required. Every effort has been made to align tables parallel to field margins to reduce visual intrusion. The solar panels array themselves account for approximately 72ha of the total 168ha with the remaining solar lands fallow. The design embeds the following set-back corridors:

- ≥ 10 m from all third-party boundaries (public roads, adjoining landholdings);
- ≥ 5 m from internal hedgerows and drainage ditches;
- ≥ 10 m from named streams and rivers.

These buffers will be managed as uncut grassland or sown with native wild-flower mixes, creating continuous ecological corridors that enhance habitat connectivity, pollinator forage and small-mammal cover. A suite of ecological enhancement measures, including hedgerow gapping-up with native species, will be implemented in line with the project's Biodiversity Management Plan.

It is proposed to develop a ground-mounted photovoltaic (PV) installation with a nominal of up to 180MWp. Generation will be provided by high-efficiency, PV modules rated at 620 watt (W) each, secured in portrait orientation on galvanised steel support frames. The PV panels will be grouped into three standardised "table" formats so that the plant can be efficiently replicated across the agricultural landholding while respecting existing field boundaries, hedgerows and watercourses.

Table type	Configuration (modules)	Footprint (W × L)	Notes
Type A	27 × 3	6.910 m × 30.618 m	Primary building block in larger, fields
Type B	18 × 3	6.691 m × 20.412 m	Used where field geometry or buffers shorten the available run length
Type C	9 × 3	6.691 m × 10.206 m	Employed adjacent to hedgerows, field corners or buffer zones

Each table carries three portrait strings of modules inclined at 25 degrees from horizontal and faces due south. Row-to-row spacing ranges from c. 3–4 m, providing safe access for maintenance personnel and preventing inter-row shading. Across the site, existing topography undulates gently. Finished PV table heights will therefore vary, not exceeding 3.85m at the rear edge, while the lowest leading edge of any panel will maintain a minimum ground clearance of 800mm to preserve vegetation, allow grazing and facilitate air circulation beneath the array.

Figure 2.26 Solar PV Elevation

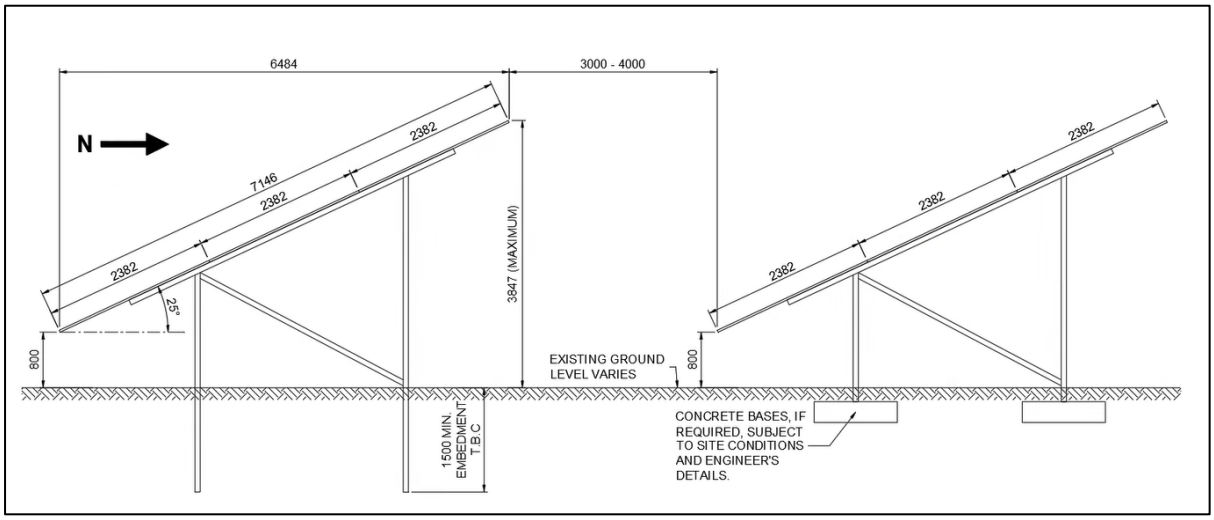
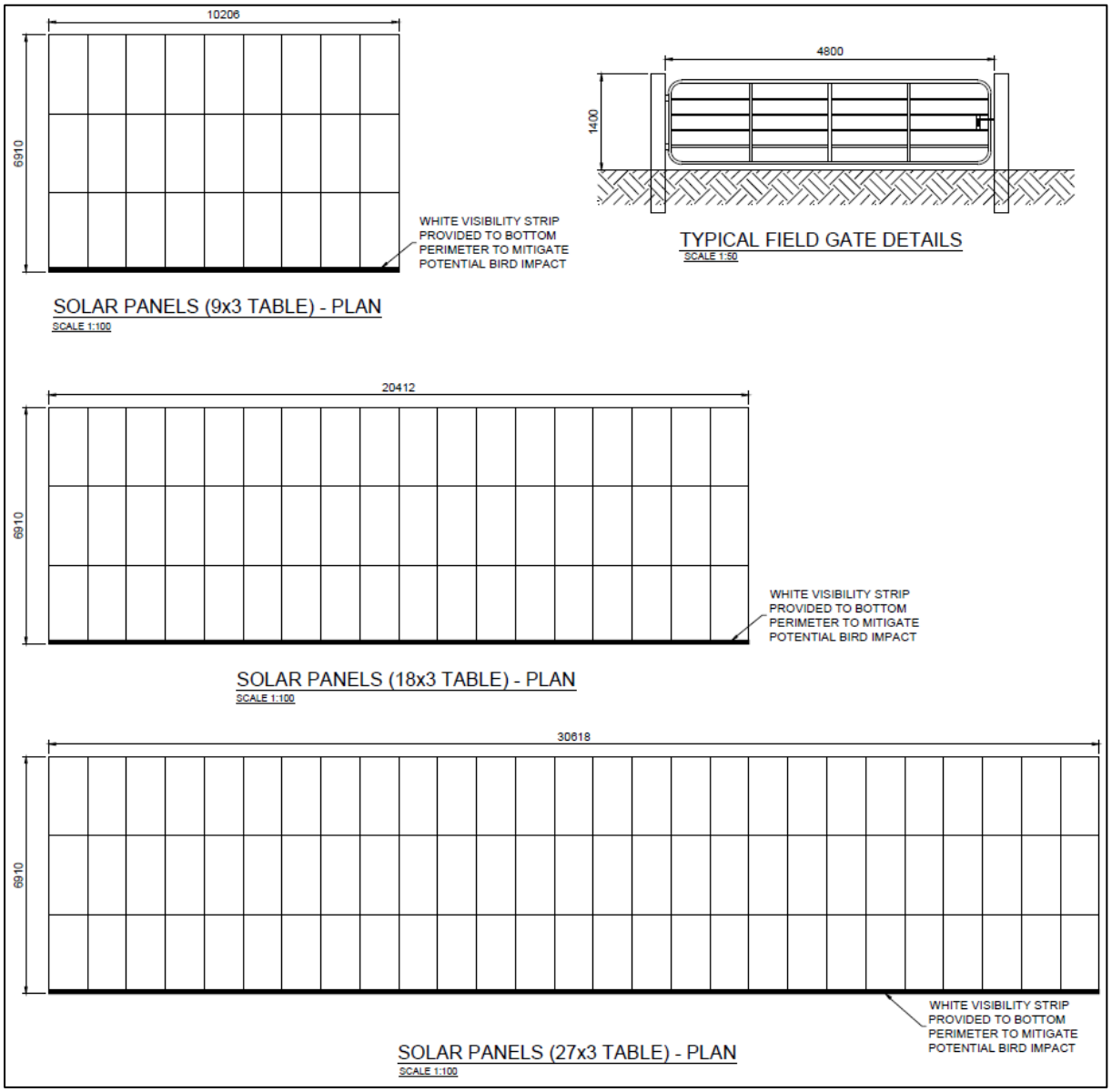


Figure 2.27 Solar PV Table Plan Details



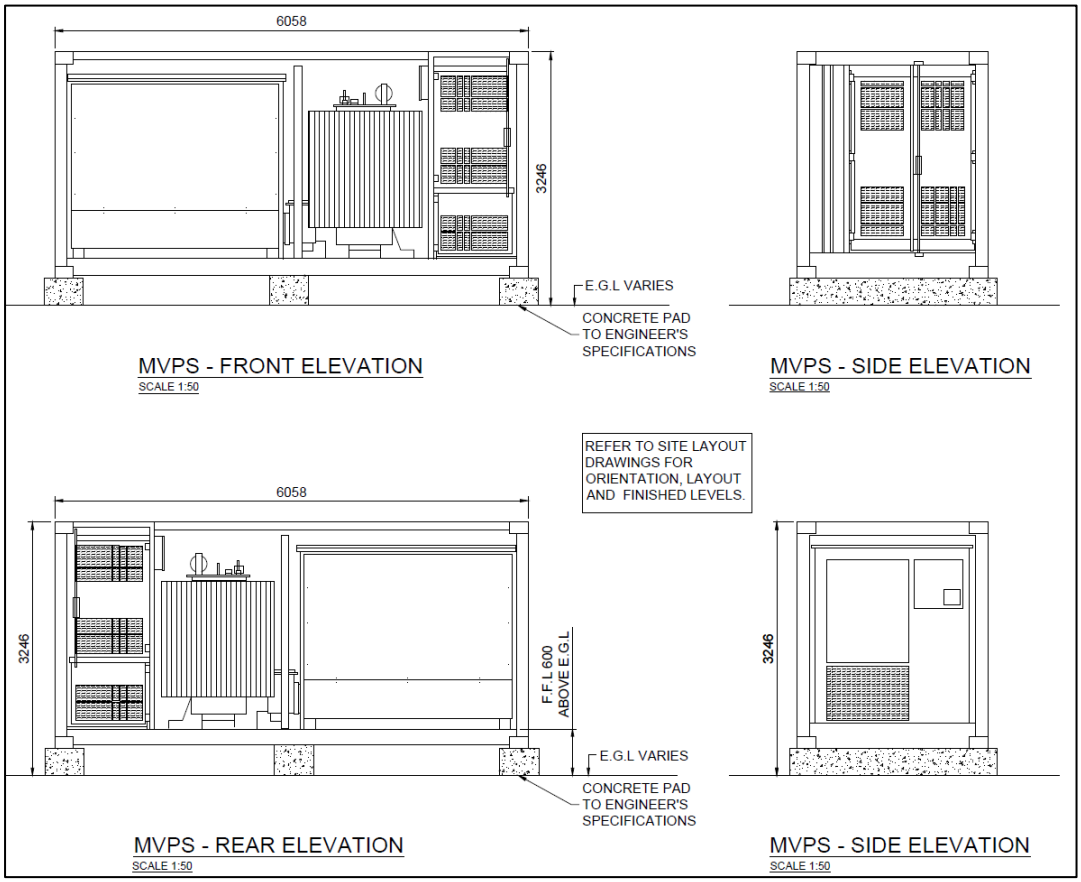
2.5.3.2 Foundations and Support Structure

PV tables will be mounted on a lightweight steel racking system consisting of vertical posts (hot-dip galvanised, typically SHS or C-section) driven or screwed to a depth of c. 1.5 m, avoiding deep excavations and enabling straightforward decommissioning. Where sub-surface obstacles such as shallow bedrock are encountered, pre-cast concrete shoes may be used. These ballast blocks sit on the surface, negating the need for intrusive groundworks. Transverse rail assemblies and mid/end clamps secure the modules and provide structural grounding continuity.

2.5.3.3 Electrical

Array LV cabling will run in cable trays fixed to the rear of each table and then in shallow trenches (typically 600 mm deep) to the nearest MV Power Station (MVPS) enclosure. Forty-five (45no) MVPS units are distributed across the site to minimise DC cable runs. Each MVPS enclosure measures 6.055 m (L) × 2.348 m (W) and stands on a reinforced concrete pad with a finished roof height of approximately 3.25 m above existing ground levels.

Figure 2.28 MVPS Details



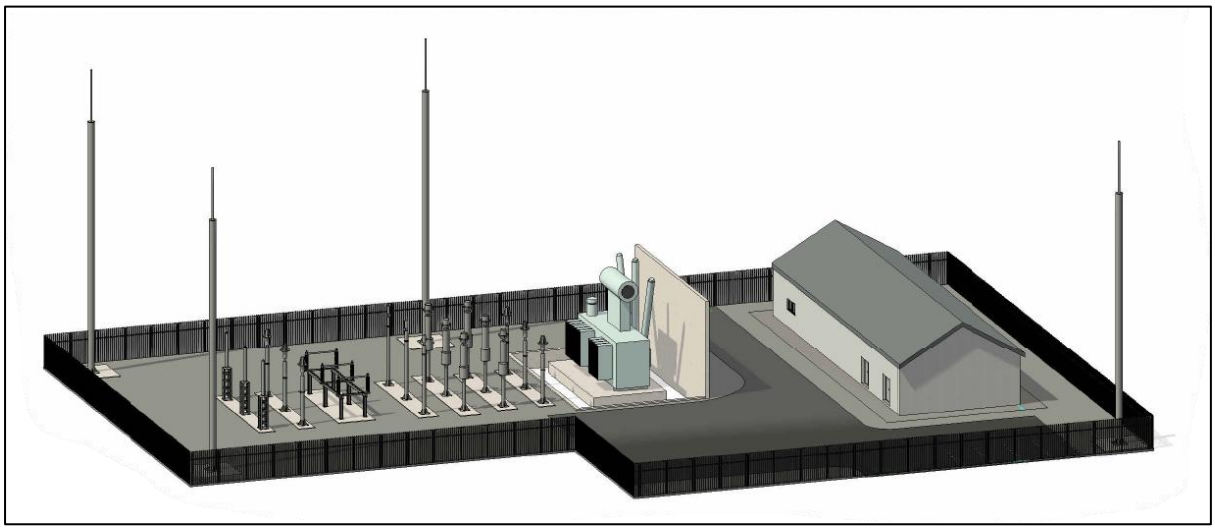
Within each MVPS, string inverters convert the panel output from direct current (DC) to low-voltage alternating current (LV AC), after which a step-up transformer raises the voltage to the medium-voltage (MV) collection network. The MV network is routed in underground ducts to the Solar PV AIS compound, containing a transformer and switchgear interface, located east of the proposed 220kV IPP GIS substation.

2.5.3.4 Solar IPP Building and AIS Compound

The output of the PV installation is firstly delivered to an Independent Power Producer (IPP) Building. It is then exported through an air-insulated switchgear (AIS) compound

that contains the main 220 kV step-up transformer where it exports the power to the proposed 220kV IPP GIS Building via AIS switchgear (this provides HV isolation, protection and metering).

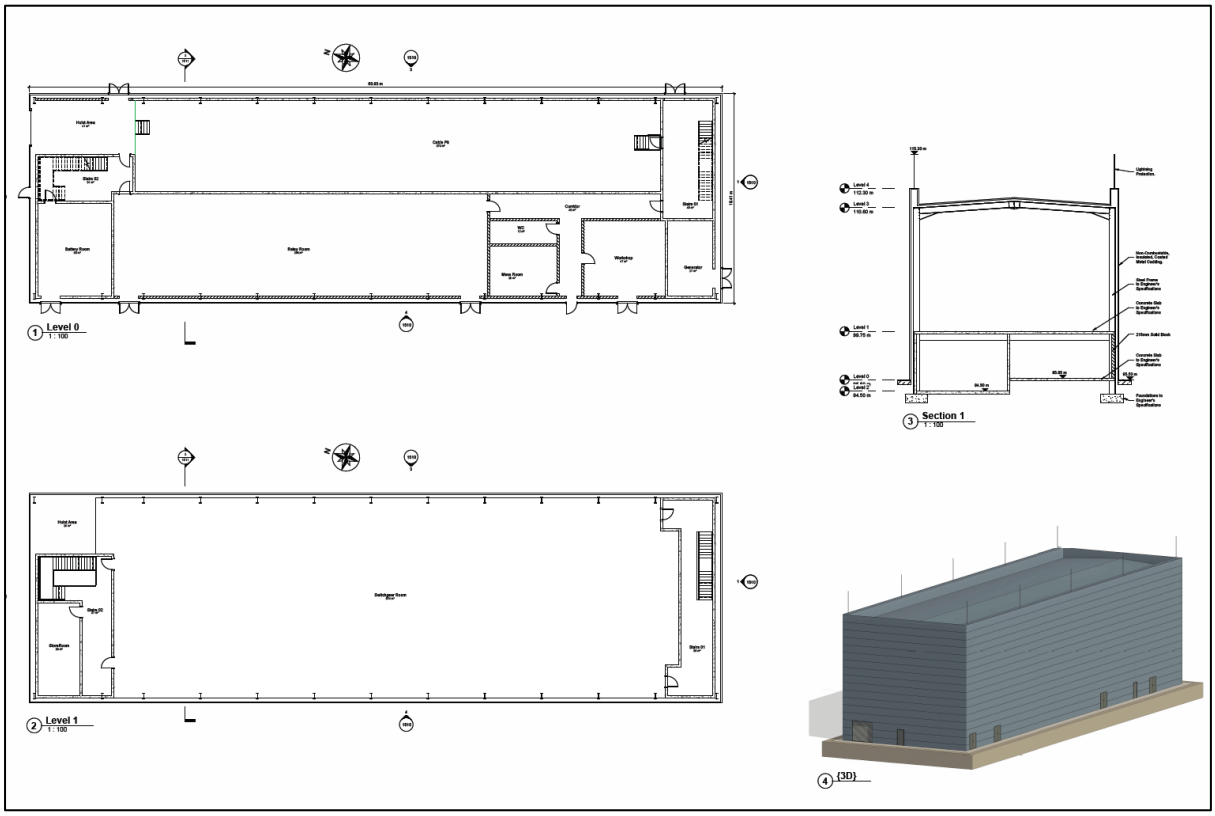
Figure 2.29 3D impression of Solar IPP Building and AIS Compound



2.5.4 GRID CONNECTION

The proposed 220kV IPP GIS will be located east and adjacent to the existing Castlelost 220kV GIS substation (an existing node on the electricity transmission system). Its connection to the national grid facilitates the use of renewable energy from the grid through commercial power purchase agreements (CPPAs) when abundant. Because of its proximity to the Castlelost node, the extent of the necessary grid connection infrastructure works, and potential associated impacts are limited.

Figure 2.30 220kV IPP GIS



2.6 DRAINAGE

2.6.1 FOUL EFFLUENT

2.6.1.1 Data Facility

Foul effluent generated on the data-centre campus, principally from welfare facilities for an anticipated workforce of 400 persons will be managed by a new, site-wide foul drainage system designed in accordance with the Uisce Éireann Code of Practice for Wastewater Infrastructure IW-CDS-5030-03, Revision 2 (July 2020), I.S. EN 752:2017 Drain and sewer systems outside buildings, I.S. EN 12056 (Parts 1-5, 2000) Gravity drainage systems inside buildings and the Building Regulations Technical Guidance Document Part H – Drainage & Waste Water (current edition).

Each data-centre building will have its own local foul network that conveys flows by gravity to a centrally aligned sewer. This then discharges to a pumping station positioned adjacent to the security building near the campus entrance. The duty/standby submersible pumps in the pumping station are sized to limit the off-site discharge to 13.3l/s. Flow is lifted by rising main that tracks towards the main entrance of the project and then east towards Rochfortbridge along the public road (R446). The private network will terminate in a new stand-off manhole from which gravity flow enters the existing Uisce Éireann public foul

sewer. All works within the public domain will be carried out under a Road Opening Licence and to Uisce Éireann Standard Details IW-CDS-5030-01.

2.6.1.2 DER

Foul wastewater generated from IPP Buildings spread across the DER will be discharged to individual sealed holding tanks (each 32m^3) collocated with associated IPP buildings. (proposed due to low occupancy of the plant when operational). The list of locations where foul holding tanks are located across the project's lands are as follows:

- Fuel Cell IPP
- BESS IPP
- Solar IPP
- 220kV IPP
- 33kV IPP

The holding tanks are proposed due to the low occupancy nature of the IPP buildings (essentially substations). The low volumes of foul waste and low biological loading, associated with this type of building, may impact the successful continual operation of a conventional septic tank and any polishing filter system reliant on bacterial action. The foul drainage proposals will cater for the wastewater generated by the toilet and wash hand basin provided in each of the IPP buildings. The IPP building will be unmanned save for infrequent inspections and routine maintenance resulting in low rates of foul flow. The holding tanks will be fully watertight with no inlet settlement chamber, no biological treatment and crucially no discharge to ground or water. The system includes a single inlet pipe from the building's gravity drain and are fitted with an air vent and high-level alarm as standard. The alarm will connect back to a control centre in each IPP. Effluent from the tanks will be emptied biannually by a licensed wastewater contractor and taken to a municipal treatment plant.

2.6.2 SURFACE WATER DRAINAGE

The surface water drainage system is designed to collect and attenuate, as far as practically possible, surface water from impervious surfaces within the DC facility and DER and discharge this into an existing field drain serving the lands. This field drain routes south and discharges into an open drainage channel which runs alongside the M6 (northern side) before flowing south through a culvert beneath the M6 and alongside a local access road before turning east and discharging to the Mongagh River (EPA Name: Kiltotan & Collinstown).

2.6.2.1 Data Facility

Combined attenuation /fire retention ponds are proposed with a total capacity of 11,630m^3 (southern pond [Pond 1] being 8,513m^3 & the northern pond [Pond 2] being 3,117m^3).

Pond 2 will receive and attenuate all surface water from DC Building 1, DC Building 2 and associated impervious features (the DC campus access road, internal roadways and associated car parking areas). Pond 1 will collect and attenuate all surface water from DC Buildings 3-6, along and associated impervious areas. Both attenuation ponds will be paired with a hydro-brake vortex flow control to restrict and limit discharge to 2.76l/s/ha. The water will flow in open channels to a rip-rap aprons[11] and then enter a 450mm culverted section followed by a second rip-rap apron before entering an existing 450mm pipe currently receiving drainage from the lands.

Figure 2.31 Surface Water Drainage Features (Data Centre)



[11] A rip-rap apron is a pad of interlocking quarried rock, laid downstream of an outlet to soak up flow energy and shield soil from scour. Sized correctly, it is a low-maintenance and ecologically sympathetic way to protect SuDS outfalls, culverts, and small spillways across Ireland's varied soils and rainfall intensities.

Each DC Building includes a 20m^3 underground rainwater harvesting tank which will be used to supplement grey water and /or firefighting water supplies. Below ground bypass separators are provided to control discharge from car parking areas. Transformer bunds have been designed utilising a water displacement system which negates the requirement for a pump to remove stormwater from within the bund. This system will be connected directly to the piped underground gravity drainage system upstream of the SUDS management train elements. This bund design can accommodate a pumped solution if required.

Both drainage catchments also incorporate bespoke shallow wildlife ponds (843m^2 and 1,025 m^2) each with undulating, low-pitch margins and water depths shallower than 2m to provide for biodiversity enhancement. Both wildlife ponds adopt a kidney-shaped, undulating perimeter. This breaks up wind fetch, creates quiet embankments and maximises the edge effect that supports most pond-life. Retaining banks are graded no steeper than 1:3.

Pond 1 and Pond 2 have also been designed as firewater retention basins. Actuated valves penstock valves will be fitted to the outlets and will close in the event of a fire. This will retain contaminated fire wastewater from discharging to the downstream receptors. Similarly actuated penstock valves will be fitted in manholes upstream of the wildlife ponds to divert fire wastewater away from the wildlife ponds and into the Ponds 1 and 2.

The carefully modelled design which incorporates open waterbodies along with the associated controls, delivers a surface-water drainage system that

- limits discharge to 2.76l/s/ha in line with GDSDS;
- creates over 1.8ha of new, high-quality freshwater habitat;
- provides a straightforward design which is easy to maintain.

The design reinforces the site's sustainable credentials by managing rainfall at source and providing a clear biodiversity gain. The drainage system on site will be further developed as part of detailed design stage works.

2.6.2.2 DER

2.6.2.2.1 Fuel Cell and Ancillary

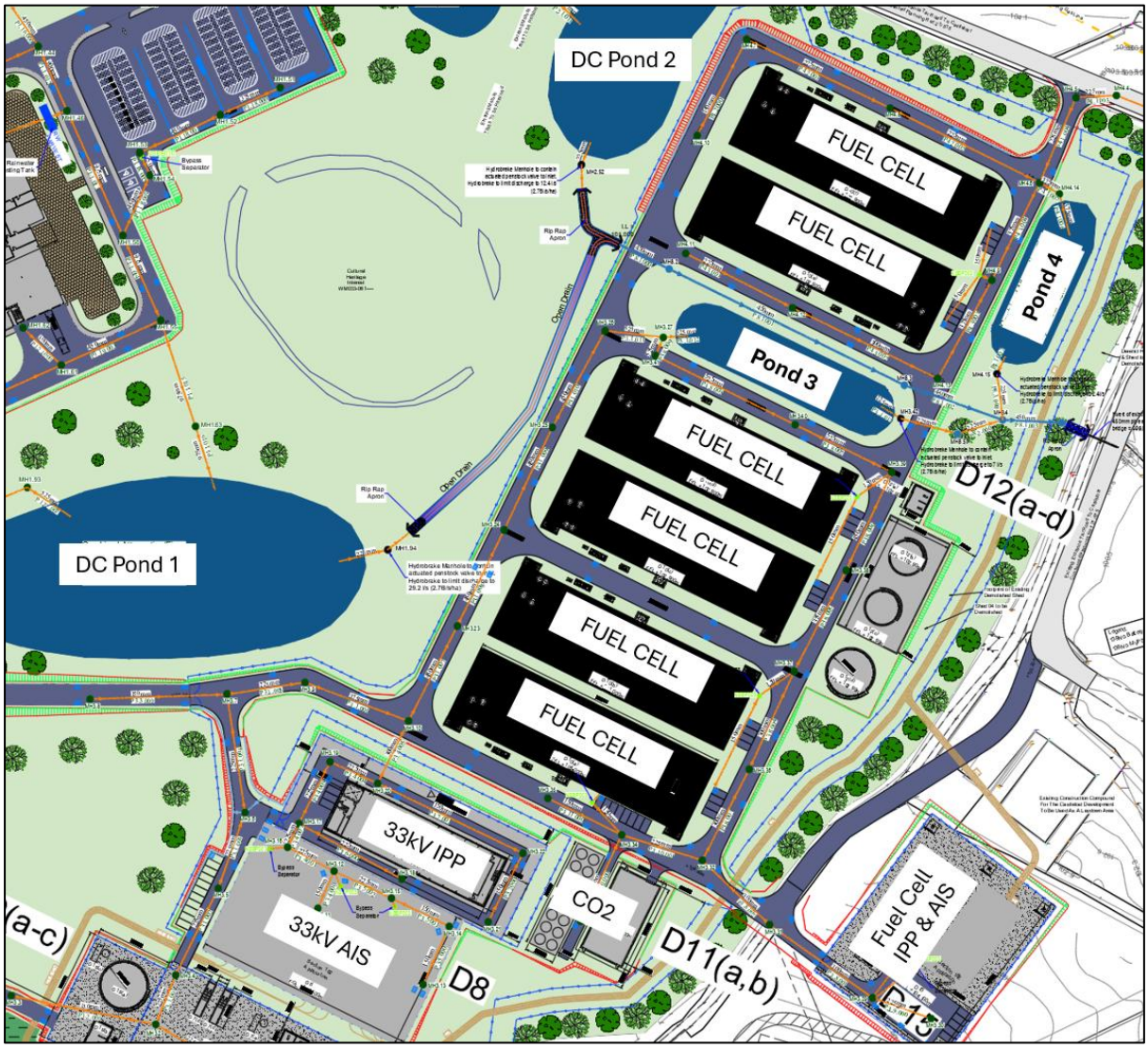
Combined attenuation /fire retention ponds are proposed with a combined capacity of 2,450m^3 (Pond 3 being 1,450m^3 & Pond 4 being 1,000m^3).

Pond 3 will receive and attenuate surface water from impervious areas in part of the Fuel Cell compound (four most southerly positioned power towers), associated areas such as

the carbon dioxide compound and chilled water storage areas, the 33kV IPP and AIS and the Ancillary Equipment Compound. Pond 4 will collect and attenuate surface water from remaining impervious areas of the Fuel Cell compound (two most northerly positioned power towers) and the nearby AGI.

Both attenuation ponds will be paired with a hydro-brake vortex flow control to restrict and limit discharge to 2.76l/s/ha. The water will be conveyed in an underground pipe to a rip-rap apron before entering an existing 450mm pipe currently receiving drainage from the lands. Pond 3 and Pond 4 are designed as firewater retention basins. Actuated valves penstock valves will be fitted to the outlets, and these will close in the event of a fire. This will retain any contaminated fire wastewater from discharging to the downstream receptors.

Figure 2.32 Surface Water Drainage Features (Fuel Cell & Ancillary)



Below ground bypass separators are provided to control discharge from the fuel cell compound, car parking areas and the 33kV AIS compound. Transformer bunds have been designed utilising a water displacement system which negates the requirement for a pump to remove stormwater from within the bund. This system will be connected directly to the piped underground gravity drainage system upstream of the SUDS management train elements. This bund design can accommodate a pumped solution if required.

2.6.2.2.2 BESS

Finished ground conditions with the BESS compound will provide for direct infiltration of rainfall to ground. All enclosures will be elevated on support plinths and the compound will be finished with clean free-draining stone eliminating the need for drainage collection and disposal infrastructure. Hardstanding and roofed areas associated with the Solar IPP building, internal roads and AIS will be served by surface water drainage infrastructure. The collection system will be fitted with a below ground bypass separator and the discharge will route through a 750m^3 firewater retention tank. The outlet pipe from the tank will be fitted with an actuated penstock valve and this will close to retain fire contaminated wastewater which may arise in the event of a fire. Clean water will route from the firewater retention tank to a below ground class 1 bypass separator and cellular storage attenuation structure. A controlled discharge of 0.7l/s will discharge via a hydrobrake to a rip-rap apron which outflows to an existing ditch within the development lands.

2.6.2.2.3 220kV IPP GIS Building

Surface water drainage from 220kV IPP GIS Building will discharge via a below ground class 1 bypass separator to a cellular storage attenuation structure before being discharged via a hydrobrake manhole (limiting discharge to 0.7l/s) to an existing open drain within the development lands.

2.6.2.2.4 Solar

Due to the fact that solar farms contain little impervious areas and cover less than 45% of the fenced compound, rainfall will be allowed to run of the panels and infiltrate straight back into the vegetated ground. The widely adopted approach for this type of development is low-maintenance, ecologically positive and fully aligned with the SuDS hierarchy set out in national and local guidance.

Surface water drainage from the Solar IPP and AIS compound will discharge via a below ground class 1 bypass separator to a cellular storage attenuation structure before being discharged via a hydrobrake manhole (limiting discharge to 0.4l/s) to an open drain which connects to an existing open drain.

2.7 TELECOMMUNICATIONS

The Project site is comprehensively served from a fibre and telecoms perspective, providing the opportunity for a straightforward and secure fibre and telecoms connection, whilst also limiting the works and associated impacts of the same.

Several dark fibre options are available near the site which meet the capacity and performance requirements for the DC facility. These include the following

- The project site has direct access to low latency (<1ms) high-capacity (>1 TB/s) dark fibre network which runs alongside the gas pipeline serving the existing AGI at the Castlelost Flexgen Power Plant. The ring network provides diverse fibre routes feeding the Dublin datacentre cluster and multiple designated fibre pairs are available.
- The project site has direct access to low latency high-capacity network which is planned along the M6 motorway to the south of the proposed development. This ring networks provides diverse fibre routes feeding the Dublin datacentre cluster and multiple designated fibre pairs are available.

Figure 2.33 Dark Fibre Network Map at the Proposed DC Facility



2.8 FIRE FIGHTING STRATEGY

2.8.1 DC FACILITY

The proposed DC facility (containing six identical buildings), each housing twenty data halls and a two-storey administration block has been laid out and specified to safeguard life in what are, by design, sparsely populated buildings, and protect critical ICT infrastructure. The design has been developed in full recognition of the duties imposed by Part B of the Building Regulations 1997-2014 (as amended) and the supporting Technical Guidance Document B (TGD-B). Specific reference to the following documents has also been considered:

- TGD-B 2006 + A1:2024 – fire safety guidance document
- IS 3218:2013 + A1:2019 – fire detection and alarm systems
- NFPA 13:2013 – automatic sprinkler systems (property protection)
- IS 391:2020 – hydrants and water supplies for fire-fighting

The following summarises the passive and active precautions, the fire-fighting facilities and the managerial arrangements that together will secure compliance and provide a robust platform for the Fire Safety Certificate applications. Key data for each building is presented in Table 2.1.

Table 2.1 DC Building Description

Parameter	Value (per DC Building)
Footprint	13,978 sqm
Gross Floor Area	26,871 sqm
Data Hall Area + MEP	21,175 sqm
Other ancillary /BoP	3,218 sqm
Administration Block	2,478 sqm
Structure	Steel Frame with metal deck floor (or similar) and proprietary insulated metal cladding

Although the fire load of server racks is modest when compared with a typical industrial occupancy, the consequences of even a localised fire are serious, so each data hall is treated as a discrete fire compartment. A central circulation spine runs the length of every DC building; on either side, pairs of halls are bounded by fire-resisting walls and floors (exact details to be determined as part of detailed design). Mechanical-plant corridors (housing the air-handling units ad chillers) and ground-floor electrical galleries are likewise enclosed, preventing lateral or vertical fire spread between halls. All load-bearing elements will meet the fire-resistance periods set out in Appendix A, Tables A1 and A2 of

TGD-B. To avoid expensive facade fire-rating, the six buildings have been staggered to respect the separation distances (in this instance minimum separation of 37m) prescribed by TGD-B for their cubic capacity, thereby curtailing external fire spread without sacrificing density on the site.

Means of escape have been planned on the same conservative basis. A grid of protected corridors connects every room to perimeter stair cores such that no point in any hall requires a travel distance greater than 18m in single direction or 45m where a choice of direction exists, mirroring clause 1.2 of TGD-B. The protected stairways discharge directly to the open air; because all cores are placed at the building edge, escaping occupants cross no higher-risk zones on their way out. While the normal staff complement in a hall is low, the campus will adopt a full-building evacuation policy on confirmation of fire. This simplifies staff training and avoids the uncertainty that can arise with phased or progressive evacuation in a lightly staffed environment.

Where passive defence finishes, active fire systems are employed. Every building will be fitted with an addressable fire-detection and alarm installation meeting Category L2/L3 of I.S. 3218. In data halls and main plant spaces this conventional point detection is backed up by early-warning aspirating detectors, providing the earliest practicable notice of cable overheating or failed power supplies. All halls, plantrooms and the administrative block are further protected by automatic sprinklers designed to NFPA 13:2013. Because accidental water discharge is almost as unwelcome as fire in a data suite, the halls and critical plant areas use double-interlock pre-action valves: two independent signals (heat or smoke detection and open sprinkler head) must coincide before water enters the pipework. The pre-action releasing solenoids are cross-zoned to the detection system, giving clear first and second-knock indications to building management and to the responding fire-service crews.

To ensure and guarantee pressure and flow at the duty side the site demands, a campus-wide 2,000m³ sectional steel fire-water reservoir served by fire pumps (contained in a pump house) on a resilient ring main. External hydrant coverage is calculated from TGD-B's formula of one hydrant per 1,000m² of ground-floor area, yielding a requirement for 13-14 hydrants per data-centre building. These will be set on the perimeter access road, which in turn affords fire appliances 100% coverage around every façade. This satisfies the appliance-access criteria for a structure of this volume.

The campus will be staffed 24/7 by trained security personnel who double as the first-response team. They investigate alarms, liaise with the fire service and, where safe to do so, operate manual fire-fighting equipment. All fuel stocks, cleaning agents and other

combustibles will be stored in dedicated, ventilated compartments, and routine maintenance of UPS batteries, switchgear and cooling modules is scheduled against the recommendations of NFPA 75 and EN 50600, so that latent ignition sources are kept in check. A master fire-safety manual will couple standard operating procedures with live computer monitoring. Any trend towards abnormal temperature or current triggers both an engineering alert and a pre-emptive fire-risk review.

Finally, each building will make its own Fire Safety Certificate submission, demonstrating point-by-point compliance with Part B. Drawings which will be prepared as part of detailed design work which will mark compartment lines, protected routes, stair cores and external access. Engineering calculations will justify the sprinkler and hydrant provision, while a fire-engineering report will document the evacuation time analysis, the designed smoke-layer interface heights and the measures taken to preserve server continuity during and after a suppression event.

The firewater storage volume is more than normally required based on 60 litres per sec (4 bar pressure) over 120 minutes. The additional capacity provides for automatic refill and reduces instantaneous pressure on water supplies (i.e. the reserve can be refilled over a longer time period than 8 hours as the stored water volume will be greater than the required water volume).

In the event of a fire, any fire wastewater generated will drain through the system and be held in either combined attenuation ponds and /or below ground fire wastewater tanks, which are designed and sized in accordance with EPA requirements[12]. An actuated penstock valve will be positioned on the outlet of each pond /tank which will be activated to close upon the initiation of the fire alarm within the development. This will allow the fire water to be retained within the attenuation feature so that it can be pumped out and disposed of offsite in an appropriate manner. Gaseous extinguishing systems will also be provided for use on electrical systems.

A Preliminary Fire Risk Assessment Report has been prepared in support of the proposed development following consultation undertaken with the local authority Fire Officer in October 2025.

[12] 2019 EPA Guidance on Retention Requirements for Firewater Run-off

2.8.2 DER

2.8.2.1 Fuel Cell

The Fuel Cell Power Towers (6no.) will deliver 160MW of resilient electricity generation to the DC facility. Level 0 contains the transformers, switchgear, local UPS, SCADA panels and fire-pump set. Levels 1 and 2 each accommodate 40no. 330kW energy servers which are fed by low-pressure natural gas from the proposed AGI. Level 3 completes the heat-recovery cycle with two-stage absorption chillers that dump surplus thermal energy into the campus cooling system. Each of the six fuel cell towers are enclosed with broadway architectural expanded metal mesh (or similar) to mitigate visual impact. Accordingly, the strategy focuses on passive fire protection. The steel framed structure will receive 90-minute intumescent coatings for fire protection purposes. Separation distances between towers range from 5-52m with towers arranged in blocks of two and separated by internal site roadways (thereby providing a minimum separation distance between blocks of 16.7m). Three separate stairs are provided on each tower along with an internal lift.

To provide for firefighting, the fuel cell area separately contains a 2,000m³ sectional steel fire-water tank served by fire pumps (contained in a pump house) on a resilient ring main. Isolation valves at every riser mean that maintenance on one tower does not compromise protection elsewhere. The towers will also be fitted with a sprinkler system. On Level 0 electrical plant is served by local extinguishers. An internal perimeter road network is designed to provide 360-degree access to the three fuel cell blocks

All control and indication panels, alarm, gas, mist, pump status and fuel-isolation, are repeated in the campus security hub, so that the arriving brigade receives an immediate schematic of whichever tower is in alarm, the floor of origin, the state of the fuel-isolation valves and the gas readings.

Fire safety ultimately rests on people as well as hardware, and the management regime is therefore built around continuous monitoring and rehearsed response. Written procedures mandate tower-by-tower evacuation on any confirmed fire, immediate closure of the automatic gas valves, and discussion with the statutory fire service at a clearly signed point. Each tower will make a standalone Fire Safety Certificate application. That dossier will present drawings, structural fire-resistance schedules, hydraulic calculations for mist, gas and hydrant systems, and computer modelling to show that tenable conditions for egress are maintained. Exact details will be determined as part of detailed design works.

2.8.2.2 BESS

Grid-scale battery energy storage systems have become a key component for balancing renewable electricity in modern power networks. The proposed BESS will play a central role in enabling the Red Admiral Datacentre Campus to operate on a fully optimised, net-zero carbon energy mix. The proposed BESS will comprise a series of (i) battery and (ii) medium voltage power system (MVPS) enclosures.

The major safety aspects which are considered in the design of the proposed BESS facility are categorised as electrical and electrochemical. Hazards are controlled through design, spacing, fixed protection and an evidence-based fire-fighting strategy that aligns with internationally recognised standards. There are numerous international standards which regulate the design, manufacture and distribution of lithium-ion batteries to ensure they are adequately tested for safety, reliability and durability. The proposed BESS has been designed in accordance with the following regulatory and standardisation framework and has layered controls built in for its fire-fighting strategy.

- UL 9540A (2019); *"Standard for Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems"*
- NFPA 855 (2023); Standard for the Installation of Stationary Energy Storage Systems
- NFCC (2024) *"Grid-scale BESS Planning – Guidance for FRS"*
- Energy Storage Ireland, (July 2021) *Safety of Grid-Scale Battery Energy Storage Systems - Information Paper*

The proposed BESS facility is designed as a series of independent enclosures. The steel ISO compliant enclosures incorporate deflagration vents sized by the installation-level UL 9540A test so that an internal over-pressure event jets upwards and away from walkways. Fixed inert gas suppression systems will be provided within enclosures in order to help prevent or limit propagation between modules. Upon detection of abnormal cell temperature, smoke, or vapour concentrations, the BMS will:

- Initiate an immediate safety-shutdown sequence by opening charge and discharge contactors and de-energising the power-conversion system, thereby preventing further energy flow into the affected string.
- Transmit a suppression-release command to the fixed gaseous-agent system, ensuring agent discharge occurs only after electrical isolation is confirmed.
- Close all motorised dampers and halt mechanical ventilation to preserve the agent's design concentration and comply with NFPA 855 in conjunction with the parent suppression standard (e.g., NFPA 2001 or NFPA 2010).

- Activate audible and visual alarms locally and via SCADA to notify plant operators and first responders of the event sequence and container status.
- Log all parameters and event timestamps for post-incident analysis and verification of compliance with the site's Hazard-Mitigation Analysis.

This fully integrated control logic ensures that detection, electrical isolation, ventilation shutdown and agent discharge occur in the correct order and timeframe, satisfying both the functional requirements of NFPA 855 (2023) and the performance criteria of the applicable clean-agent standard.

All enclosures (BESS and MVPS) will be UL9540A (2024) tested and certified. Spacing of battery enclosures to each other and MVPS units will be 3.99m (greater than the 0.9m minimum spacing specification detailed in NFPA 855. Accordingly, the BESS facility will be NFPA 855 (2023) compliant.

A 500m^3 sectional steel fire-water tank and pump set is positioned within the BESS facility which will serve hydrants thereby delivering site-wide cooling for nearby enclosures and boundary areas. The water tank is positioned near the entrance to the BESS facility (40m from BESS enclosures) and safe access to hydrants is provided in the event of a fire. The reservoir will be capable of delivering a minimum of 1,900 litres per minute for just over 4 hours (minimum 2 hours normally required). The additional capacity provides for automatic refill and reduces instantaneous pressure on water supplies (i.e. the reserve can be refilled over a longer time period than 8 hours as the stored water volume will be greater than the required water volume).

In the event of a fire, any fire wastewater generated will drain through the system and be held in a proposed below ground fire wastewater retention tank, which is designed and sized in accordance with EPA requirements[13]. An actuated penstock valve will be positioned on the outlet of the tank which will be activated to close upon the initiation of the fire alarm at the BESS facility. This will allow the fire water to be retained within the attenuation feature so that it can be pumped out and disposed of offsite in an appropriate manner.

2.9 EXTERNAL BOUNDARY TREATMENTS AND LANDSCAPING

The project site is located in a robust part of the surrounding landscape with limited highly susceptible landscape or visual designations. The project lands incorporate an area of approximately 243ha. The immediate site context is influenced by the existing recently

[13] 2019 EPA Guidance on Retention Requirements for Firewater Run-off

constructed Castlelost Flexgen Power Plant, the M6 motorway corridor, the R446 regional road, and typical rural land uses including pastoral farmland and conifer forest plantations. In this regard, the site and immediate study area is not considered highly distinctive or susceptible to change.

In addition to mitigation by avoidance measures, retention of existing hedgerow boundaries will visually screen and maintain the existing field pattern across most of the project lands. In this respect, there will be requirement for removal of some hedgerow vegetation and trees (predominantly within the 39ha DC facility).

The DC facility includes an area of approximately 39ha. The supporting 33kV IPP and AIS compound will occupy an area of 0.76ha. Of the total 39ha, soft landscaping and boundary treatments amounts to 23.5ha including 0.7ha of compensatory native woodland planting (northwestern area of the site) and freshwater features (1.8ha). The Fuel Cell (and ancillary infrastructure) adjoining the eastern boundary of the DC facility will be set out on 5.7ha of land. An additional 4.6ha of compensatory native woodland will be provided to the south of the DC facility along with 3.6ha of golden plover habitat.

The solar farm component of the DER will span across 168ha of lands to the east of Castlelost Flexgen and the proposed BESS (footprint of 2.65ha). The footprint of solar panels arrays (ground coverage ratio) is 40-45% of total fenced area (approximately 72ha). Furthermore, the layout incorporates suitable buffers to third party boundaries, internal hedgerows, drainage ditches, streams and rivers. The solar scheme includes 6.7ha of golden plover habitat and 1.5ha of compensatory native woodland.

Landscape tender drawings and specifications will be produced to ensure that the landscape work is implemented in accordance with best practice and conforms with the proposed landscape and biodiversity plan. This document will include tree work procedures, soil handling, planting and maintenance. The contract works will be supervised by a suitably qualified landscape architect.

Planting works will be undertaken in the next available planting season after completion civil engineering and building work for each phase and will integrate and form the overall landscape and biodiversity plan for the project. All tree protection requirements will be installed on commencement of the development and removed on a phased basis as stages of the development are completed.

A series of targeted design refinements have been developed and a revised layout was undertaken to primarily address the relationship between the DC buildings and the R446

corridor, the landscape strategy, the architectural articulation of the DC buildings, and the overall composition of the DC campus.

The key elements of the design response in March 2026 can be summarised as follows:

1. Increased setback of the data centre buildings from the R446, with the distance increased from approximately 49 metres to approximately 75 metres.
2. Expansion of the landscape buffer zone along the R446 and adjacent residential boundaries to provide enhanced visual screening and ecological planting.
3. Reduction in the overall building height of the data centre blocks fronting the R446, with parapet heights reduced from 18 metres to 16 metres.
4. Introduction of an architectural veiling system using a simple metal mesh fabric to soften the appearance of the large-scale building volumes.
5. Breaking the linear repetition along the R446 frontage through the introduction of contrasting architectural elements.
6. Creation of a campus-style development, centred around a strong architectural identity for the office component, providing a focal point for the scheme and helping to humanise the overall development

In addition, extended buffers /setbacks to nearest residential properties have been incorporated into the overall development layout and a minimum set-back of 40m of the solar array from all residential boundaries is now provided.

2.10 DESCRIPTION OF CONSTRUCTION AND COMMISSION STAGES

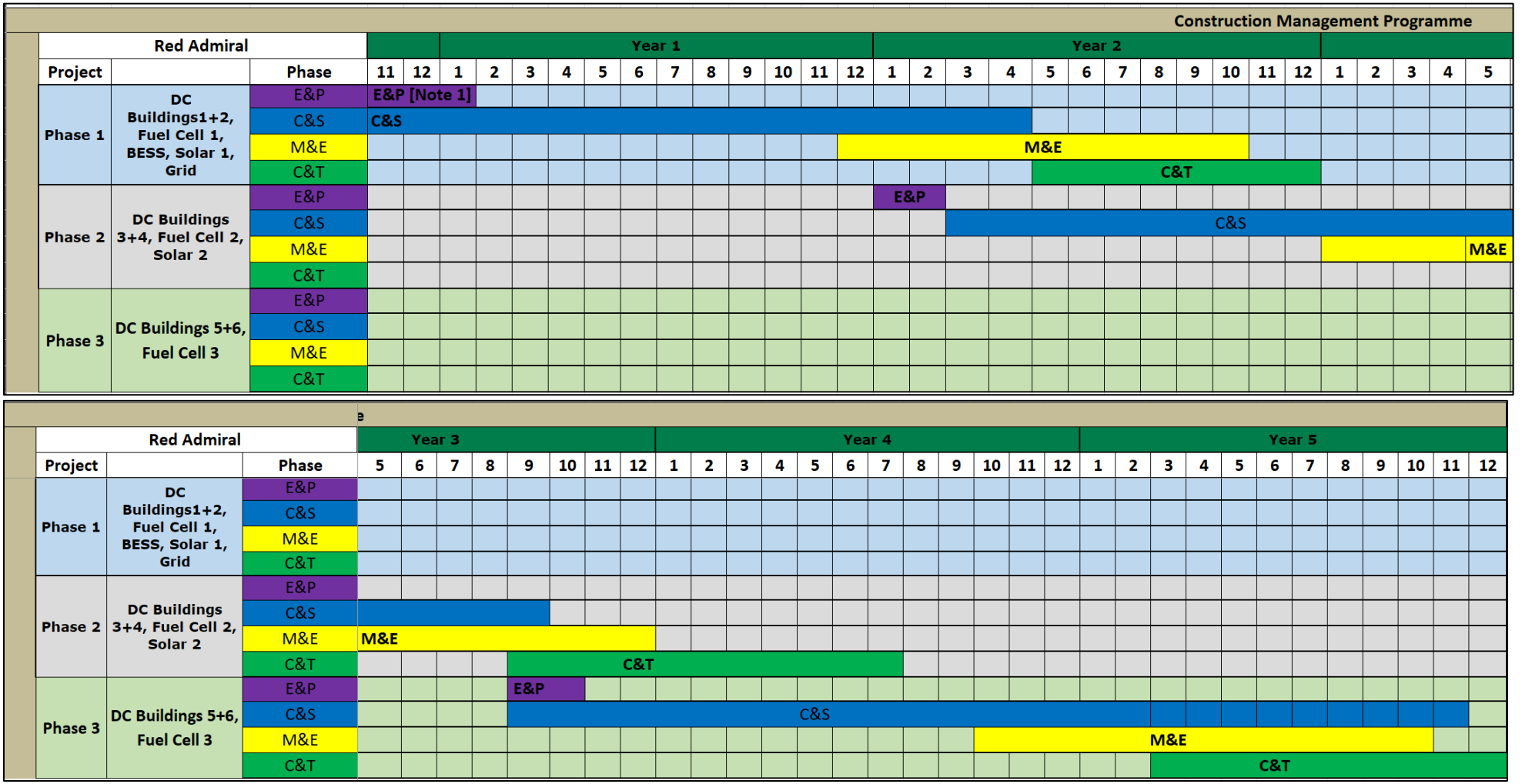
This section details the construction works associated with the proposed development and outlines general construction methods and associated mitigation measures to be implemented to ensure that potential environmental impacts are minimised.

It is envisaged that the project will be constructed over an estimated 62-month period across three phases. After the construction period, it is expected that all elements of the project will be fully constructed, commissioned and capable of operating as designed. The specific details of the construction programme are not currently known as such this programme will be developed under Engineering Procurement and Construction (EPC) contract as part of the detailed design phase. The EPC contractor will prepare a detailed Construction Environmental Management Plan (CEMP) which will be submitted for agreement with the planning authority. It is expected that the EPC contractor will appoint subcontractors to undertake all the specific construction and civil works. A preliminary CEMP has been prepared and is contained in Volume 3 of the EIAR (Appendices) and is lodged in support of the project.

It is therefore difficult to assess the staffing and delivery levels for the development. However, it is considered that the design and proposed layout of projects has developed sufficiently to discuss the potential environmental effects of proposed construction methods. An estimate of construction traffic volumes has been made for a site of this size and is described in Chapter 13 (Traffic and Transport).

The timing of the commencement of construction is subject to planning, design, tendering and ecological constraints. Any works associated with site clearance and removal of soils and internal hedging would be seasonally limited to mitigate against any adverse ecological effects. The impact of construction activities on Biodiversity and Roads and Traffic are assessed separately in this EIAR. The CEMP will provide a framework under which construction activities, which have potential for environmental impact (e.g., generation of dust, ecological impacts, surface water discharge, etc.), will be managed. Mitigation measures as outlined in the EIAR shall be included within this plan. An indicative construction schedule for each phase is outlined below (Figure 2.34). It should be noted that the timing and phasing of projects and activities are approximate and are indicative rather than a definitive programme of works.

Figure 2.34 Indicative Construction Programme



Notes:

1. The construction timelines are for each project are indicative and will be finalised at detailed design stage of the projects.
2. E&P = Site Evaluation and Preparation (Works)
   C&S = Civil & Structural (Works)
   M&E = Mechanical & Electrical (Works)
   C&T = Commissioning and Testing (Works)

Equipment to be used during the construction of the facility will be typical for a project of this scale. In general, the following machinery will be used:

- Tracked excavators,
- Wheeled Excavators,
- Bulldozer,
- Vibrator Rollers,
- Trucks, Dump trucks /Dumpers,
- Mobile Crane,
- Backhoe,
- Grader,
- Breakers,
- Generators /pumps,
- Hoists,
- Concrete pump – Lorry Mounted,
- Loaders,
- Compressors /compactors,
- Rollers,
- Road surfacing plant,
- Delivery vehicles for concrete, steel and other construction materials,

Heavy vehicle movements to the site will consist predominantly of plant and material deliveries. The extent of HGV movements will vary at different stages of the construction works in response to the activities taking place at any given time. The majority of machinery associated with the construction phase is likely to remain onsite for the duration of the construction process. Therefore, the traffic associated with heavy plant will be limited to their delivery and removal, with the intervening period comprising internal movements within the site.

The intensity of traffic will vary over the course of the construction programme. The values referenced are only anticipated during peak periods and therefore representative of the worse-case scenario. Further details on estimated and predicted traffic (LGV and HGV) trip generation figures are assessed in Chapter 13 (Traffic) with supporting data provided in Appendices 13.2. Deliveries during the construction phase will occur on weekdays and will be spread over the over the course of the working day.

2.10.1 DURATION AND PHASING

It is expected that the project will be constructed over an approximate 60-month construction period. Construction works will be carried out over 3 phases (overlapping).

Phase	Period	Items
Phase 1	26 months	DC Buildings 1 & 2, Fuel Cell Power Tower 1, BESS facility, Solar Farm (parcel 1), Grid Connection (including 220kV IPP GIS Building)
Phase 2	31 months	DC Buildings 3 & 4, Fuel Cell Power Tower 2, Solar Farm (northern and southern parcels)
Phase 3	28 months	DC Buildings 5 & 6, Fuel Cell Power Tower 3.

Prior to commencement of construction, geotechnical investigations such as trial pits and boreholes will be conducted to verify foundation designs and road construction. All investigations required prior to enabling works will be carried out in accordance with BS 5930 (Code of Practice for Site Investigations).

No land acquisition is required prior to construction, as the applicant has put in place agreements with the relevant landowners with respect to the entire development lands. Phase 1 of construction will not commence until the main construction contract is awarded and will initially comprise, fencing, excavation, re-grading and berming /soil deposition. The site clearance works will be undertaken in accordance with best practice. Removal of any bird habitats will be undertaken outside the bird breeding season to mitigate disturbance to birds. Mitigation measures to avoid and limit impact to biodiversity include implementation of an environmental management plan which will address water run-off, noise and dust generation, implementation of a suitable landscaping strategy to compensate for habitat loss and to benefit the wildlife of the local area, retention of hedgerows and treelines along the boundary of the site, etc. Also, site clearance will proceed only after cognisance is made to the ecological mitigation measures as detailed in this EIAR.

Where cutting or excavation is carried out, this material will then be reused in areas of the site where fill is needed or in areas requiring landscaping. If any additional material is required this will be imported into the site in a safe and controlled manner, so as to minimise the potential for nuisance and disturbance.

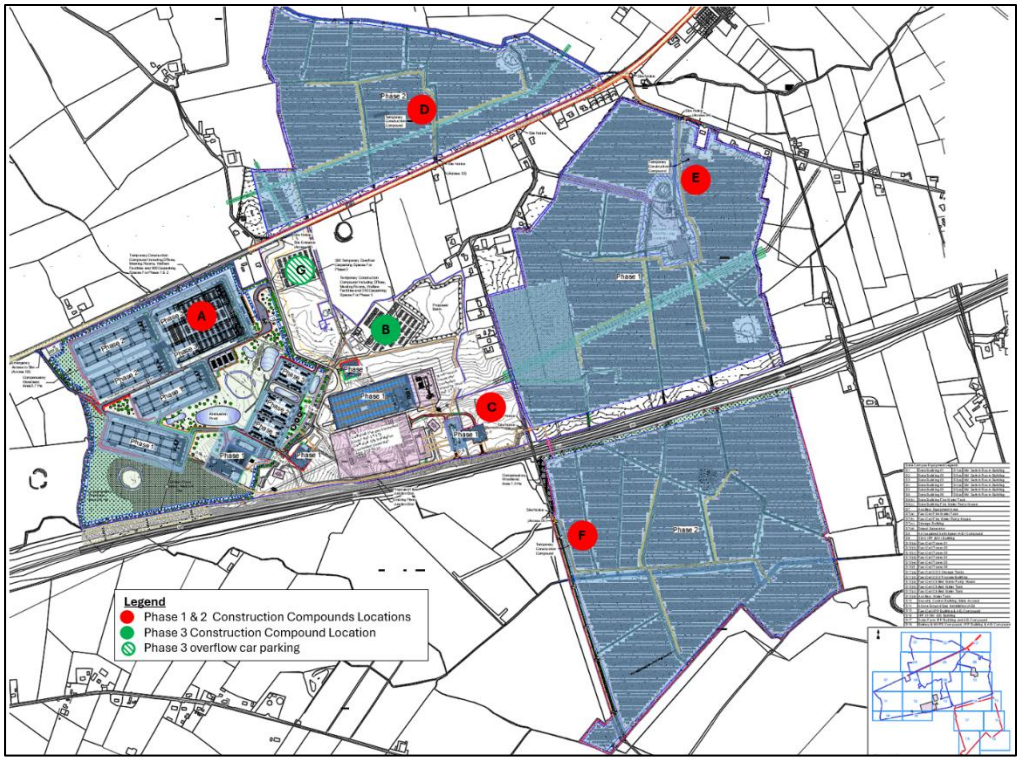
The applicant is committed to ensuring that all the mitigation measures are implemented in full. Haul roads, internal construction site roads, construction compound, main drainage runs, temporary car-parking and staff facilities will also be constructed during this phase. Such site preparation works are expected to be carried out within the first 6 months of the project commencing.

Site preparation and enabling works will also involve the site set up by the building contractor, which will include provision of a site construction compounds which will include the following:

- Site Office,
- Site Facilities (canteen, toilets etc.),
- Office for Resident Engineer,
- Secure compound for the storage of all on site machinery and materials,
- Carparking,
- Permanent/temporary fencing,
- Site Security.

Construction traffic will enter the site via the R446 Regional Road. Internal Roads will be constructed from the public roads to the project development compounds and contractor's compounds (see Figure 2.35). It should be noted that the construction compound for Phase 1 and 2 works on the DC facility will be located in the area where DC Buildings 5 & 6 will be constructed (Phase 3). The temporary construction compound will be relocated to east (to the position marked as "B" on Figure 2.35) and an overflow car park (marked as "G" on Figure 2.35) will be located within the development lands.

Figure 2.35 Layout showing locations of temporary construction compounds



2.10.1.1 Structural Works

Structural works will comprise the construction of the foundations and buildings (e.g., DC Buildings, IPP Buildings, etc), below ground pipework and conduits for services, bunds, internal roads, drainage works, and infrastructural works completion.

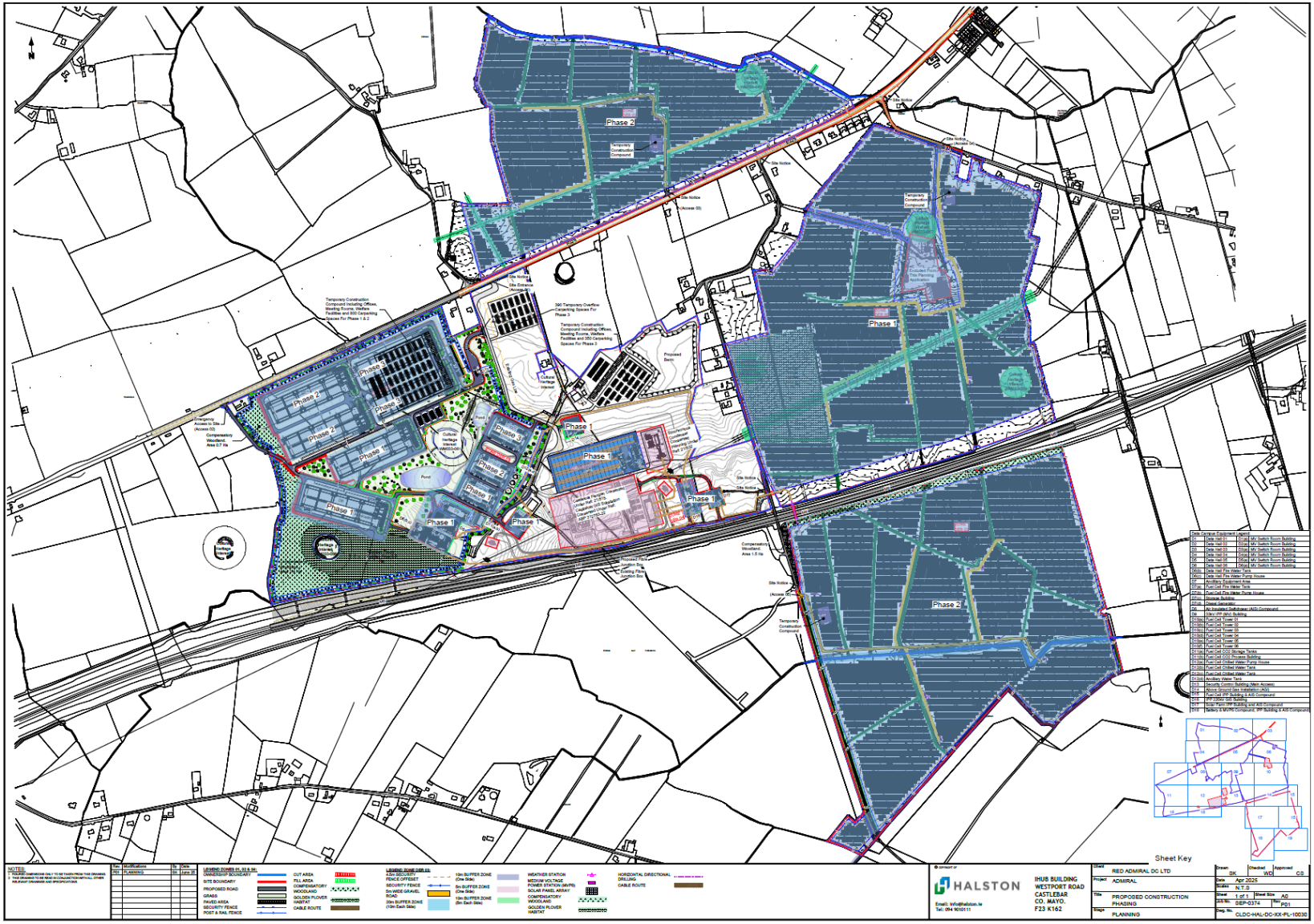
2.10.1.2 Mechanical and Electrical Works

Mechanical and electrical works include placement of plant and machinery, transformers, tanks, skid mounted structures and enclosures, above ground pipework, wiring and cabling, etc. The individual project plant components will be delivered to the site by the preferred supplier and will be installed in accordance with manufacturer requirements.

2.10.1.3 Commissioning and Testing

Commissioning and testing of mechanical and electrical equipment will be carried out in anticipation of handover of the projects to the project owner /client. It should be noted that the above phasing is indicative only and may be subject to variation by the planning authority and also to final schedule agreement with the main contractor. In terms of the DC facility, each building will undergo a five-month integrated-systems test. This will be followed by 1-2 months of snag clearance and demobilisation of contractor's compounds.

Figure 2.36 Proposed Construction Phasing



2.10.2 EMPLOYMENT

Employment levels during the development will vary depending on the construction programme and the extent of activities occurring on the site. It is expected that during peak activities there will be up to 900 construction workers at the site. An assessment of the likely traffic volumes which may arise during the construction and operational phase is discussed in the Traffic and Transport Chapter of this EIAR (Chapter 13 and in the supporting Appendices, in particular Appendix 13.2).

2.10.3 ACCOMMODATION/FACILITIES

The relevant statutory requirements will be provided for all workers on the construction site including:

- Canteen facilities and drinking water supply
- Toilet, wash up and locker facilities and hot water
- Drying room
- Car parking for workers
- First Aid Office
- Site Engineers & Resident Engineers offices
- Site offices for Contractors
- Secure site compounds

Welfare provision will be concentrated within the main contractor compounds rather than dispersed across the site. This is considered appropriate for a development of this scale and is consistent with established construction practice in Ireland. It also allows welfare and wastewater infrastructure to be managed from a limited number of controlled locations, thereby reducing environmental risk.

The proposed construction-stage wastewater design comprises a fully contained temporary foul drainage system. No foul wastewater generated by welfare facilities will discharge to ground, surface water drainage, field drains or watercourses. Instead, foul effluent from toilets, wash-hand basins, canteen sinks and other welfare facilities will be collected in sealed proprietary storage systems and removed from the site by a licensed contractor.

Depending on the scale and duration of activity within each compound, this will either involve self-contained portable welfare units with integral storage or modular welfare cabins connected by sealed temporary pipework to dedicated sealed holding tanks located within the compound. This is considered the most appropriate and environmentally robust solution for a temporary construction project of this nature, where welfare demand is

significant but temporary and permanent foul drainage infrastructure is not warranted during the construction period.

This approach provides a conservative and flexible foul wastewater solution for a long-duration project with overlapping phases and changing compound locations. It allows welfare facilities and associated wastewater storage to be scaled, serviced and relocated in line with the construction programme, while avoiding the need for temporary on-site treatment systems or any discharge to ground. In doing so, it removes the potential for untreated or partially treated foul effluent to affect soils, groundwater, field drains or surface waters.

The temporary foul wastewater arrangements for each active compound will be designed and operated in accordance with standard Irish construction practice and relevant health, safety and environmental requirements. Welfare facilities will be provided in numbers appropriate to the workforce assigned to each compound at any given time, and the contractor will maintain them in accordance with applicable statutory welfare requirements. The principal contractor and PSCS will keep welfare provision and foul storage capacity under review throughout the construction period to ensure that provision reflects actual workforce demand across the three overlapping phases.

In practice, compounds will generally comprise grouped welfare cabins connected to one or more dedicated sealed holding tanks, while smaller or more transient compounds may use self-contained portable sanitation units. In all cases, the tanks and units will be proprietary, watertight and used solely for foul effluent storage. They will be located within secure compounds, protected from accidental damage, and positioned away from temporary drainage features and surface water controls.

The operational management regime will be straightforward and robust. Portable toilets and welfare units will be supplied and serviced by an approved and licensed sanitation contractor. Toilets will be serviced at regular intervals, and more frequently where required by workforce levels or usage. Where welfare cabins are connected to holding tanks, those tanks will be routinely inspected and emptied by licensed tanker before reaching capacity. All wastewater removed from the site will be transported by an authorised collector to an authorised wastewater treatment or reception facility. Records of servicing, removal and disposal will be maintained on site as part of the environmental management documentation.

The foul wastewater system will remain entirely separate from the temporary surface water management system serving the compounds. Clean runoff from roofs, yards and parking areas will not be directed to foul holding tanks, and foul wastewater will not be

permitted to enter temporary drains, settlement measures or silt control infrastructure. The temporary foul wastewater arrangements will be integrated with the wider construction drainage and environmental protection measures set out in the CEMP, ensuring that foul and surface water remain fully segregated throughout the construction period.

Having regard to the scale, duration and phased nature of the proposed development, the use of temporary modular welfare compounds served by sealed self-contained sanitation units and/or sealed holding tanks with routine licensed pump-out is considered the most appropriate construction-stage wastewater solution. It is technically robust, adaptable to the three overlapping construction phases, consistent with the submitted compound layouts, and aligned with standard practice for major construction projects in Ireland. Most importantly, it ensures that all foul wastewater generated during construction will be fully contained and removed off site, with no discharge to ground or watercourses.

2.10.4 CONSTRUCTION OPERATION HOURS

Subject to agreement with the planning authority, it is anticipated that the following times will constitute the standard working hours[14] on the construction site.

- Monday to Friday 07:00 to 19:00
- Saturdays 07:00 to 13:00
- Site closed on Sundays and Bank Holidays,

Working hours may vary slightly depending on weather conditions and daylight hours during winter months. Heavy construction activities will be avoided where possible outside the normal working hours outlined above. Lighting for night-time working will be downward facing and directed towards the centre of the site so as to minimise any nuisance outside of the site in relation to residential receptors or light disturbance to ecological receptors.

2.10.5 CONSTRUCTION TECHNIQUES

The construction techniques used will be standard and similar to those that would normally be associated with large industrial projects of this nature with both building and technology installation elements and a large civil engineering element.

[14] Typical Construction hours will apply with the exception of commissioning and specific engineering works (e.g., concrete pours) which could take place outside these hours, as and when agreed with the planning authority. It is likely that some construction activities will be required to continue for 24 hours for limited durations. The facility may be operational at any point during a 24-hour period during commissioning (and operation).

2.10.6 MATERIALS

In so far as possible, construction materials will be from local sources to support the local economy and minimise environmental impact associated with vehicle emissions. All imported material that will be used on site will be retrieved from approved sources.

Under LEED v4.1 BD+C—Data Centres, the Materials & Resources (MR) credit framework incentivises both (i) the specification of products that can demonstrate quantifiable reductions in cradle-to-gate global-warming potential (e.g. via whole-building life-cycle assessment or EPD Optimisation pathways) and (ii) the procurement of products whose extraction, manufacture and point of purchase all occur within a 160 km radius, through the Location Valuation Factor that doubles their weighted contribution to the BPDO credits.

Crucially, these mechanisms are performance based rather than prescriptive: LEED awards points for verified embodied-carbon improvements and for documented regional sourcing, but it does not mandate either criterion in isolation. This design flexibility allows the project's procurement strategy (aiming for Gold/Platinum certification) to optimise the mix of low-carbon materials and local supply chain advantages in a manner that best meets cost, schedule and risk objectives while maximising credit uptake.

The construction of surface water systems are an important element of the project. Temporary localised settlement ponds and interceptors (where necessary) will be constructed during the initial stages of the contract mitigating against adverse impacts on receiving water receptors.

2.10.7 EMBODIED CARBON OPTIMISATION AND LCA

The baseline scenario presented for the DC facility in the LCA (Appendix 3.2) derived from the provisional estimated quantities and specifications contained in the design package. Concrete mixes in this reference case already incorporate a 20–25% ground-granulated blast-furnace slag (GGBS) replacement to reflect prevailing Irish practice for large industrial floors and foundations, while structural steel has been assigned an emissions factor of 1.51 kg CO_2/kg in line with the latest Environmental Product Declarations (EPDs) for standard hot-rolled sections.

Applying these inputs through the LCA platform yields a cradle-to-practical-completion intensity of 567kg CO_2e/m^2. This figure captures the primary materials of the superstructure, envelope and internal floor systems as well as a proportional allowance for temporary works, fittings and construction-stage energy. Although respectable by historic data-centre benchmarks, the result maps the major carbon hot spots that were further considered. A component-by-component breakdown of the baseline reveals that five

material groups dominate the carbon profile, i.e. ground-floor concrete slab, upper floor, concrete slab, primary structural steel, composite façade panels and secondary steel. An iterative optioneering exercise tested alternative material specifications, supply chains and design efficiencies. The optimum blend of measures, all technically feasible within programme and budget parameters, achieves a 34% reduction, bringing embodied-carbon intensity down to 373kg CO_2e/m^2 without compromising durability, structural integrity or fire performance.

The cumulative effect of these material switches (for the same structural spans and loading criteria) drives the embodied-carbon saving of 194kg CO_2e/m^2 relative to the baseline, equating to an absolute reduction of roughly 18,000t CO_2e/m^2 over the building's gross internal floor area.

The embodied-carbon modelling demonstrates that intelligent material choices, particularly high-GGBS concrete, low-carbon steel, and optimised façade components—deliver a quantifiable 34% reduction without diluting functional performance. Coupled with a forward-looking DER configuration, the scheme outperforms current policy baselines and provides a replicable model for how large-scale digital infrastructure can contribute positively to Ireland's legally binding climate targets. In total, the combination of design optimisation, construction-phase controls and operational net-zero capability means the proposed project will exert no significant residual impact on climate, while simultaneously underpinning the nation's digital transformation.

A Project Carbon Management Plan (PCMP) has been prepared to support the proposed development and is provided in Appendix 15.1 to this EIAR. The report sets out how greenhouse gas (GHG) emissions will be managed across the whole life of the proposed development. It has been prepared for planning purposes and follows the intent and requirements of PAS 2080 (Carbon Management in Infrastructure). The PCMP should be read in conjunction with the Updated Carbon Impact Statement & Alignment with LEU Policies contained in Appendix 3.3.

2.10.8 EXTENSION OF INFRASTRUCTURE

Services such as ESB and Telecoms will be brought to the dedicated construction compound from the nearest available point. Where this is not practicable and deemed unnecessary, diesel generators will provide power (as required) at the more remote /low intensity construction compounds. Potable water for the development will be supplied from the on-site well which is currently serving the residential property which is to be demolished. Temporary sanitary accommodation will be provided on site until proposed foul effluent management packages are installed. All domestic effluent generated on site

will be discharged to temporary sewage containment facilities prior to transport and treatment off site.

2.10.9 WASTE MANAGEMENT

During the construction phase both solid and liquid waste will be produced at the facility. Waste oils, solvents and paints will be stored in a temporary bunded area prior to transport off site by a licensed contractor. All wastes arising from construction of the proposed development will be managed in accordance with the Waste Management Acts 1996, as amended.

It is proposed to demolish and remove some farm buildings /outbuildings and a derelect house within the development lands. These will be demolished and removed from site upon commencement of construction work in accordance with best practice. Anticipated wastes which will be generated include soils, bricks and blocks; concrete and reinforced concrete; timber; metal sheeting and steel. Materials arising from this process will be recycled /disposed of at authorised waste management facilities.

Designated skips and receptacles will be provided on site for all recyclable wastes. The appointed waste contractor will collect and transfer the recyclable wastes as skips are filled. Non-recyclable waste (e.g. canteen waste, general waste) will be transferred by an authorised waste collector to licensed facilities (e.g., canteen waste, general waste). Numerous licensed waste contractors are available in the area and will be obtained from the waste management authority listing.

It is not envisaged that there will be any excess spoil materials arising from construction, as all the excavated soil will be re-used as part of the construction process (formation of berms and landscaping). All other solid waste generated during the construction phase will be adequately segregated and stored prior to transfer to an authorised facility for recovery/recycling/disposal.

2.10.10 FENCING AND SECURITY

Secure fencing will be erected around individual development sites and temporary fencing will be erected around the construction compound. All on site machinery and materials will also be stored within the fenced compound.

2.10.11 NOISE, VIBRATION AND DUST

Dust emissions during the construction period have been detailed under temporary environmental protection measures. The CEMP will incorporate all mitigation measures

detailed in the EIAR and any conditions specified in the interests of proper planning, sustainable development and environmental protection. This will include measures and trigger values to mitigate any potential impacts to nearby receptors.

2.10.12 TEMPORARY ENVIRONMENTAL PROTECTION MEASURES

During the construction stage site construction roads will be sprayed with water during dry periods to mitigate against the formation of dry dust particles. Excavated materials stored or moved on site could lead to the formation of airborne dust particles during dry weather periods. Water suppressants will be used during these dry weather conditions.

The landscaping areas proposed for the facility will be constructed and planted at the earliest opportunity thus limiting the potential for off-site migration of airborne dust. Where temporary stockpiles are required, the material will be stored in designated areas and will be covered with tarpaulins and/ or regularly dampened during dry weather periods.

All potentially polluting substances such as oils, chemicals and paints used during construction will be stored in designated storage areas. These will be bunded to a volume of 110% capacity of the largest tank/container within the bunded area with all filling and draw-off points fully located within the bunded area. Drainage for the bunded area will be diverted for dedicated collection and safe disposal.

As stated above all domestic effluent generated on site will be discharged to temporary sewage containment facilities prior to transport and treatment off site.

Temporary settlement ponds and interceptors will be constructed as necessary during the early stages of construction mitigating against silt laden run-off to the existing drainage network.

Prior to commencement of development a construction quality assurance plan (CQA) will be jointly prepared by the contractor and developer. Written approval of the CQA will be sought from the planning authority prior to commencement of construction activities on-site if required.

Good housekeeping and facility management during the construction period will ensure that there will be no negative environmental impacts from the construction of the proposed facility.

The majority of machinery associated with the construction phase is likely to be onsite for extended periods of time. The traffic associated with these will therefore be limited to

their delivery and removal, with the intervening period involving internal movements within the site. The impact of these on the surrounding road network is therefore expected to be minimal and infrequent.

2.11 DESCRIPTION OF OPERATIONAL STAGE

The operational stage of the proposed DC facility and collocated DER is designed with robust sustainability commitments which represents a critical period in the facility's lifecycle. This stage is characterised by the continuous operation of advanced digital infrastructure, supported by integrated energy systems and environmental management practices that align with international best standards. The following outlines the anticipated operational characteristics, resource consumption, emissions, waste management, and mitigation measures relevant to the project.

2.11.1 DC FACILITY

The operational phase begins once final commissioning tests are complete, and the data halls are handed over for live IT load. From that point, the facility operates continuously, twenty-four hours a day, three hundred and sixty-five days a year, to provide services. Its design philosophy links its performance with best-in-class environmental stewardship, reflecting the commitments embodied in the European *Climate Neutral Data Centre Pact*. It is proposed that as part of detailed design work (preconstruction) the project will be prepared for certification to the LEED BD+C v4 rating system for data centres.

Unlike conventional data centres that often rely on water-intensive evaporative cooling, the proposed DC facility will employ a combination of free fresh air cooling, air handling units, and, during periods of unusually high ambient temperatures, electric and absorption chillers. The primary cooling strategy utilises filtered outside air to maintain optimal server temperatures, significantly reducing water consumption and associated environmental impacts.

Electric chillers and absorption chillers will only operate when climatic conditions exceed the design thresholds for free air cooling. This hybrid approach ensures year-round thermal stability while minimising both energy and water use. The absence of evaporative cooling eliminates the need for large-scale water abstraction and discharge, further reducing the facility's environmental footprint. The operational phase will be characterised by substantial but carefully managed resource consumption. Electricity will remain the primary input, with demand moderated through energy-efficient hardware, virtualisation, and intelligent workload management (*"Digital Carbon Passport Solution").* The Digital Carbon Passport automatically ranks supply options in a carbon merit order. The facility's

commitment to sourcing energy from the lowest carbon-intensive sources will result in a significantly reduced operational carbon footprint compared to conventional data centres.

Direct emissions will be minimal, primarily associated with periodic testing of backup systems. The use of fuel cells and renewable energy will further limit reliance on fossil-fuel-based backup generators. Air quality impacts will be negligible, with emissions well below regulatory thresholds (refer to Chapter 10). Noise emissions, primarily from cooling equipment and backup power systems, will be addressed through careful equipment selection, acoustic screening, and adherence to design criteria specified. Predictive modelling was used to ensure that operational noise levels remain within permissible limits at the site boundary and nearby sensitive receptors (refer to Chapter 11).

Operational water use is confined to domestic demand, cleaning and minor closed-loop top-ups. Groundwater abstraction, supplied though a modular water treatment unit, will serve the vast majority of the proposed demand on site and this will be supplemented by rainwater harvested from each building. Harvested rainwater stored in underground tanks and will used as "grey water", e.g. for WC flushing or replenishment of bulk water storage tanks (e.g. firewater). Clean stormwater is attenuated on site using open ponds in accordance with SuDS principles and released to an existing receiving watercourse at greenfield run-off rates flow controls to safeguard and mitigate any risk of downstream impact. Foul effluent from the DC facility will be discharged to the public sewer.

Operational waste streams will include electronic waste (e-waste) from hardware upgrades and decommissioning, packaging materials, and general municipal waste from staff activities. The DC facility will implement a comprehensive waste management plan, prioritising reduction, reuse, and recycling in line with LEED BD+C v4 requirements and circular economy principle. Waste will be processed by certified contractors, ensuring responsible handling and material recovery. Routine training and awareness programmes will be provided for staff to support waste segregation and minimisation efforts. The facility will report on waste generation and diversion rates as part of its ongoing sustainability commitments

2.11.2 DER

A distinguishing feature of project is the collocation and integration of a DER including a solar farm, fuel cell, and BESS, in addition to a grid connection. These systems are designed to prioritise the lowest carbon-intensive energy sources available at any given time, thereby minimising the facility's carbon footprint. The solar farm will provide renewable electricity during daylight hours, while the fuel cell offers a low-emission,

dispatchable power source. The BESS will facilitate load balancing, back-up, and support to energy source integrations, enhancing overall energy resilience and flexibility.

The facility's energy management system will dynamically optimise the use of on-site and grid-sourced electricity, ensuring that the data centre's demand is met in the most sustainable manner possible. Although the fuel cell does not involve combustion, it is expected that it will require an industrial emissions licence from the EPA. EU guidance on both the IED and the ETS makes clear the oxidation of a fuel, not the presence of a flame, that brings an installation into the "combustion" category, i.e., it falls under a class of activity ("*Combustion of fuels in installations with a total rated thermal input of 50 MW or more*") as outlined in the first schedule of the EPA Act 1992, as amended.

The Solar Farm and BESS facility will operate largely unmanned and will be controlled remotely. The Solar PV farm and BESS will provide power to the DC facility via the 220kV IPP GIS. Neither project is a class of activity under the First Schedule of the EPA Act 1992, as amended. Noise emissions, primarily from DER assets has been addressed through careful equipment selection, acoustic screening, and adherence to design criteria specified. Predictive modelling was used to ensure that operational noise levels remain within permissible limits at the site boundary and nearby sensitive receptors (refer to Chapter 11).

Upon handover after the Commissioning and Testing Phase, the plant operators will provide suitably qualified and technically competent staff who will be responsible for maintenance of the facility. Employees will cover a broad range of services including safety, engineering, technical, security, maintenance and administrative support staff. Subcontracted maintenance staff will also be required at critical times throughout the life of the project. The plant will be operated in accordance with procedures which will be prescribed in management systems associated with the site operations, i.e., quality, health and safety.

2.12 DECOMMISSIONING

A decommission plan has been prepared for the project and is contained in Appendix 2.3.

3 NEED FOR THE DEVELOPMENT AND ALTERNATIVES

This chapter of the EIAR sets out the need for the development and the consideration of reasonable alternatives in terms of locations, designs and processes. The impact of not proceeding with the proposed development at all, often referred to as the *"do nothing"* option, is also considered.

3.1 NEED AND RATIONALE FOR THE PROJECT

Ireland's case for continued but carefully managed data-centre development is now framed explicitly by two companion policy texts: the Government Statement on the Role of Data Centres in Ireland's Enterprise Strategy (July 2022)[15] and Harnessing Digital, The Digital Ireland Framework (February 2022)[16]. Together they set out how the twin transitions of digitalisation and decarbonisation are to be delivered, and what is expected of every new facility. The national policies are mutually reinforcing rather than competing ambitions.

The July 2022 Statement is unambiguous: Data centres are "*core digital infrastructure"* and "*indispensable"* to the economy and society, underpinning everything from banking to health-service delivery. At the same time, the document recognises acute short-term constraints which include limited spare grid capacity, tighter carbon budgets, and rising public concern over water use, which mean "*not all existing demand for data-centre development can be accommodated."* To address this, the Statement establishes six national principles:

- demonstrable economic impact;
- efficient use of the electricity grid;
- renewables additionality;
- co-location with future-proof power or storage;
- decarbonised by design; and
- tangible SME and community benefits.

The statement sets a clear preference for projects that (i) locate outside the electricity-constrained Dublin area, (ii) make efficient use of existing transmission assets, and (iii) add renewable generation and storage "*in regional locations where capacity is available"*.

[15] Department of Enterprise, Trade and Employment (DETE) (2022) *Government Statement on the Role of Data Centres in Ireland's Enterprise Strategy*
[16] Department of the Taoiseach (DoT) (2025) *Harnessing Digital – The Digital Ireland Framework* (updated 2024 progress report)

Ireland's Digital Ireland Framework positions the State as a *"bridge between the United States and the European Union"* in global tech, while promising that digital solutions will also tackle climate challenges and boost inclusion and productivity. The strategy mirrors the EU's Digital Compass along four axes (a) digital transformation of business, (b) world-class infrastructure, (c) digital skills, and (d) digitised public services. The strategy insists on a *"modern, cohesive, well-resourced regulatory framework"* to keep the transition safe and trusted.

The Government Statement prioritises projects that reduce pressure on the grid through on-site renewable generation and other grid supporting technologies (such as BESS and Fuel Cell technologies). The proposed project aligns with the six principles of the 2022 Government Statement and the four pillars of the Digital Ireland Framework. The project does not result in conflicts with electricity grid capacity constraints, and the DER is a catalyst for innovation in the decarbonisation and digitalisation transition.

3.2 CONSIDERATION OF ALTERNATIVES

This Section of the EIAR sets out the reasonable alternatives considered and iterations of the design of the development which have evolved in terms of layout and processes.

Schedule 6(1)(d) to the Planning and Development Regulations, as replaced by Article 97 of the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018, states that the EIAR should contain *"A description of the reasonable alternatives studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed development on the environment".* It should be noted that the assessment does not include an assessment of potential alternatives, rather it evaluates and considers "reasonable alternatives" that have been "*studied by the person or persons who prepared the EIAR".*

In Section 4.2(d) of the *"Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment August 2018"* it states that the information provided must include

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

Reasonable alternatives are defined under Section 4.13 in the 2018 guidelines as the following:

> *The Directive requires that information provided by the developer in an EIAR shall include a description of the reasonable alternatives studied by Reasonable alternatives may relate to matters such as project design, technology, location, size and scale. The type of alternatives will depend on the nature of the project proposed and the characteristics of the receiving environment. For example, some projects may be site specific so the consideration of alternative sites may not be relevant. It is generally sufficient for the developer to provide a broad description of each main alternative studied and the key environmental issues associated with each. A 'mini- EIA' is not required for each alternative studied.*

The above statement is also reiterated in the 2022 EPA EIA Guidelines (Section 3.4.1).

> *The objective is for the developer to present a representative range of the practicable alternatives considered. The alternatives should be described with 'an indication of the main reasons for selecting the chosen option'. It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account in deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required.*

3.2.1 DO NOTHING

The European Union's Digital Decade Policy Programme 2030[17], created by Decision (EU) 2022/2481, recasts the Union's long-standing digital ambitions as a legally framed contract between Brussels and every member state. The associated targets call for *"secure and sustainable digital infrastructures"*, including 10,000 climate-neutral edge nodes, to underpin cloud uptake, e-health, digital ID and AI[18]. Variables that influence global locations for this type of development include power availability, latency and resilience, natural hazard score (e.g. earthquakes, hurricanes,) security, climate, workforce and regulation and tax policy.

Ireland has succeeded in establishing itself as a leading cloud destination in Europe with a significant presence of data centres and cloud computing companies. However,

[17] European Parliament and Council (2022) *Decision (EU) 2022/2481 of 14 December 2022 establishing the Digital Decade Policy Programme 2030*. *Official Journal of the European Union*, L 323, 19 December, pp. 4–26.
[18] European Commission (2025) *Europe's Digital Decade: digital targets for 2030 - https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en*

maintaining this position depends on providing low-carbon power expanding resilient fibre routes, keeping a predictable pro-innovation regulatory and tax environment, and growing a skilled workforce able to design, run and secure the next generation of climate-neutral facilities.

In a do-nothing scenario, the project site would remain in its current use (agricultural pastures with arable parcels.). As demonstrated by the extensive biodiversity studies carried out, there are no rare or protected habitats recorded in the study area and the proposed development area is of low local ecological value with treelines of higher local value. The open field habitats are considered of low biodiversity value at a local level as are the internal hedgerows. There are no rare or protected habitats recorded in the study area and the is no potential for connectivity to any other European sites. The project site does provide habitat for certain specified identified; however, the project is designed to allow these habitats to endure. The *"reasonable alternative"* of *"doing nothing"* would displace environmental impacts rather than eliminating them and would fail to advance Ireland's digital and climate goals.

If the proposed project is not pursued, domestic workloads would revert to using legacy in-house less efficient servers (which are collectively less efficient than cloud-based servers) or relocate to other parts of the world thereby diminishing Ireland's reputation as a technology hub service economy and the loss of high-value activity from the domestic ICT cluster. This conflicts with the EU's (75% cloud-adoption goal) and Government policy, which treats energy-efficient digital infrastructure as the twin engine of the State's digitalisation and decarbonisation agendas. A *"do-nothing"* outcome would defer not only direct employment but also the spill-over benefits for indigenous ICT firms and energy-services companies that cluster around large digital infrastructure.

A *"do nothing"* approach will impede regional diversification and the spread of growth more evenly across the island of Ireland required by National Strategic Outcomes (NSOs) stated in the National Planning Framework (NPF)[19] and the National Development Plan (NDP)[20]. Balanced regional growth is both a social imperative and economic obligation.

For reasons presented above, the *"do-nothing"* alternative can be rejected as unreasonable within the meaning of Schedule 6. The project is inconsistent with national and EU policy objectives, and a "do-nothing" alternative offers no superior environmental outcome when the full life cycle and system context are considered.

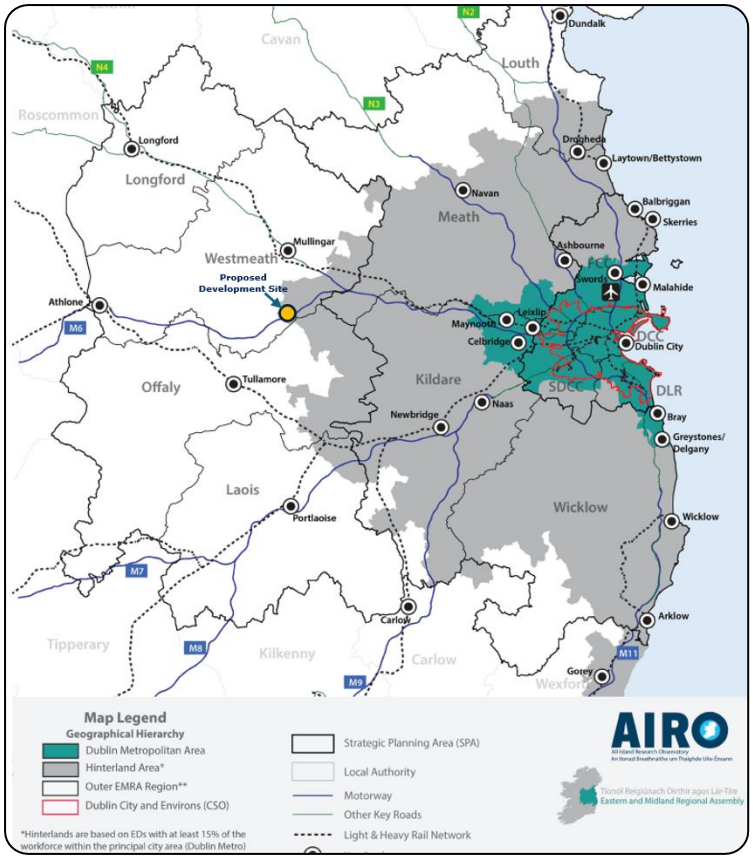
[19] Government of Ireland (2025) *National Planning Framework: First Revision (Project Ireland 2040)*. Dublin: Department of Housing, Local Government and Heritage
[20] Government of Ireland (2021) *National Development Plan 2021-2030 (Project Ireland 2040)*. Dublin: Department of Public Expenditure, National Development Plan Delivery and Reform

3.2.2 ALTERNATIVE LOCATIONS

The government guidance[21] regarding alternative sites is clear and supports the decision to locate the development at the proposed site, i.e. *"….some projects may be site specific so the consideration of alternative sites may not be relevant…."*

The location of the proposed project was guided by a number of factors not least being the existing 220kV transmission corridor and Castlelost GIS substation (node) within the site, which provides firm Maximum Import Capacity (MIC) without triggering major off-site reinforcement works. Locating the project at the proposed site, which is an unconstrained grid area, therefore aligns with the Statement's *"grid-capacity-and-efficiency"* principle and avoids intensifying grid stress in the Greater Dublin Area.

Figure 3.1 Proposed Site Location



The c.243ha landbank comfortably accommodates the DC facility and collocated DER energy assets the DER. The project lands allow for development of a campus style DC facility with appropriate separation of project assets and purposefully designed landscapes that promote biodiversity enhancement. Ground conditions at the site are suited to the

[21] Department of Housing, Planning and Local Government (2018) *Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment*.

proposed project and while there are recorded archaeological monuments within the site the project has been designed to avoid any known archaeological and architectural heritage constraints.

The project site is comprehensively served from a fibre and telecoms perspective, providing the opportunity for a straightforward and secure fibre and telecoms connection, whilst also limiting the works and associated impacts of the same. Several dark fibre options are available near the site which meet the capacity and performance requirements for the DC facility (low latency, diverse fibre routes and multiple designated fibre pairs).

The existence of the adjacent high-pressure natural gas network on site allows for construction of the fuel cell asset on site without the need for off-site development for an associated gas pipeline. This eliminates the need for new wayleaves, reduces construction time and avoids potential cumulative effects. The fuel cell is designed to operate on natural gas but is also capable and future-proofed to operate on biomethane and green hydrogen in accordance with the policy as set out in the National Hydrogen Strategy (2023)[22] and National Biomethane Strategy (2024)[23].

Figure 3.2 Summary of Benefits of Proposed Project Location



[22] Department of the Environment, Climate and Communications (2023) *National Hydrogen Strategy*.
[23] Department of Agriculture, Food and the Marine and Department of the Environment, Climate and Communications (2024) *Ireland's National Biomethane Strategy*

The site fronts directly onto a regional road with direct access to the M6 and N52, giving HGVs, construction traffic and service buses multiple route options without passing through village cores and there are no material conflicts with zoning objectives. The nearest European site (SAC/SPA) is located over 5km from the site (Raheenmore Bog SAC) and the downstream River Boyne and River Blackwater SAC /SPA is greater than 30km from the site. The local settlement pattern is dispersed and consequently the project avoids encroaching on any sensitive receptors.

The regionally located project collocates a DC facility with a mix of low emissions and zero-carbon generation and storage DER assets. The design ensure that the development is consolidated and substantially improves cost benefit analysis of the proposed development. Developing the project at this location avoids and reduces adverse environmental effects (following the mitigation hierarchy of avoid, reduce and, if possible, remedy).

3.2.3 ALTERNATIVE TECHNOLOGIES AND PROCESSES

The proposed project incorporates a DER which shifts the DC facility design away from a legacy *"plug and play"* approach. The proposed DER approach developed from the Government's 2022 policy statement, and this is also echoed in the Commission for Regulation of Utilities (CER) draft Large Energy User (LEU) connection policy[24]. An Energy Statement and Approach to Sustainable Data Centre Development was commissioned to inform the design and this is presented in Appendix 3.1 (Volume 3 of EIAR). This Energy Statement and Approach to Sustainable Data Centre Development is updated with the Carbon Statement and Alignment with National Large Energy Users Policies provided in Appendix 3.3 to this EIAR.

This DER approach coupled with alternative DC facility cooling technologies is presented below.

3.2.3.1 DC facility with Collocated DER

A mix of energy technologies were chosen to support the DC facility and configured as a DER. The DER component of the project is a key attribute and provides a future-proof powertrain that supports the electricity demand of DC facility.

The DER includes demonstrated proven energy generation and storage assets. This includes a 180MW solar PV farm, a 500MWh BESS, 160MW of high efficiency fuel cells and a grid connection to allow for import of low carbon and /or renewable energy from the

[24] https://consult.cru.ie/en/consultation/review-large-energy-users-connection-policy

network (see Figure 3.3). The DER also incorporates technologies to facilitate recovery of by-products (waste CO_2 and waste heat) which increases its overall efficiency.

The fuel cell is designed to provide variable power to the DC facility. When compared with conventional generation technology such as a combined cycle gas turbine (CCGT), fuel cells provide more power (kWh) per cubic meter (m^3) of natural gas, has lower CO_2 emissions and practically zero NO_X and SO_2 emissions. This mitigates the need for emissions abatement technology such as Selective Catalytic Reduction (SCR) catalyst. Fuel cells are modular in nature, can be deployed to match DC facility phasing and have a much smaller footprint. The technology has low noise emissions and has no requirement for water (no stream cycle).

The BESS provides resilience and demand flexibility. In terms of the BESS, a number of battery types were considered. This included lead acid, flow battery (iron, vanadium)[25] and NaS batteries. Criteria which informed selection of the preferred technology included, proven and demonstrated technology, long life cycling requirements and positive environmental and safety attributes.

The 500 MWh BESS will play a central role in enabling the DC facility to operate on a fully optimised, net-zero carbon energy mix. While all battery systems incur some round-trip efficiency (RTE) losses, typically around 10% for lithium-ion, these are significantly outweighed by their advantages. By enabling the datacentre to displace traditional diesel backup, the BESS delivers far greater environmental and operational value. Instead of relying on carbon-intensive generators during peak demand or emergencies, the battery discharges clean, stored energy, sourced from renewable generation, when it's needed most. In effect, the BESS transforms backup power from a passive liability into an active, climate-aligned energy asset.

Power from the solar PV farm will be either used directly or stored in the BESS to provide further resilience. This asset gives the operator a direct, traceable source of zero-carbon electricity without relying on the electricity grid. It is expected that the maximum output from the solar farm will occur and coincide with the DC facility's cooling peaks (i.e. during hot sunny days).

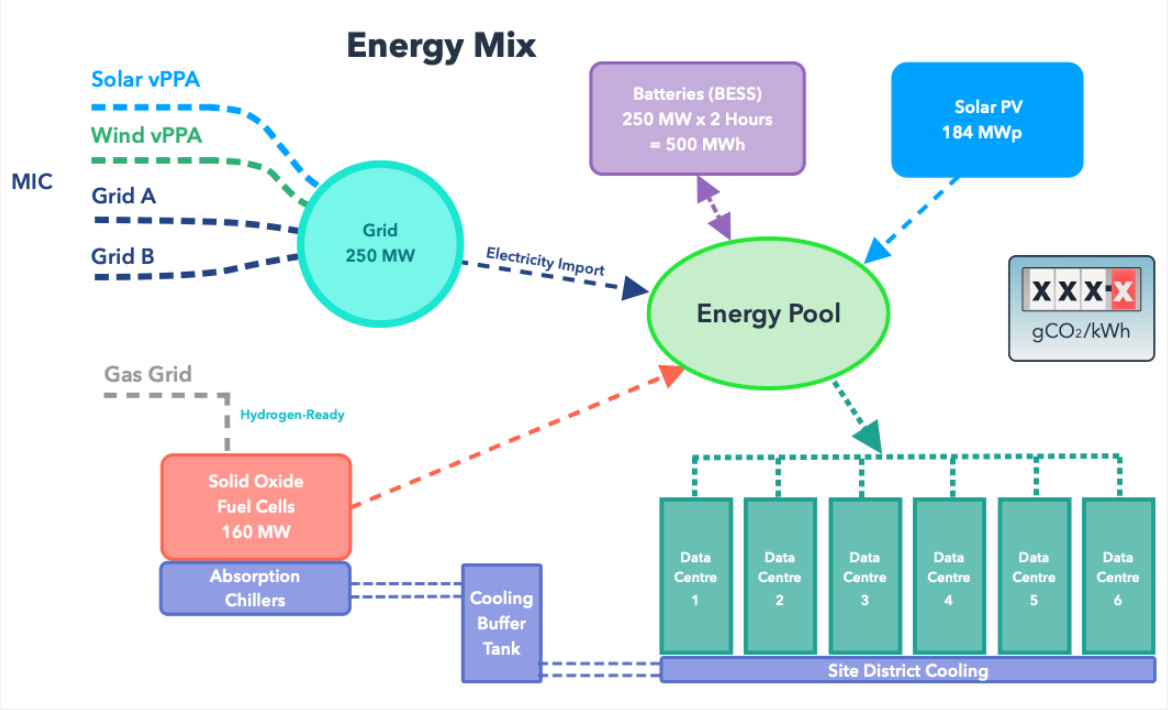
The project will be grid connected, which allows for import of electricity and facilitates power purchase agreements, but the DER is designed and configured to eliminate any demand pressure on the grid. The project optimises its electricity supply for highest efficiency and lowest carbon intensity by monitoring the data centre demand, DER

[25] Including the previously consented flow battery (Westmeath Co. Co. Case Ref. 21/532) proposed within the development lands.

availability, the national grid and selecting modes of energy supply based on hourly data. It is proposed that the data centre operator will report to the System Operator annually in relation to their use of renewable energy (directly or through Corporate Power Purchase Agreements (CPPAs)) and their site's emissions. Reporting will align with the requirements of the EU's EED article 12[26] on data centre reporting.

By pooling the energy assets on site, the optimum mix can be adjusted based on live carbon intensity data. The data centre will be able to monitor and report its hourly carbon footprint. Predictive analysis can help the data centre tenant to best avail of the available power supply and to balance workload and the prevailing carbon intensity of the energy supply.

Figure 3.3 Admiral DER Energy Mix



3.2.3.2 DC Cooling and Water Use

The building envelope, the climate and the cooling train have been engineered to keep water use essentially at background domestic-service levels. For roughly 95 per cent of the year the DC buildings (halls within) will be conditioned by drawing in naturally cool air, filtering it, and passing it across heat-exchange coils. By contrast, a conventional evaporative system would mist or cascade water through adiabatic pads or cooling towers every hour that the data centre load produces heat. The proposed dry-cooling alternative

[26] European Parliament and Council (2023) *Directive (EU) 2023/1791 of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955 (recast)*. *Official Journal of the European Union*, L 231, 20 September, pp. 7-108 — see Article 12 'Data centres'.

avoids ad removes any water usage vulnerabilities and stresses which evaporative cooling might place on local water supplies. The proposed project also incorporates recovery /harvesting of the high-grade waste heat from the fuel cells and routing it through absorption chillers. This replaces additional compressor work with waste thermal energy and further improves the overall fuel-utilisation efficiency of the fuel cell (toward 80%). This non-evaporative cooling system, which is a synergy of airside economisation, electric chillers and waste-heat recovery, underpins the sustainable design principles employed on the project.

3.2.4 ALTERNATIVE LAYOUT AND DESIGNS

Once the preferred site was selected, the design team focused on suitably positioning a proposal within the site that is sympathetic and one which integrates into the landscape and surrounding environment. The final design concept has been developed, as far as practicable, to minimise visual intrusion and accordingly the proposed finished ground levels were determined following careful consideration of cut and fill requirements and existing local topographical conditions.

During the EIA process, baseline surveys were carried out, and design mitigation measures were incorporated into the overall scheme. Various design layout options were developed to minimise potential impact on sensitive receptors and accord with the natural features of the site (e.g., topography). Extensive consideration was also given in relation to devising suitable access all parts of the project development lands to mitigate potential impacts.

Key to developing the project concept was a detailed review of the policy hierarchy at EU, national and local levels. In particular, the 2022 Government Statement on the Role of Data Centres in Ireland's Enterprise Strategy and the six principles laid down in the statement framed the thinking from the outset; (1) economic impact, (2) grid capacity and efficiency, (3) renewables additionality, (4) co-location or proximity to future-proof energy supply, (5) Decarbonised by design, and (6) SME access & community benefit.

The design also used the LEED process as a design manual to improve consider efficiency and sustainability measures within the planning stage. Given the rural setting and following consideration of baseline findings in conjunction the functional specifications of DC facility and DER technologies, it was proposed to develop the DC facility within a secure campus in the western part of the proposed project site and to collocate suitable DER technologies on adjoining available lands to the east (consolidating these assets with the Castlelost Flexgen and GIS substation). The adopted LEED preassessment (LEED BD+C v4 Rating System for Data Centres) is tailored for the projects involving multiple buildings

within a single development site. Campus approach allows for efficiency in certification process as shared site features (e.g., stormwater management, landscaping, renewable energy, parking) can be documented once and applied across multiple buildings.

Examples of early iterations of development layouts are presented in Figure 3.4 to Figure 3.9 and these initially focused on the DC facility.

Figure 3.4 DC Facility Site Layout Iteration #1



As can be seen, the layout of the DC campus evolves through the various iterations presented, demonstrating consideration of site constraints, building positions, building types, separation distances, access points, etc. As development of the DER advanced, proximity of key components to one another resulted in changes to the layout within the project lands. The site layout presented in Figure 3.7 incorporates the fuel cells, BESS and grid connection point (220kV IPP GIS building) and the DC facility's 33kV IPP building and AIS compound. This followed input from technology suppliers, electrical engineers (including HV infrastructure) and the EIA team of specialists.

Figure 3.5 DC Facility Site Layout Iteration #2

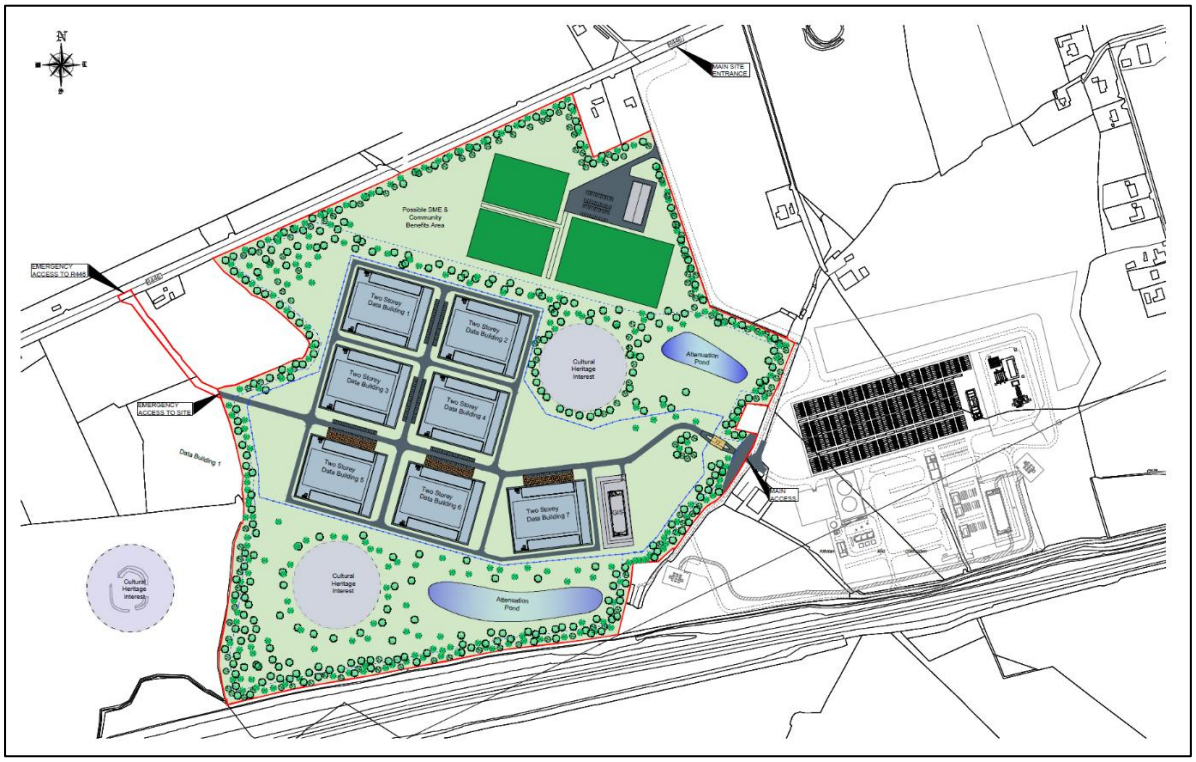


Figure 3.6 DC Facility Site Layout Iteration #3

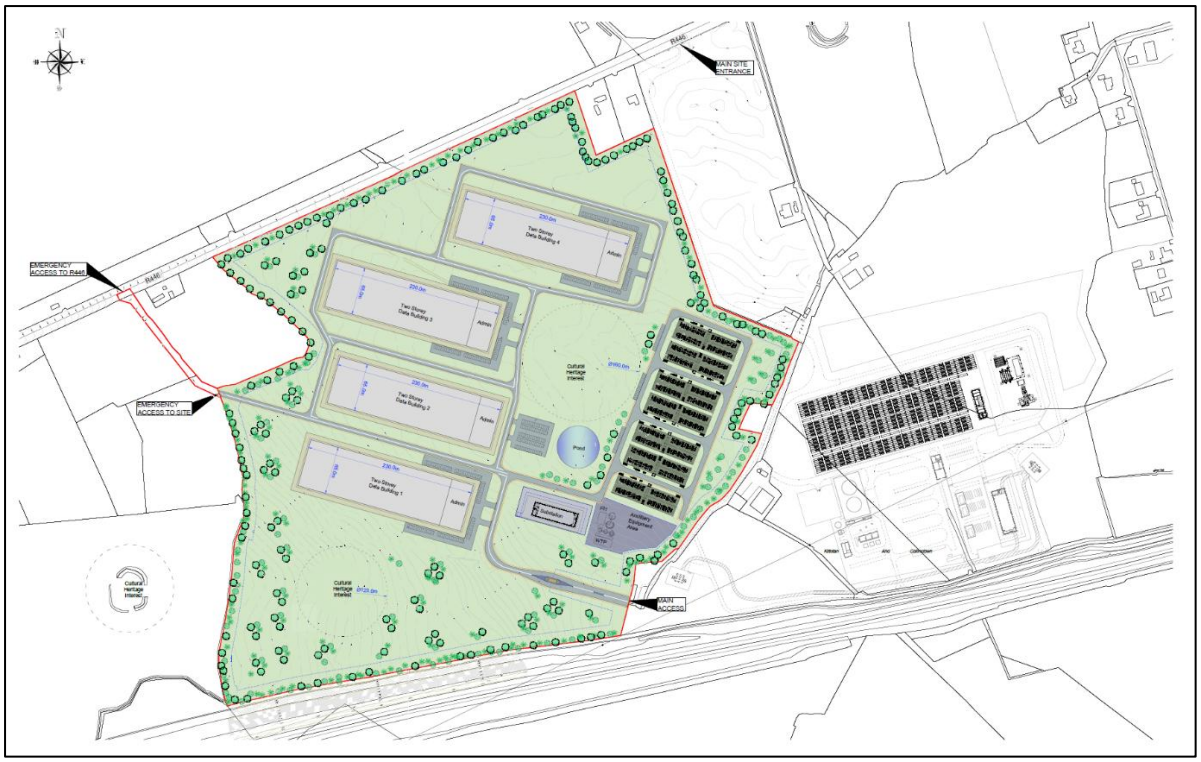


Figure 3.7 Site Layout Iteration #5 (DC Facility and DER Layout)



An overall project layout shown in Figure 3.8 highlights the importance of securing land rights for the solar farm component of the DER. The solar farm layout subsequently further evolved alongside the DC facility layout and this is presented in Figure 3.9.

Figure 3.8 DC Facility and DER Project Layout (April 2024)

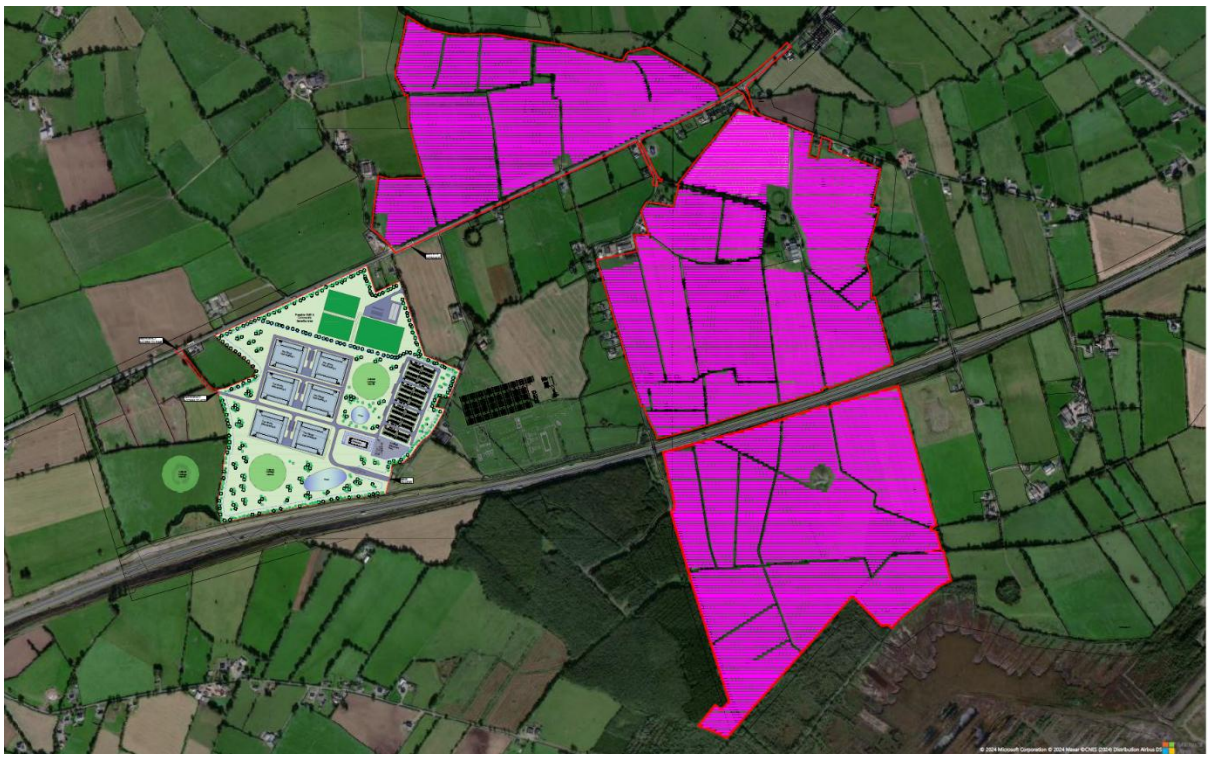


Figure 3.9 DC Facility and DER Project Layout



3.2.4.1 Revised Site Layout (March 2026)

A further iteration of the layout was examined and developed for the project during the period September 2025-March 2026 (as a result of the Section 34 FI request – Westmeath Planning Ref 25/60344). This additional design iteration focused specifically on the relationship between the data centre buildings and the R446, the extent and effectiveness of the landscape buffer, the architectural articulation of the road-facing elevations and the overall composition of the campus. The design considerations formed part of the ongoing consideration of reasonable alternatives in respect of layout and design, rather than any change to the fundamental nature or function of the proposed development.

The principal alternative design measures examined included increasing the setback of the road-facing data centre buildings; redistributing internal roads, parking and service areas to create additional landscape mitigation space; reducing the perceived massing of the buildings through lower parapets and recessed roof-edge treatment; introducing an architectural veiling system to soften the appearance of the principal elevations; and strengthening the campus character of the development through more distinctive treatment and positioning of the office component.

These measures were assessed against the operational and environmental requirements of the scheme, including internal traffic circulation, emergency access, building functionality, landscape integration and visual effects. The adopted revised layout was selected because it maintains the functional performance of the campus while materially improving the spatial and visual relationship of the development with the R446 corridor and nearby receptors. In particular, the revised arrangement increases the building setback from approximately 49m to approximately 75m, enables a broader and more robust landscape buffer, reduces the apparent height of the most exposed building edges, and introduces a more coherent campus composition.

Accordingly, the revised layout as presented in the Planning-Stage Drawings prepared in support of the associated planning applications represents the preferred design response having regard to the need to balance operational efficiency, emergency access, architectural quality, landscape integration and the protection of visual and residential amenities. It is considered to constitute a reasonable and environmentally preferable refinement of the previously submitted layout.

3.2.5 ALTERNATIVE PROCESSES AND TECHNOLOGIES

Ireland's 2022 *Government Statement on the Role of Data Centres in Enterprise Strategy* promotes six design principles including maximising renewables additionality, flexibility, and decarbonisation. The project was design to align with this and satisfy the twin transitions of digitalisation and decarbonisation set by Government. In terms of power demand required by the DC facility, the DER assets were chosen to (a) optimise the balance between security of supply, (b) compliment and efficiently use existing services within the site (transmission gas and HV electricity), (d) deliver carbon abatement, and (e) conform with policy and international best practice.

The proposed differs from traditional *"plug and play"* legacy models by integrating a suite of collocated DER power generation and storage assets. A range of alternative DER energy technologies were considered to ensure both operational resilience and environmental sustainability. These included open cycle gas turbines (OCGT), combined cycle gas turbine (CCGT), vanadium redox flow battery (VRFB), iron flow battery (IFB) technology and standby diesel /HVO generators.

The chosen DER design leverages fuel cell technology (avoiding combustion related air quality impacts) for power generation and this is complemented by a commercial battery energy storage system (BESS) and renewable generation (solar PV farm). The modular nature of fuel cell systems allows for incremental capacity additions and seamless its

integration with the BESS and solar farm to match the proposed phased build approach of the DC facility.

In terms of configuration, a power tower configuration (rather than ground level) of fuel cell technology is proposed. Siting and placement of the fuel cell power towers east of the DC facility and close the Castlelost Flexgen is compliment and aligns with the height and scale of nearby structures (i.e. the DC buildings to the west and Castlelost Reserve Gas-Fired Generator (OCGTs and 30m high stacks) further east. Once suitably placed within the development lands, further efforts were made to minimise visual impact and integrate the structures. This included design of and external screen across the facades of the power towers (see iterations of this design in Figure 3.10 to Figure 3.12.

Figure 3.10 Fuel Cell – Tower without external screens (iteration #1)

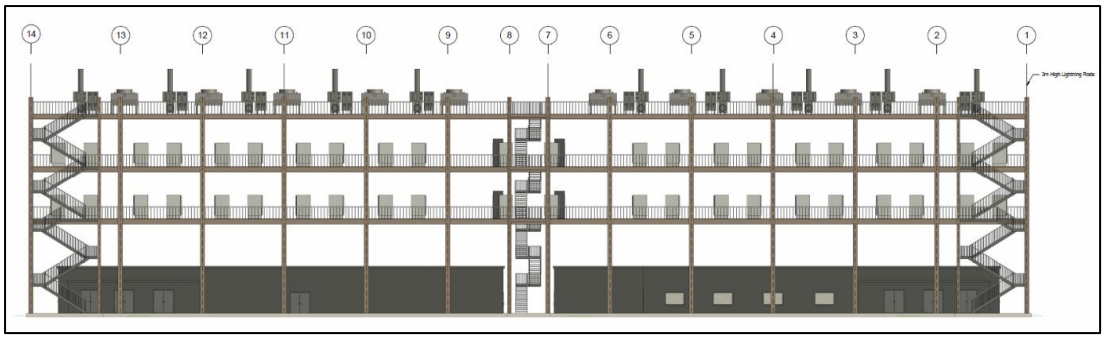


Figure 3.11 Fuel Cell – Tower with external screen (iteration #2)

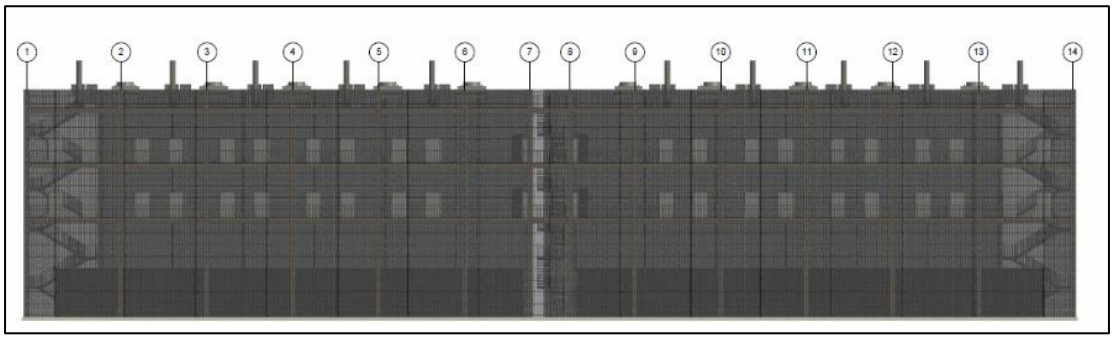
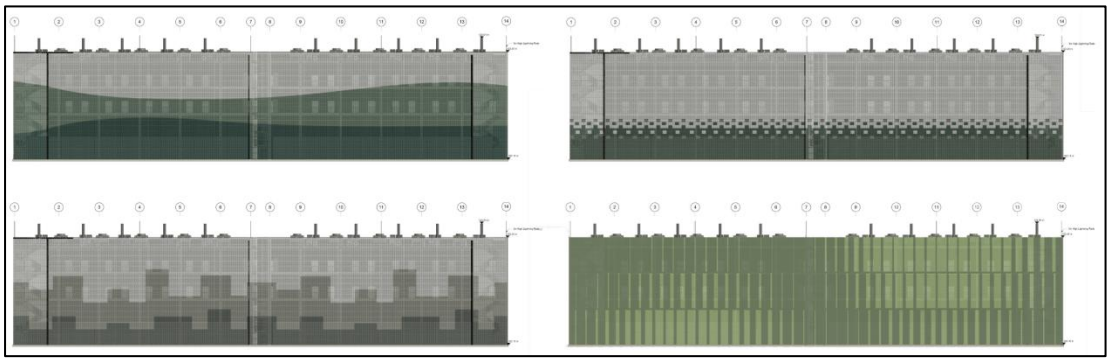


Figure 3.12 Visual consideration of Fuel Cell elevations (external screens)



The solar farm layout was optimised during project design work and most significantly this included consideration of DC/AC ratios to better utilise the available inverter capacity and adoption of a three-panel table (module) rather than a two-panel table. A two-panel table supports two portrait modules, while a three-panel table supports three. Both versions can be deployed on fixed-tilt racking and spacing was optimised to avoid inter-row shading and efficiently use the proposed development land and optimise output.

Figure 3.13 Typical section through two-panel table

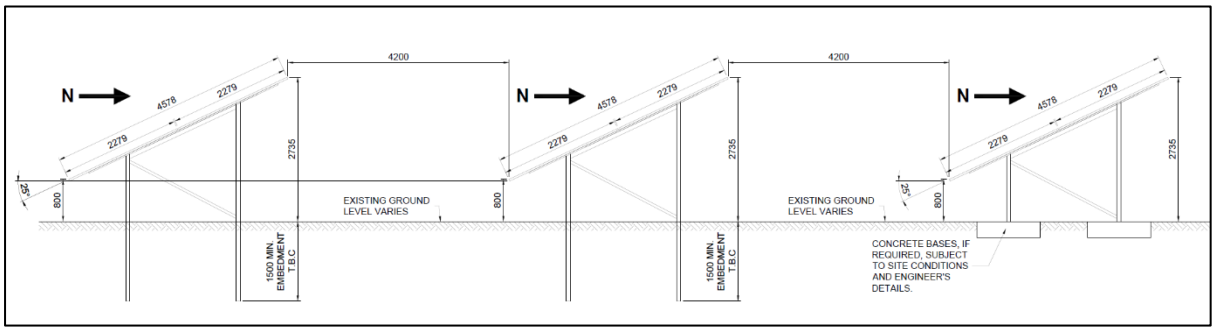
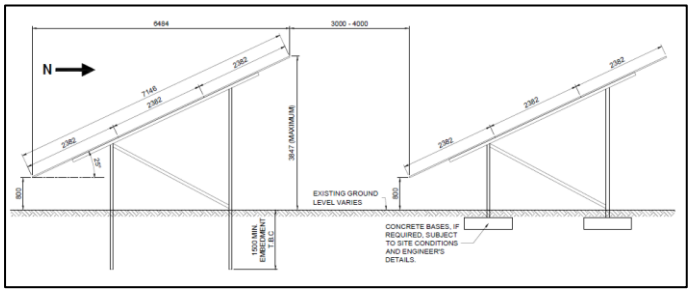


Figure 3.14 Typical section through two-panel table



The layout incorporates appropriate buffer zones to retained hedgerows, mature trees, watercourses and site boundaries, protecting established ecological features and maintaining the natural drainage and roughness corridors present at field edges; these buffers are shown on the site layout drawings. This includes a minimum set-back of 40m of the solar array from all residential boundaries.

The DC facility is also specifically designed without evaporative cooling or diesel standby generators. The proposed cooling technologies are complementary to the Irish climate profile and offers the simplest maintenance regime and aligns with sustainability (including LEED pre assessment) principles by minimising water and power usage. Further details related to the selected cooling technologies are presented in the project description chapter.

4 PLANNING & POLICY

4.1 INTRODUCTION

The proposed development is reviewed in the context of the current international/EU, national, regional and local planning and climate policy framework as at 19 March 2026, including the National Planning Framework First Revision (April 2025), the National Development Plan Review 2025, Climate Action Plan 2025, the updated National Energy and Climate Plan 2021–2030, the Eastern and Midland RSES 2019–2031, and the Westmeath County Development Plan 2021–2027 together with the Westmeath County Council Climate Action Plan 2024–2029.

At EU level, the recast Energy Efficiency Directive and related data-centre sustainability reporting regime are also materially relevant. These updates strengthen the policy emphasis on sustainable regional growth, grid and renewable integration, energy efficiency, operational transparency and delivery of critical infrastructure within environmental limits.

4.2 INTERNATIONAL AND EUROPEAN

4.2.1 EUROPEAN GREEN DEAL

The European Green Deal[27] (launched in 2019) is the EU's flagship strategy to achieve climate neutrality by 2050, with an interim target of reducing greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels. The EGD aims to transform the EU into a modern, resource-efficient, and competitive economy, decoupling economic growth from resource use and ensuring no person or region is left behind. To turn that vision into law the EU has since adopted the European Climate Law, which makes the 2050 neutrality goal legally binding, and has rolled out the wide-ranging *Fit for 55* legislative package, a bundle of energy, transport, land-use and taxation files designed to deliver the interim 55% cut this decade. The EGD is fundamentally reshaping data centre development in Europe. Operators must now integrate sustainability into every aspect of their operations, from design to daily management, to meet ambitious climate and energy targets. This transformation is both a regulatory requirement and a driver of innovation and competitiveness in the digital economy.

[27] European Commission (2019) *The European Green Deal*. Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2019) 640 final, Brussels, 11 December 2019

4.2.2 ENERGY EFFICIENCY DIRECTIVE

Under the recast Energy Efficiency Directive, data centres are subject to enhanced reporting obligations concerning energy performance and sustainability metrics, and the European Commission has adopted an EU-wide scheme for the rating of data-centre sustainability. This reinforces the policy relevance of the project's proposed measures on renewable generation, storage, efficient cooling, operational monitoring and carbon performance reporting.

4.2.3 EUROPEAN UNION TAXONOMY REGULATION

The European Union Taxonomy Regulation, officially known as Regulation (EU) 2020/852, establishes a standardised framework for defining what constitutes *"environmentally sustainable economic activity"* within the single market. This regulation identifies six environmental objectives: climate change mitigation and adaptation, water conservation, circular economy practices, pollution prevention, and biodiversity preservation. These objectives are integral to the broader Sustainable Finance agenda and the European Green Deal. It is designed to redirect investment flows towards financing decarbonisation, enhance investment security, and prevent greenwashing. Additionally, it establishes a unified classification system for sustainable economic activities.

Companies and financial intermediaries subject to the Corporate Sustainability Reporting Directive (CSRD) or the Sustainable Finance Disclosure Regulation (SFDR) are now required to disclose the proportion of their turnover, capital expenditures, and operational expenditures that align with the Taxonomy. Consequently, project teams that can demonstrate compliance with these standards will gain preferential access to the rapidly expanding pool of green capital.

The European Commission has included gas under the transitional activity category of the Taxonomy Regulation to *"allow us to accelerate the shift from more polluting activities, such as coal generation, towards a climate-neutral future, mostly based on renewable energy sources."* To qualify as taxonomy aligned, use of natural gas must satisfy technical screening criteria; emissions intensity, replacement logic, future proofing, transparency (disclosure of KPIs) and *"do-no-significant-harm"* safeguards. Rather than conventional combustion, fuel cells convert energy from natural gas by an electrochemical reaction that directly transforms the fuel's chemical energy into electricity, without burning the fuel. By leveraging electrochemical conversion instead of combustion, fuel cells achieve a combination of high efficiency, lower carbon intensity, and fuel flexibility that directly supports EU sustainable finance goal.

The proposed project accords with taxonomy legislation by using fuel cell technology to convert natural gas to generate power. This DER component is coupled with recovery technologies (CO_2 and waste heat) and is part of the overall on-site energy generation and storage mix serving demand from the proposed DC facility Another critical feature of fuel cell technology is its fuel flexibility and compatibility with low-carbon gases, which future-proofs it for long-term sustainability. The fuel cells can run on biomethane or green hydrogen in future, without wholesale redesign of the balance-of-plant allowing for decarbonisation of the gas network and use of renewable gas (such as biomethane) and blends of hydrogen.

4.3 NATIONAL POLICY

4.3.1 NATIONAL PLANNING FRAMEWORK (NPF), FIRST REVISION (APRIL 2025)

The National Planning Framework (NPF) 2018–2040, as updated by the National Planning Framework First Revision (April 2025), is the Government's high-level strategic plan for shaping Ireland's future growth and development to 2040. It seeks to secure more balanced regional development, support sustainable growth, and improve quality of life across the country. The first revision responds to updated population and housing evidence, including Census 2022, evolving climate and energy-policy requirements, and the implementation context arising from the Planning and Development Act 2024. The revised NPF continues to provide the long-term spatial framework within which public investment and infrastructure delivery are to be planned. It remains aligned with the National Development Plan through the shared set of 10 National Strategic Outcomes (NSOs), ensuring that capital investment can be assessed against national spatial and development objectives.

Figure 4.1 National Strategic Outcomes of the NDP



The revised NPF also confirms that the updated framework will inform the review of regional strategies and local authority development plans, including updated housing requirements, projected jobs growth and renewable energy capacity allocations.

Most National Policy Objectives in the 2018 NPF have been retained in the first revision, while a number have been updated, strengthened or supplemented to reflect current national priorities. In this regard, NSO 6 – *A Strong Economy Supported by Enterprise, Innovation and Skills* recognises that a competitive, innovative and resilient regional enterprise base is essential to provide jobs and employment opportunities that enable people to live and prosper in the regions. The revised NPF places particular emphasis on decarbonisation, digital transformation, innovation, balanced regional development and strengthening enterprise ecosystems throughout the State.

Under the heading *"Digital and Data Innovation"*, the revised NPF states that the impact of digitalisation will continue to grow and will require a coherent and informed policy response. It cross-refers to key national digital strategies, including *Harnessing Digital – The Digital Ireland Framework*[28]*, Ireland's Industry 4.0 Strategy 2020–2025*[29], and *AI – Here for Good: National Artificial Intelligence Strategy for Ireland*[30]. The revised NPF further notes that Ireland is attractive in terms of international digital connectivity, climatic factors, and current and future renewable energy sources for the development of international digital infrastructure, such as data centres, and that this supports Ireland's international ICT position and wider economic synergies, including regional clustering effects.

- It is forecast in the economic assessment prepared in support of the planning application that the proposed project will deliver the following economic contributions to the local and Midlands regional economy:
- Construction investment in excess of €1 billion over the five-year development period;
- Construction-related employment of 320 annualised FTEs over ten years; 360-400 direct operational jobs across a range of occupations; 1,094 indirect and induced jobs in the local/regional service economy and supply chain;

[28] Department of the Taoiseach. (2022) *Harnessing Digital – The Digital Ireland Framework*. Dublin: Government of Ireland. Available at: https://www.gov.ie/en/department-of-the-taoiseach/publications/harnessing-digital-the-digital-ireland-framework/

[29] Department of Business, Enterprise and Innovation. (2019) *Ireland's Industry 4.0 Strategy 2020-2025: supporting the digital transformation of the manufacturing sector and its supply chain*. Dublin: Government of Ireland. Available at: https://enterprise.gov.ie/en/publications/publication-files/irelands-industry-4-strategy-2020-2025.pdf

[30] Department of Enterprise, Trade and Employment. (2021) *AI – Here for Good: National Artificial Intelligence Strategy for Ireland*. Dublin: Government of Ireland. Available at: https://enterprise.gov.ie/en/publications/national-ai-strategy.html

- Almost €80 million in additional annual wage circulation; and
- Annual GVA of €118 million to the economy.

The revised NPF also supports the proposed development in the context of NSO 8 – *Transition to a Carbon Neutral and Climate Resilient Society.* This outcome reflects the commitments of the Climate Action and Low Carbon Development (Amendment) Act 2021, including a legally binding target to reduce greenhouse gas emissions by 51% by 2030, increase the share of electricity generated from renewable sources to 80% by 2030, and achieve net-zero emissions no later than 2050. The revised NPF states that new energy systems and transmission grids will be necessary for a more distributed, more renewables-focused generation system, and highlights the importance of accelerating renewable electricity generation, reinforcing grid infrastructure, and co-locating renewable generation and grid connections where appropriate.

The revised NPF also recognises the strain on the electricity sector, and that the outcome promotes *diversifying supply, strengthening interconnection and developing district-heating networks*, alongside technologies that can provide balancing and flexibility services. NSO 8 stresses place-based adaptation measures and the protection (and restoration) of natural capital so that growth, infrastructure delivery and biodiversity goals are mutually supportive.

The NPF supports the proposed project under the following NPOs:

- *NPO 32 Enhance the competitiveness of rural areas by supporting innovation in rural economic development and enterprise through the diversification of the rural economy into new sectors and services, including ICT-based industries and those addressing climate change and sustainability.*
- *NPO 62 In co-operation with relevant Departments in Northern Ireland, develop a stable, innovative and secure digital communications and services infrastructure on an all-island basis.*
- *NPO 66 The planning system will be responsive to our national environmental challenges and ensure that development occurs within environmental limits, having regard to the medium and longer-term requirements of all relevant environmental and climate legislation and the sustainable management of our natural capital.*
- *NPO 69 Reduce our carbon footprint by integrating climate action into the planning system in support of national targets for climate policy mitigation and adaptation objectives, as well as targets for greenhouse gas emissions reductions as expressed in the most recently adopted carbon budgets*

- *NPO 70 Promote renewable energy use and generation at appropriate locations within the built and natural environment to meet national objectives towards achieving a climate neutral economy by 2050*
- *NPO 71 Support the development and upgrading of the national electricity grid infrastructure, including supporting the delivery of renewable electricity generating development*
- *NPO 73 Support the co-location of renewable technologies with other supporting technologies and complementary land uses, including agriculture, amenity, forestry and opportunities to enhance biodiversity and promote heritage assets, at appropriate locations which are determined based upon the best available scientific evidence in line with EU and national legislative frameworks.*

In this context, the proposed development which incorporates its own zero-carbon generation and storage technologies together with flexible low-carbon, hydrogen-ready power infrastructure, is consistent with the direction of the revised NPF. It reflects the Framework's support for new energy systems, stronger grid infrastructure, renewable integration, digital and data innovation, and regionally distributed economic development. As such, the proposal can be understood as an example of how the revised NPF's economic, digital and climate objectives may be delivered on the ground in County Westmeath

4.3.2 NATIONAL ENERGY AND CLIMATE PLAN 2021-2030

Under the new 2030 Climate and Energy Framework, which is also part of the Clean Energy for all Europeans Package, EU countries are required to draft 10-year National Climate and Energy Plans (NECPs) for 2021-2030, outlining how they will meet the new 2030 targets for renewable energy and for energy efficiency. In June 2019, the government agreed to support the adoption of a net zero target by 2050 at EU level, and to pursue a trajectory of emissions reduction nationally which is in line with reaching net zero in Ireland by 2050.

The national plan released in 2019 centres around the five dimensions of the Energy Union:

1. Decarbonisation – GHG Emissions and Removals & Renewable Energy
2. Energy Efficiency
3. Energy Security
4. Internal Energy Market
5. Research, Innovation & Competitiveness

These plans are designed to ensure that the EU remains on track to meet its long-term energy and climate goals, including the transition to a low-carbon economy and the fulfilment of commitments under the Paris Agreement. Each NECP also includes specific

policies, measures, and trajectories for achieving these targets, reflecting national circumstances and priorities.

Ireland's updated National Energy and Climate Plan (NECP) 2021–2030 forms part of the current national policy framework and consolidates the State's climate and energy policies for the period to 2030. The NECP is relevant to the proposed development in relation to decarbonisation, electricity system resilience, energy efficiency, energy security and competitiveness

4.3.3 GOVERNMENT STATEMENT ON THE ROLE OF DATA CENTRES IN IRELAND'S ENTERPRISE STRATEGY (2022)

Ireland's *Government Statement on the Role of Data Centres in Ireland's Enterprise Strategy* (July 2022) defines how the State will reconcile the *"twin transitions"* of deep digitalisation and rapid decarbonisation. The document recognises data centres as *core digital infrastructure* while acknowledging the finite headroom on the national electricity grid and the binding carbon-budget ceilings set under the Climate Action and Low-Carbon Development (Amendment) Act 2021. Within that strategic tension the Statement articulates six guiding principles, each of which were carefully examined and used to guide and development the proposed project. These principles now sit alongside more recent national and EU policy development discussed in this EIAR, including the Revised NPF, LEAP, CAP 2025, the updated NECP, and the EU data-centre reporting framework.

The proposed DC facility and DER will generate high-value employment, skills and export earnings rather than speculative capacity. It is located at an existing unconstrained node on the electricity system with available network headroom. The project includes a DER which can alleviate constraints through behind-the-meter flexibility (e.g. battery storage). Use of renewable capacity was heavily considered. Because of its location and design, the DC facility be able to enter into long-term corporate power-purchase agreements (CPPAs) (importing low carbon and renewable generation from the national grid) in addition to it being supported by DER assets (on-site generation and storage).

The DC facility adjoins the DER assets which includes to large-scale renewable and storage assets. It is also located adjacent to the existing Castlelost Flexgen project in anticipation of CRU large energy user (LEU) policy decision[31]. The project presents a *credible pathway to net-zero operations*, addresses embodied carbon, efficient cooling, low water usage, waste-heat recovery, CO_2 recovery and zero-carbon standby generation; This aligns with Article 12 of the Energy Efficiency Directive (EU) 2023/1791. Finally, the project will

[31] Commission for Regulation of Utilities (CRU) (2025) *Large Energy Users Connection Policy – Proposed Decision*, CRU/202504

provide tangible benefits to the local and wider communities along with indigenous small- and medium-sized enterprises (SMEs); examples of tangible socio-economic benefits from a data-centre development include employment (direct and indirect), upskilling of workers, local procurement and SME enablement, wage circulation effect, development contributions, donations to charitable organisations, local authority rates, community benefit funds and social investment. Please refer to Economic Assessment Report provided in Appendix 5.1.

4.3.4 CLIMATE ACTION PLAN 2025

Climate Action Plan (CAP) 2025 is the current national climate action roadmap. It refines the measures and actions required to deliver the legally binding climate objective, carbon budgets and sectoral emissions ceilings, and should be read in conjunction with Climate Action Plan 2024 where relevant. While CAP24 and CAP23 set the strategic direction, CAP 25 updates this by building on the progress made under previous plans by delivering policies, measures and actions that will support the achievement of our carbon budgets, sectoral emissions ceilings, and 2030 and 2050 climate targets. To achieve Ireland's targets under the Plan, a detailed sectoral roadmap setting out a range of measures and actions for each sector of the economy is included.

For the electricity sector, CAP25 retains the 80% renewable-share target for 2030, adds an interim 50% milestone for 2025, and confirms a build-out of at least 6GW on-shore wind, up to 5GW solar and 2GW of new flexible, hydrogen-ready gas generation. It restates the need for *"rapid delivery of flexible gas generation"* and in a timeframe that replaces emissions from coal and oil generation as soon as possible to reduce impacts on the carbon budgets. The proposed high efficiency fuel cell technology is aligned with taxonomy regulations and CAP25 aligns with taxonomy transition rules.

Chapter 7 of CAP25 extends Just-Transition supports for the Midlands, presenting the region as Ireland's test-bed for clean-energy clusters. Taken together, these measures create a clear enabling framework for the proposed DC facility and collocated DER in county Westmeath supporting regional economic renewal.

4.3.5 LARGE ENERGY USER ACTION PLAN (2026)

The Large Energy Users Action Plan (LEAP) recognises that available grid capacity will constrain data-centre growth in the short to medium term and advances a plan-led approach to regional, energy-intensive development, including co-location opportunities with renewable generation, storage and enabling infrastructure. In this respect, the

proposed development aligns and is consistent with the direction of national policy as expressed in LEAP.

4.3.6 NATIONAL HYDROGEN STRATEGY 2023

Published in July 2023, the Strategy sets three drivers: decarbonisation, energy security and industrial opportunity. It singles out *renewable* ("green") hydrogen as Ireland's focus and envisages its use as a zero-emission store of renewable energy and as flexible power for hard-to-abate sectors. The strategy provides a sequenced policy, governance and market blueprint that stretches into the 2030s

4.3.7 NATIONAL BIOMETHANE STRATEGY 2024

The strategy was jointly prepared by the Department of Agriculture, Food and the Marine (DAFM) and the Department of the Environment, Climate and Communications (DECC). The Strategy is Ireland's first major policy statement on biomethane and is an important milestone in the development of an indigenous sector. The primary objective of the National Biomethane Strategy is the delivery of the ambitious Government target of producing 5.7 TWh[32] of indigenous biomethane by 2030 and that Ireland will have developed a sustainable biomethane industry (anaerobic digestion) of scale.

Biomethane is already firmly established and available on the European market, with circa. 37 TWh produced in 2022. The Strategy identifies the sectors in which biomethane could bring the most benefit in terms of decarbonisation, and it will be critical that biomethane resources are principally used in those sectors where no alternative decarbonisation options exist. It is acknowledged that it is likely that biomethane will be injected into the grid and a percentage of that renewable gas could contribute to the decarbonisation various sectors.

In 2024 Gas Networks Ireland (GNI) published *Pathway to a Net-Zero Carbon Network*[33], resetting its earlier "Vision 2050" and committing to run the network on 100 % renewable gases by 2045. Subsequent corporate plans and independent analyses (including KPMG's 2024 Turning Down the Gas paper[34]) provide milestones, economics and regulatory asks needed to deliver the vision.

[32] This figure has increased substantially from an original Climate Action Plan 2019 target of 1.6 TWh by 2030.
[33] Gas Networks Ireland. (2024) *Pathway to a Net-Zero Carbon Network*
[34] Smyth, R. (2024) *Turning down the gas: how Ireland can make biomethane work*. Dublin: KPMG Ireland.

4.4 REGIONAL

4.4.1 EASTERN & MIDLAND RSES (2019-2031)

The *Eastern & Midlands Regional Assembly Regional Spatial & Economic Strategy (RSES) 2019-2031*[35] provides a high-level development framework for the region, which supports the implementation of the National Planning Framework (NPF) and economic policies and objectives of Government. It provides a 12-year strategy with a vision to 2040 and it provides a solid foundation to deliver transformational change that is necessary to achieve the objectives of the NPF. It provides a framework for investment to better manage regional planning and economic development throughout the Region.

The RSES recognises that one of the key challenges facing the region is the transition to a low carbon society. To expedite this transition, the RSES sets out 16 Regional Strategic Outcomes which are broken down into Economic Opportunity, Healthy Placemaking and Climate Action. There are six Strategic Outcomes specific to Climate action which can be summarised as follows:

1. Integrated Transport & Land Use - Promote best use of Transport Infrastructure, existing and planned, and promote sustainable and active modes of travel to ensure the proper integration of transportation and land use planning.
2. Sustainable Management of Water, Waste & other Environmental Resources - Conserve and enhance our water resources to ensure clean water supply, adequate wastewater treatment and greater resource efficiency to realise the benefits of the circular economy.
3. Build Climate Resilience - Ensure the long-term management of flood risk and build resilience to increased risks of extreme weather events, changes in sea level and patterns of coastal erosion to protect property, critical infrastructure and food security in the Region.
4. Support the Transition to Low Carbon and Clean Energy - Pursue climate mitigation in line with global and national targets and harness the potential for a more distributed renewables-focussed energy system to support the transition to a low carbon economy by 2050.
5. Enhanced Green Infrastructure - Identify, protect and enhance Green Infrastructure and ecosystem services in the Region and promote the sustainable management of strategic natural assets such as our coastlines, farmlands, peatlands, uplands woodlands and wetlands.

[35] The RSES remains the operative regional strategy; however, it must now be read and applied in the context of the NPF First Revision (April 2025), which will inform subsequent regional and local plan reviews.

6. Biodiversity and Natural Heritage - Promote co-ordinated spatial planning to conserve and enhance the biodiversity of our protected habitats and species including landscape and heritage protection.

The RSES frames digital infrastructure as an engine of *balanced* growth and places climate action at the heart of its investment framework. Section 8 (Connectivity) of the RSES recognises fast, resilient digital connectivity as *"an essential utility for economic competitiveness and social cohesion".* Regional Policy Objective 8.25 states that local authorities shall:

- Support the National Broadband Plan.
- Facilitate enhanced international fibre links.
- Promote a high-quality ICT network throughout the Region in order to achieve balanced social and economic development, whilst protecting the amenities of urban and rural areas.
- Support the national objective to promote Ireland as a sustainable international destination for ICT infrastructures such as data centres and associated economic activities at appropriate locations.
- Support the national objective to promote Ireland as a sustainable international destination for ICT infrastructures such as data centres and associated economic activities at appropriate locations.

RPO 8.25 ties local decision-making directly to national enterprise policy. The policy is supportive of data-centre development, where it can be shown to enhance the Region's connectivity, protect local character and crucially occupy a site that is *"appropriate";* in terms of grid capacity, renewable-energy availability, connectivity and environmental fit.

Chapter 6 (Economy and Employment) deals with the type of jobs the Region wants to attract. One of its "Guiding Principles for Investment Prioritisation in Placemaking for Enterprise Development" states: *"Align to national strategy and approach for data centres – right location for use and energy demand.*

The proposed regionally based project data centre facility and DER has been integrated to be compatible with the receiving environment. The DER is proximate to the existing Castlelost Flexgen Plant and GIS substation which is an unconstrained node on the grid. It is well served in terms of fibre and public transport corridors, and the location is sufficiently distanced from sensitive receptors.

The proposed regionally based DC facility and DER have been designed to seamlessly integrate with the receiving environment. The DC facility has been designed as a campus

and the DER is located proximate to the existing Castlelost Flexgen Plant and GIS substation (which is an unconstrained node on the grid. Additionally, the site is well-supported by dark fibre connectivity (along M6 corridor and along the gas pipeline within the site) and public transport corridors, while sufficiently safe distanced from sensitive receptors.

It is submitted that the subject site is an appropriate location for the development of a new ICT infrastructure development having regard to its strategic and accessible location in close proximity to the key attributes as described in Section 3 (Need for the Development Rationale).

4.4.2 WESTMEATH COUNTY DEVELOPMENT PLAN 2021-2027

The Westmeath County Development Plan (CDP) 2021-2027 sets out the Council's proposed policies (CPO's) and objectives for the development of the County over the Plan period. In this regard the CPO's listed in the Plan constitute the policies and objectives of the Plan. The Development Plan seeks to develop and improve, in a sustainable manner, the social, economic, environmental and cultural assets of the County.

Chapter 10 (Transport, Infrastructure and Energy) mirrors the position as stated in the RSES. It is a policy objective (CPO 10.178) of Westmeath County Council to *"Support the national objective to promote Ireland as a sustainable international destination for ICT infrastructures such as data centres and associated economic activities at appropriate locations."* The plan simultaneously requires:

- enhanced international fibre links;
- a county-wide high-quality ICT network; and
- facilitation of renewable-energy generation.

The plan states that new energy systems and transmission grids will be necessary for a more distributed, renewables-focused energy generation system, harnessing both the considerable onshore and offshore potential from energy sources and connecting the richest sources of that energy to the major sources of demand. In terms of energy and renewable energy policy, the CDP outlines the following:

- CPO 10.139 Support local, regional, national and international initiatives for limiting emissions of greenhouse gases through energy efficiency and the development of renewable energy sources which make use of the natural resources in an environmentally acceptable manner and having particular regard to the requirements of the Habitats Directive.

- CPO 10.140 Facilitate measures which seek to reduce emissions of greenhouse gases and support the implementation of actions identified in the Westmeath County Council Climate Change Adaptation Strategy 2019-2024 and any future amendments.
- CPO 10.141 Promote and support the use of renewable forms of energy as a contribution to the energy demand of all new buildings where it is consistent with the proper planning and sustainable development of an area.

The CDP acknowledges the importance of the existence of the 220kV grid and the natural gas pipelines which passes through the southern part of the County. The plan states that key investments are planned by Eirgrid for the upgrading of the transmission network and new circuit build /reinforcement, to cater for continued demand. The upgrading of the transmission network at Castlelost (adjoining the site) facilitates power flows from both renewable and conventional sources and maximises the use of the existing power corridor.

The CDP states that the Council will continue to encourage solar energy in commercial and residential developments, subject to design and other environmental considerations

- CPO 10.149 Support Ireland's renewable energy commitments outlined in national policy by facilitating solar power where such development does not have a negative impact on the surrounding environment, landscape, historic buildings or local amenities
- CPO 10.150 Encourage and support the development of solar energy infrastructure, including solar PV, solar thermal and seasonal storage facilities.
- CPO 10.151 Ensure that proposals for solar farms consider the following criteria:
  - The Landscape Character of the County.
  - Visual impact particularly on raised/elevated sites
  - Zone of visual influence and visual impact of the structures.
  - Glint and glare report and potential impact on adjoining road networks and dwellings.
  - Road access and impact on road network serving the site during the construction phase (A pre and post construction impact report may be required)
  - Archaeological Impact.
  - Incorporation of security measures – use of CCTV/surveillance cameras and security fencing.
  - The suitability/strength of the grid and accessibility to it.
  - The suitability of the site, having regard to other land use policies, including the need to protect areas of important built and natural heritage.

- Decommissioning of obsolete infrastructure and after-use.

The electricity and gas policy objectives prescribed in the CDP are presented below:

- CPO 10.169 Support and promote the sustainable improvement and expansion of the electricity transmission and distribution network that supply the County, subject to landscape, residential, amenity and environmental considerations.
- CPO 10.170 Support the provision of electricity and gas transmission networks to Athlone and Mullingar to provide for the medium to long-term future needs of these towns, subject to landscape, residential, amenity and environmental considerations.
- CPO 10.171 Support and promote the improvement and extension of gas infrastructure to serve the County,
- CPO 10.172 Co-operate and liaise with statutory and other energy providers in relation to power generation, in order to ensure adequate power capacity for the existing and future needs of the County.
- CPO 10.173 Support the implementation of EirGrid's Grid 25 Investment Programme, subject to landscape, residential, amenity and environmental considerations
- CPO 10.174 Support and facilitate the development of enhanced electricity and gas supplies, which do not negatively impact on environmental quality, landscape, wildlife, habitats or residential amenity and which are critical to the economic development of the County.
- CPO 10.175 Support roll-out of the Smart Grids and Smart Cities Action Plan enabling new connections, grid balancing, energy management and micro grid development.
- CPO 10.176 Support and facilitate the development of enhanced electricity and gas supplies, and associated networks, to serve the existing and future needs of the Region and facilitate new transmission infrastructure projects that might be brought forward in the lifetime of this Strategy including the delivery of the necessary integration of transmission network requirements to facilitate linkages of renewable energy proposals to the electricity and gas transmission grid in a sustainable and timely manner subject to appropriate environmental assessment and the planning process.

Chapter 11 of the CDP sets out details with regard to Climate Action. The aim is *"to transition to a low carbon and climate resilient County, with an emphasis on reduction in energy demand and greenhouse gas emissions, through a combination of effective mitigation and adaptation responses to climate change".* The recently published

Westmeath County Council Climate Action Plan (2024-2029) builds on the Council's *Climate Change Adaptation Strategy* 2019-2024.

4.4.3 WESTMEATH COUNTY COUNCIL CLIMATE ACTION PLAN (2024-2029)

The Plan (2024-2029) establishes a county-level framework for emissions reduction, energy efficiency, climate resilience and local climate governance, aligned with the national objective of reducing greenhouse gas emissions by 51% by 2030 and achieving climate neutrality by 2050. The Plan emphasises mitigation and adaptation across the Council's own functions and infrastructure, while also advancing broader countywide action through evidence-based measures and the designation of Mullingar as a Decarbonising Zone. At local policy level, the Westmeath County Development Plan 2021–2027 reinforces these aims by promoting reduced energy demand and emissions, compact and sustainable settlement patterns, renewable energy development, climate adaptation, flood management, and green infrastructure, thereby supporting a coordinated transition to a more climate-resilient and low-carbon county

4.4.4 PLANNING HISTORY AT THE SITE

A review of other projects /development in the general area of the site was undertaken using the Westmeath Planning Search Portal[36]. The recent valid planning permission consents in the immediate vicinity of the site (1 km radius) relate to the following

Project Name	Pl Ref	Details	Status
Castlelost ESS	26/60145	Amendments to the Energy Storage System (ESS) facility (consented under Westmeath County Council Planning Ref: 21/532) The amendments are as follows: (i) the removal of the Battery Energy Storage System (BESS) compound and contents within, including the IPP building and all ancillary items, as previously consented, (ii) reconfiguration of the synchronous condenser compound (area remains at 9,309sqm), (iii) increase the size of the horizontal synchronous generator building and reposition within the compound, (iv) increase of control modules from 5 No. to 8 No., (v) reposition and alteration of associated bunded transformers and electrical plant, (vi) reposition external cooling fans, (vii) provision of a new external containerised diesel generator, and (viii) all ancillary development, including; lightening mast protection, perimeter fencing	Under consideration

[36] https://westmeathcoco.maps.arcgis.com/apps/webappviewer/index.html?id=f114217b26f348ea95660cad27e42ef6

		with access gates, landscaping, lighting, car parking, internal access roads, underground electrical cable routes, and all civil engineering works for the disposal of surface water	
Admiral	25/60344	the development of a Data Centre Facility and Decentralised Energy Resource within an overall development boundary area of 243 hectares comprising: • 1 No. Security control building (floor area 23.5m2). • 6 No. new data buildings including administration blocks (each 228m x 62m x 18m high), 6 No. MV switch room buildings, within a secure campus having an area of 39 hectares, 1 No. fire water tank (Volume: 2000m3), pump house and proprietary modular water treatment plant. • 6 No. fuel cell towers (each 89m x 29m x 20m high), 2 No. chilled water tanks (Volume: 1000m3 each), pump house, ancillary water tank (Volume: 2000m3), carbon dioxide process building (30.7m x 15.7m x 11.3m high) and 16 No. carbon dioxide storage tanks (100 tonnes each). • Ancillary equipment compound including a storage building (30.7m x 10.7m x 9.7m high), 2 No. diesel generators, fire water tank (Volume: 2000m3) and pump house and proprietary modular water treatment plant. • Above ground gas installation (AGI) compound including a boiler/instrument kiosk, regulator/metal skid kiosk and connection to the existing gas network within the site. • 33kV IPP building (60.9m x 18.4m x 16.8m high), 1 No. telecoms tower 36m high and compound. • Fuel cell IPP building (40m x 9.8m x 7.1m high) and compound. • Solar farm IPP building (30m x 9.8m x 7.1m high) and compound. • Battery compound including 138 No. battery enclosures & 138 No. medium voltage power stations (MVPS), IPP building (40m x 9.8m x 7.1m high) and fire water tank (Volume: 500m3). • Proprietary modular water treatment plant serving the solar farm IPP building and battery compound IPP building. • Solar farm (168 hectares) to the east of the data campus facility including solar arrays measuring (10.2m x 6.9m), (20.4m x 6.9m) & (30.6 x 6.9m), 45 No. medium voltage power stations (MVPS), 5 No. weather stations, river crossings, internal gravel access roads, security fencing and gates, 3 No. temporary construction compounds, cable crossings in the R446, L11272 & L51251 public roads, and cable crossing under the M6 using horizontal directional drilling. • Connection to public sewer under the R446 public road. • New emergency only access/egress from the R446 public road. • Access/egress to the data centre campus facility through the existing Castlelost Flexgen and GIS substation access to the R446. • Demolition of	WCC Notification of Grant issued 02/06/2026

		the existing derelict dwelling and agricultural sheds. • All associated site works including	
Castlelost Flexgen	21/515	Application to Westmeath County Council for development comprises 275MWe reserve gas-fired generator to boost and back up the power system and will include the following elements (a) 5no. open cycle gas turbine (OCGT) modules (each module being c 1042sqm) and complete with lube oil coolers, generators, air intake vents, continuous emissions monitoring (CEMS) technology, selective catalytic reduction (SCR) units and c.30m high stacks, (b) 1no two-storey administration building (32.615m long x 13m wide x 9.33m high) which contains a control room, offices, storage meeting room workshop and double height warehouse (c) 2no. 2,400m3 capacity bunded secondary fuel storage tanks (each with a diameter of 17.6m and height of 10m), (d) a fenced above ground installation (AGI) compound containing gas pipework , a regulator house enclosure, instrument kiosk, boiler house enclosure and analyzer kiosk, (e) 1no. fuel pump and filter unit, (f) 1no. containerised water treatment module (12.192m long x 2.438m wide x 2.896m high), (g) 1no. 10m3 purified water storage tank (2.75mm high and 2.27m diameter), (h) 2no. containerised black start diesel generators (2.438m x 12.192m long x 2.896m high) with integrated stacks(4.755m high), (i) 1 no 50m3 ammonia storage tank (9.360m high and 3.16m diameter, (j) fire pump skid building (9.23m long x 6.98m wide x 4.6m high), (k) 1 no. 500m3 capacity water tank (7.597m high x 10m diameter, (l) 1 no. single storey IPP building (20m long x 10m wide and 6.853m high, (m) 1 no. low voltage (LV) bunded house transformer (1.914m high), (n) 5 no. medium voltage (MV) bunded step-up transformers (6.287 m high) 1no. high voltage (HV) customer compound containing 2no. bunded transformers (9m high) connected to electrical equipment, (o) 1no air compressor building (8.33m long x 4.73m wide x 4.517m high) and (p) all ancillary development including new access road, internal roads, 2.65m high fencing and gates securing the main reserve generator site, and associated engineering works to provide for the connection of site services and for the treatment and disposal of foul wastewater and surface water. The development includes for construction of a new entrance to the site from the R446 with associated signage and an access road from the new entrance to the reserve gas-fired generator. The development also includes for the demolition and removal of a farm shed, farm workshop, feed silo and a silage clamp	Granted with conditions Altered by 23/60042 & 24/60053

Castlelost GIS	312783	Application to An Bord Pleanála for a 220kV Gas Insulated Switchgear (GIS) Electrical substation and two 220kV underground transmission cables, interface compounds and pylons and associated works	Granted with conditions
Castlelost ESS	21/532	Application to Westmeath County Council for development of an Energy Storage System (ESS) development comprising (i) an open area battery energy storage system (BESS) compound(area of 26,317sqm) containing 264no battery modules and associated medium voltage power station (MVPS) enclosures (12.192m long x 2.438m wide x 3.896m high), (ii) IPP building (40n long x 10m wide x 6.853m high), (iii) synchronous condenser compound (area of 9,309sqm) containing a horizontal synchronous generator positioned within a building (30.0m long x 18.0m wide x 12.15m high), 5no control modules each (12.192m long x 2.438m wide x 3.332m high), associated bunded transformers and electrical plant, (iv) high voltage (HV) customer compound containing 1no. bunded transformers (9m high) and electrical plant to provide for connection to the electricity transmission system, and (v) all ancillary development, including lightening mast protection, perimeter fencing with access gates, landscaping, lighting, car parking, internal access roads and all civil engineering works for the disposal of foul and surface water. The development includes for construction of a new entrance and access road to the facility from the R446 with associated signage from the new entrance to the ESS facility.	Granted with conditions

Other historic nearby planning applications predominantly relate to once off residential development and agricultural sheds. The projects are mainly positioned along public roads (R446 and L51251) in the vicinity of the site and are deemed to be not significant in terms of cumulative impacts with the proposed projects. It was also noted that some projects which were consented were not subsequently constructed (e.g., PL001590 which relates to a house which was granted planning permission in 2001).

4.4.5 PLANNING AND POLICY SUMMARY -DC CAMPUS

The proposed development has been reviewed in the context of the current international/EU, national, regional and local planning and climate policy framework, as updated to March 2026. In particular, regard has been had to the revised National Planning Framework, the updated National Energy and Climate Plan 2021–2030, Climate Action Plan 2025, the Government Statement on the Role of Data Centres in Ireland's Enterprise Strategy (2022), the emerging Large Energy User policy framework, the Eastern and

Midland Regional Spatial and Economic Strategy, the Westmeath County Development Plan 2021–2027, and the Westmeath County Council Climate Action Plan 2024–2029.

Overall, the current policy framework supports sustainable regional growth, strategic digital and energy infrastructure, decarbonisation, renewable and flexible energy systems, and climate-resilient development, subject to compliance with environmental protection and proper planning requirements. The proposed development, comprising a data centre facility together with a collocated decentralised energy resource, has been formulated having regard to these policy objectives, including the need for energy efficiency, grid integration, renewable-energy utilisation, reduced carbon intensity, and balanced regional economic development.

At national level, the proposed development is consistent in principle with the policy recognition of data centres as strategic digital infrastructure, while also reflecting the increased emphasis on sustainable design, infrastructure efficiency, and alignment with climate and energy objectives. At regional and local level, the proposal is also consistent in principle with the relevant policy support for enterprise, electricity and gas infrastructure, renewable energy, innovation, and climate action within County Westmeath.

The revised data centre campus layout (March 2026) represents a targeted design-led refinement of the proposed development. The increased setback from the R446, wider landscape buffer, lower road-facing parapets, enhanced façade treatment and stronger campus composition materially improve the manner in which the development addresses the public road corridor and the surrounding rural landscape. The revised arrangement also improves the relationship of the development with nearby residential receptors by increasing separation distances and strengthening visual screening. Accordingly, the amended scheme should be assessed as providing a higher quality design response, with improved landscape integration and a reduced visual profile, while continuing to support the strategic policy basis for the proposed development.

Accordingly, it is considered that the proposed development is supported in principle by the prevailing planning and climate policy framework, subject to the detailed assessment of environmental effects and all other material planning considerations set out in this EIAR

5 POPULATION & HUMAN HEALTH

5.1 INTRODUCTION

This Chapter presents an assessment of impacts on Population & Human Health. The recitals to the 1985 and 2011 Directives refer to *'Human Health'* and include 'Human Beings' as the corresponding environmental factor. The 2014 Directive changes the title of this factor to *"Population and Human Health".*

While there are a range of issues which may impact on human beings many of these have been considered within other disciplines within this EIAR, including Planning Policy (Chapter 4), Water Environment (Chapter 8), Air Quality (Chapter 10), Noise and Vibration (Chapter 11), Landscape and Visual (Chapter 12), Traffic and Transport (Chapter 13), and Cultural Heritage (Chapter 14). This approach is consistent with the EPA EIAR Guidelines (2022)[37].

This Chapter is therefore focused on potential impacts which have not been assessed elsewhere within the EIAR.

5.2 ASSESSMENT METHODOLOGY & SIGNIFICANCE CRITERIA

5.2.1 METHODOLOGY

A desk-based assessment was undertaken to examine relevant information pertaining to the population impact assessment. Information on population statistics, employment and social data for the relevant Electoral Division (EDs) was obtained from the Central Statistics Office (CSO) for census years 2022. Fáilte Ireland's EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects and specifically the potential impact of the proposed development on Tourism is considered. Given the rural setting, much of the potential for impacts is addressed in Chapters 6 (Biodiversity) and 12 (Landscape and Visual) of this EIAR.

5.2.1.1 Study Area

The Study Area for the assessment of *"Population and Human Health"* includes a review of relevant information on a county and national scale but is mainly concentrated on the Electoral Districts (EDs) and Small Areas (Small Area Population Statistics (SAPS)) within which the Proposed Development is located.

[37] EPA, Guidelines of the Information to be contained in Environmental Impact Assessment Report, 2022

The EIA Directive does not define the term *"human health"*, however the 2017 EC Guidance on the preparation of the EIAR states that:

> *"human health is a very broad factor that would be highly project dependent. The notion of human health should be considered in the context of the other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air pollutants) are obvious aspects to study. In addition, these would concern the commissioning, operation and decommissioning of a Project in relation to workers on the Project and surrounding population".*

The assessment of human health is a qualitative rather than quantitative assessment, due to the diverse nature of health determinants and health outcomes which are assessed.

Local Authority

The proposed development lands lies midway between the villages of Rochfortbridge and Tyrrellspass and within the Eastern and Midland Regional Assembly's *"Dublin Hinterland"* growth belt within the jurisdiction of Westmeath County Council.

Electoral Divisions

Electoral Divisions (EDs) are the smallest legally defined administrative areas in the State for which consistent population and socio-economic data are published. The also uses Small Areas (SAs) in recent censuses, and townlands exist as historic land divisions, but neither is a modern legal administrative unit. Therefore, in order to discuss the receiving human environment and other statistics in the vicinity of the proposed development site, the Study Area for this assessment has regard to Electoral Divisions (EDs) within or located close to the proposed development site. The proposed development is predominantly within the Castlelost ED, though it also extends partially into Ballykilmore ED.

Small Area

Small Areas were first published for Census 2011 following work undertaken by the National Institute of Regional and Spatial Analysis (NIRSA) on behalf of Ordnance Survey Ireland (now Tailte Éireann) and in consultation with the CSO. They were designed as the lowest level of geography for the compilation of statistics in line with data protection guidelines and typically contain between 50 and 200 dwellings. A further constraint imposed when creating these new areas was that they nested within Electoral Division boundaries. Finally, they are generally comprised either of complete townlands or neighbourhoods. Small Areas within a 1km radius from the centre of the proposed

development lands are included in this assessment. This includes three small area named as A237024001, A237024002 and A237012003 by CSO.

5.2.1.2 Desktop Study

A desk study was undertaken to assess the baseline environment. The desk study involved the assessment and review of data from the Central Statistics Office (CSO) and a review of the Westmeath County Development Plan (CDP) 2021-2027. Information was also obtained from the following sources:

- Environmental Protection Agency (www.epa.ie);
- Westmeath County Council (https://www.westmeathcoco.ie/en/)
- Central Statistics Office (http://www.cso.ie);
- Geohive (https://airomaps.geohive.ie/ESM);
- Health and Safety Authority (http://www.hsa.ie/eng/);
- Pobal (https://maps.pobal.ie/WebApps/DeprivationIndices/index.html);
- All-Island Research Observatory (AIRO) (https://airo.maynoothuniversity.ie/).

As there is no loss of residential or community lands as a result of the proposed developments, the impacts from the loss of private property are not further considered. Similarly, the development of either or all of the proposed projects will not result in negative adverse impact to the local economy. Positive effects on the local economy, supply chains, and employment opportunities (particularly) during construction is anticipated.

5.2.1.3 Field Work

Various site walkover surveys of the proposed development lands and windscreen survey of the wider study area were undertaken and include three during the period February, April and June 2025 to inform this assessment.

5.2.2 DETERMINATION OF SENSITIVE RECEPTORS

The sensitivity of the existing baseline environment defines the ability of the receptor to respond to potential effects.

5.2.2.1 Employment

This assessment considers the impact on the workforce in County Westmeath and the Region, as this is where the majority of effects are likely to occur. The Proposed Development may provide direct and indirect job opportunities. Direct jobs include the

temporary workforce required to construct the Proposed Development in the short to medium term, as well as the workforce required to operate the facility in the longer term. Indirect jobs include those created in the supply chain to provide material, specialist labour and demolition and remediation services for the workforce. There is no consolidated methodology or practice for assessing the magnitude of the impact on employment in EPA Guidelines. It has therefore been assessed based on professional opinion in which the size of the workforce in the impact area is considered, relative to the number of jobs that the Proposed Development and will create.

5.2.2.2 Severance

Severance of land as a result of the proposed development and the loss of rights of ways or amenities is considered in this assessment along with the separation of residents from facilities and services, they use within their community caused by new or improved roads or by changes in traffic flows. The Proposed Development could cause severance effects by changing levels of traffic congestion on existing roads and / or introducing traffic management measures. This may lead to separation of residents from facilities and services which they use. All severance impacts are direct impacts. The assessment of magnitude is informed by the assessment results presented in Chapter 13 (Traffic and Transport).

5.2.2.3 Landuse Change

A description of the existing site is presented in Chapter 2 and assessed in the context of Planning & Policy and Material Assets in Chapter 4 and Chapter 9 respectively. Land use changes can affect populations in different ways. Planning policy plays an important role in guiding and facilitating approximate changes in land use which can influence settlement as well as transportation patterns. Planning policy ensures these changes are managed sensitively and are appropriate to the unique existing and emerging social, economic and environmental conditions. The primary consideration relating to land use change is to assess whether the proposed development conforms with land use policy and to identify if the proposed development is likely to change the intensity of patterns, types of activities and land uses. Therefore, a review of planning policy was carried out as part of this assessment as well as an assessment of the existing and emerging baseline and its capacity to absorb predicted changes. Landuse Change is further discussed in Chapter 9 (Material Assets).

5.2.2.4 Health and Safety

The primary legislation in Ireland is the Safety Health and Welfare at Work Act 2005. There are a number of amendments to the Act, as well as Regulations and Codes of Practice. Primary legislation can be referenced from the HSA website and the Act can be downloaded from the Irish Statue Book. Within the legislation responsibilities have been assigned to each party at the different stages of the development of a project. These apply to any construction project and are applicable to the project discussed within this EIAR. The Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the "COMAH Regulations") implement the Seveso III Directive (2012/18/EU) and aim to prevent and mitigate the effects of major accidents involving dangerous substances which can cause serious harm to people and/or the environment, with the overall objective of providing a high level of protection in a consistent and effective manner.

5.2.3 SIGNIFICANCE CRITERIA

The assessment of significance is a professional appraisal based on the sensitivity of the receptor and the magnitude of the effect. Within any area, the sensitivity of individuals in a population will vary.

The purpose of the population assessment is to identify the likely significant impacts as they might affect users of the proposed development and the local community. It usually follows that impacts of a population and human health nature are a function of:

- The location and character of the local environment,
- The sensitivity of the local population and its capacity to absorb change,
- The nature of the environmental effect,
- The scale or extent of the effect in terms of area or population affected,
- The duration and frequency of an effect, and,
- The probability of an impact's occurrence and possibility of effectively reducing the effects through mitigation.

Impacts result from direct, indirect, secondary and cumulative effects on existing environmental conditions. Effects can be positive, neutral or negative. The significance of an effect depends on, among other considerations, the nature of the environmental effect, the timing and duration of an effect and the probability of the occurrence of an effect. The significance of an effect is described as imperceptible, slight, moderate, significant, very significant or profound. The impacts may be short term, medium-term or long-term. The duration of an effect may be momentary, brief, temporary, short-term, medium-term,

long-term, permanent or reversible in accordance with the timescales. The frequency of that effect can also influence significance i.e., if the effect will occur once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually.

The population and human health assessment addresses impacts at a community level rather than for individuals or identifiable properties, although impacts for individual properties are discussed where these are significant or located within proximity to the proposed development, as appropriate.

This EIAR is focused on providing a clear documentary trail of analysis used to arrive at conclusions. The criteria used to describe the predicted effects is outlined in Table 5.1 in accordance with Table 3.4 of the 2022 EPA Guidelines[38].

Table 5.1 Description of Effects [Magnitude]

Effect Characteristic	Description
Quality	
Positive	A change which improves the quality of the environment
Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
Negative	A change which reduces the quality of the environment
Duration of Effect	
Brief	Effects lasting <1 day
Temporary	Effects lasting <1 year
Short-term	Effects lasting 1-7 years
Medium-term	Effects lasting 7-15 years
Long-term	Effects lasting 15-60 years
Permanent	Effects lasting over 60 years
Reversible	Effects that can be undone, e.g., through remediation or restoration
Probability of Effects	
Likely	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented
Unlikely	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented
Significance of Effects	
Profound	An impact which obliterates all previous sensitive characteristics.
Significant	An impact, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
Moderate	An impact that alters the character of the environment in a manner that is consistent with existing or emerging trends

[38] EPA, Guidelines of the Information to be contained in Environmental Impact Assessment Report, 2022

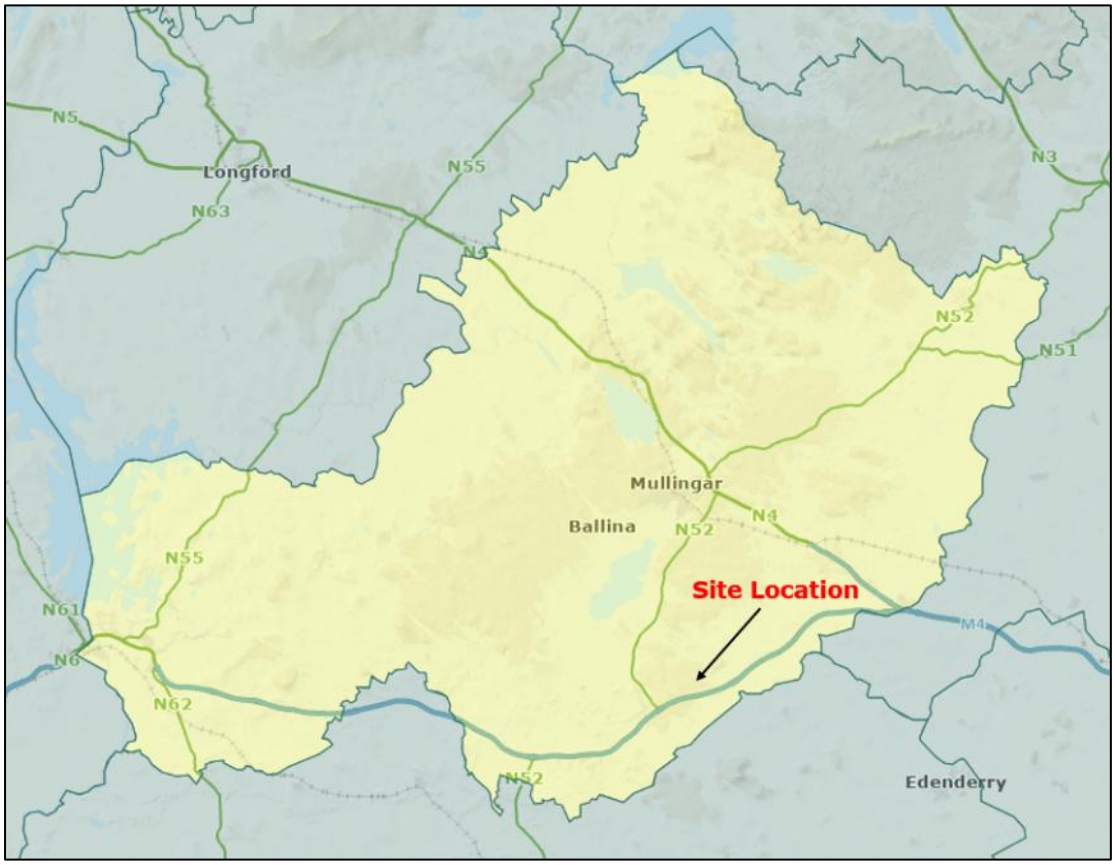
Effect Characteristic	Description
Slight	An impact that alters the character of the environment without affecting its sensitivities
Imperceptible	An impact capable of measurement but without noticeable consequences

5.3 DESCRIPTION OF RECEIVING ENVIRONMENT

5.3.1 POPULATION AND SETTLEMENT PATTERNS

The proposed development lands are located midway between the villages of Rochfortbridge and Tyrrellspass within the jurisdiction of Westmeath County Council (see Figure 5.1).

Figure 5.1 Westmeath County Council Area



Westmeath County Council is responsible for the administrative area of County Westmeath. The Council is responsible for the County's Housing, Planning, Roads, Environment, Fire, Libraries and Economic Development functions. Westmeath County Council is the custodian of the environment and through its planning and environment policies seeks to enhance the County's attractiveness while protecting its unique character

and atmosphere. The Council takes an active role in the promotion and development of the County's industrial, economic, business, social, arts, heritage and cultural affairs. Westmeath County Council covers an area of 1,756 square kilometres (km^2) and includes two municipal districts (MDs). The vast majority of the proposed development lands are located in the Mullingar MD. According to the CSO (2022) the population of Westmeath County Council is 96,221. A breakdown of population is presented in Figure 5.2.

Figure 5.2 Westmeath County Council - Population



The subject development lands are located in the electoral divisions (ED) of Castlelost and Ballykilmore, which have a population of 1,736 people (859 males and 877 females) and a population of 778 (390 males and 388 females) respectively (Figure 5.3). A breakdown of each ED population is presented in Figure 5.4 and Figure 5.5. The largest settlement in the Castlelost ED is the town of Rochfortbridge, which has a population of 1,498 people. The ED of Ballykilmore adjoins the western boundary of Castlelost ED. The Ballykilmore ED has a population of 778 people of which 480 live in the settlement of Tyrrellspass. Mullingar and Tullamore are the closest settlements with populations greater than 5,000 people. Both settlements are approximately 14km and 17km (approximately 15-minute vehicle journey time to/from site) respectively from the proposed development lands.

Figure 5.3 Setting – Electoral Division

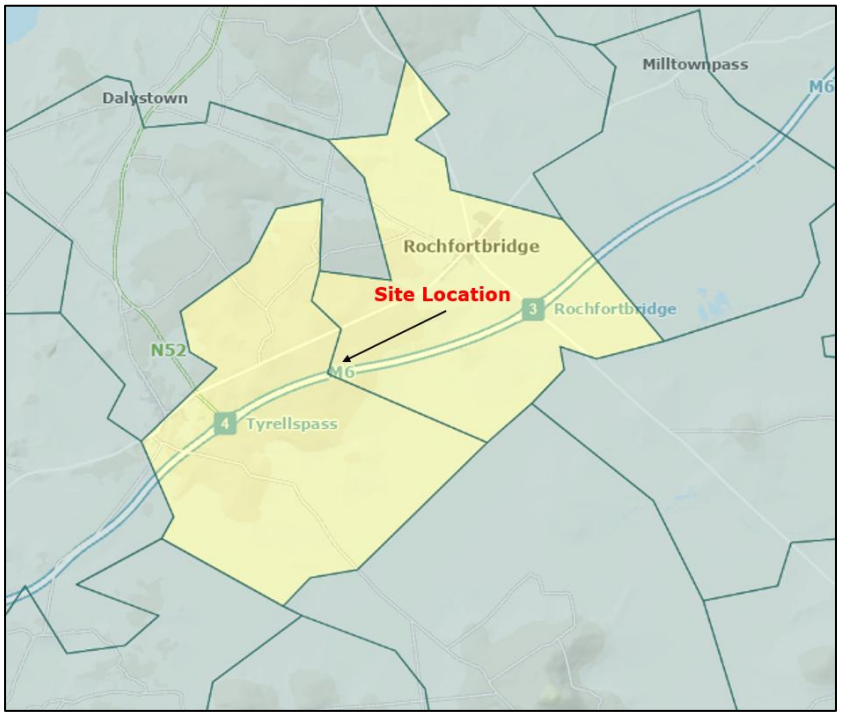


Figure 5.4 Castlelost ED - Population Breakdown



Figure 5.5 Ballykilmore ED - Population Breakdown



The Pobal[39] deprivation indices describe the Castlelost ED as being *"Marginally Above Average"* (index 6.41) compared with the County of Westmeath being *"Marginally Below Average"* (Index -1.43). The Pobal deprivation indices describe the Ballykilmore ED as *"Marginally Below Average"* (index -0.70). Further details are presented in Figure 5.6 and Table 5.3.

[39]https://data.pobal.ie/portal/apps/experiencebuilder/experience/?id=3b0acba7eb694ffa85340a60f81d516c#data_s=id%3AdataSource_1-18b85a45500-layer-28-18b85a418a0-layer-26%3A6

Figure 5.6 Castlelost ED Deprivation Indices Map

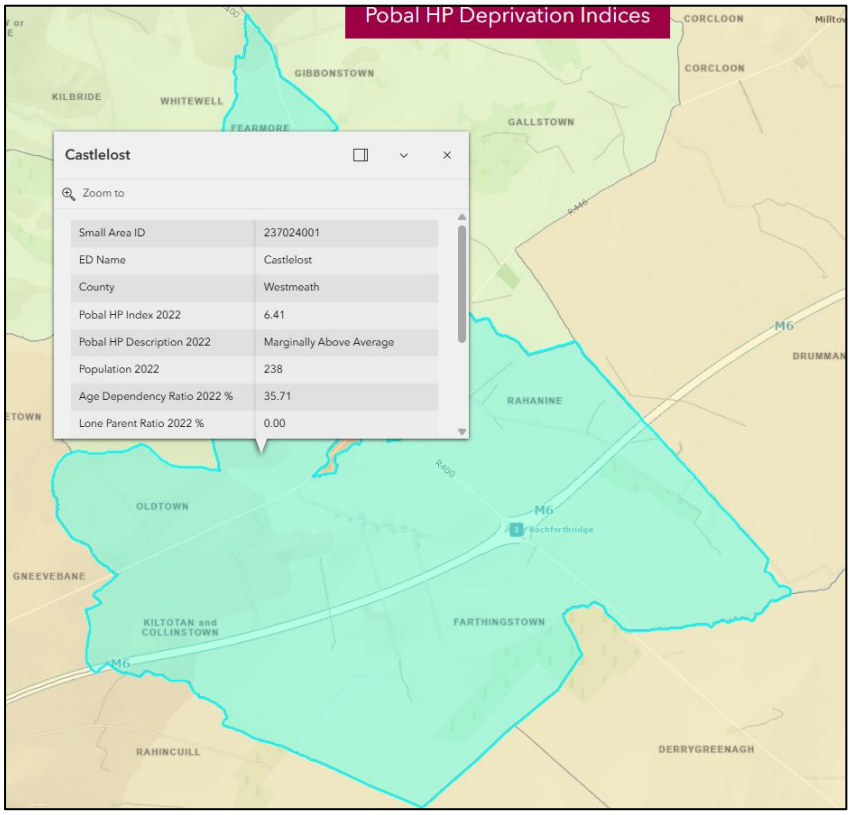


Figure 5.7 Ballykilmore ED Deprivation Indices Map

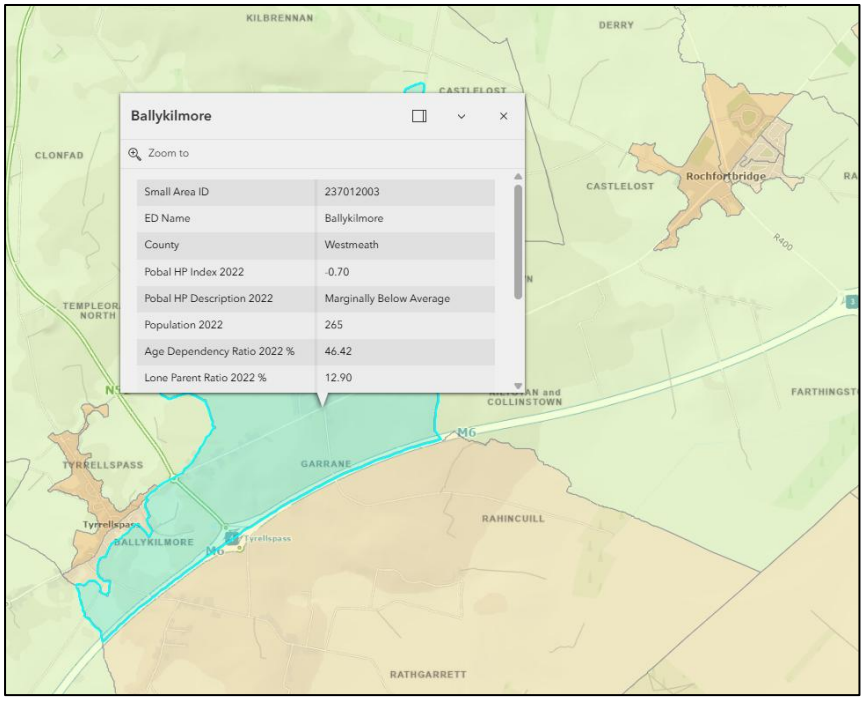


Table 5.2 Castlelost ED Statistics

Castlelost ED Statistics	
ED ID	237024001
ED Name	Castlelost
County	Westmeath
Pobal HP Index 2022	6.41
Pobal HP Description 2022	Marginally Above Average
Population 2022	238
Age Dependency Ratio 2022 %	35.71
Lone Parent Ratio 2022 %	0.00
Prop. Primary Education Only 2022 %	7.19
Proportion at Third Level Education 2022 %	42.48
Unemployment Rate - Male	4.48
Unemployment Rate - Female	4.17

Table 5.3 Ballykilmore ED Statistics

Ballykilmore ED Statistics	
ED ID	237012003
ED Name	Ballykilmore
County	Westmeath
Pobal HP Index 2022	-0.70
Pobal HP Description 2022	Marginally Below Average
Population 2022	265
Age Dependency Ratio 2022 %	46.42
Lone Parent Ratio 2022 %	12.9
Prop. Primary Education Only 2022 %	12.21
Proportion at Third Level Education 2022 %	43.60
Unemployment Rate - Male	6.25
Unemployment Rate - Female	10.64

A map showing an inclusion of small area population statistics (SAPS), whose boundaries intersect a 1km radius of the main project areas is provided in Figure 5.8. A breakdown of population for each areas is presented in Figure 5.9, Figure 5.10 and Figure 5.11. The combined populations of the area delineated in Figure 5.8 is 845 people (430 males and 415 females). Pobal HP Deprivation details for SAPS Area ID A237024001describe geographic units as *"Being Marginally Above Average"*. Pobal HP Deprivation details for SAPS Area ID A237012002 and A237012003 describe both geographic units as *"Being Marginally Below Average"*.

Figure 5.8 Small Areas Map – Radius of 1km

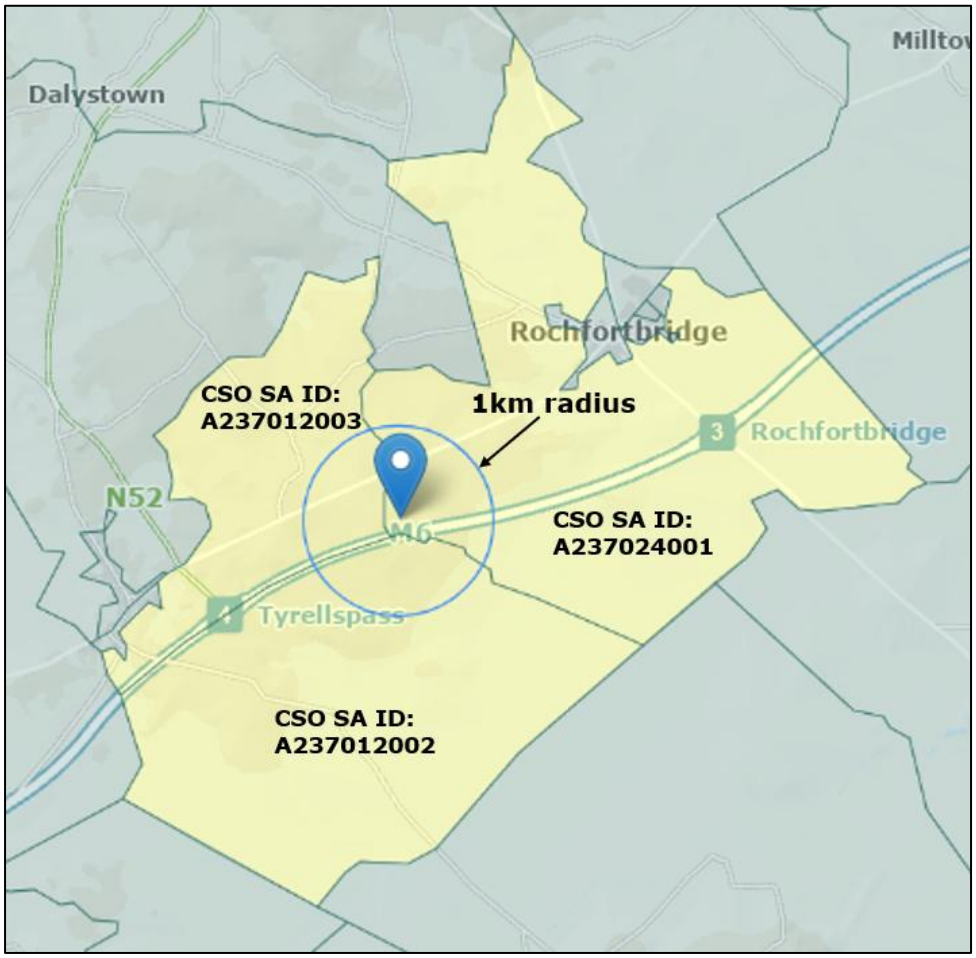


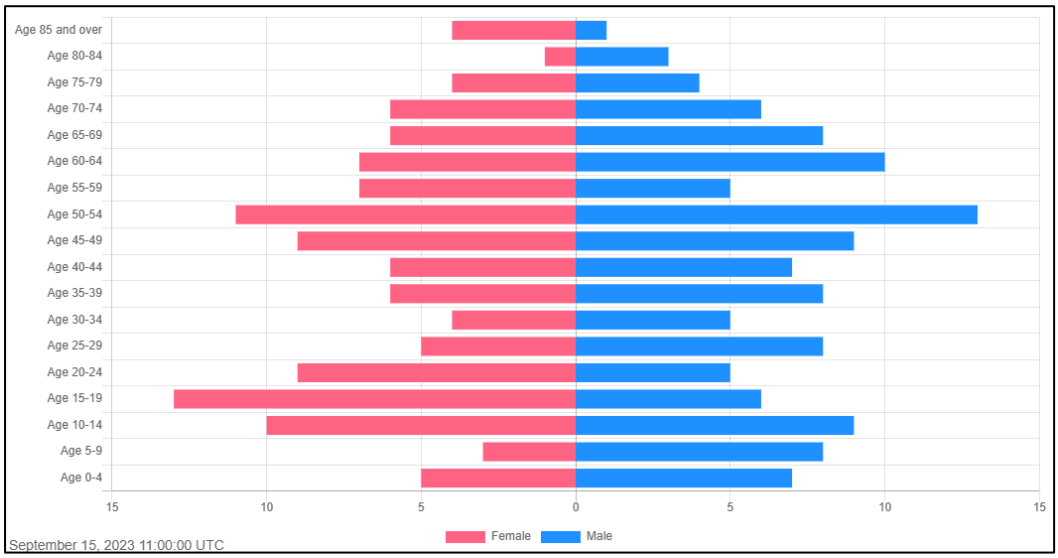
Figure 5.9 Small Areas: A237012002 (176 males, 166 females)



Figure 5.10 Small Areas: A237012003 (132 males, 133 females)

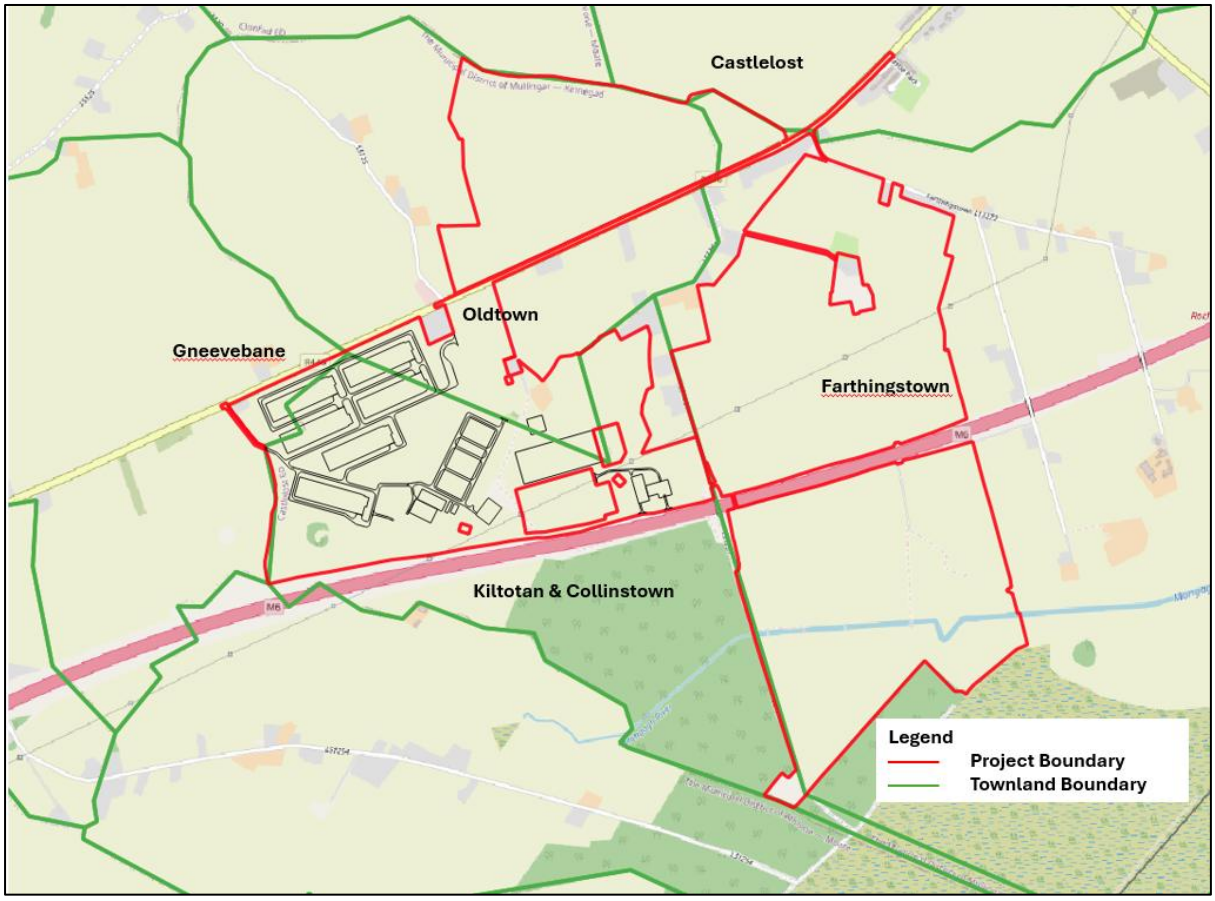


Figure 5.11 Small Areas: A237024001 (122 males, 116 females)



The number of persons enumerated in the townlands which the proposed development lands are located (see Figure 5.12) is not reported by CSO in the 2022 statistics.

Figure 5.12 Setting – Townlands



5.4 ASSESSMENT OF POTENTIAL ENVIRONMENTAL EFFECTS

5.4.1 DO NOTHING SCENARIO

In the "do-nothing" scenario, the site would remain as agricultural land (pastures and arable fields). Biodiversity studies confirm the absence of rare or protected habitats, with the area offering generally low ecological value aside from some treelines of local significance. There are no links to European protected sites, and existing habitats for certain species would be preserved within the project design. Choosing not to proceed would merely shift environmental impacts elsewhere, without delivering climate or digital benefits for Ireland. Please refer to Chapter 3, Need for the Development and Alternatives.

5.4.2 POPULATION AND SETTLEMENT PATTERNS

This project does not contain a housing or services element and is not considered to have any direct positive or negative impacts on the local or regional population levels. However,

the plant will attract employees who are not based in locally to relocate to the town to reduce commuting distances. During the construction phase there is the potential for limited impacts on the residential amenity of the local population. The overall impact is considered to be imperceptible in terms of population. Temporary /short term slight adverse impacts associated with an increase in traffic (construction) levels will likely occur. With the recommended traffic and transport mitigation measures in place, no significant adverse roads and traffic related environmental impacts are anticipated during the construction, operational or decommissioning phases of the proposed development.

5.4.3 SEVERENCE

The effect of the impact associated with the project or in combination with other projects is considered as neutral and long-term.

5.4.4 HEALTH AND SAFETY

Given the nature of the project, dispersed residential population and distance to nearby settlements, the sensitivity of receiver is considered to be low. The predicted impact on air quality is short term and not significant hence the potential human health impact during construction is imperceptible. Air quality and noise are dealt with separately in Chapters 10 (Air Quality) and 11 (Noise and Vibration) and 15 (Climate). The air quality impacts associated with the proposed developments will be well within the relevant Air Quality Standards. The impacts are deemed to be not significant and long-term. Due to the size and nature of the development and the nature and volume of the potential emissions, the construction phase activities will not have a significant impact on climate and will be short-term in duration while the operational phase activities will have an imperceptible impact on climate and a not significant impact on air quality and will be long-term in duration. A Stage 1 Road Safety Audit has been carried out in accordance with TII's publication *'GE-STY-01024 – Road Safety Audit'* and is included under the Traffic and Transport Appendix 13.5. All issues raised in the Road Safety Audit have been addressed so the proposed development will be satisfactory in terms of traffic operations and safety.

In terms of COMAH, it is noted that the adjoining Castlelost Flexgen Reserve Gas Fired Generator is a lower tier COMAH site due to the requirement to store gas oil as backup fuel onsite. Lower-Tier sites fall under the *European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015* (S.I. 209 of 2015). Development sensitivity levels were considered during the design and layout of the proposed project. Proposed infrastructure (level 1 sensitivity band[40]) is sufficient

[40] Industrial (Level 1) development is generally acceptable even in the inner zone, provided it does not exacerbate risk or hamper emergency response

distanced and sited in respect of the COMAH facility and emergency planning or evacuation routes are not impeded by the proposed development.

5.5 MITIGATION MEASURES

In order to control potential negative impacts during construction, an updated Construction Environmental Management Plan (CEMP) has been prepared for the development and provided in Appendix 2.6. This will be further developed and implemented by the nominated Contractor in advance of construction works and agreed with the planning authority. A project decommissioning plan has been prepared for the project and is available in Appendix 2.3 of the EIAR.

Due to layout changes within the DC campus area of the proposed development a Revised Lighting Study and Design Package is provided in Appendix 5.3.

A Community Benefit Framework Report is provided in Appendix 5.4. The report provides an initial assessment of community benefit and an outline framework and set of principles for informing a fully-fledged community benefit Scheme or fund once the project is developed and operational.

Post mitigation impacts to population and human health during the construction (and decommissioning stages) are predicted as temporary /short-term, direct and indirect slightly adverse effects. Given the setting and sensitivity of identified receptors, the potential effects associated with operation of the proposed development is considered neutral.

5.6 RESIDUAL IMPACTS OF THE DEVELOPMENT

Based on the assessment, the proposed development will not give rise to any significant negative population and human health effects.

5.7 CUMULATIVE EFFECTS

Based on the assessment findings presented in all Chapters of the EIAR which have interactions with Population and Human Health, the magnitude of potential effects associated with operation of the proposed development in combination is considered neutral.

6 BIODIVERSITY

6.1 INTRODUCTION

This chapter provides an assessment of the impacts of the proposed development on the ecological environment, i.e. biodiversity, flora and fauna. It has been compiled in compliance with European Communities Legal requirements and follows EPA Guidelines on Information to be contained in an EIAR (EPA, 2022) and on Transport Infrastructure Ireland TII policy and guidance outlined in Section 6.2.

This chapter was compiled by Ger O'Donohoe M.Sc. of Moore Group providing information on habitats in the study area. Ger is the principal ecologist with Moore Group and has over 30 years' experience in ecological impact assessment. He graduated from ATU Galway in 1993 with a B.Sc. in Applied Freshwater & Marine Biology and subsequently worked in environmental consultancy while completing an M.Sc. in Environmental Sciences, graduating from Trinity College, Dublin in 1999. (He also has over 15 years' experience of carrying out bat surveys and has completed the Bat Conservation Ireland, Bat Detector Workshop which is the standard training for the carrying out of bat surveys in Ireland and follows the Bat Conservation Ireland 'Bat Survey Guidelines' - Aughney *et al*., 2008'. In addition, Ger is an active member of the Galway Bat Group and Bat Conservation Ireland, which monitors bat populations in Ireland, and facilitates the education of bat communities to the public.

Éire Ecology was commissioned to carry out preliminary Bat and Bird Surveys. The work was undertaken by John Curtin of Éire Ecology. John Curtin B.Sc. is the principal ecologist with Éire Ecology and has over 10 years of experience in ecological impact assessment having conducted plant, habitats, birds, bats and mammal surveys since 2010 including at windfarm and solar sites. John conducted bird, bat and badger surveys. Shane O'Neill is an experienced ornithologist (Co-author Hen Harrier Survey, NPWS 2015) with a broad knowledge of breeding birds, waders and all aspects of ornithology. Shane has previously conducted I-WeBS surveys and taken part in the Shannon estuary wintering wader surveys. Laura Hynes has a degree in Wildlife Biology from MTU Kerry and has worked as an ecologist since 2022. Laura has worked as a Curlew officer for the NPWS.

6.2 METHODOLOGY

This chapter of the EIAR concentrates on ecological features within the development area of particular significance, primarily designated habitats and species. This includes

habitats/species listed in Annex I, II and IV of the EU Habitats Directive, rare plants listed in the Flora Protection Order and other semi-natural habitats of conservation value.

A Report for the purposes of Appropriate Assessment Screening was undertaken by Moore Group for the proposed development. In order to screen out a project, it must be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site.

6.2.1 POLICY AND GUIDANCE

6.2.1.1 EU Habitats Directive

The "Habitats Directive" (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna) is the main legislative instrument for the protection and conservation of biodiversity within the European Union and lists certain habitats and species that must be protected within wildlife conservation areas, considered to be important at a European as well as at a national level. A "Special Conservation Area" or SAC is a designation under the Habitats Directive. The Habitats Directive sets out the protocol for the protection and management of SACs.

The Directive sets out key elements of the system of protection including the requirement for "Appropriate Assessment" of plans and projects.

Both the Habitats Directive and the Birds Directive have been transposed into Irish law by one set of regulations (i.e. The European Communities (Birds and Natural Habitats) Regulations 2011 to 2015 (S.I. No. 477/2011 as amended by S.I. No. 355 of 2015)).

6.2.1.2 EU Birds Directive

The "Birds Directive" (Council Directive 2009/147/EC on the Conservation of Wild Birds) provides for a network of sites in all member states to protect birds at their breeding, feeding, roosting and wintering areas. This directive identifies species that are rare, in danger of extinction or vulnerable to changes in habitat and which need protection (Annex I species). Appendix 1 indicates Annex I bird species as listed on the Birds Directive. A "Special Protection Area" or SPA, is a designation under The Birds Directive.

Special Areas of Conservation and Special Protection Areas form a pan-European network of protected sites known as Natura 2000 sites and European sites.

6.2.1.3 Wildlife Acts (1976 - 2021[41])

The primary domestic legislation providing for the protection of wildlife in general, and wild birds in particular, and the control of some activities adversely impacting upon wildlife is the Wildlife Act of 1976, as amended. The aims of the Wildlife Act, according to the National Parks and Wildlife Service (NPWS) are "... to provide for the protection and conservation of wild fauna and flora, to conserve a representative sample of important ecosystems, to provide for the development and protection of game resources and to regulate their exploitation, and to provide the services necessary to accomplish such aims." All wild bird species are protected under the Act. The European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) made significant amendments to the Wildlife Acts to ensure consistency with the Habitats and Birds Directives.

6.2.2 HABITAT SURVEY

The Biodiversity survey was carried out in three stages, firstly through desktop research to determine existing records in relation to habitats and species present in the study area. This included research on the National Parks and Wildlife Service (NPWS) metadata website, the National Biodiversity Data Centre (NBDC) database and a literature review of published information on flora and fauna occurring in the proposed development area.

Sources of information that were used to collate data on biodiversity in the potential Zone of Influence are listed below:

- The following mapping and Geographical Information Systems (GIS) data sources, as required:
  - National Parks & Wildlife (NPWS) protected site boundary data;
  - Ordnance Survey of Ireland (OSI) mapping and aerial photography;
  - OSI/ Environmental Protection Agency (EPA) rivers and streams, and catchments;
  - Open Street Maps;
  - Digital Elevation Model over Europe (EU-DEM);
  - Google Earth and Bing aerial photography 1995-2025;
- Online data available on Natura 2000 sites as held by the National Parks and Wildlife Service (NPWS) from www.npws.ie including:
  - Natura 2000 - Standard Data Form;
  - Conservation Objectives;
  - Site Synopses;

[41] Wildlife Act 1976, as amended. Administrative consolidation of the Wildlife Act 1976, Law Reform Commission (2021)

- National Biodiversity Data Centre records;
  - Online database of rare, threatened and protected species;
  - Publicly accessible biodiversity datasets.
- Status of EU Protected Habitats in Ireland. (National Parks & Wildlife Service, 2019); and
- Relevant Development Plans in neighbouring areas:
  - Westmeath County Development Plan 2021-2027

Other environmental information for the area was reviewed, e.g. in relation to soils, geology, hydrogeology and hydrology. Interactions in terms of the chapters on these topics presented in this EIA Report were important in the determination of source vector pathways and links with potentially hydrologically connected areas outside the proposed development site.

The second phase of the survey involved site visits on the following dates to establish the existing environment in the footprint of the proposed development area.

- 20/08/24 Habitats, Badgers and Otters Surveys
- 31/10/24 Habitats and Badgers Surveys
- 01/04/25 Spring Habitats, Badgers and Otters Surveys
- 07/05/25 Habitats and Badger Surveys

Areas which were highlighted during desktop assessment were investigated in closer detail according to the Heritage Council Best Practice Guidance for Habitat Survey and Mapping (Smith *et al*., 2011). Habitats in the proposed development area were classified according to the Heritage Council publication "A Guide to Habitats in Ireland" (Fossitt, 2000). This publication sets out a standard scheme for identifying, describing and classifying wildlife habitats in Ireland. This form of classification uses codes to classify different habitats based on the plant species present. Species recorded in this report are given in both their Latin and English names. Latin names for plant species follow the nomenclature of "An Irish Flora" (Parnell & Curtis, 2012).

6.2.3 BADGER SURVEY METHODOLOGY

The following methodology used during fieldwork and site surveying was adopted from Scottish Nature and included information provided in Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes by Transport Infrastructure Ireland formerly NRA (2006).

6.2.4 INITIAL FIELD SURVEYS

Badger surveys should be undertaken within an area of search extending 1km from the periphery of the proposed development area. Within this area of search all fence lines, woodland and scrub habitats should be systematically surveyed for evidence of badgers in the form of:

- Faeces: badgers usually deposit faeces in characteristic excavated pits, concentrations of which (latrine sites) are typically found at home range boundaries.
- Setts, comprising either single isolated holes or a series of holes, likely to be interconnected underground.
- Paths between setts or leading to feeding areas.
- Scratching posts at the base of tree trunks.
- Snuffle holes (small scrapes where badgers have searched for insects, earthworms and plant tubers).
- Day nests (bundles of grass and other vegetation where badgers may sleep above ground).
- Hair traces.
- Footprints
- When found, activity levels at setts should be scored using the following criteria:
- Number of well used holes (with one or more of the features : well worn entrance; freshly excavated soil; bedding material)
- Number of partially used holes (leaves or twigs in entrance and/or mosses and other plants growing in or around entrance)
- Number of disused holes (partially or completely blocked, with considerable amount of excavation required for reoccupation).

Setts should also be classified using the conventions shown in the following criteria.

Sett Type	Definition
Main	Several holes with large spoil heaps and obvious paths emanating from and between sett entrances
Annexe	Normally less than 150m from main sett, comprising several holes. May not be in use all the time, even if main sett is very active.
Subsidiary	Usually at least 50m from main sett with no obvious paths connecting to other setts. May only be used intermittently
Outlier	Little spoil outside holes. No obvious paths connecting to other setts and only used sporadically. May be used by foxes and rabbits.

6.2.5 OTTER SURVEY METHODOLOGY

The following methodology used during fieldwork and site surveying was adopted from Guidelines for the treatment of otters prior to the construction of national road schemes by Transport Infrastructure Ireland formerly NRA (2006).

A walkover otter survey was undertaken on watercourses within the vicinity of the proposed development on. The survey area comprised 1.3km of linear riverine habitat (inclusive of both banks where accessible) on the Castlejordan River and 1.5km of drainage ditches leading to the Kiltonan Stream and 1.1km of the Kiltonan Stream.

The survey was completed during optimal conditions (dry, mild, bright and settled) which ensured that a good representation of habitat marked by otter could be recorded in the field, including territorial marking or marking of feeding areas. The survey also deliberately coincided with a prolonged dry period to minimise rain washout of otter signs (spraint, smears etc.). Water levels were low (at base flows) during the survey period.

Any otter sign is logged by type, location (GPS), condition and approximate age for later interpretation to distinguish differences in habitat use and activity. Spraints were subjectively assessed as either fresh (very recent), mixed-age (recent & older spraints, typically indicative of a regular marking site) or old (spraint degrading and not recently deposited). Furthermore, indicative counts of spraint (i.e. number of individual spraints) and the number of sprainting sites (often separate clusters in one area) are noted. This helps indicate the frequency of otter marking that can clarify preferential use of habitat over time. High marking frequency often demarcates important territory.

Bat Surveys were undertaken by Éire Ecology and the methodology for those surveys is presented in the Bat Report which is included as Appendix 6.2.

Bird Surveys were undertaken by Éire Ecology and the methodology for those surveys is presented in the Bird Report which is included as Appendix 6.3.

The final part of the assessment involves an evaluation of the study area and determination of the potential impacts on the habitats of the study area. This part of the assessment forms the basis for Impact Assessment and is based on the following guidelines and publications:

- Guidelines for Ecological Impact Assessment in the UK And Ireland Terrestrial, Freshwater, Coastal and Marine Version 1.3 - Updated September 2024 (CIEEM, 2024);
- EPA Guidelines on Information to be contained in an EIAR (EPA, 2022);

- Best Practice Guidance for Habitat Survey and Mapping (Heritage Council, 2011);
- Ecological Surveying Techniques for Protected Flora & Fauna (NRA, 2008);
- Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009);
- Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (DEHLG, December 2009, Rev 2010);
- Guidance document on Article 6(4) of the Habitats Directive 92/43/EEC (EC, 2007).

While prepared for linear projects the TII Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009) are still relevant and outlines the methodology for evaluating ecological impacts of the project in the present report. According to the TII Guidelines, the Ecological Study should address:

- Designated conservation areas and sites proposed for designation within the zone(s) of influence of any of the Project options,
- All the main inland surface waters (e.g. rivers, streams, canals, lakes and tanks) that are intersected by any of the route corridor options, including their fisheries value and any relevant designations,
- Aquifers and dependent systems and turloughs and their subterranean water systems,
- Any known or potentially important sites for rare or protected flora or fauna that occur along or within the zone(s) of influence of any of the route options,
- Any other sites of ecological value, that are not designated, along or in close proximity to any of the route corridor options,
- Any other relevant conservation designations or programmes (e.g. catchment management schemes, habitat restoration or creation projects, community conservation projects, etc.),
- Any other features of particular ecological or conservation significance along any of the route options.

The TII Guidelines set out a method of evaluating the importance of sites identified and in turn the evaluation of the significance of impacts.

Impact Assessment is then based on CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland, 2019.

6.2.6 DESCRIPTION OF THE PROPOSED DEVELOPMENT

Red Admiral DC Limited propose to develop a DC facility and DER on lands in the townlands of Gneevebane, Oldtown, Farthingstown, Castlelost and Kiltotan and Collinstown in the south of County Westmeath. The project includes two main elements, namely:

- The Data Centre (DC) facility, comprising six two-storey Data Centre buildings, car parking, landscaping, drainage and other associated works. The DC facility will be constructed and secured within a 39ha campus. Each DC building will have a footprint of 13,978 m^2 (sqm). Each DC building will contain:
  - Data halls fitted with server racks and distribution units,
  - Mechanical and electrical (M&E) plant rooms /spaces which will house advanced cooling equipment, pumps, piping and medium voltage (MV) and low voltage (LV) switchgear, and
  - Administration and support areas including, reception, offices, meeting rooms and welfare facilities.
- Decentralised Energy Resource (DER), which will be constructed across approximately 200ha of lands adjoining the DC facility. The DER incorporates several power assets which will generate, store and manage electricity close to the DC facility. The DER comprises the following assets:
  - Fuel Cell Power System – 160MW,
  - Battery Energy Storage System (BESS) – 250MW,
  - Solar PV farm (nominal 180MWp), and
  - 220kV IPP GIS Grid connection to the 220kV Castlelost GIS substation which adjoins the proposed development site.

A full description of the proposed development is provided in Chapter 2.

6.3 DESCRIPTION OF EXISTING ENVIRONMENT

6.3.1 GENERAL

The site comprises a mosaic of open farmland fields (GA1) which are either mown for silage or under Arable Crops (BC1).

The fields are bordered by low gappy sections of Hedgerows with semi-mature or outgrown mature trees.

The following is a description of the flora and fauna of the existing environment in the study area.

6.3.2 DESIGNATED CONSERVATION AREAS

The Zone of Influence may be determined by connectivity to the Proposed Development in terms of:

- Nature, scale, timing and duration of works and possible impacts, nature and size of excavations, storage of materials, flat/sloping sites;
- Distance and nature of pathways (dilution and dispersion; intervening 'buffer' lands, roads etc.); and
- Sensitivity and location of ecological features.

The potential for source pathway receptor connectivity is firstly identified through GIS interrogation and detailed information is then provided on sites with connectivity. European sites that are located within a potential Zone of Influence of the Proposed Development are listed in Table 6.1and presented in Figure 6.1 below. Spatial boundary data on the Natura 2000 network was extracted from the NPWS website (www.npws.ie) on 4 June 2025. This data was interrogated using GIS analysis to provide mapping, distances, locations and pathways to all sites of conservation concern including pNHAs, NHA and European sites.

Table 6.1 European Sites located within a potential Zone of Influence[42] of the Proposed Development

Site Code	Site name	Distance (km)[43]
000582	Raheenmore Bog SAC	5.12
000685	Lough Ennell SAC	5.62
001831	Split Hills And Long Hill Esker SAC	6.47
004044	Lough Ennell SPA	6.30
002299	River Boyne and River Blackwater SAC	31.5
004232	River Boyne and River Blackwater SPA	31.5

The nearest European site to the Proposed Development is the Raheenmore Bog SAC (Site Code 000582), which is located just over 5.12km to the south. It is designated for raised bog habitats and with no mobile species indicated as conservation objectives and no hydrological connectivity to the proposed development it can be excluded from the assessment at this preliminary stage.

Wooddown Bog SAC is located c.13.5km to the north and designated for degraded raised bog habitats and with no mobile species indicated as conservation objectives and no

[42] All European sites potentially connected irrespective of the nature or scale of the Proposed Development.
[43] Distances indicated are the closest geographical distance between the Proposed Development and the European site boundary, as made available by the NPWS.

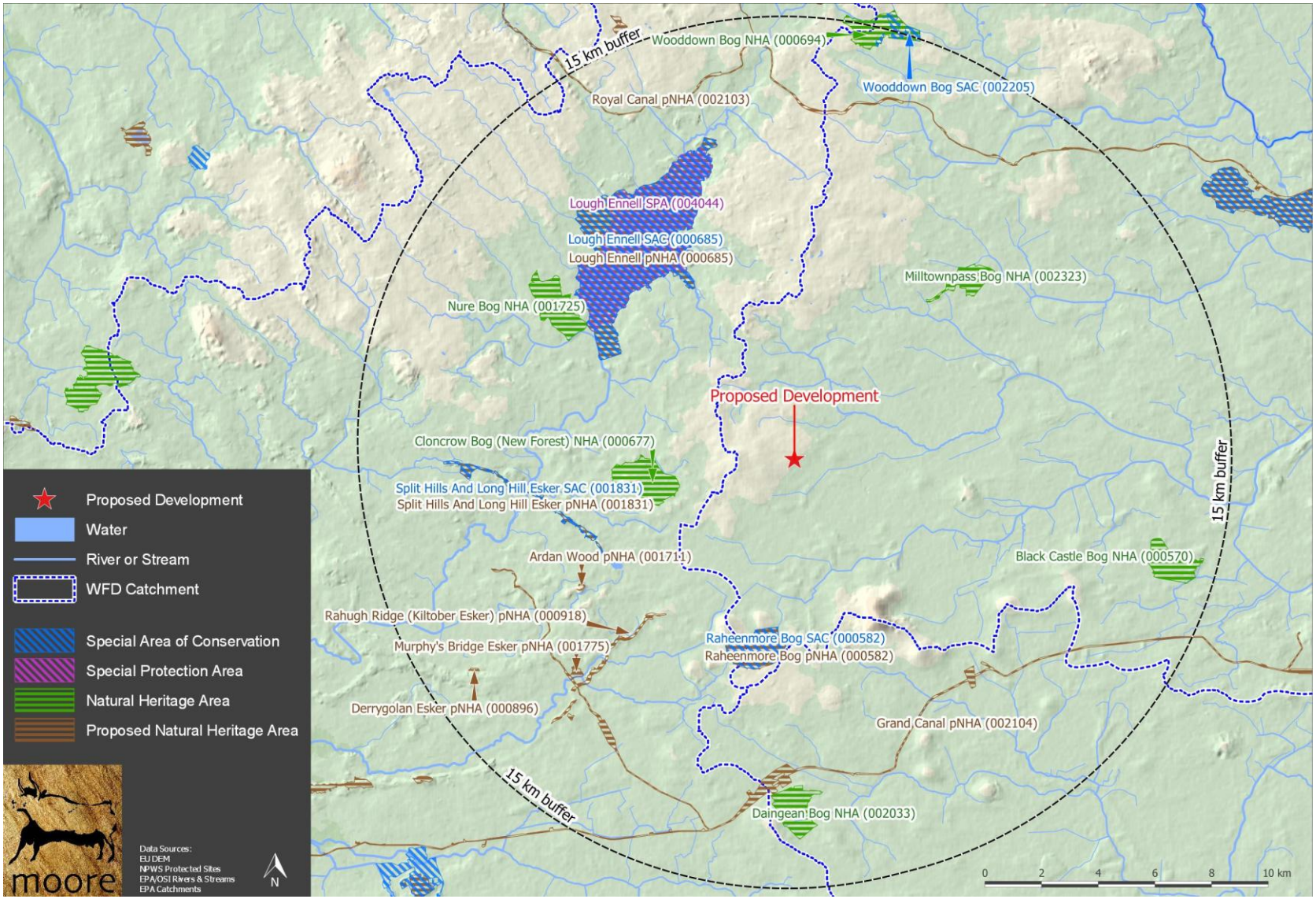
hydrological connectivity to the proposed development it can be excluded from the assessment at this preliminary stage.

The Proposed Development is located in a separate catchment to Lough Ennell, and with no hydrological connectivity and no mobile species, the Lough Ennell SAC is excluded from the assessment at this preliminary stage.

There is no hydrological connectivity to the Lough Ennell SPA and there are no supporting habitats for two of the three Special Conservation Interest Annexed Bird species (Pochard and Tufted Duck) and limited supporting habitats for Coot at the Proposed Development site. There is no potential for significant ex situ effects, the Lough Ennell SPA is excluded from the assessment at this preliminary stage.

The Proposed Development is located within the hydrological catchment of the Castlejordan and Yellow River which flow northeast to the River Boyne with its associated European sites, the River Boyne and River Blackwater SAC (Site Code 002299) and the River Boyne and River Blackwater SPA (Site Code 004232), which are located just over 18km directly but c.31.5 river km downstream of the Proposed Development.

Figure 6.1 Showing European Sites & NHAs/pNHAs within the wider Potential Zone of Influence



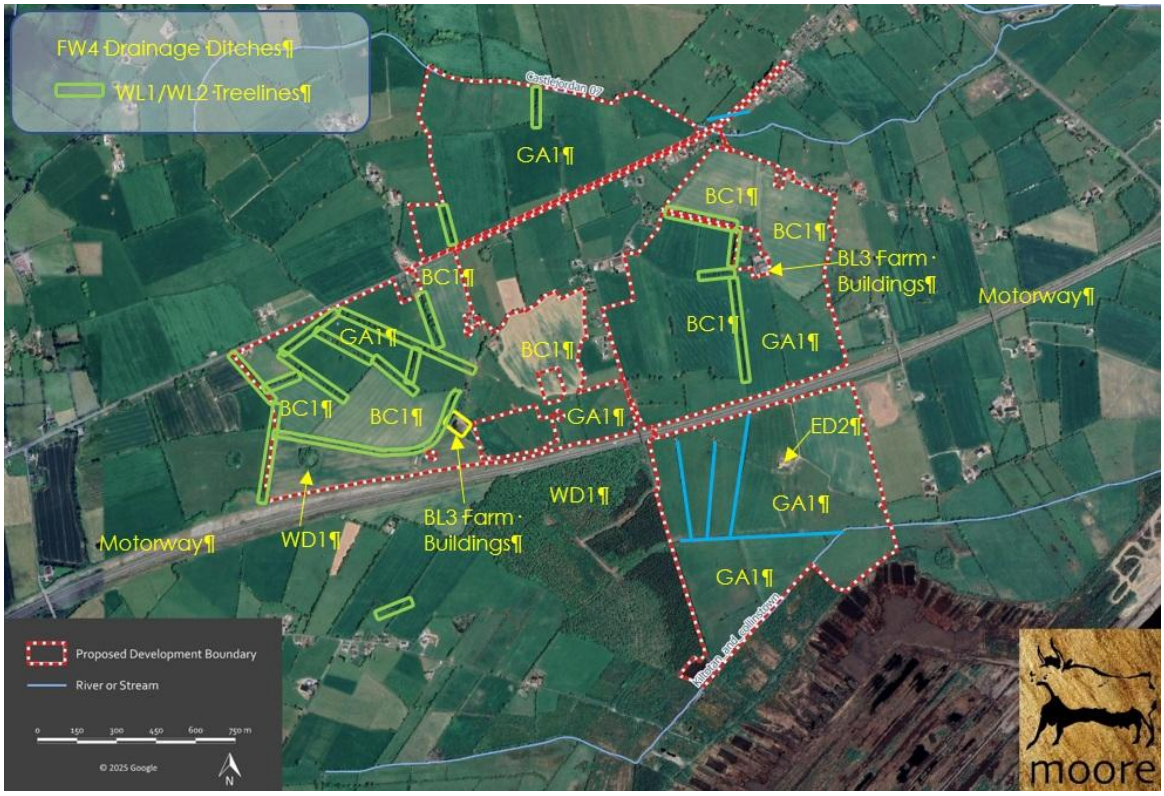
6.3.3 NON-DESIGNATED HABITATS

The proposed development area is improved farmland with open fields which are either heavily grazed or under Arable Crops. There are internal hedgerows and associated short shallow drainage ditches and surrounding outgrown hedgerows. The main habitats are presented on the recent aerial photography in Figure 6.2. A list of habitats recorded, and their corresponding Fossitt codes is presented in Table 6.2.

Table 6.2 Details of Habitats Recorded and their Corresponding Fossitt Codes

Habitat	Habitat Category	Habitat Type
(F) Freshwater	(FW) Watercourses	((FW4) Drainage ditches
(G) Grassland	(GA) Improved grassland	(GA1) Improved agricultural grassland
(W) Woodland and Scrub	(WD) Scrub and transitional woodland	(WD1) Mixed broadleaved woodland
	(WL) Linear woodland	(WL1) Hedgerows
		(WL2) Treelines
(B) Cultivated and Built land	(BC) Cultivated land	(BC1) Arable crops
(B) Cultivated and Built land	(BL) Built land	(BL3) Buildings and artificial surfaces
(ED) Exposed rock and disturbed ground	(ED) Disturbed ground	(ED2) Spoil and bare ground

Figure 6.2 Showing habitats recorded at the proposed development site.



6.3.3.1 (FW1) Eroding upland rivers

This habitat classification applies to the Castlejordan stream running along the northern boundary and the Kiltotan and Collinstown stream along the southern boundary.

6.3.3.1.1 Castlejordan Stream

The Castlejordan Stream runs along the northern boundary of the site, and has been significantly modified, with steep uniform sides. A line of mature Beech (*Fagus sylvatica*) trees lines the northern bank, with Bramble (*Rubus fruticosus*), False Oat-Grass (*Arrhenatherum elatius*) and Great Willowherb (*Epilobium hirsutum*) along the southern bank. Poached areas where animals access to drink supported Brooklime and Lesser Spearwort. Species present in the sluggish watercourse include abundant Fool's Water Cress (*Apium nodiflorum*) and Water Cress (*Nasturtium officinale),* with some Floating Sweet Grass *(Glyceria fluitans).* The stream has a muddy base and little flow and does not appear to have any fisheries value. No signs of otter were observed along the stream.

6.3.3.1.2 Kiltotan and Collinstown Stream

The Kiltotan and Collinstown Stream flows along the southern boundary of the site, and through a small section of the southeastern part of the site. The stream has been artificially straightened and deepened and presents a typical uniform profile, with steep sides. The watercourse is heavily overgrown in parts, with Grey Willow (*Salix cinerea*), Downy Birch (*Betula pubescens*) and Bramble invading from the cutover bog to the south. Instream vegetation includes large areas of Common Duckweed and Fool's Water Cress. The stream displayed no obvious flow, and has a soft peaty substrate, with no obvious fisheries value. No signs of otter were observed along the stream.

6.3.3.2 (FW4) Stream/Drainage ditches

This habitat classification applies to drainage ditches within and bounding the site, and the unnamed channelised minor stream entering the southern site from the west.

These ditches are of depths from 1 to 3m, with steep sides, and generally with little flow. Species present include Fool's Water Cress (*Apium nodiflorum*), Water Cress (*Nasturtium officinale*), Angelica (*Angelica sylvestris*), Branched Bur-reed (*Sparganium erectum*), Iris (*Iris pseudacorus*)and Reed Canary Grass (*Phalaris arundinacea*). Occasional poached muddy margins where animals drink also support Brooklime (*Veronica beccabunga*) and Lesser Spearwort (*Ranunculus flammula*).

6.3.3.3 (GA1) Improved agricultural grassland

This habitat refers to those grassland areas which comprise the fields managed for silage or grazed by livestock on the site. Species present include abundant Perennial Rye Grass (Lolium perenne), Meadow grass (*Poa* spp.). Ribwort plantain (*Plantago lanceolata*), Meadow Buttercup (*Ranunculus acris*), Cocks foot (*Dactylis glomerata),* Yorkshire Fog *(Holcus lanatus),* Creeping Thistle (Cirsium arvense), and Nettle (*Urtica dioica*). Some of the southern fields have more impeded drainage, and Soft Rush (*Juncus effusus*) and Creeping Buttercup (*Ranunculus repens*) are more prominent.

6.3.3.4 (WL1) Hedgerows & WL2 Treelines

This habitat refers to the various field boundaries within and surrounding the site, a mix of tightly managed and outgrown hedgerows, as well as significant treelines bordering fields and avenues.

Many field boundary hedgerows have been so degraded that they are remnants along fencelines, with some better managed hedgerows particularly in the western section, and occasional fine outgrown hedgerows which include mature specimen trees. Species composition is typical of such farmland, with Hawthorn (*Crataegus monogyna*), Elder (*Sambucus nigra*), Ash (*Fraxinus excelsior*), Blackthorn (*Prunus spinosa*), Wild Privet (*Ligustrum vulgare*), Sycamore (*Acer pseudoplatanus*) and Grey Willow (*Salix cinerea*). Ivy (*Hedera hibernica*) is abundant throughout, as are Bramble (*Rubus fruticosus*) and Honeysuckle (*Lonicera periclymenum*). Ground flora is similar to that of the adjacent grassland, with occasional woodland edge plants such as Wood Avens (*Geum urbanum*) and Ground Ivy (*Glechoma hederacea*).

The avenue to Farthingstown House and farm comprises a double row of Copper Beech (*Fagus sylvatica var purpurea*) and Ash, while the western aspect of the farm is defined by a row of large specimen Beech trees. As is the case throughout Ireland, much of the Ash in hedgerows and treelines is exhibiting various symptoms of Ash Dieback.

6.3.3.5 (WD1) Mixed Broadleaved Woodland

This habitat was recorded in the ringfort, located in the western section of the site. The ringfort comprises a double earthen embankment, with Ash, Sycamore, Hawthorn and Grey Willow, as well as scrubby Elder. Hogweed (*Heracleum sphondylium*) and Ivy are frequent in the understorey, as is Bramble.

6.3.3.6 (BC1) Arable crops

Several large fields throughout the site are managed for crops, with barley being the most widespread, as well as some Rapeseed. Typical arable weeds observed on the margins of these fields included Giant Brome (*Anisantha diandra*), Common Field Speedwell (*Veronica persica*), Scarlet Pimpernel (*Anagallis arvensis*) and Shepherd's Purse (*Capsella bursa pastoris*).

6.3.3.7 (BL3) Buildings and artificial surfaces

This habitat refers to a variety of farm buildings within the site, with little to no vegetation.

6.3.3.8 (ED2) Spoil and bare ground

This habitat classification refers to the area within the southern section of the site used to store piles of unconsolidated spoil and stone and baled silage. A rough track leading to this area is included in the classification. Some ruderal colonisation has occurred, with species recorded including Oxeye Daisy (Leucanthemum vulgare), Broad-leaved Willowherb (*Epilobium montanum*), Docks (Rumex sp.) and scrubby Grey Willow.

6.3.4 INVASIVE SPECIES

Small patches of Japanese Knotweed were record during preliminary site visits in May 2019 and again observed in April 2025. The area is located on the access road to the east and was treated in the past 5 years having reduced an extensive patch along the road in that area to a few persistent plants. The site will be monitored by an Invasive Species Specialist, and an Invasive Species Management Plan will inform the requirement for further treatment. A photo of these from April 2025 is provided below.



6.3.5 FAUNA

6.3.5.1 Badgers

The National Biodiversity Centre Database was consulted on 27 February 2026 for records of badgers in the zone of influence of the Proposed Development. There are several records from the Bord na Mona site at Derrygreenagh to the southeast of the M6 Motorway outside and to the southeast of the portion of the site proposed for solar farm development. There are no records in the intensively managed farmland fields to the north of the M6. The site boundaries were surveyed and no setts were recorded.

6.3.5.2 Otters

The National Biodiversity Centre Database was consulted on 27 February 2026 for records of otters on all water courses in the zone of influence of the Proposed Development. There is one historical record (1982) for signs of otters ('2 Count of Droppings') on the Rochfortbridge Stream which flows from the north hinterland to join the Castlejordan Stream to the south and east of Rochfortbridge. A later record from the Rochfortbridge Stream.at the Bridge North of Rochfortbridge recorded *'two spraints on a grass tuft by cattle drinking access 25m u/s from bridge'* on 16/09/2005. There are no records on the Castlejordan Stream upstream or with 150m downstream of the that section of the site proposed for solar farm development.

There is one historical record (1982) for otter signs ('2 droppings') on the Kiltonan Stream at NGR N467386, where it leaves the Proposed Development site upstream of the Bord na Mona lands at Derrygreenagh. A Bord na Mona 'Commission Survey' from 23/03/2015 recorded a Spraint a further 2.6km downstream at the bridge on the R400 corresponding to the county boundary. The surveys conducted during fieldwork on the water courses including drainage ditches, the Castlejordan Stream and the Kiltonan Stream did not reveal any signs of otter usage. No resting places, slides, spraints or latrines were recorded.

6.3.5.3 No Volant Mammals

There are anecdotal references to deer, pine marten, and hares in third party submissions lodged on the initial application. There were no specific signs of these species recorded during habitat surveys.

Pine martens are more likely to occur in densely forested habitats and on scrubby peatland which does not occur on site. They have been recorded in peatland and fringing woodland far outside the subject site.

Hares and foxes are frequent inhabitants of hedgerows and while no hares were observed, they may be present foraging on open fields. Fox scats were observed and typical scent markings were recorded. However, this species is not protected.

There are no records of red deer from the surrounding area. Any anecdotal records may refer to fallow deer, an invasive species, which have been recorded in Bord na Mona woodland to the far south and east.

6.3.5.4 Bats

6.3.5.4.1 Tree Surveys

In total 420 trees were surveyed from ground level for their potential to host individual bats or a maternity roost. Two veteran ash trees in Section 1 and two Beech trees in Section 3 were flagged as having the potential to host a maternity roost (PRF-M). Both pairs of trees were subjected to nighttime emergence surveys as a second survey after an at-height inspection. Results are summarized below

At-height surveys were carried out by John Curtin and Rik Pannett where Rik climbed trees and used a Ridgid CA-350. This was connected to the ecologist's phone via wi-fi thus the ecologist inspected all cavities. Surveys were conducted on the 02 and 08 April 2025. A number of Veteran trees onsite were noted to be of key importance in maintaining the continuity of connectivity through the site during and post construction. It is advised as many of these trees be kept as Monolith features to assist in the establishing of the Compensatory woodland that will be planted on the west of the site.

No bats were found to be roosting in trees onsite, though bats were observed utilising treelines for feeding purposes during nighttime surveys. *Structure Surveys*

A search was conducted of sheds and dwellings of highest potential that were within or close to the site. In situations where access was not possible the surveyor conducted nighttime surveys from the road examining bats and attempting to locate commuting routes and roosts.

During the daylight search no evidence of bats was noted from any of the structures listed in Table 3-4 of the Bat Report. Night-time surveys did reveal the presence of bat roost within five of these structures.

6.3.5.4.2 Night-time Surveys

Nighttime surveys were conducted on the 23rd April, 01st of May and 9th May 2025. These surveys consisted of multiple surveyors recording activity levels at various points throughout the site at various structures identified during desktop surveys. The purpose

of surveys was to examine for roosting bats that could be impacted by the development, observe bat interactions such as commuting routes, feeding areas, and examine if there are current impediments to bats within and surrounding the site.

Two emergence surveys were conducted on the 1st May 2025 of structures 1, 2 and 3 by multiple surveyors working with NVA's and Ultrasonic detectors. Six Pipistrelle bats were observed emerging from Structure 3 (most likely 5 Common Pipistrelle and 1 Soprano Pipistrelle), from various exit points in the walls and gable end of the building. Only a single bat was observed leaving Structure 2.

Multiple emergence surveys were conducted on the 9th of May on Structure 4, an occupied house with tile roof and Structure 5, a semi-detached derelict shed and dwelling. No bats were found to be emerging from either building. Structure 4 is an occupied dwelling and shed, with a modern slate roof. The shed is small but showed better potential for a small number of roosting bats than the dwelling. Additionally, a derelict dwelling with semi-detached sheds, both with slate roofs in disrepair, were also surveyed. Facia was in disrepair on these structures, but many areas had collapsed roofs, making the interior brighter and thus less suitable for bats.

6.3.5.4.3 Static Detector Surveys

Eight Song Meter Mini full spectrum bat recorders were deployed within areas suitable for bats for 12 nights from August to early September during the bat active season, and again in May 2025. Detector 3, located in Section 3 showed the highest levels of Soprano Pipistrelle, Natterer's Bat and Leisler's Bat on site and had the highest activity level overall.

Several Pipistrelle calls were recorded with a peak frequency of around 40kHz. These calls are lower than expected for Common Pipistrelle but higher than the typical for Nathusius. In these cases, the calls are classified to genus level (Unidentified Pipistrelle 40kHz).

Table 3-1 below provides a summary of data with full data tables provided in Appendix A. Results show number of registrations and Bat passes per hour (Bp/Hr) and divides results per species and detector. An overall average of 46.9 Bp/Hr was recorded from the August-September period.

Activity across the site was very high in edge habitat and much lower in open habitat, with the highest areas of bat activity being at Detector 3 and Detector 2 which show Bp/Hr of 241.1 and 131.6 respectively. The most common species recorded was Common Pipistrelle with 27,060 registrations (48%) followed by Soprano Pipistrelle with 14,829 recordings (27%). Leisler's bat represents 2.3% of total calls with other species recorded at low levels comparatively.

Activity in Spring showed reduced activity when compared to the first survey period. Detector 3 showed the largest drop-in activity of any location, activity dropped from 241.1 Bp/Hr (15,803 recordings), to just 18.5 Bp/Hr, with all species dropping in the same proportions. The majority of the calls on this site are still recorded at Detector 2, where Common Pipistrelle is the most abundant call recorded (89% of D-2 Bat calls are Common Pipistrelle).

It should be noted that a single bat continuously circling a small stand of trees will produce numerous recordings, thus the number of registrations cannot quantify abundance, rather activity.

6.3.5.4.4 Summary

Seven of the nine resident Irish bat species were found within the site; Leisler's Bat, Common Pipistrelle, Soprano Pipistrelle, Nathusius' Pipistrelle, Brown Long-eared, Natterer's Bat and Daubenton's bat.

62,880 registrations were recorded over the course of 22 nights from 8 static bat detectors placed in key locations throughout the site. Detectors 2, 3, 5, 7 are set in Edge Habitat which shows much higher activity on this site and these detectors make up 97% of all bat calls. Locations with high density of bat commuting traffic are Detector 2 and Detector 3 (D3 particularly in late summer when Young are present).

Lowest Levels of activity are consistently seen in open habitats onsite, with Detector 1, 4, 6 and 8 showing drastically lower levels of activity. Detector 5 is the only detector placed adjacent to a watercourse, a small stream along the northern border of Section 3. It also showed the highest levels of Myotis Species on site though few Myotis bats were recorded.

A Breeding pair of Barn owls were observed nesting onsite near Detector 3. Literature suggests that Barn Owls can influence the suitability of an area for bats, potentially driving bats out of a roost. Roulin (2013) concludes that while Barn Owls can predate on insectivore bat species, bats typically make up a small portion of their diet (usually <0.2%) and predation is mostly opportunistic on the part of the Barn Owl.

No tree roosting bats were recorded during any survey. Bat roosts were noted from buildings to the west of the site (two roost structures) however these buildings will not be altered by the proposed development.

6.3.5.5 Birds

The NBDC was accessed on the 14 August 2024 and again on the 21 May 2025 for previous records within the 3 x 2km squares the site resides in N43U, N43P and N44K. In total

there were sixteen bird species recorded within the records examined. The following rare and / or threatened birds have been recorded in Table 6.3.

Table 6.3 Designated species recorded within the 2km squares; N43U, N43P and N44K.

Name	Latin Name
Mallard	*Anas platyrhynchos*
Eurasian Teal	*Anas crecca*
Eurasian Wigeon	*Anas penelope*
Tufted Duck	*Aythya fuligula*
Common Snipe	*Gallinago gallinago*
Eurasian Woodcock	*Scolopax rusticola*
Eurasian Curlew	*Numenius arquata*
Northern Lapwing	*Vanellus vanellus*
Barn Swallow	*Hirundo rustica*
Common Starling	*Sturnus vulgaris*
House Martin	*Delichon urbicum*
House Sparrow	*Passer domesticus*
Lesser Black-backed Gull	*Larus fuscus*
Mute Swan	*Cygnus olor*
Sky Lark	*Alauda arvensis*
Yellowhammer	*Emberiza citrinella*

The proposed site lies in close proximity to the Yellow River windfarm project where numerous bird surveys have previously been carried out. The Kilmurray's sand and gravel quarry (lying 1.4km from the subject site) is a component of this windfarm and contains a breeding population of Lapwing as well as numerous wintering birds including Golden Plover and Whooper Swans.

6.3.5.5.1 Field Survey

During Vantage point surveys, species of interest noted using the site included Golden Plover, Lapwing, Snipe and Woodcock. Buzzard, Golden Plover and Kestrel were seen most frequently making use of the site, with moderately sized flocks of Meadow Pipit, Mallard and Redwing also present. A large flock of Golden Plover observed far to the South of the Site numbering ~375 individuals were noted, and the largest recorded flock was 262 individuals strong.

Three vantage point surveys were conducted each month between September 2024 and March 2025. The presence of the Target species and their flightlines were recorded. Table 6.4 provides a summary of species of interest including number of times the species was

observed and if the species interacted with the site (perched within, hunting or roosting compared to flying over).

Table 6.4 Summary of Vantage Points 'Species of Interest' Results

Species	No of Obs.	Max Obs.	Recorded within site	Interacting with Site	BoCCI4	Season for BOCCI4 designation
Black-headed Gull	2	2	In	No	Amber	Breeding/Wintering
Buzzard	63	7	In	Yes	Green	-
Golden Plover	42	375	In	Yes	Red	Breeding/Wintering
Great Cormorant	2	1	In	No	Green	-
Hen Harrier	1	1	In	Yes	Amber	Breeding
Herring Gull	1	1	In	No	Green	-
Kestrel	21	92	In	Yes	Red	Breeding
Lapwing	2	3	In	Yes	Green	-
Lesser Black-backed Gull	1	5	In	No	Amber	Breeding/Wintering
Meadow Pipit	3	22	Out	Yes	Red	Breeding
Peregrine Falcon	1	1	Out	Yes	Green	-
Raven	1	2	In	Yes	Green	-
Redwing	2	35	In	Yes	Red	Wintering
Sky Lark	1	1	In	Yes	Green	-
Snipe	4	2	In	Yes	Red	Breeding/Wintering
Sparrowhawk	3	1	In	Yes	Green	-
Whooper Swan	7	10	In	No	Amber	Breeding/Wintering
Wigeon	1	4	In	No	Amber	Breeding/Wintering
Woodcock	1	2	In	Yes	Red	Breeding
Yellowhammer	29	3	In	Yes	Red	Breeding

Table 6.5 Summary of Vantage Point Non-Target Results

Species	No of Obs.	Max Obs.	BoCCI4	Season for BOCCI4 designation
Blackbird	16	6	Green	-
Barn Swallow	3	10	Amber	Breeding
Blackbird	3	1	Green	-
Blue Tit	12	4	Green	-
Bullfinch	1	4	Green	-
Chaffinch	16	10	Green	-
Coal Tit	1	1	Green	-
Collared Dove	2	6	Green	-
Dunnock	14	2	Green	-
Fieldfare	9	150	Green	-
Goldcrest	2	2	Amber	Breeding
Goldfinch	6	25	Green	-
Great Tit	6	2	Green	-
Greenfinch	4	30	Amber	Breeding

Species	No of Obs.	Max Obs.	BoCCI4	Season for BOCCI4 designation
Grey Heron	1	1	Green	-
Hooded Crow	20	40	Green	-
House Martin	1	6	Amber	Breeding
House Sparrow	2	7	Amber	Breeding
Jackdaw	13	80	Green	-
Jay	5	3	Green	-
Lesser Redpoll	2	5	Green	-
Linnet	4	4	Amber	Breeding
Long-tailed Tit	5	9	Green	-
Magpie	3	2	Green	-
Meadow Pipit	12	10	Red	Breeding
Mistle Thrush	4	7	Green	-
Pheasant	1	1	Green	-
Pied Wagtail	13	4	Green	-
Raven	4	3	Green	-
Redwing	6	50	Red	Wintering
Reed Bunting	2	18	Green	-
Robin	24	20	Green	-
Rook	18	100	Green	-
Sky Lark	3	2	Green	-
Song Thrush	9	3	Green	-
Starling	21	500	Amber	Breeding
Stonechat	5	2	Green	-
Tree Sparrow	1	4	Amber	Breeding
Winter Wren	16	8	Green	-
Wood Pigeon	26	150	Green	-
Yellow Wagtail	1	2	Green	-

6.3.5.5.2 Winter Season Surveys

To determine which species are breeding within the site, combined surveys were conducted, including preliminary barn owl assessment, a nighttime thermal survey and several breeding walkover surveys (O' Brien and Smith). Summaries are provided below with full results in Appendix 6.2.

Three wintering transect surveys were conducted in December and two in January; these surveys are of benefit to discover species not obvious during VP surveys. Table 6.6 below provides a summary of birds found during these transect surveys, including the number of times the species was observed and the largest flock observed at once. All Transect Points were recorded within the site outline.

Table 6.6 Summary of Vantage 'Species of interest' Results

Species	No. of observations	Max no. observed	BoCCI4	Season for BOCCI4 designation
Buzzard	16	2	Green	N/A
Golden Plover	5	262	Red	Breeding/Wintering
Little Grebe	1	1	Green	N/A

Species	No. of observations	Max no. observed	BoCCI4	Season for BOCCI4 designation
Meadow Pipit	29	16	Red	Breeding
Mute Swan	3	2	Amber	Breeding/Wintering
Northern Pintail	1	2	Green	N/A
Redwing	8	22	Red	Wintering
Snipe	14	42	Red	Breeding/Wintering
Yellowhammer	33	8	Red	Breeding

Table 6.7 Summary of Vantage Non-Target Transect Results

Species	No. of observations	Max no. observed	BoCCI4	Season for BOCCI4 designation
Blackbird	142	5	Green	N/A
Blue Tit	21	2	Green	N/A
Bullfinch	3	2	Green	N/A
Chaffinch	80	9	Green	N/A
Dunnock	30	5	Green	N/A
Fieldfare	17	100	Green	N/A
Goldfinch	3	3	Green	N/A
Great Tit	7	6	Green	N/A
Hooded Crow	3	1	Green	N/A
Jackdaw	10	4	Green	N/A
Jay	17	18	Green	N/A
Lesser Redpoll	3	2	Green	N/A
Long-tailed Tit	1	2	Green	N/A
Magpie	1	1	Green	N/A
Mistle Thrush	5	7	Green	N/A
Pheasant	5	3	Green	N/A
Pied Wagtail	25	7	Green	N/A
Robin	3	4	Green	N/A
Rook	18	3	Green	N/A
Sky Lark	2	3	Green	N/A
Starling	51	2	Amber	Breeding
Stonechat	14	71	Green	N/A
Tree Sparrow	3	1	Amber	Breeding
Winter Wren	1	4	Green	N/A
Wood Pigeon	1	1	Green	N/A

6.3.5.5.3 Breeding Season Surveys

To determine which species are breeding within the site, combined surveys were conducted, including preliminary barn owl assessment, a nighttime thermal survey and several breeding walkover surveys (O' Brien and Smith).

Table 6.8 Summary of Breeding Season Species of Interest Results

Species	No. of observations	Max no. observed	BoCCI4	Season for BOCCI4 designation	Confirmed Breeding?
Barn owl	1	2	Red	Breeding	Yes
Buzzard	8	1	Green	N/A	No
Goldcrest	11	1	Amber	Breeding	No
Golden Plover	1	1	Red	Breeding/Wintering	No
Great Black-backed Gull	1	1	Green	N/A	No
House Martin	5	6	Amber	Breeding	No
Little Grebe	2	3	Green	N/A	No
Mallard	1	2	Amber	Breeding/Wintering	No
Meadow Pipit	65	11	Red	Breeding	Yes
Mute Swan	2	2	Amber	Breeding/Wintering	No
Northern Lapwing	2	1	Green	N/A	No
Snipe	1	1	Red	Breeding/Wintering	No
Teal	2	2	Amber	Breeding/Wintering	No
Willow Warbler	16	1	Amber	Breeding	No
Yellowhammer	64	3	Red	Breeding	No

Table 6.9 Summary of Breeding Season Non-Target Results

Species	No. of observations	Max no. observed	BoCCI4	Season for BOCCI4 designation	Confirmed Breeding?
Blackbird	218	4	0	0	Yes
Blackcap	87	2	0	0	No
Blue Tit	30	2	0	0	No
Bullfinch	1	1	0	0	No
Chaffinch	248	3	0	0	Yes
Chiffchaff	15	1	0	0	No
Dunnock	43	2	0	0	Yes
Goldfinch	34	8	0	0	No
Great Tit	15	2	0	0	Yes
Greenfinch	10	2	Amber	Breeding	No
Hooded Crow	3	2	0	0	No
Jackdaw	11	7	0	0	No
Linnet	33	7	Amber	Breeding	Yes
Long-tailed Tit	3	2	0	0	No
Magpie	3	2	0	0	Yes
Mistle Thrush	17	2	0	0	No
Moorhen	1	1	0	0	No
Pheasant	2	1	0	0	No
Pied Wagtail	8	2	0	0	No
Raven	11	4	0	0	No
Reed Bunting	2	1	0	0	No
Robin	128	2	0	0	Yes

Species	No. of observations	Max no. observed	BoCCI4	Season for BOCCI4 designation	Confirmed Breeding?
Rook	5	6	0	0	No
Sky Lark	20	2	0	0	No
Song Thrush	56	2	0	0	
Starling	28	12	Amber	Breeding	Yes
Tree Sparrow	25	4	Amber	Breeding	Yes
Winter Wren	205	1	0	0	No
Wood Pigeon	42	7	0	0	No

6.3.5.5.4 Nighttime Thermal Surveys

Thermal Surveys were conducted in order to assess the use of the site by wintering wader species, particularly Golden Plover. Most commonly found species during these surveys was snipe, with 39 Observations of Snipe during nighttime surveys, mostly in Section 4 of the site to the North.

Table 6.10 Summary of Thermal Survey Results

Species	No. of observations	Max no. observed	BoCCI4	Season for BOCCI4 designation
Golden Plover	3	2	Red	Breeding/Wintering
Meadow Pipit	1	5	Red	Breeding
Snipe	39	16	Red	Breeding/Wintering
Song Thrush	1	3	Green	N/A
Woodcock	3	2	Red	Breeding

6.3.5.5.5 Hinterland Surveys

Hinterland surveys were conducted monthly, in order to examine the connectivity of the subject site to the surrounding lands. Areas of high ornithological value were established through a desktop study followed by ground truthing. February's hinterland survey consisted of the assessment of Golden Plover Habitat with a 5km area based on the results of this desktop study. Surveys were conducted in lands thought to have high potential for species of interest, Golden Plover, Whooper Swan, Snipe and Woodcock. During the surveys, Golden Plover, Whooper Swan, Curlew, Northern Lapwing and Tufted Duck were found to be using lands to the south of the site.

The majority of Hinterland activity surrounding the site was located in the wetlands to the south of site, where multiple water bird species were observed interacting with these lands, including Tufted Duck, Mallard, Whooper Swan and Mute Swan.

Lapwing were discovered adjacent to these lands, with observations of birds using the quarry lake, located just to the Southwest of the site. Territorial Behaviour was indicative

of a breeding pair of Lapwing. Larger flocks of Lapwing were observed further South of the quarry, reaching a maximum size of 235 individuals.

An Area to the East of Section 1, the westernmost section of the site, is labelled as "Construction Area" in Figure 6.5, this is the location of the construction works being conducted ancillary to the construction of the main substation for this site and is no longer suitable habitat for species of interest in this site and was disregarded in the transect surveys conducted.

Please refer to Appendix 6.2 for Bird Survey Report.

6.3.6 HABITAT EVALUATION

The ecological value of the site was assessed following the guidelines set out in the Institute of Ecology and Environmental Management's Guidelines for Ecological Impact Assessment (2019) and according to the Natura Scheme for evaluating ecological sites (after Nairn & Fossitt, 2004). Additionally, the TII Guidelines (formerly NRA) for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009) outlines the methodology for evaluating ecological impacts Judgements on the evaluation were made using geographic frames of reference, e.g. European, National, Regional or Local, see Table 6.11 below.

Due cognisance of features of the landscape which are of major importance for wild flora and fauna, such as those with a *"stepping stone"* and ecological corridors function, as referenced in Article 10 of the Habitats Directive were considered in this assessment.

Table 6.11 Details of TII Guidelines (formerly NRA) for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009)

Ecological valuation: Examples

International Importance:

- 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.
- Proposed Special Protection Area (pSPA).
- Site that fulfills the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended).
- Features essential to maintaining the coherence of the Natura 2000 Network.[4]
- Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive.
- Resident or regularly occurring populations (assessed to be important at the national level)[5] of the following:
  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or
  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.
- Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).
- World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972).
- Biosphere Reserve (UNESCO Man & The Biosphere Programme).
- Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).
- Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).
- Biogenetic Reserve under the Council of Europe.
- European Diploma Site under the Council of Europe.
- Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).[6]

National Importance:

- Site designated or proposed as a Natural Heritage Area (NHA).
- Statutory Nature Reserve.
- Refuge for Fauna and Flora protected under the Wildlife Acts.
- National Park.
- Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park.
- Resident or regularly occurring populations (assessed to be important at the national level)[7] of the following:
  - Species protected under the Wildlife Acts; and/or
  - Species listed on the relevant Red Data list.
- Site containing 'viable areas'[8] of the habitat types listed in Annex I of the Habitats Directive.

County Importance:

- Area of Special Amenity.[9]
- Area subject to a Tree Preservation Order.
- Area of High Amenity, or equivalent, designated under the County Development Plan.
- Resident or regularly occurring populations (assessed to be important at the County level)[10] of the following:
  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
  - Species protected under the Wildlife Acts; and/or
  - Species listed on the relevant Red Data list.
- Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.
- County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP,[11] if this has been prepared.
- Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.
- Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Local Importance (higher value):

- Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;
- Resident or regularly occurring populations (assessed to be important at the Local level)[12] of the following:
  - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
  - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
  - Species protected under the Wildlife Acts; and/or
  - Species listed on the relevant Red Data list.
- Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;
- Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.

Local Importance (lower value):

- Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;
- Sites or features containing non-native species that are of some importance in maintaining habitat links.

There will be earth movement and construction work associated with the Data Centre aspect of the Proposed Development. However, these works will be confined to the central western portion of the site where surface water goes to ground.

There will be earth movement during site preparation for the Solar Panels, however, there will be no discharge of silt laden or contaminated surface water to the Kiltotan Stream or Castlejordan River downstream.

There are only two main crossings (Bridge 1 and 2) and these are clear span, with no interaction with the water course below, i.e. the Kiltotan-Collinstown stream.

Other proposed crossings of minor field drains will be served by placement of short sections of round precast concrete culvert with minimal intervention in the field drain.

The possibility of contaminated surface water reaching the River Boyne is extremely low given the design of the solar panels to be set back from all water courses, the very large distance downstream over 30 river km and the high degree of dilution in that distance.

To this end, the River Boyne and two associated European sites are considered to be outside the Zone of Influence of the Proposed Development.

Additionally, the proposed development design includes SuDS features to attenuate surface water. Thus, the potential for downstream impacts is considered highly unlikely.

Given the above analysis, it is considered that there will be no potential for significant effects on any European sites considered and therefore potential effects on European sites can be excluded at the screening stage.

The open field habitats are considered of low biodiversity value at a local level as are the internal hedgerows.

There are no rare or protected habitats recorded in the study areas. Overall, the proposed development areas are of Low Local Ecological Value with Treelines of higher local value.

6.4 POTENTIAL EFFECTS ON BIODIVERSITY

6.4.1 POTENTIAL DIRECT EFFECTS

6.4.1.1 Terrestrial Habitats

The open field habitats are considered of low biodiversity value at a local level as are the internal hedgerows. The central dividing Hawthorn hedgerow is maintained at a very low height and there would be a loss of c. 250m of this hedgerow which is not significant.

There are no rare or protected habitats recorded in the study areas. Overall, the proposed development area is of Low Local Ecological Value with outgrown Hedgerows and Treelines being of High Local Ecological Value.

6.4.1.2 Aquatic Habitats

Water courses were assessed for fisheries value in terms of potential foraging and food sources for otters. Fisheries value determination is based on a broad appraisal/overview of the upstream and downstream habitat at each site. This was undertaken to evaluate the wider contribution to salmonid and lamprey spawning and general fisheries habitat. River habitat surveys and fisheries assessments were also carried out utilising elements of the approaches in the River Habitat Survey Methodology (Environment Agency, 2003[44]) and Fishery Assessment Methodology (O'Grady, 2006[45]) to broadly characterise the stream sites (*i.e.* channel profiles, substrata *etc*.).

[44] Environment Agency (2003) River Habitat Survey in Britain and Ireland. Field Survey Guidance Manual: 2003 Version (2022 Reprint).
[45] O'Grady, M.F. (2006). Channels and challenges: enhancing Salmonid rivers. Irish Fresh- water Fisheries Ecology and Management Series: Number 4. Central Fisheries Board, Dublin.

The Castlejordan Stream is a relatively small water course, more of a farmland stream rather than a river. It has a mud/clay substrate for much of its course and its banks are heavily vegetated in sections with adjacent Hawthorn and Bramble. It has no fisheries value and limited value for otter usage. It joins the Rochfortbridge Stream downstream and east of Rochfortbridge and flows on to the Yellow River flowing through large areas of former Bord na Mona peatland and on to the River Boyne not reaching the River Boyne European sites until east of the Royal Canal over 30km downstream.

The most recent EPA water quality data (2024) for the Castlejordan Stream are recorded upstream of that section of the solar far at Mongagh Bridge to the west as Q3 'Poor' and similarly downstream of Rochfortbridge again as Poor. This status indicates 'Slight pollution' and is 'Unsatisfactory'. The Q value increases marginally to Q3-4 'Moderate' downstream of the peatland areas at Baltinoran Bridge, most likely due to dilution factors. This status indicates 'Moderate pollution' and is 'Unsatisfactory'.

The Kiltonan stream is largely channelised in the portion of the site where the solar farm is proposed and has a mud/peaty substrate. It has no fisheries value and no value for otter usage. The Kiltonan Stream is not monitored by the EPA. It joins the Castlejordan and the above record at Baltinoran Bridge is the nearest and most recent indication of water quality.

The drainage ditches recorded have a predominantly mud/clay substrate. They have no fisheries value and no value for otter usage.

There are only two main crossings proposed (Bridge 1 and 2) and these are clear span, with no interaction with the water course below, i.e. the Kiltotan stream.

Other proposed crossings of minor field drains will be served by placement of short sections of round precast concrete culvert with minimal intervention in the field drain.

There is a very tentative pathway from the Solar Farm aspect of the Proposed Development via the Castlejordan and Yellow River which flows northeast to the River Boyne albeit at a very large distance downstream, over 30 river km.

The main lamprey populations in the River Boyne are currently protected within the existing SAC boundary area[46].

[46] O'Connor W. (2006) A survey of juvenile lamprey populations in the Boyne Catchment. Irish Wildlife Manuals, No. 24 National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Salmon spawn in clean gravels. There is restricted habitat for salmon in the Boyne and the water courses located adjacent to the Proposed Development do not support spawning habitat.

6.4.1.3 Otters

The water courses located adjacent to the Proposed Development do not support suitable foraging habitat for Otters.

There will be no direct or indirect impact on otters.

6.4.1.4 Badgers

There will be no direct or indirect impact on badgers.

6.4.1.5 Non-Volant Mammals

There will be no direct or indirect impact on mammals such as deer, pine marten, hares or foxes.

6.4.1.6 Birds

Potential direct effects on breeding birds through loss of internal hedgerow can be avoided by appropriate timing.

Potential direct effects on Birds are considered in terms of (a) Displacement and barrier effect and (b) Direct Habitat Loss.

The majority of impact determinations for bird species recorded were low or very low with the exception two species outlined in Table 6.12 below.

Table 6.12 Impacts on bird species of interest

Species	Potential Impacts		Duration and Magnitude of potential impact	Frequency and reversibility	Magnitude and Significance of effect
Barn Owl	Direct Habitat Loss	Barn owl were found to roost within the site. Barn owl are not strongly territorial, with home ranges regularly overlapping. Barn owl nest sites have been recorded less than 350m apart. See mitigation section below for further details. Few studies have been conducted on the impacts of solar arrays on barn owls. The Barn owl trust UK state; Ground mounted solar arrays "*present a negligible collision risk and do not electrocute, dazzle or burn Barn Owls. In fact, solar PV 'farms' have the potential to be of great benefit to Barn Owls as the array frameworks are typically at a height from which Barn Owls can perch-hunt*." (Trust, 2025).	Permanent, neutral	Occurs once, irreversible	The magnitude of the impact is assessed as Very Low. moderate sensitivity species + Negligible Impact = Very Low effect significance. No likely significant effects at a local level are predicted
	Displacement and barrier effect	A breeding site was found during nighttime surveys. (Goodship, 2022) states Barn owl have a low sensitivity to disturbance and suggests a 50 to 100m buffer zone during the breeding season. (Shawyer, 2011) suggests a disturbance risk of 175m for heavy construction works . The breeding site lies within the site boundary thus disturbance from the development may impact this species. With the creation of breeding season buffer disturbance impacts can be avoided - see mitigation	Temporary and of negligible magnitude and will not result in long-term adverse effects.	Occurs during construction phase	The magnitude of the impact is assessed as Very Low. Moderate sensitivity species + Negligible Impact = Very Low effect significance. No likely significant effects at a local level are predicted
Buzzard	Direct Habitat Loss	The development footprint is dominated by improved grassland and tillage with associated hedgerows and treelines, providing suitable breeding and foraging habitat for the species. While breeding surveys did not confirm breeding, it is likely this species will breed within the site at some stage. Due to mitigation by design the majority of treelines and hedgerows will be retained thus no net loss of breeding habitat is anticipated. The placement of solar panels on grassland will result in a change of land use of hunting habitat for the species. Given passerines are likely to remain unaffected by the presence of solar panels no net loss of prey species is anticipated.	Permanent, slight negative	Occurs once, irreversible	The magnitude of impact is assessed as Low. Low sensitivity species + Low Impact = Very Low effect significance. No likely significant effects at a local level are predicted

Species	Potential Impacts		Duration and Magnitude of potential impact	Frequency and reversibility	Magnitude and Significance of effect
	Displacement and barrier effect	There is the potential of disturbance to breeding Buzzard through construction phase solar panel arrays, or because the construction activities will disturb the birds and displace them from the area. Foraging and commuting birds may temporarily avoid construction areas owing to the noise and increased activity. Construction of solar farms does not require heavy construction activities with solar stands bored into soil. Based on continued bird surveys through the construction phase it is proposed to identify breeding sites and create a 150m buffer surrounding the zone (Goodship, 2022). Construction will be avoided here until fledging has occurred.	Temporary and of low magnitude and will not result in long-term adverse effects.	Occurs during construction phase	The magnitude of impact is assessed as Low. Low sensitivity species + Low Impact = Very Low effect significance. No likely significant effects at a local level are predicted
Golden Plover	Direct Habitat Loss	30 sightings from within site (max of 262 birds interacting with site); Higher numbers observed in the surrounds. Within the overall site section 1 had most sightings. This species favours stubble and grassland with a very short sward. In total it is predicted that 35.34 Ha of Habitat will be lost during the implementation of the current proposed development. This Corresponds to a habitat reduction of 1.5% within the 5km surrounding area of the site. Overall, the site was used by smaller flock numbers in comparison to those found in the hinterland, although hinterland figures are not of national importance.	Permanent and of high magnitude and will result in long-term effect.	Occurs once, long term	The magnitude of the impact is assessed as low. High sensitivity species + low Impact = low effect significance. The low number of Golden plover using section 2 are likely to be effected however there is more favourable habitats in the area.
	Displacement and barrier effect	The IECS Toolkit26 **Invalid source specified.** suggests that golden plover is of moderate sensitivity to disturbance. There is the potential of disturbance to wintering Golden Plover located onsite through construction phase activities. Golden Plover showed the highest level of activity in the Western portion of the site. Based on wintering surveys, tillage in this section will be retained to ensure access to suitable habitat for this species. Construction activity in this zone will be limited to time when the species is not present.	Temporary and of low to negligible magnitude and will not result in long-term adverse effects.	Occurs during construction phase	The magnitude of impact is assessed as Low. High sensitivity species + Low Impact = Low effect significance. No likely significant effects at a local level are predicted

Species	Potential Impacts		Duration and Magnitude of potential impact	Frequency and reversibility	Magnitude and Significance of effect
Kestrel	Direct Habitat Loss	The development footprint is dominated by improved grassland and tillage with associated hedgerows and treelines, providing suitable foraging habitat for the species. 21 observations of Kestrel were noted during surveys, 14 of which were determined to be interacting with the site. Kestrel can nest in a variety of substrates such as rock ledges, old corvid stick nests, bird boxes, buildings etc. Due to mitigation by design only minor impacts will occur on treelines and hedgerows thus no net loss of breeding habitat is anticipated. The placement of solar panels on grassland will result in a change of land use of hunting habitat for the species. Given passerines are likely to remain unaffected by the presence of solar panels no net loss of prey species is anticipated. No evidence of breeding kestrel was found.	Permanent, slight negative	Occurs once, irreversible	The magnitude of impact is assessed as Low. Medium sensitivity species + Low Impact = Low effect significance. No likely significant effects at a local level are predicted
	Displacement and barrier effect	There is the potential of disturbance to breeding Kestrel through construction phase solar panel arrays, or because the construction activities will disturb the birds and displace them from the area. Foraging and commuting birds may temporarily avoid construction areas owing to the noise and increased activity. Construction of solar farms does not require heavy construction activities with solar stands bored into soil. Construction phase breeding bird surveys will identify if breeding kestrel and create a 200m buffer (NatureScot 2022) where construction will be delayed until after fledging.	Temporary and of low magnitude and will not result in long-term adverse effects.	Occurs during construction phase	The magnitude of impact is assessed as Low. Medium sensitivity species + Low Impact = Low effect significance. No likely significant effects at a local level are predicted
Meadow Pipit	Direct Habitat Loss	The development footprint is dominated by improved grass and tillage, which provides some suitable nesting, roosting and foraging habitat for the species. Meadow pipit was observed 3 times during VP's, interacting with the site only twice. This species was noted in much higher numbers during breeding bird surveys and was observed 66 times (A single confirmed breeding onsite and 58 contacts with Possible or Probable Breeding). The majority of the site will still be used as grassland post construction thus this species ability to occupy the site will remain.	Permanent and of medium magnitude	Occurs once, irreversible	The magnitude of the impact is assessed as Low. Medium sensitivity species + Low to medium Impact = Low effect significance. No likely significant effects at a local level are predicted

Species	Potential Impacts		Duration and Magnitude of potential impact	Frequency and reversibility	Magnitude and Significance of effect
	Displacement and barrier effect	There is the potential of disturbance to breeding meadow Pipit because the construction activities will disturb birds and displace them from the area. Based on continued bird surveys through the construction phase it is proposed to identify breeding sites and create a 50m buffer surrounding the zone (50m buffer is based on IECS Toolkit26). Works will avoid key breeding periods with works continuing after fledging.	Temporary and of negligible magnitude and will not result in long-term adverse effects.	Occurs during construction phase	The magnitude of the impact is assessed as Very Low. Medium sensitivity species + Negligible Impact = Very Low effect significance. No likely significant effects at a local level are predicted
Snipe	Direct Habitat Loss	The development footprint is dominated by improved grassland, which provides some suitable nesting, roosting and foraging habitat for the species particularly close to patches of wet grassland in section 4. Dedicated breeding wader surveys show the site was not used as a breeding site for this species. Post construction, the hydrological regime of the site will remain the same thus little long-term impacts are expected.	Long term slight Negative	Occurs once, irreversible	The magnitude of the impact is assessed as Very Low. Medium sensitivity species + Negliable Impact = Very Low effect significance. No likely significant effects at a local level are predicted
	Displacement and barrier effect	Some displacement may occur. Pierce-Higgins et al (2012) note that snipe densities declined to the order of ca. 50% within 500 metres of turbines at wind farms during construction. Construction activities will be limited to the development footprint so direct disturbance effects will not extend beyond the works areas. There is potential for indirect disturbance to roosting (and potentially breeding) snipe from noise and visual stimuli associated with construction activities. Construction phase breeding surveys will re-survey lands and should breeding snipe be found a disturbance zone of 400m (BES, 2020) will be put in place until fledging has occurred.	Temporary and of low to negligible magnitude and will not result in long-term adverse effects.	Occurs during construction phase	The magnitude of impact is assessed as Medium. Medium sensitivity species + Low Impact = Low effect significance. No likely significant effects at a local level are predicted

Species	Potential Impacts		Duration and Magnitude of potential impact	Frequency and reversibility	Magnitude and Significance of effect
Yellowhammer	Direct Habitat Loss	The development footprint in section 1 is dominated by tillage with associated treelines and hedgerows, which provides some suitable nesting, roosting and foraging habitat for the species. The proposed development will maintain existing hedges and trees thus no loss of nesting habitat will occur for this species. The proposal will result in a large reduction of tillage created within the site as grassland will replace tillage underneath solar panels. Given the potential impacts of habitat loss, a mitigation strategy has been put in place to create significant areas of bird crop cover (11.16Ha) within sections 1 and 2. This crop will not be harvested so all grain will remain available for passerines. These areas will be resown every year for the lifespan of the development thus ensuring a food source within the site. The addition of bird crop cover in section 2 will allow for the expansion of Yellowhammers range into these fields. Monitoring of Yellowhammer numbers will continue for three years post construction. The monitoring program will identify if impacts are low or medium within the site. Should numbers of breeding Yellowhammer fall post construction other strategies will be employed to aid Yellowhammer in the locality. One such measure being the long term leasing of improved grassland adjacent to the site and converting to tillage.	Permanent and of medium magnitude	Occurs once, irreversible	The magnitude of the impact is assessed as Medium. Medium sensitivity species + high to medium Impact = medium to Low effect significance within the site. Low effect for Yellowhammer within the locality.
	Displacement and barrier effect	There is the potential of disturbance to breeding Yellowhammer because the construction activities will disturb birds and displace them from the area. Based on continued bird surveys through the construction phase it is proposed to identify breeding sites and create a 50m buffer surrounding the zone. Works will avoid key breeding periods with works continuing after fledging.	Temporary and of negligible magnitude and will not result in long-term adverse effects.	Occurs during construction phase	The magnitude of the impact is assessed as Very Low. Medium sensitivity species + Negligible Impact = Very Low effect significance. No likely significant effects at a local level are predicted

6.4.2 POTENTIAL INDIRECT EFFECTS

There are only two main crossings (Bridge 1 and 2) and these are clear span, with no interaction with the water course below, i.e. the Kiltotan Stream.

Other proposed crossings of minor field drains will be served by placement of short sections of round precast concrete culvert with minimal intervention in the field drain.

The possibility of contaminated surface water reaching the River Boyne is extremely low given the design of the solar panels to be set back from all water courses, the very large distance downstream over 30 river km and the high degree of dilution in that distance.

To this end, the River Boyne and two associated European sites are considered to be outside the Zone of Influence of the Proposed Development.

Solar farms can be mistaken as water by birds and aquatic species, and this issue has been addressed by appropriate design. Insects that lay eggs on water, (e.g. mayflies, stoneflies) may mistake solar panels for water bodies, due to reflection of polarised light . Under certain circumstances, insects have been found to lay eggs on their surfaces, reducing their reproductive success and food availability for birds, fish and other aquatic invertebrates. A laboratory study undertaken by Grief & Siemers (2010) showed that that bats attempted to drink from the panels and occasionally collided with them. If plates were vertically aligned, they often crashed into them when attempting to fly through them. There is evidence that this potential effect can be mitigated by a non-polarising white grid, partitioning on solar panels to reduce or eliminate their reflection of polarised light . Thus, this measure has been included as a design feature to avoid potential effects on commuting bats.

RSPB (2014) states 'Solar farms can be mistaken as water by birds and aquatic species, and this issue has been addressed by appropriate design. Insects that lay eggs on water, (e.g. mayflies, stoneflies) may mistake solar panels for water bodies, due to reflection of polarised light'. It should be noted they also state they are in favour of solar given the impacts climate change is having on bird life.

There are only three Special Conservation Interest Annexed Bird species listed for European sites in the zone of influence. Given, there are no supporting habitats for two of (Pochard and Tufted Duck) and limited supporting habitats for Coot at the Proposed Development site and the above listed design features, there are no predicted negative effects on these birds.

Guidance on lighting has been based on the Bats & Lighting document; (BCI , 20 the Bats and artificial lighting in the UK Guidance Note 08/18 (BC T, 2018) and Guidelines for consideration of bats in lighting projects. EUROBATS Publication Series No. 8 (Voigt, 2018). Lighting can alter the behaviour of bats and the insects they prey on.

6.5 MITIGATION MEASURES

6.5.1 MITIGATION MEASURES FOR BIRDS

Potential impacts on birds will be avoided by cutting of vegetation outside the bird nesting season March 1st to August 31st. If this cannot be enforced, then the site will be surveyed for the presence of nesting birds and/or nests prior to cutting and if none are recorded the vegetation may be removed within 48 hours.

The following measures are taken from the Bird Report:

- An Ornithologist ECoW will be employed during the construction phase to micromanage construction locations to avoid disturbance on key species.
- Whilst halting the construction to times outside the wintering period was considered the scale of works was not considered impactful enough to negatively impact wintering birds both within the site and in the surrounds. Rather an ECoW will be involved in the construction and limit construction in areas based on when they are of value to birds. The monitoring section above outlines how bird surveys will continue during the construction phase and based on these results micro exclusion zones can be put in place. Table 4-3 goes through potential buffer zones and timings when works may need to be halted here. This method based on co-operation between overseeing ornithologist, site manager and NPWS / Local Authority representative will allow works to continue throughout the year whilst also avoiding disturbances to key species at vulnerable times.
- Minimum 5m buffer for drain ditches, hedgerows and tree lines.
- The proposed development aims to retain as much tree lines and hedgerows as possible. In order to allow access, there will be 4.5m of guaranteed internal hedgerow loss within the red line boundary. Mature hedgerow will be maintained onsite and hedgerow will be plan ted in proportion to the Hedgerow removed during the construction phase of the project
- The proposed development will result in significant loss of tillage. This tillage was not utilised by breeding waders. Wintering snipe and Possible Breeding Snipe utilised grassland and wet grassland thus should not be impacted in this respect. The only species significantly impacted from this transformation will be Yellowhammer. As mitigation for the loss of feeding habitat for yellowhammer

several areas totaling 11.16Ha have been designated for wild bird cover planting. A section of land in section 1 and a plot of land in section 3 will be maintained for these crops. While the overall loss of tillage is greater, these wild bird cover areas benefit from not being harvested thus are of significantly higher benefit to passerines. The addition of grains to section 2 will allow for the expansion of Yellowhammer's range into this area.

The bird crop planted areas (see figure 6.11 below) will follow the below regime;

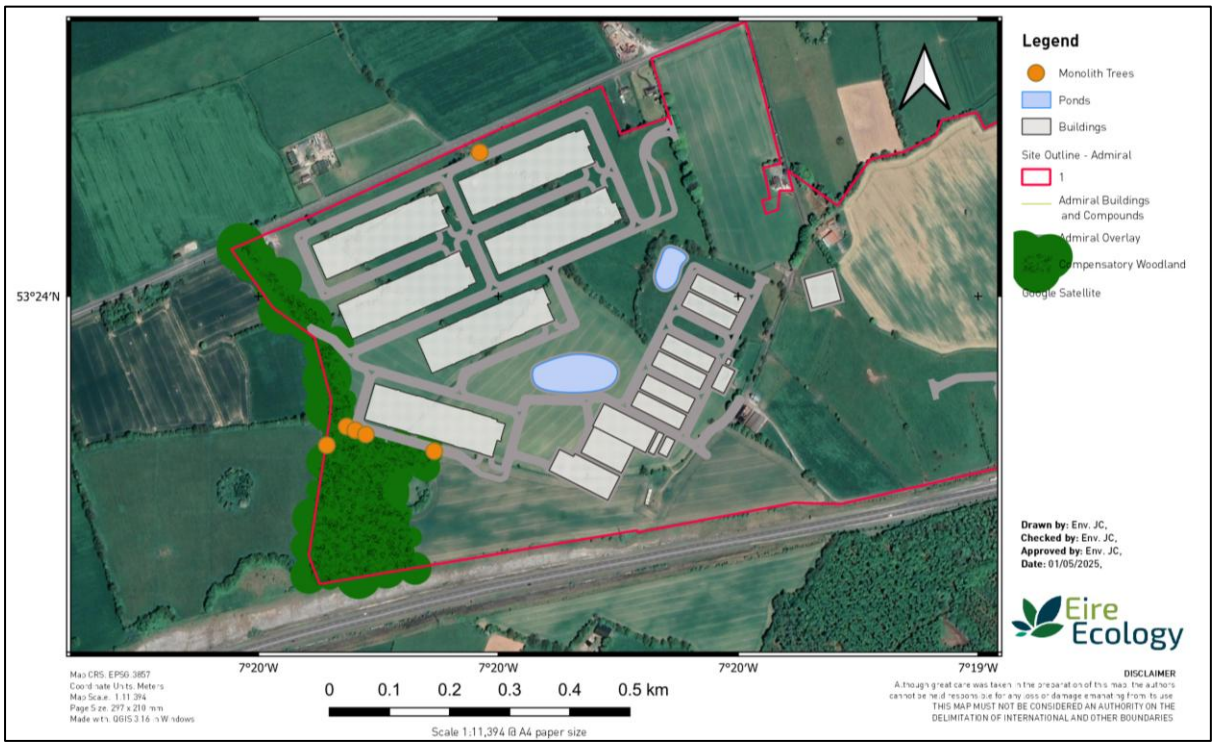
- Yellowhammer require large cereal grains thus wild bird cover will consist primarily of oats, barley (65%) and a smaller portion of linseed (10%) and cornflower annuals (10%) (mayweed, cornflower, corncockle). The remaining 2Ha (15%) should be a native Irish provenance annual wildflower (15% or 2Ha). Heritage grains are recommended.
- These margins and designated areas will be planted each year by the 31st of May.
- No pesticides will be used.
- Crops will not be harvested
- Before replanting, livestock can clear areas from the 15th until the 30th of March. Livestock should not enter these areas at any other time of year.
- The wildflower component should be 25 to 50cm of width along field margins sown with perennial wildflower (this area is not to be plowed as they plants persist once sown correctly). This mix should correspond to Design By Nature's WF03 seed mix (https://www.wildflowers.ie/mixes/wf/wf03.htm)
- A Yellowhammer monitoring program will be implemented for years 1 to 3 post construction. If a significant decline of breeding Yellowhammer is found additional measures will be implemented to prevent a decline in population. One such measure is to rent out lands adjacent to Section 1 and plant this area with tillage, transformed from improved grassland.
- A construction exclusion zone of 100 m will be implemented where breeding barn owl where observed nesting. Construction should not occur during breeding season at this location.

6.5.2 MITIGATION MEASURES FOR BATS

In order to minimise the extent of light spill onto perimeter habitats, all lights that are pole mounted will be directional and/or cowled to ensure that light is directed downward and inwards. Lights will be programmed or otherwise to be off unless required. The following measures are taken from the Bat Report:

- Tree-felling should ideally be undertaken in the period September to late October/early November, however, can also be conducted from late January until the end of February. Outside of these times an EcOW will need to first verify if impacts will occur. All trees recorded as potential roost features (PRF) will require an additional at height survey prior to felling.
- To compensate for the loss of PRF features, veteranisation of remaining trees will create new features suitable for roosting bats. Six trees have been marked to be retained as monolith features to assist in the development of the compensatory woodland. The tree to the north will be retained if possible. This tree is an ash with significant dieback and is at the edge of the proposed road. This tree would have its crown removed and additional PRF cut in. The canopy of these trees will be cut and roost features will be cut into the trunks thus providing PRF features in trees without any. Retaining these veteran trees will expedite the effectiveness of the mitigation measures by providing potential satellite roost locations and maintaining important continuity in the connectivity of treelines onsite.

Figure 6.3 DC facility layout with retained monolith trees



- New woodland will be created which will compensate for the loss of feeding grounds in section 1. See Section 6.5.3 below.
- While a bat roost was not found in building 1, the attic of this building will be converted to make it more suitable for roosting bats. Three bat slates will be installed in the roof. In the attic, baffles will be created and 3 x 1FF Schwegler (or equivalent) bat boxes installed.

- Where lighting is unavoidable during construction, low-intensity lighting and motion sensors will be used to limit illumination. Exterior lighting, during construction, will be designed to minimize light spillage, thus reducing the effect on areas outside the proposed development, and consequently on bats i.e. Lighting will be directed away from mature trees/treelines around the periphery of the site boundary and woodland areas to minimize disturbance to bats. Directional accessories will be used to direct light away from these features, e.g. through the use of light shields (Stone, 2013). The luminaries will be of the type that prevent upward spillage of light and minimize horizontal spillage away from the intended lands.
- The aim of the lighting plan is to create three lighting zones in section 1; a dark zone (not impacted by lights), a low lux zone and a standard lit area. Figure 6.4 shows these areas.

6.5.2.1 Dark zone

- The western boundary of the site (by building 1) showed highest bat activity during surveys. This entrance and the proposed woodland strip will remain unlit. The proposed road here is a secondary emergency road and does not require lighting. The new woodland and ponds will also remain unlit.

6.5.2.2 Low light zone

- This area covers some sections of road where connectivity between the ponds and the woodland is desirable. Along these roads 6m high lights are proposed with a colour of 4000k thus not attractive to invertebrates. These lights will have motion sensors installed so will only operate when required. For much of the night, these areas will remain unlit.

6.5.2.3 Standard areas

- The main buildings are considered standard areas where lighting is required. These areas are not of high value to bats.

Figure 6.4 Lighting Zones



- Some research suggests solar panels are a new source of polarized light pollution and can be attractive to insects, thus also insect feeding bat species. There is evidence that this potential effect can be mitigated by a non-polarising white grid, partitioning on solar panels to reduce or eliminate their reflection of polarised light. As such, all panels will be fitted with a non-polarising white grid partitioning.
- Retention of all hedgerows and treelines in sections 2, 3 4 and 5.

6.5.3 MITIGATION MEASURES FOR BADGERS

Pre-construction checks will be undertaken in accordance with best practice, and appropriate buffers applied should any setts be identified.

Security fencing will include mammal gates or a gap of at least 10cm at the bottom to allow free movement of badgers and other mammals through the site.

6.5.4 MITIGATION MEASURES FOR HABITATS

Compensatory woodland will be planted in Section 1 and 4 to mitigate the loss of linear features onsite during the construction phase. Two areas (CW1 and CW2) are detailed below including a plot located adjacent to the ring fort feature in the western section of the data centre site and an additional strip of woodland along the southern boundary of the motorway is also proposed in order to facilitate woodcock and Snipe in the Southern

section of the site. The total area of proposed compensatory woodland planting is 5.34 ha, as illustrated in Figure 6 2 of the Bat Survey Report.

Figure 6.5 Proposed Compensatory Woodland



6.6 RESIDUAL IMPACTS

Specific local mitigation measures include the avoidance of cutting of vegetation during the bird nesting season with regard to the construction phase. The remaining hedgerow habitat to be conserved in site. There will be a loss of relatively low value local habitats including short sections of low value gappy hedgerow, scrub, grassland and overgrown drainage ditches. The overall effect is considered neutral, imperceptible, in the short term and will gradually increase in terms of biodiversity nett gain in the long term as new habitats establish over time.

No significant indirect impacts on the habitats associated with rare and protected birds found utilising the site in the wintering and breeding seasons as long as best practice measures such as those outlined in Mitigation and Enhancement are implemented fully. As such residual Impacts on bird species will be low.

With the employment of appropriate mitigation measures with regard to local biodiversity, the Proposed Development will have a positive and long term effect on biodiversity.

6.7 CUMULATIVE EFFECTS

Cumulative effects are described by the EPA as the addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects. In combination effects are considered in the appropriate assessment process as an assessment of the potential adverse effects of a plan or project in combination with other plans or projects. The underlying intention of the in-combination provision is to take account of cumulative effects.

A review of the National Planning Application Database was undertaken. The database was then queried for developments granted planning permission within 1000m of the Proposed Development within the last three years, these are presented in Table 6.13 below

Table 6.13 Planning applications granted permission in the vicinity of the Proposed Development.

Planning Ref.	Description of development	Comments
22247	development and construction of a logistics warehouse at the site of the former site compound for the M6 Motorway project, a site of 2.99 Hectares. The development which will consist of the construction of a logistics warehouse (956.20 sqm) with a maximum ridge height of 9.80 m for the supply and distribution of parts for large plant and machinery and two storey office within the building, covered parts storage area, associated trade counter, car parking, external loading and unloading area, and all associated site works and services including the construction of a realigned site entrance, site services and all associated site works above and below ground to accommodate the proposed works including new treatment system and percolation area	No potential for in-combination effects given the Proposed Development will have no significant effects on Biodiversity.
2360032	retention of existing extension to the front and rear to include on ground floor, kitchen, dining, living area, utility, hot press, boiler, bathroom, bedroom with wardrobe and stairs and on the first floor two bedrooms, bathroom, landing and storage area with 4 velux windows and two chimneys with all ancillary site works	No potential for in-combination effects given the Proposed Development will have no significant effects on Biodiversity.
2360151	development which will consist of the restoration and renovation of the existing Glebe House, its courtyard, stables, hayshed, walled garden and ancillary outbuildings and the reinstatement of the original avenue and entrance, landscaping and all associated site works and services	No potential for in-combination effects given the Proposed Development will have no significant effects on Biodiversity.
2360204	installation of flood lighting to our two, new playing pitches (currently under	No potential for in-combination effects given the Proposed Development will

Planning Ref.	Description of development	Comments
	construction). Permission is also sought to extend our exercise/walkway track to the perimeter of our new pitches complete with exercise stations, lighting and all associated site works	have no significant effects on Biodiversity.
2360253	development which will consist of the: demolition of the existing two-storey school building and its extensions including demolition of two-storey Block 2 (c. 1,894.7 sq.m), single-storey Block 3 (c. 760.4 sq.m), two-storey Block 4 (c. 531.0 sq.m), two-storey Block 5 (c. 1,187.4 sq.m), and two-storey Block 6 (c. 440.6 sq.m) within south-eastern corner of site; removal of all temporary classroom accommodation (c. 720.0 sq.m); partial demolition (c. 1,206.4 sq.m) and refurbishment (c. 550.6 sq.m) of two-storey Block 1 at junction of Castlelost Road and Main Street; extension of Block 1 to provide a new sports facility (c. 891.0 sq.m) (single-storey foyer and double height hall); demolition of 1 no. single-storey extension and 2 no. single-storey outbuildings (totalling c. 128.8 sq.m) to rear of the former Convent of Mercy (a protected structure); refurbishment of the one to three-storey former Convent of Mercy (c. 924.7 sq.m) (a protected structure), including construction of a two-storey (c. 33.0 sq.m) extension to the rear to provide a vertical circulation core for universal access to upper floors; refurbishment of the two-storey former Convent of Mercy House (145.2 sq.m), including construction of a single-storey (c. 14.6 sq.m) extension to the rear to provide universal access; construction of a three-storey school building (c. 9,068 sq.m); relocation of grotto; upgrades to the existing vehicular and pedestrian entrance to the site off Castlelost Road and provision of new school gates; provision of a car park containing 90 no. car parking spaces; provision of 100 no. sheltered bicycle spaces; implementation of traffic management measures including a new pedestrian crossing across Castlelost Road; provision of external play and amenity areas; provision of a garden and reflection area adjacent to the Convent Graveyard (a protected structure); provision of site landscaping, boundary treatment and site lighting; provision of a covered work area, bin stores, storage shelters, and associated drainage, attenuation and other site services; and all related site development works	No potential for in-combination effects given the Proposed Development will have no significant effects on Biodiversity.
2360316	construction of a single storey dwelling and a new domestic entrance onto the public roadway. Permission is also sought to	No potential for in-combination effects given the Proposed Development will

Planning Ref.	Description of development	Comments
	connect to the existing foul sewer mains and all associated site works at the above address	have no significant effects on Biodiversity.
2360317	demolition of the bedroom section and chimneys to the existing dwelling house, the derelict stone storage and turf shed buildings including the dog run area and to construct in its place a new single storey pitched roof extension to the front, side and rear with a flat roof link corridor, including internal and external renovations/alterations as shown all to the existing dwelling house, the decommissioning of the existing septic tank which is to be replaced with a new treatment plant and soil polishing filter, new boundary treatments and all ancillary site works and services. Retention permission is also sought for the as built detached lean-to garage/storage with open carport roof structure	No potential for in-combination effects given the Proposed Development will have no significant effects on Biodiversity.
2360442	development which will consist of (i) the construction of a new Administration/Control Building at a new location within the site in lieu of the IPP Building granted under planning Ref. No. 21/515, (ii) the construction of a new Workshop Building at a new location within the site in lieu of the Administration/Workshop Building granted under Planning Ref. No. 21/515, and (iii) associated minor changes to internal roads, civil engineering, drainage, landscaping, lighting, car parking, and site works. The development alterations are with respect to Planning Ref No. 21/515, which is a development that is for the purpose of an activity requiring an Industrial Emissions Licence from the Environmental Protection Agency (EPA)	No potential for in-combination effects given the Proposed Development will have no significant effects on Biodiversity.
2460053	development which will consist of alterations to the development consented under Westmeath Planning Case Ref. 21/515 (parent permission) and are as follows: (i) reconfiguration of structures and pipework within the above ground installation (AGI) compound, (ii) increase the size of gas oil (secondary fuel) storage tanks and bund and realignment of tanks within the bund, (iii) remove one consented emergency diesel generator from the development layout and reposition of the second consented emergency diesel generator alongside an LV switchroom, (iv) reposition palisade fence associated with ancillary equipment compound approximately 15m to the west, (v) reconfigure and reposition fuel pumps (polishing and forwarding), MCC equipment,	No potential for in-combination effects given the Proposed Development will have no significant effects on Biodiversity.

Planning Ref.	Description of development	Comments
	fire water pump, fire water tank and air compressor adjacent to the southern side of the secondary fuel storage bund, (vi) remove water treatment module and ammonia storage tank from the development layout, (vii) remove two distribution transformers from the development layout and reposition the remaining three consented distribution transformers to the ancillary equipment compound to the west, (viii) remove five gas turbine selective catalytic reduction (SCR) units and associated ancillary components (fans), (ix) reposition of two high voltage (HV) transformers within the HV transformer compound and installation of a third HV transformer in lieu of the HV transformer consented under Planning Permission Ref. 21/532, and (x) associated minor changes to internal roads, civil engineering, drainage, landscaping, lighting, car parking, and site works. The development alterations relate to Westmeath Planning Case Ref. 21/515, which is a development that is for an activity requiring an Industrial Emissions Licence from the Environmental Protection Agency (EPA)	
2460131	the upgrade and extension of existing dwelling and to upgrade existing entrance to public road , to replace existing septic tank and soak hole with new septic tank and percolation area, and all associated site works	No potential for in-combination effects given the Proposed Development will have no significant effects on Biodiversity.
2460218	change of use of building from beauty Salon to After school service to include an after school room 1, entrance lobby, kitchen, two w.c.s with lobby, boiler, hot press with play area, bike rack & car parking with all ancillary site works	No potential for in-combination effects given the Proposed Development will have no significant effects on Biodiversity.
2460238	construction of a first floor extension, containing bedroom and bathroom and all associated site works at our family home	No potential for in-combination effects given the Proposed Development will have no significant effects on Biodiversity.

In addition to these listed proposed developments other Projects in the zone of influence considered include:

- Gas Pigging Station development (Ref no 25/60006); (Operational)
- Underground Gas transmission line connection which was an application to the Commission for Regulation of Utilities (CRU) (Operational)
- Yellow River Wind Farm (Operational)

These developments were tested at either AA Screening or Stage 2 AA and significant effects excluded. The Proposed Development will not have a significant effect on local

Biodiversity or on any European site and therefore in-combination effects with these developments can be excluded.

6.8 MONITORING AND FURTHER WORKS

An Ornithologist ECoW will be employed during the construction phase to micromanage construction locations to avoid disturbance on key species.

A Yellowhammer monitoring program will be implemented for years 1 to 3 post construction. If a significant decline of breeding Yellowhammer is found additional measures will be implemented to prevent a decline in population. One such measure is to rent out lands adjacent to Section 1 and plant this area with tillage, transformed from improved grassland.

A post-construction bat monitoring programme is proposed and detailed in Section 7 of the Bat Survey Report. Monitoring will be undertaken at Years 1, 3 and 5 following commencement of development, focusing on activity levels, habitat usage, and effectiveness of mitigation measures.

Should monitoring identify any unforeseen adverse impacts, adaptive mitigation will be implemented as necessary.

6.9 SUMMARY OF SIGNIFICANT EFFECTS

There will be no significant effects on designated sites in the potential Zone of Influence of the proposed development.

There will be no significant effects on local biodiversity.

6.10 REFERENCES

- Guidelines for Ecological Impact Assessment in the UK And Ireland Terrestrial, Freshwater, Coastal and Marine Version 1.3 - Updated September 2024 (CIEEM, 2024).
- Department of the Environment, Heritage and Local Government (2010) Guidance on Appropriate Assessment of Plans and Projects in Ireland (as amended February 2010).
- EC (2000) Managing Natura 2000 sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC.
- EC (2018) Managing Natura 2000 sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC.

- EC (2001) Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43EEC. European Commission, Brussels.
- EC (2007) Guidance document on Article 6(4) of the 'Habitats Directive '92/43/EEC: Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interests, compensatory measures, overall coherence and opinion of the Commission. European Commission, Brussels.
- EPA (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. EPA.
- Fossitt, J. (2000) A Guide to Habitats in Ireland. The Heritage Council.
- Nairn, R. and J. Fossitt (2004) The Ecological Impacts of Roads, and an Approach to their Assessment for National Road Schemes. In: J. Davenport and J.L Davenport (eds) The Effects of Human Transport on Ecosystems: Cars and Planes, Boats and Trains, 98-114. Dublin. Royal Irish Academy.
- NRA (2009) Guidelines for Assessment of Ecological Impacts of National Road Schemes. Dublin: National Roads Authority. Available at: http://www.nra.ie/Environment/
- Parnell, J. and T. Curtis (2012) Webb's An Irish Flora. Cork University Press.
- Smith, G.F., O'Donoghue, P., O'Hora, K. and E. Delaney (2011) Best Practice Guidance for Habitat Survey and Mapping. The Heritage Council.

7 SOILS & GEOLOGY

7.1 INTRODUCTION

This Chapter of the EIAR assesses the potential effects associated with the proposed development on the soils and geology. The chapter provides an overview of the baseline geological and soil conditions across the development lands and an assessment of potential significant effects during the construction, operational and decommissioning stages. A description of the existing site setting and proposed development is presented in Chapter 2 of this EIAR:

For the purpose of the Environmental Impact Assessment (EIA) the following is defined:

1) The term *"Geology"* refers to the bedrock and unconsolidated deposits beneath the soil horizon.
2) The term *"Soil"* refers to the naturally occurring, unconsolidated materials composed of mineral particles, organic matter, water, air, and living organisms, forming the uppermost layer of the lands of the proposed development.

The amended EIA Directive introduces Land as a prescribed environmental factor. Recital 9 gives context to this addition, showing that it relates to the issue of *'land take'*. This aspect is separately discussed under Material Assets (Chapter 10).

This section on Soils and Geology encompassed the following technical evaluations:

- A Critical review of development proposals, assessing their feasibility with respect to geological and pedological conditions.
- Examination of site-specific reports and field measurements of geological and soil data, with integration of empirical data and field investigations.
- Engagement with statutory bodies and consultation of authoritative geospatial databases to delineate baseline geological conditions and identify any site-specific constraints.
- Evaluation of potential geological and pedological interactions, determining pathways and vectors of impact.
- Quantitative and qualitative assessment of direct, indirect, and cumulative effects within the context of the local geological and soil environment.
- Formulation of impact mitigation strategies, incorporating avoidance, minimization, and remedial measures.
- Residual impact analysis, factoring in the efficacy of mitigation measures and long-term sustainability.

This structured methodology establishes a comprehensive assessment framework, enabling well-informed decision-making in accordance with engineering principles, environmental sustainability, and regulatory compliance standards.

7.2 METHODOLOGY & SIGNIFICANCE CRITERIA

7.2.1 ASSESSMENT METHODOLOGY

This assessment has been undertaken in line with the Conceptual Model approach, as per the documents *"Guidelines on the Information to be contained in Environmental Impact Assessment Impact Assessment Reports"*, EPA May 2022 and *"Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements"* IGI April 2013.

During the impact evaluation process, the potential positive or negative effects linked to the development are recognized and analysed in relation to the existing environmental conditions. This involves an evaluation of:

- Sensitivity/value of the receptor,
- Magnitude of the impact,
- Impact duration,
- Whether impact occurs in isolation, is cumulative or is interactive; and
- Performance against environmental quality standards or other relevant thresholds.

7.2.2 ASSESSMENT CRITERIA AND IMPACT ASSESSMENT METHODOLOGY

This evaluation examines the potential risks posed to environmental receptors, along with the routes through which these receptors may be influenced. Below are definitions of the key terms:

- Source: origins of possible contaminants,
- Pathway: the mechanism by which the source may impact a receptor, and
- Receptor: specific elements that could be affected, determined by the site's level of sensitivity.

The efficacy of a contaminant migration pathway between a source and a receptor is governed by both spatial separation and the physical characteristics of the medium through which migration occurs. The fundamental principles of hydrogeology and contaminant transport dictate that permeability, porosity, hydraulic conductivity, and attenuation mechanisms play crucial roles in determining the strength of a pathway.

In lithological settings dominated by impermeable clay strata, groundwater migration is significantly constrained due to the low permeability and minimal pore connectivity within the matrix. Clays exhibit a high attenuation capacity, adsorbing contaminants onto their mineral surfaces and thereby restricting contaminant mobility even over relatively short distances. Consequently, the potential for pollutant dispersion via groundwater transport is weak, often necessitating alternative vector analyses such as surface water runoff, vapor intrusion, or preferential flow through structural discontinuities like fissures or fractures.

Conversely, granular formations such as sand or gravel exhibit high permeability and hydraulic conductivity, facilitating rapid contaminant transport within the saturated zone. The increased interconnectivity of pore spaces allows for efficient advective and dispersive movement, meaning that receptors in close proximity to the source experience stronger exposure due to the limited natural attenuation processes inherent to these substrates. However, at greater distances, dilution and dispersion mechanisms gradually weaken the migration pathway, reducing contaminant concentrations as groundwater flows toward downgradient receptors.

Moreover, the presence of secondary permeability features such as fractures in bedrock or karstic voids within carbonate terrains can significantly alter expected migration behaviour, sometimes bypassing conventional attenuation mechanisms entirely. In such environments, contaminant transport may exhibit non-linear dynamics, where high-velocity preferential pathways result in unpredictable receptor exposure risks.

The significance of expected impacts throughout all stages of the proposed development was assessed by evaluating the importance and sensitivity of key attributes potentially affected, alongside the scale of the anticipated impact

7.2.3 DETERMINING VALUE OF RECEPTOR THROUGH BASELINE STUDIES

The significance or sensitivity of a receptor is primarily influenced by its quality, rarity, and extent. Evaluating its value or sensitivity considers the scale at which the attribute holds importance. To determine the significance of predicted environmental impacts within this assessment, the value of receptors is categorized based on their relative importance, as outlined below.

- LOCAL LEVEL: On the development lands or immediately adjacent to it.
- DISTRICT LEVEL: Beyond the development land boundary but within the district.
- COUNTY LEVEL: County Level e.g., Westmeath
- REGIONAL LEVEL: Eastern and Midlands Region
- NATIONAL LEVEL: Ireland.

- INTERNATIONAL LEVEL: European Community.

Determining the value and sensitivity of a receptor is a fundamental step in assessing potential environmental impacts. This process requires the application of established guidelines, informed professional judgment, and a thorough evaluation of site-specific sensitivities to ensure an accurate classification of each receptor.

In some cases, a receptor's inherent importance is formally recognized through statutory designations, such as Special Areas of Conservation (SACs), Sites of Special Scientific Interest (SSSIs), or Natura 2000 sites. These designations help streamline the assessment process by providing clear criteria for assigning value, as they indicate that a receptor has already been identified as ecologically, culturally, or scientifically significant at national or international levels. However, not all receptors benefit from such formal classification, necessitating a more nuanced approach to evaluating their sensitivity and importance.

The significance of a receptor is determined on a case-by-case basis, taking into account various factors such as ecological function, rarity, vulnerability to change, and its role within broader environmental systems. Sensitivity may also be influenced by external pressures, such as existing pollution, habitat fragmentation, or previous human interventions. For receptors without statutory protection, expert judgment plays a crucial role in assessing their sensitivity based on comparative studies, historical records, and site-specific observations.

Additionally, receptors may vary in their response to different types of impact, requiring tailored methodologies to ensure that both direct and indirect effects are considered. While some receptors may exhibit resilience and adaptability to changes introduced by a development, others may be highly susceptible, necessitating mitigation strategies to safeguard their integrity.

The classification of receptor sensitivity informs decision-making processes, guiding measures that can minimise adverse impacts while supporting conservation objectives where appropriate. Regardless of their acknowledged value, all receptors or features possess a certain level of sensitivity to changes introduced by new development. The sensitivity aspect of the assessment ensures that this characteristic is thoroughly evaluated for each receptor.

Table 7.1 outlines the classification system used to determine receptor sensitivity. This framework serves as a general methodology, with professional judgment applied in each instance to ensure accurate assessment.

Table 7.1 Receptor Sensitivity and Typical Descriptors

Sensitivity	Descriptors
Very Low	Feature / receptor is generally insensitive to impact, no discernible changes e.g., soils are not in use, the land is used for industrial/commercial purposes and /or mainly covered by hard standing.
Low	Feature / receptor has some tolerance to accommodate the proposed change. It responds in a minimal way such that only minor changes are detectable e.g., landscaped areas.
Medium	Feature / receptor has a low capacity to accommodate the proposed form of change. It clearly responds to effects in a quantifiable manner e.g. low-grade agricultural land and recreational ground.
High	Feature / receptor has a very low capacity to accommodate the proposed form of change. The response is a major change e.g. agricultural land use for food production, allotments.

7.2.3.1 Magnitude of Impacts

Magnitude refers to the 'scale' or 'amount' of an impact. Key impacts have been identified, and the likely magnitude of each potential impact has been determined through the predicted change from the baseline conditions throughout the various phases of development. The magnitude of an impact is a measure of aspects such as the impacts:

- Extent (i.e., the geographical area over which the impact occurs),
- Duration (i.e., the time for which the impact is expected to last prior to recovery or replacement of the resource or feature: short, medium or long term),
- Likelihood (i.e., the probability that the impact will occur),
- Direct or Indirect (i.e., difficult to avoid), and,
- Reversibility (i.e., an irreversible (permanent) impact is one from which recovery is not possible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it: Temporary or Permanent).

In order to help define the level of impact magnitude the following guidance (see Table 7.2) has been adopted for the purpose of providing a transparent assessment. The professional judgement of the technical author is used in the decision-making process when characterising impacts in accordance with the criteria set out in Table 7.2.

Table 7.2 Assessment Criteria for Magnitude

Magnitude	Assessment Criteria
No Change	• No loss or alteration of characteristics, features or elements. • No observable impact on receptors/features.
Imperceptible	• Noticeable, temporary (for part of the development duration) change; or • Barely discernible change for any length of time, over a small area, to any key characteristics or features. • Impact unlikely or rarely to occur. • Results in effects on attribute of insufficient magnitude to affect the use/integrity.
Slight	• Noticeable, temporary (during the project duration) change, over a partial area, to key characteristics or features. Impact will possibly occur. • Impact predicted to extend over a small area. • Impact predicted to affect small numbers of people. • Impact predicted to affect a small number of other receptors (ecological, businesses, facilities). • Impact not predicted to have trans-boundary effects, but possibility remains. • Slight but discernible change in environmental conditions predicted. • Impact not predicted to entail unusual/complex effects for receptors. • Impact not predicted to affect particularly scarce features/resources. • Impact not predicted to result in breaches of legislation or statutory Environmental Quality Standard or Objectives. • Impact not predicted to result in loss of attribute. • Impact will continue for a short period of time only. • Impact will be temporary. • Impact will be intermittent and/or rare. • Impact will be reversible. • Impact will be possible to avoid, reduce, repair, or compensate for; or • Slight positive change in environmental conditions resulting in minor improvements in quality or value of a receptor.

Magnitude	Assessment Criteria
Moderate	• Significant, permanent / irreversible changes, over most of the development area and potentially beyond, to key characteristics or features. Impact certain or likely to occur. • Impact predicted to extend over a moderate area. • Impact predicted to affect moderate numbers of people. • Impact predicted to affect some other receptors (ecological, businesses, facilities). • Impact unlikely to have trans-boundary effects, but possibility remains. • Moderate change in environmental conditions predicted. • Impact unlikely to entail unusual/complex effects for receptors but possibility remains. • Impact unlikely to affect particularly scarce features/resources but possibility remains. • Impact entails a low probability that breaches of legislation or statutory Environmental Quality Standard or Objectives will occur. • Impact unlikely to result in loss of attribute but possibility remains. • Impact will continue for a moderate period. • Impact will be semi-permanent. • Impact will be intermittent. • Impact will be possible to avoid, reduce, repair, or compensate for; or • Notable positive change in environmental conditions resulting in measurable improvements in quality or value of a receptor.
Substantial	• Very significant, permanent / irreversible changes, over the whole development area and beyond (i.e. off-site), to key characteristics or features of character or distinctiveness. Impact certain or likely to occur. • Impact predicted to extend over a large or very large area. • Impact predicted to affect considerable numbers of people. • Impact predicted to affect considerable numbers of other receptors (ecological, businesses, facilities). • Impact predicted to have trans-boundary effects. • Significant change in environmental conditions predicted. • Impact will entail unusual/complex effects for receptors. • Impact will affect particularly scarce features/resources. • Impact entails a high probability that breaches of legislation or statutory Environmental Quality Standard or Objectives will occur; • Impact will result in total loss of attribute. • Impact will continue for extended periods of time. • Impact will be permanent rather than temporary. • Impact will be continuous rather than intermittent, or were intermittent, frequent rather than rare. • Impact will be irreversible. • Impact will be very difficult to avoid, reduce, repair, or compensate for; or • Significant positive change in environmental conditions resulting in major improvements in quality or value of a receptor.

7.2.3.2 Impact Significance

Section 236 of 'The Planning and Development Regulations, 2024 as amended state that it is necessary to *'identify, describe and assess the direct and indirect significant effects of the relevant development concerned'.* Therefore, an assessment of significance is necessary to identify the main environmental effects of the proposed development and assist in determining what weight these effects should be given. Definitive guidance in the preparation of EIA in the soils and geological environment exists *in 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements',* issued by the Institute of geologists of Ireland. From the guidance, a significant effect is defined as "an impact, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment".

It is widely acknowledged that the significance of an impact is determined by the relationship between its magnitude and the sensitivity or value of the affected environmental receptor.

To support the evaluation process, the Impact Significance Matrix (ISM) (

Table 7.3) offers a clear and systematic approach, ensuring consistency and facilitating the interpretation of impact significance.

An initial assessment of whether an impact is adverse or beneficial is derived by integrating magnitude and sensitivity/value according to the ISM framework. While this matrix provides a robust methodology for assessing impacts across diverse environmental factors, professional judgment and further objective analysis remain essential in refining the final significance determination. Given that the criteria operate along a continuum rather than fixed thresholds, expert evaluation is required to balance the relative importance of magnitude and sensitivity/value in each case.

Receptors with formal legal designations are inherently classified as high-value entities, typically holding greater importance than non-designated features. Consequently, impacts affecting designated receptors are assigned a higher significance level compared to those affecting non-designated features. The value classification for these designated receptors establishes a preliminary assumption that impacts will be significant. However, sensitivity assessments can be used to either validate or adjust this initial determination, ensuring a more precise evaluation.

Table 7.3 Impact Significance Assessment

Magnitude[1]	Value/sensitivity of receptor[2]			
	Very Low	Low	Medium	High
No Change	Imperceptible	Imperceptible	Imperceptible	Minor
Imperceptible	Imperceptible	Minor	Minor	Moderate
Slight	Minor	Minor	Moderate	Major
Moderate	Minor	Moderate	Major	Major
Substantial	Moderate	Major	Major	Major
Profound	Major	Major	Major	Major

Note 1 Refer to Table 7.2
Note 2 Refer to Table 7.1

Given the use of professional judgement in the assessment process, there may be some variation between subject areas (i.e., different environmental parameters) in the significance rating process. This may be because of limited information on the sensitivity of features and / or the complexity of interactions that require assessment in determining the magnitude of change. However, the ratings derived through the impact assessment process, as set out in Table 7.3 can also be described in a generic fashion as given in Table 7.4. The following definitions are proposed in relation to the significance of environmental impacts predicted throughout this EIAR.

Table 7.4 Impact Significance Definitions

Level of Significance	Description
Imperceptible	No discernible effect. An impact that is likely to have imperceptible or insignificant impact.
Slight	Slight, very short or highly localized impact of no significant consequence. These effects may be raised as local issues but on their own are unlikely to be of importance in the decision-making process. When combined with other effects these could have a more material influence.
Moderate	Intermediate limited (extent / duration / magnitude) impact that may be considered as significant. These effects are likely to be important considerations at a local level. These could have an influence on decision making especially when combined with other similar effects.
Significant	Very large or considerable impact (extent/duration/magnitude). Effects, both adverse and beneficial, are likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or could result in exceedance of statutory objectives and / or breaches of legislation. In isolation, these could have a material influence on the decision-making process.

Profound	An impact which obliterates sensitive characteristics. profound environmental impacts are understood as those effects that drastically and durably alter the natural environment, posing significant risks to both ecological integrity and human well-being.

7.2.3.3 Impact Mitigation Measures

Following the implementation of mitigation measures the identified impacts may be reduced to environmentally acceptable levels (or not).

It is best practice to consider mitigation measures for all impacts that are of a minor negative significance (i.e., slight, very short or highly localized impact of no significant consequence) or higher and this has been adopted for the purpose of this assessment.

The purpose of mitigation is to reduce the significance of the residual impact (see below) to a minor adverse or imperceptible level, which is a level that is expected to be acceptable by local authority, environmental regulators, and the public. Individual impacts assessed as being of minor adverse or imperceptible significance have not automatically been considered to require mitigation. However, where appropriate, and considering views and comments received through consultation, consideration has been given to the implementation of mitigation measures designed to reduce minor adverse impacts to an imperceptible level.

Mitigation measures can be incorporated at various stages in the proposed development. The preferred hierarchy of mitigation is as follows:

- Prevention: At the design stage: avoid, relocate, modify the design and / or do not process with the development.
- Reduction: introduce design modification or additional structures (e.g., screens), reduce size and scale of development etc.; and,
- Compensation or remediation: compensation to provide like-for-like replacement for any lost environmental elements. When adverse impacts are unavoidable, it may also be possible to limit the duration of an impact by undertaking remedial works. For example, the impact on the landscape of mineral extraction is unavoidable, but the land can be progressively restored following the completion of extraction to complement or enhance the character of the landscape.

7.3 DESCRIPTION OF THE DEVELOPMENT

Red Admiral DC Limited propose to develop a DC facility and DER on lands in the townlands of Gneevebane, Oldtown, Farthingstown, Castlelost and Kiltotan and Collinstown in the south of County Westmeath. The project includes two main elements, namely:

- The Data Centre (DC) facility, comprising six two-storey Data Centre buildings, car parking, landscaping, drainage and other associated works. The DC facility will be constructed and secured within a 39ha campus. Each DC building will have a footprint of 13,978 m^2 (sqm). Each DC building will contain:
  - Data halls fitted with server racks and distribution units,
  - Mechanical and electrical (M&E) plant rooms /spaces which will house advanced cooling equipment, pumps, piping and medium voltage (MV) and low voltage (LV) switchgear, and
  - Administration and support areas including, reception, offices, meeting rooms and welfare facilities.
- Decentralised Energy Resource (DER), which will be constructed across approximately 200ha of lands adjoining the DC facility. The DER incorporates several power assets which will generate, store and manage electricity close to the DC facility. The DER comprises the following assets:
  - Fuel Cell Power System – 160MW,
  - Battery Energy Storage System (BESS) – 250MW,
  - Solar PV farm (nominal 180MWp), and
  - 220kV IPP GIS Grid connection to the 220kV Castlelost GIS substation which adjoins the proposed development site.

A full description of the proposed development is provided in Chapter 2 of this EIAR.

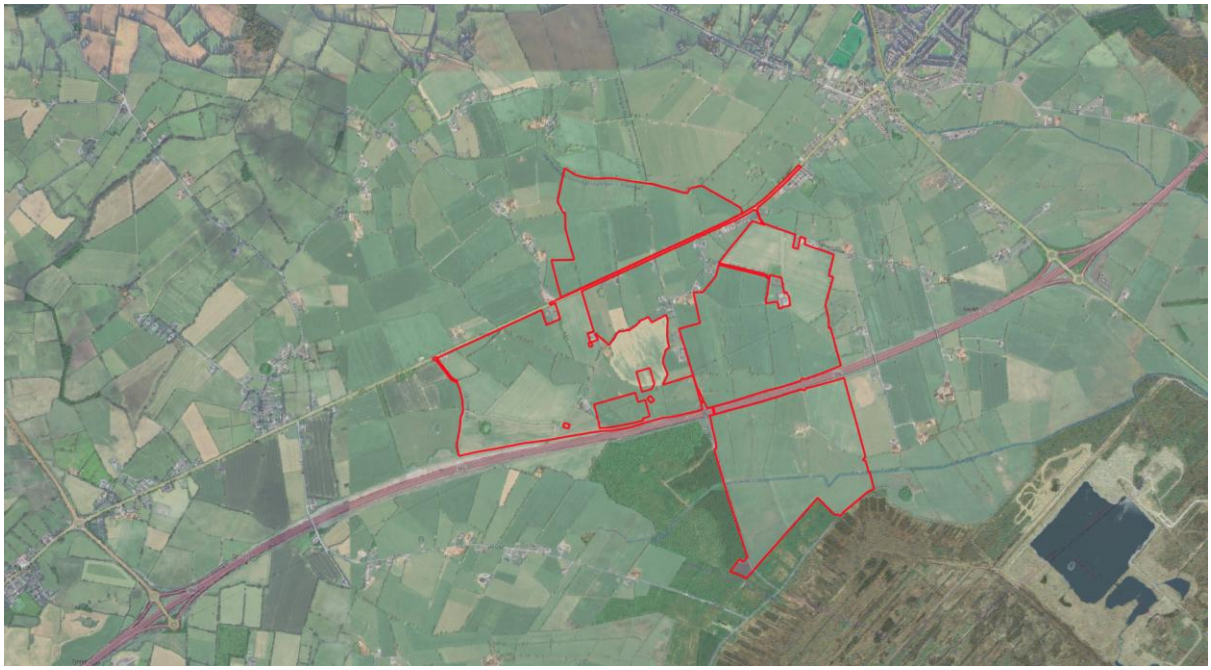
7.4 DESCRIPION OF THE RECEIVING ENVIRONMENT

The main development site is situated approximately 3 kilometres southwest of Rochfortbridge and about 3 kilometres east-north-east of Tyrrellspass, within the townlands of Farthingstown and Kiltotan & Collinstown, County Westmeath. The development area consists of greenfield lands with the site also adjacent to the M6 motorway. Surrounding the site to the east, northeast and northwest are one-off existing residential properties, which are themselves adjacent to agricultural lands which are used for a combination of either horticulture or for pasture (Figure 7.1).

The primary access point to the main site is via the regional road R446, which runs across the northern section of the development lands. Lands in which solar PV development are

proposed are currently access from the R446 (northern parcel), the L51251 and L11272 (middle and southern parcels). Within and adjacent to the development lands, the Castlelost Flexgen Reserve Gas-Fired Generator (275MWe capacity) is under construction (nearing completion) along with a newly constructed 220kV Gas Insulated Switchgear (GIS) Electrical Substation

Figure 7.1 Location of Development Lands



7.4.1 HISTORICAL LAND USE

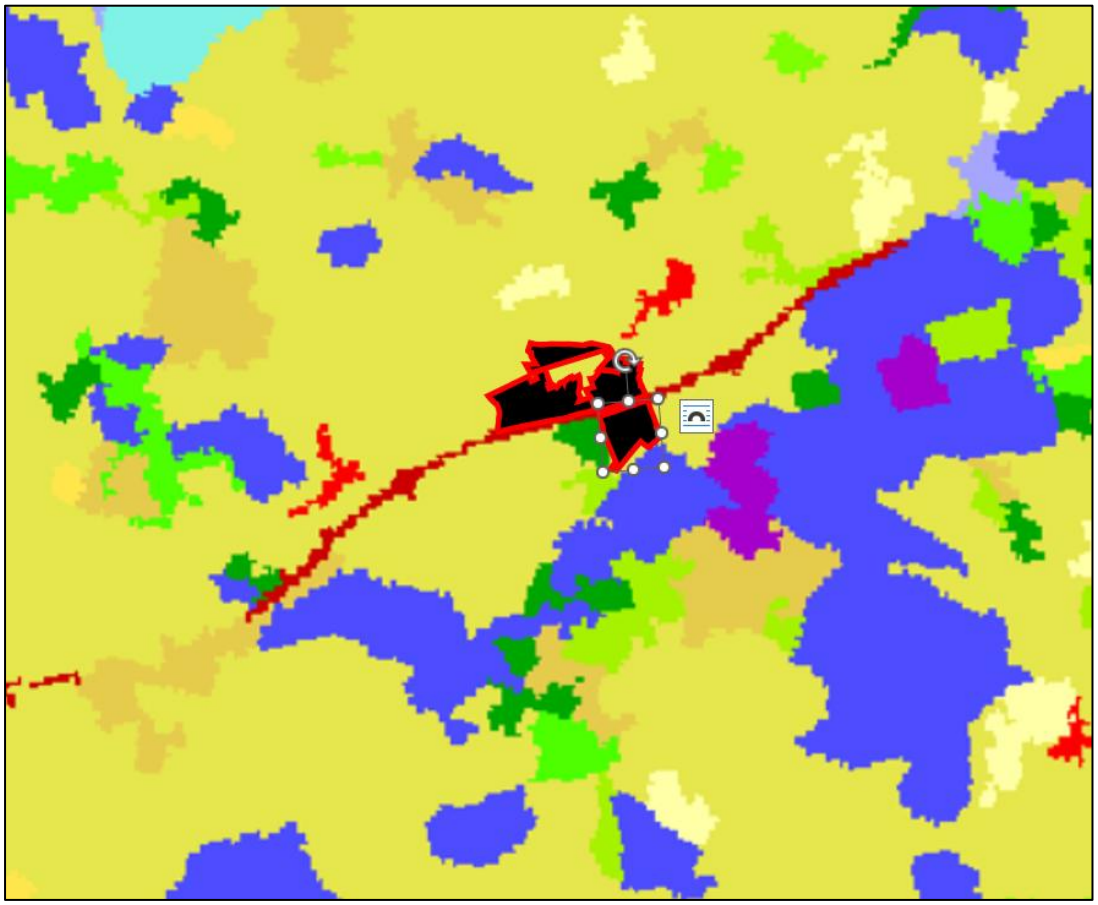
Review of historical aerial imagery and mapping indicates that the site was historically used as agricultural land. There are areas of extensive cutaway bogs, quarries and forestry located to the south. Lands in the general area of the site are predominantly agricultural pastures with some arable lands.

7.4.2 SOILS AND GEOLOGY

7.4.2.1 Desktop Study

The Copernicus Land Monitoring Survey (CLMS) Corine Land Cover Map provides a representation of the current land use at the development site and the surrounding region. Current land use at the development site is described as agricultural pastures and is represented by the yellow colour on Figure 7.2. Peat bogs (blue colour) and quarries (purple colour) surround the development site to the south and east, with some limited patches of peat bog also present to the west and northwest of the proposed development.

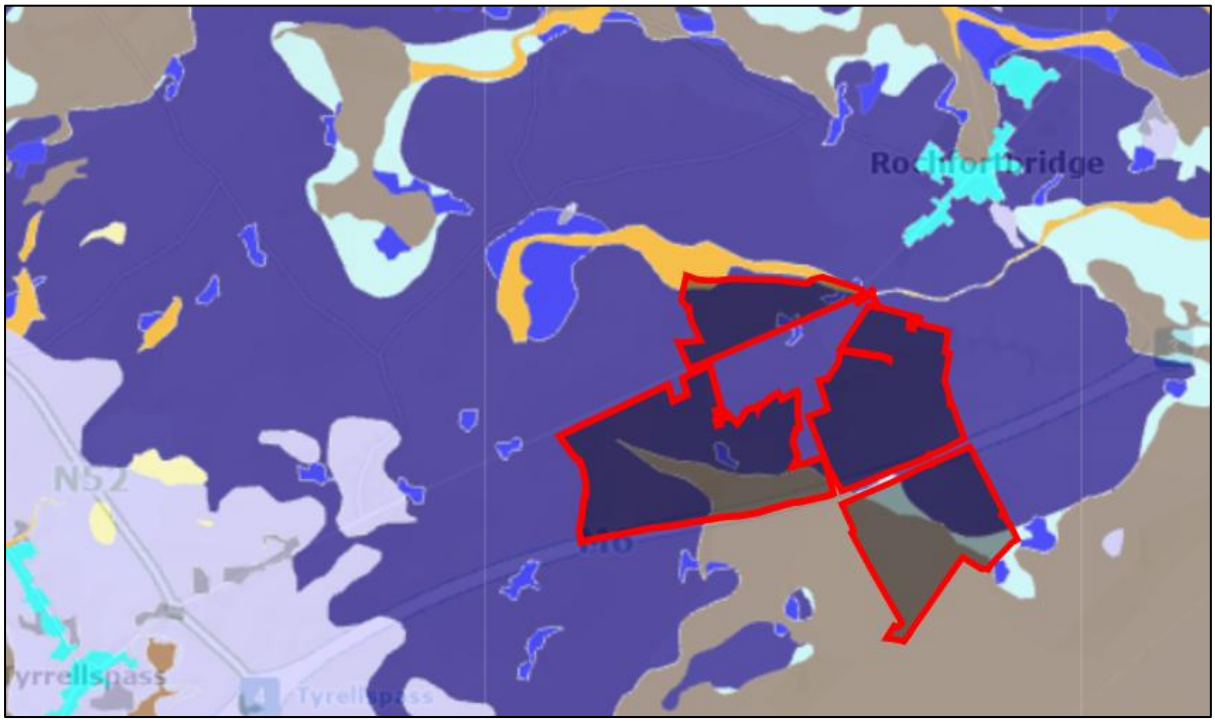
Figure 7.2 Corine Land Cover 2018



Note Proposed development area (red border with black shading). Image derived from Copernicus Land Monitoring Survey data.

Soils within the development lands are mostly classed as fine loamy drift with limestones (Elton association) of moderate drainage, with cutover peat within the eastern and southern sections (Figure 7.3). Elton association soils are within the soil subgroup Luvisol, which are characterized by the presence of an argic horizon, where clay particles have been washed down below the surface layer and concentrated. Cutover peat is the result of selective peat extraction, where only parts of the surface are removed, leaving behind pockets of intact peat that help sustain some of the original ecological functions.

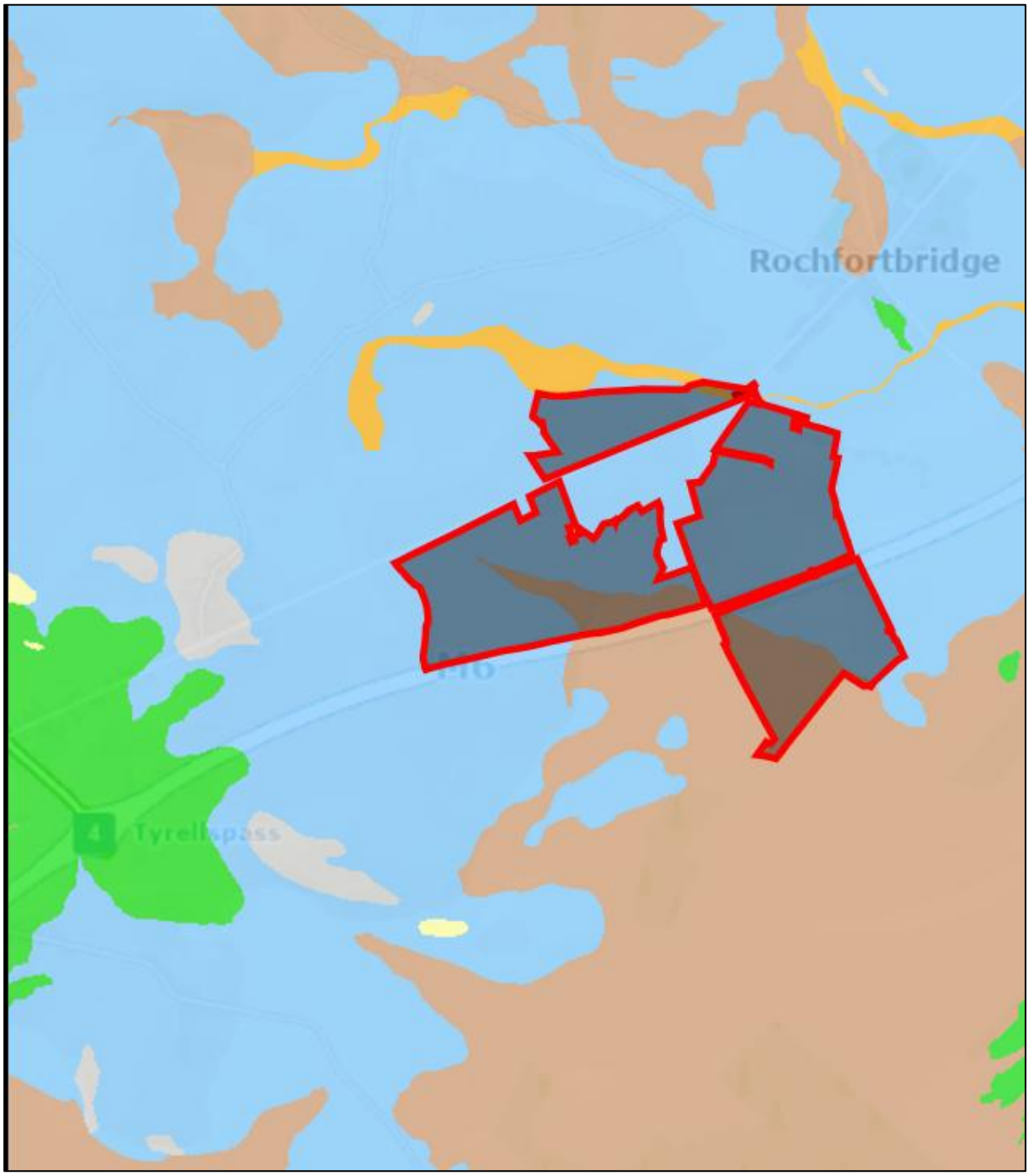
Figure 7.3 Distribution of soil associations adjacent to the development site



Note
1. Project lands outlined with redline.
2. The development site is located entirely within the fine loamy drift (Elton association), indicated by the dark blue colour.
3. Image derived from EPA (STRIVE Research Programme 2007-2013) and Teagasc.

The Quaternary sediments underlying the site are describe as *"Till derived from limestones"* and *"Cutover raised peat"* shown in Figure 7.4 (blue- and brown-coloured areas). Till refers to unsorted glacial deposits – as glaciers melted during the last ice age, sediments that had been picked up by the glaciers were deposited on the ground. As the till is derived from limestones, this implies a significant calcium carbonate component to the sediments.

Figure 7.4 Quaternary deposits at the development site

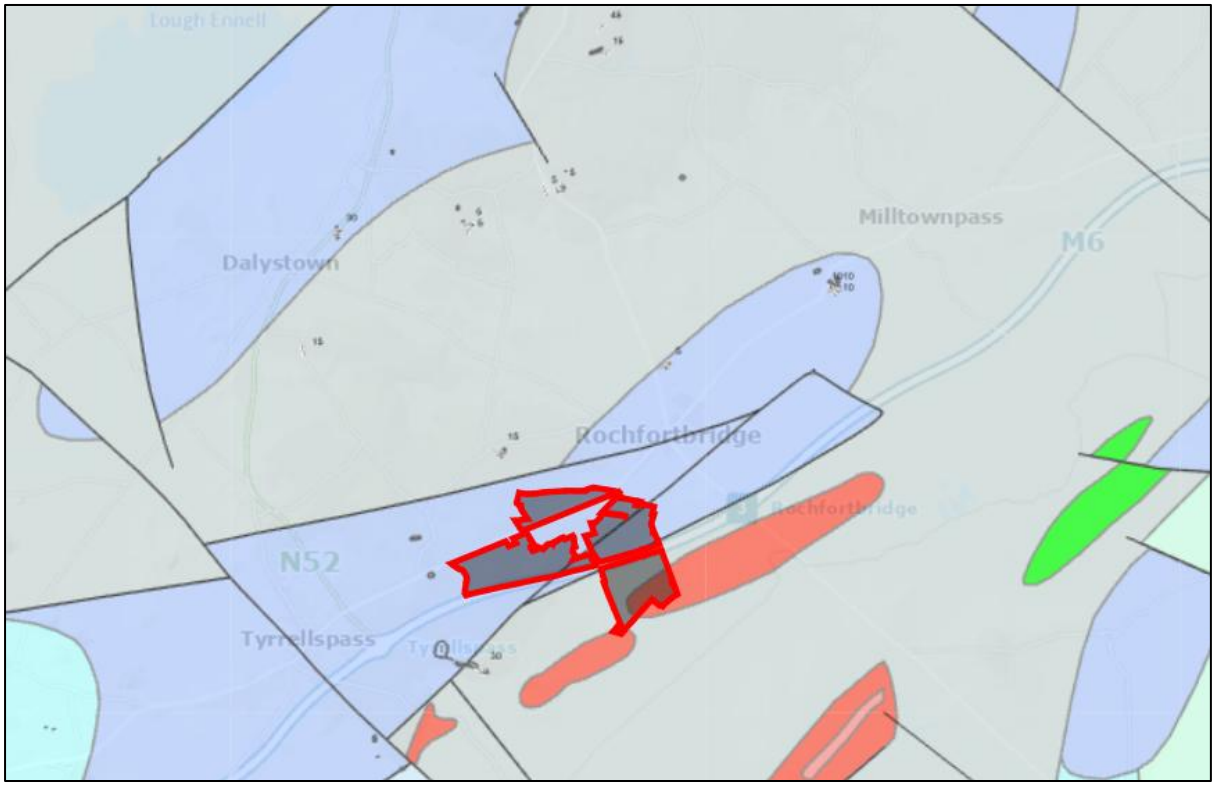


Note
1. Project lands outlined with redline.
2. The development site is within the blue and brown shaded areas, which represents till deposits derived from limestones and cutover peats. Data from Geological Survey Ireland.

The bedrock geology underlying the site is mapped on the GSI 1:100,000 bedrock formations map. This data shows that the bedrock geology underlying most of the development lands is mapped as Waulsortian Limestones which are dated from the Lower Carboniferous (Mississippian) period. Waulsortian limestones consist mainly of pale grey biomicrite (a limestone consisting of skeletal debris (bioclasts) and carbonate mud (micrite)). These limestones commonly form individual and coalesced mounded deposits

and are unbedded. The southern section of the development is underlain by a combination of Tobercolleen / Lucan formation limestone, and basalt intrusions.

Figure 7.5 Illustration of the bedrock geology adjacent to the development site



Note
1. Project lands outlined with redline.
2. The development is mostly within the Waulsortian Limestone bedrock (pale blue shading), with the southern section within Tobercollen / Lucan formations, with some basalt intrusions (grey and red shading respectively).
3. Data from the Geological Survey Ireland.

No bedrock outcrops are identified within the development area by the Geological Survey of Ireland. There are bedrock outcrops at the adjacent motorway (M6) rock cuttings (Plate 7.1), which indicate an unbedded limestone bedrock, typical of the Waulsortian limestones. It is envisaged that the soil level is relatively thick within the area bounded by the proposed development. This is supported by ESRI data, which suggests that soil thicknesses are at least 80cm throughout this area.

Plate 7.1 Aerial view of motorway (M6) rock cutting



Note
1. View west along M6
2. Project lands outlined with redline.

Plate 7.2 Motorway (M6) rock cutting (south of development lands)



Note
1. The facies are unbedded, a characteristic of Waulsortian limestones

7.4.3 FIELD WORK

As part of site assessment works, a number of trial pits were excavated across the development lands on the 18 March 2025 to depths of c.2.5m below ground level (bgl) for the purposes of foul and storm drainage design (Trial pit logs are included as Appendix 7.1). No bedrock was encountered in any of the trial pits excavated. No groundwater was observed within the trial pits. The soils were described as sandy, gravelly clay containing a moderate number of cobbles and boulders. Photographs of the trial pits are presented in Plate 7.3-Plate 7.8, and the locations of the trial pits are shown in Figure 7.6

Figure 7.6 Distribution of trial pits (SA01-SA06) across the western part of the development area



Plate 7.3 Trial pit SA01



Plate 7.4 Trial pit SA02



Plate 7.5 Trial Pit SA03



Plate 7.6 Trial Pit SA04



Plate 7.7 Trial Pit SA05



Plate 7.8 Trial Pit SA06



7.4.3.1 Boreholes

Boreholes were installed at five locations across the development lands, using a rotary coring method, and drilled to an average depth of 9.7m below ground level (Figure 7.7). Borehole logs are included as an appendix (Appendix 7.1). The borehole logs confirm the stratigraphy as implied by the desktop study, with unsorted quaternary deposits overlying limestone bedrock.

Figure 7.7 Location of boreholes across the development lands.



7.4.3.2 Karst

Karst terrain forms as a result of karstification, a process that primarily affects soluble rock types such as limestone and dolomite. This phenomenon occurs due to the dissolution of calcite triggered by meteoric water. As rainfall travels through the atmosphere, it absorbs extra carbon dioxide, initiating a chemical reaction within the limestone. This interaction gradually shapes a variety of surface and underground features characteristic of karst landscapes. A common geomorphological feature in Ireland is the presence of dolines in areas where quaternary glacial till overlays carboniferous limestone bedrock. Dolines are enclosed depressions in the landscape, formed by either dissolution of the

underlying bedrock, or the collapse of the quaternary deposits into voids within the bedrock (or, most commonly, a combination of both processes).

Dolines have been identified close to the northern boundary of the development in aerial photographs (Figure 7.8), each with an approximate diameter of 10 metres. Dolines play a crucial role in groundwater recharge, allowing surface water to drain underground and contribute to the aquifer system. The circular shape, relatively small size (10m diameter), and relatively small slope gradients that can be inferred from the aerial photographs suggest that these are solution dolines.

Solution dolines form in karst terrains when water slowly dissolves soluble rock, causing the overlying material to sag into a depression. This gradual, steady process—often accompanied by the accumulation of clay-rich residual deposits—allows the landscape to adjust over time, presenting a lower immediate ground stability risk than the sudden and unpredictable collapse associated with other sinkhole types. However, while the slow evolution generally promotes equilibrium, long-term stability still hinges on consistent environmental conditions and the absence of abrupt changes in groundwater dynamics or surface loads.

Further dolines and possible karst collapse features are present outside the boundary of the proposed development (Figure 7.9) to the east. The presence of a group of dolines is a clear geomorphological marker that extensive karstification is occurring at the Quaternary–bedrock interface. In these environments, water percolates through young, porous Quaternary deposits (glacial till) and reacts with the underlying soluble rock (limestone) via carbonic acid dissolution. This process exploits preexisting weaknesses in the bedrock (joints, fractures, bedding planes), gradually forming subsurface voids that cause the overlying material to sag and manifest as dolines at the surface.

From a technical perspective, the clustering of dolines suggests a laterally connected network of dissolution features acting as natural conduits for groundwater flow into a karst aquifer system. The enhanced water infiltration through permeable Quaternary deposits accelerates chemical weathering along structural weaknesses, resulting in a pockmarked landscape.

Figure 7.8 Distribution of dolines (highlighted by yellow circles) across the northern section of the proposed development area

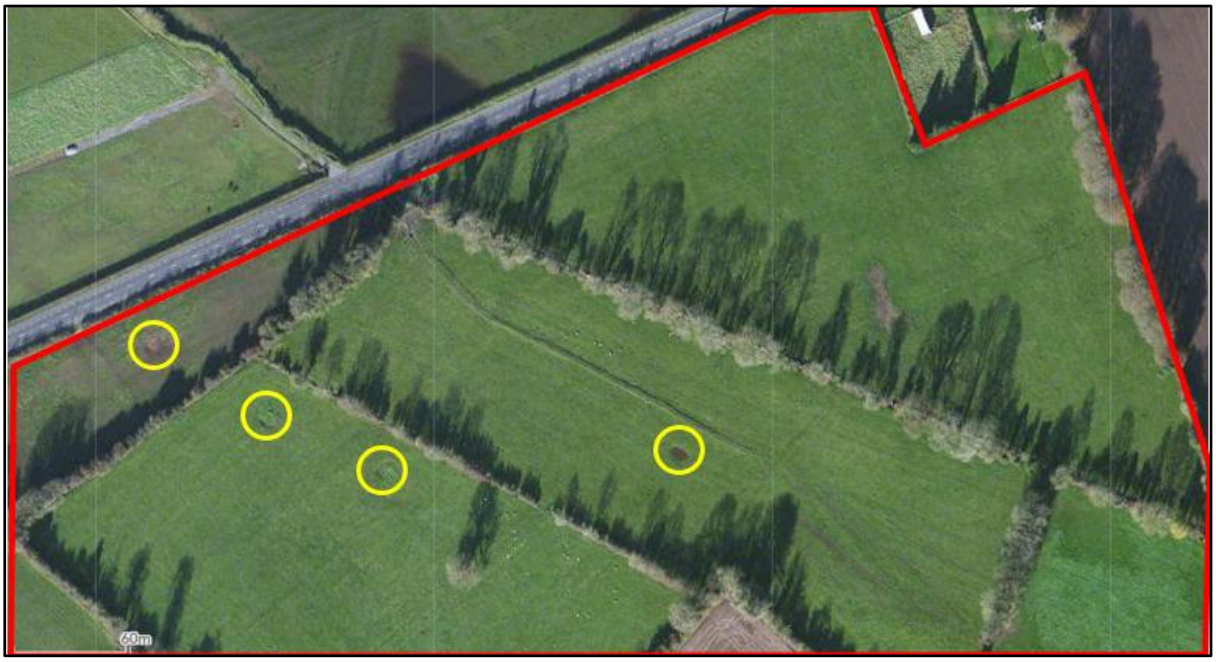


Figure 7.9 Distribution of dolines (highlighted by yellow circles) to the west of the proposed development area



7.4.3.3 Geological Heritage

The Geological Survey of Ireland, in collaboration with the Geoparks network and GSNI, has launched the "*Geoheritage*" initiative, aimed at preserving and promoting geologically significant areas and features across the country. These locations are designated as County Geological Sites and are incorporated into County Development and Heritage Plans. However, there are no geological heritage sites within or near the development boundary. The closest such feature is the Tyrrellspass Kettle Hole (a shallow,

sediment-filled hollow formed by a retreating ice sheet). This feature is 2.5km west-south-west of the proposed development area.

7.5 ASSESSMENT OF POTENTIAL ENVIRONMENTAL EFFECTS

This section provides an assessment of the potential environmental impacts of the proposed development on the soil and geological environment during the construction and operational phases of the project.

Judgments made are based on an assessment of the magnitude of contamination sources, geotechnical hazards and mineral alteration as obtained from desk study, existing ground investigation and monitoring information, which form the baseline conditions and an assessment of the source–pathway–receptor philosophy and identified pollutant linkages.

The development lands and the area within its immediate environs (i.e.,1 km of development land boundary) have been considered in detail to assess the changes in ground conditions. The receptors potentially at risk that could be present are indicated in Table 7.5 and their relative sensitivity is assessed to enable predicted impact to be determined.

7.5.1 RECEPTOR SENSITIVITY

The receptors considered for the risk assessment are detailed in the table below and considered in relation to their relative importance and receptor sensitivity; justifications for the classification are provided.

Table 7.5 Receptor Sensitivity

Receptor	Relative Importance	Receptor Sensitivity	Justification
Shallow Soils	Local Level	Low	The receptor does not make a significant contribution to local character or distinctiveness. The receptor is considered very local.
Underlying Drift Deposits (Till)	Local Level	Low	The project is expected to cause minimal change to the drift deposits in the local area, e.g., any excavated drift depositions will remain on site be used as part of landscaping works (berming).
Bedrock Geology (Limestone)	County Level	Low	Based on the findings from the baseline assessment undertaken, development of the project within the development lands will not result in impact to the underlying limestone bedrock.

7.5.2 CONSTRUCTION PHASE

The main potential environmental effects during the construction phase have been tabulated below.

Table 7.6 Construction Phase Potential Environmental Effects

Receptor with sensitivity	Effect	Quality of impact	Significance of impact	Duration of impact	Type of impact	Summary and discussion
Drift Deposits and Shallow Soils (Low)	Contamination from spills or leaks of fuel/oil and hazardous substances stored onsite e.g., paints, lubricants, adhesives, oils etc.	Negative	Moderate, without mitigation	Temporary	Worst case	Mitigation is proposed in Table 7.8
	Loss of shallow soils and drift through construction onsite e.g., buildings, compounds, access roads and car park.	Negative	Moderate, without mitigation	Permanent	Irreversible	Mitigation is proposed in Table 7.8
	Earthworks have the potential to cause disturbance of contaminated soil.	Negative	No change*	Temporary	Worst case	No mitigation measures required *The impact significance is considered reasonable as there are no known sources of contamination within the soils on-site.
Bedrock Geology (Low)	Contamination from spills or leaks of fuel/oil and hazardous substances stored	Negative	Moderate, without mitigation	Temporary	Worst case	Mitigation is proposed in Table 7.8

Receptor with sensitivity	Effect	Quality of impact	Significance of impact	Duration of impact	Type of impact	Summary and discussion
	onsite e.g., paints, lubricants, adhesives, oils etc.					
	Contamination of bedrock due to foundation construction and road works	Negative	Moderate, without mitigation	Temporary	Worst case	Mitigation is proposed in Table 7.8
	Vibration-Induced Impacts - Construction activities, including heavy machinery operations, generate vibrations that can exacerbate pre-existing fractures or initiate new cracks in the bedrock	Negative	Slight, without mitigation	Short term	Worst case	Mitigation is proposed in Table 7.8

7.5.3 OPERATIONAL PHASE

Table 7.7 Operational Phase Potential Environmental Effects

Receptor with sensitivity	Effect	Quality of impact	Significance of impact	Duration of impact	Type of impact	Summary and discussion
Drift Deposits and Shallow Soils (Low)	Operational leaks or spills of cooling fluids, oils, and other chemicals pose a risk of contaminating the soil, which can modify its chemistry and harm soil microbial communities.	Negative	Moderate, without mitigation	Temporary	Worst case	Mitigation is proposed in Table 7.9
	Waste heat released during data centre operations may increase local soil temperatures, potentially impacting biological activity and soil processes.	Negative	Slight, without mitigation	Temporary	Worst case	Mitigation is proposed in Table 7.9
	Replacing natural or vegetated areas with impervious materials like concrete and asphalt. This limits natural infiltration of rainwater and has the potential to alter soil structure.	Negative	Slight, without mitigation	Temporary	Worst case	Mitigation is proposed in Table 7.9
Bedrock Geology (Low)	The heavy structures of a data centre impose	Negative	Slight, without mitigation	Permanent	Cumulative	Mitigation is proposed in Table 7.9

Receptor with sensitivity	Effect	Quality of impact	Significance of impact	Duration of impact	Type of impact	Summary and discussion
	long-term pressures that can modify stress distributions in the underlying bedrock.					
	Persistent vibrations from operational equipment may exacerbate pre-existing microfractures or even initiate new ones.	Negative	Imperceptible	Permanent	Cumulative	Mitigation is proposed in Table 7.9
	Temperature variations from cooling systems contribute to cyclical stress, potentially impacting the integrity of the bedrock.	Negative	Slight, without mitigation	Temporary	Worst case	Mitigation is proposed in Table 7.9

7.6 MITIGATION MEASURES

7.6.1 CONSTRUCTION PHASE

Table 7.8 Mitigation of Potential Environmental Effects during the Construction Phase

Potential Environment effect	Significance of Impact	Receptor	Mitigation	Impact of Significance following mitigation
Loss of shallow soils and drift through construction onsite e.g., buildings, compounds, access roads and car park.	Moderate	Drift Deposits and Shallow Soils (Low	Topsoil Stripping and Stockpiling - Carefully remove and stockpile the topsoil layer in designated, well-protected areas to prevent compaction and contamination, ensuring it can be effectively reused during site restoration. Design construction layouts to reduce the extent of impermeable surfaces and limit heavy machinery access through sensitive soil areas. Use designated traffic routes and specialized low-compaction equipment. Install silt fences and / or sedimentation basins. Establish buffer strips of vegetation around the construction site. Use erosion control blankets on slopes and areas with disturbed soil.	Slight
Contamination from spills or leaks of fuel/oil and hazardous substances stored onsite e.g., paints, lubricants, adhesives, oils etc.	Moderate	Drift Deposits and Shallow Soils (Low	Dedicated zones with bunding or secondary containment measures that prevent spills reaching the soil. Install spill pallets, bunded barriers, and absorbent mats around storage tanks and handling areas to capture any leaks promptly. Train personnel on safe chemical handling, proper storage procedures, and emergency spill response to minimize risks. Ensure spill kits are readily available and include absorbents, neutralizing agents, and clean-up tools to initiate immediate containment and clean-up. Incorporate drainage controls, sediment traps, or collection ditches to capture any potential chemical runoff, preventing widespread soil contamination.	Imperceptible
Vibration-Induced Impacts - Construction activities, including heavy machinery operations, generate	Slight	Bedrock geology	Install vibration monitoring systems (such as geophones or accelerometers) to continuously assess vibration levels during construction, enabling immediate adjustments if threshold values are exceeded.	Imperceptible

vibrations that can exacerbate pre-existing fractures or initiate new cracks in the bedrock			Preference for non-impact or pre-bored pile-driving techniques rather than high-energy impact driving and opting for equipment designed to minimize mechanical shocks. Implement physical barriers like pile barriers or trenches along the vibration propagation path to absorb or reflect vibrational energy before it reaches the bedrock. Incorporate flexible or damping materials (such as vibration isolation pads or elastomeric bearings) into the structure's foundation design to reduce the transfer of vibrational energy to the underlying bedrock. Plan and schedule construction activities to avoid excessive simultaneous operations that could amplify vibrations, thereby ensuring that the cumulative stress on the bedrock is minimized.	
Contamination from spills or leaks of fuel/oil and hazardous substances stored onsite e.g., paints, lubricants, adhesives, oils etc. Contamination of bedrock due to foundation construction and road works	Moderate	Bedrock geology	Dedicated zones with bunding or secondary containment measures that prevent spills reaching the soil. Install spill pallets, bunded barriers, and absorbent mats around storage tanks and handling areas to capture any leaks promptly. Train personnel on safe chemical handling, proper storage procedures, and emergency spill response to minimize risks. Ensure spill kits are readily available and include absorbents, neutralizing agents, and clean-up tools to initiate immediate containment and clean-up. Incorporate drainage controls, sediment traps, or collection ditches to capture any potential chemical runoff, preventing widespread soil contamination.	Imperceptible

Table 7.9 Mitigation of Potential Environmental Effects during the Operational Phase

Potential Environment effect	Significance of Impact	Receptor	Mitigation	Impact of Significance following mitigation
Replacing natural or vegetated areas with impervious materials like concrete and asphalt. This limits natural infiltration of rainwater and aquifer recharge	Moderate	Drift deposits and shallow soils	Design the site's grading to encourage water to flow slowly towards infiltration zones rather than rapidly directed off-site via sealed channels. Design shallow basins or trenches that store stormwater temporarily and allow water to percolate slowly through the soil into the groundwater system. Incorporate green infrastructure (e.g., permeable pavements, bioswales) on-site to promote natural water infiltration and counterbalance the water extracted from groundwater. Construct small-scale detention ponds or retention areas that hold water for a controlled period. Gradual release from these features prevents sudden surges that bypass natural infiltration areas and helps align discharge volumes with the soil's absorption capacity. Landscape with Native Vegetation -Planting deep-rooted, native vegetation helps increase soil porosity and promotes water infiltration.	Imperceptible
Operational leaks or spills of cooling fluids, oils, and other chemicals pose a risk of contaminating the soil, which can modify its chemistry and harm soil microbial communities.	Moderate	Drift deposits and shallow soils	Use double-walled tanks, spill-proof containers, and secured storage systems. Implement strict protocols for the transportation of hazardous chemicals. Construct secondary containment systems—such as bunded areas—that are designed to capture any spills from primary storage containers. Enhance bund lining systems with chemically resistant liners (e.g., HDPE geomembranes) to create durable barriers that prevent leaked chemicals from seeping into the ground. Install leak detection sensors and automatic shut-off valves on storage tanks, pipes, and transportation units. Use early warning alarms that promptly alert staff to a leak or spill. Develop detailed emergency response procedures that outline containment and cleanup actions.	Imperceptible

			Conduct frequent inspections of storage areas, containment systems, and spill detection devices to ensure they are in optimal condition. Design the facility with proper grading to divert potential spills away from groundwater recharge zones, using diversion channels and berms. Incorporate spill containment walls and safe drains.	
Waste heat released during data centre operations may increase local soil temperatures, potentially impacting biological activity and soil processes.	Slight	Drift deposits and shallow soils	Install systems to capture and repurpose waste heat—for example, redirecting it to district heating networks, nearby buildings, or agricultural facilities. Use thermal insulation on walls, foundations, and piping near the ground to prevent conductive heat transfer from the facility into the soil. Configure heat exchangers and radiators to dissipate heat upward or away from soil surfaces. Opt for cooling technologies that recycle coolants within a sealed system, reducing the overall heat emission to the surrounding environment. Apply reflective or organic ground covers and vegetation buffers that help stabilize soil temperatures and offset the thermal load by providing natural shading and evapotranspiration. Implement continuous soil temperature and moisture monitoring near the data centre to detect early thermal anomalies and allow for timely adaptive measures.	Imperceptible
The heavy structures of a data centre impose long-term pressures that can modify stress distributions in the underlying bedrock. Persistent vibrations from operational equipment may exacerbate pre-existing microfractures or even initiate new ones. Temperature variations from cooling systems contribute to cyclical stress, potentially impacting the integrity of the bedrock.	Slight / imperceptible	Bedrock geology	Incorporate flexible or damping materials (such as vibration isolation pads or elastomeric bearings) into the structure's foundation design to reduce the transfer of vibrational energy to the underlying bedrock. Utilize vibration dampers, isolation pads, and flexible connections during operation to minimize the transmission of mechanical vibrations to the bedrock. Implement efficient cooling systems and thermal insulation measures to capture or redirect waste heat, preventing harmful temperature fluctuations that might induce thermal stress in the bedrock.	Imperceptible

7.6.2 DECOMMISSIONING

Prior to decommissioning, a site closure and decommissioning plan will be completed to ensure the identification and mitigation of any further effects present at that time.

7.7 POSITIVE IMPACTS OF THE DEVELOPMENT

The positive impacts on of the proposed development include.

- The development of the subject typically has a smaller direct impact on soil health relative to land that is used for horticulture / agriculture, due to reduced chemical inputs and ground disturbance, thereby reducing chemical runoff and mitigating local soil degradation.
- The integration of green infrastructure, such as landscaped areas between solar panels, can further enhance soil moisture retention and biodiversity relative to agricultural use, ultimately promoting a healthier and more resilient subsurface environment.
- By removing the regular use of heavy vehicles through ploughing etc., the underlying bedrock is less exposed to accelerated weathering and degradation.

7.8 RESIDUAL IMPACTS OF THE DEVELOPMENT

The proposed developments will not have any significant residual effects on soil and geology post implementation of mitigation. The management of drainage at the development will result in minimal disruption to natural drainage flow paths and volumes, and infiltration to ground will suffer minimal disruption, with the creation of low permeability and impermeable surfaces, limiting the potential for contamination of the subsurface aquatic environments.

7.9 CUMULATIVE EFFECTS

Within the European Commission - Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions, dated May 1999, cumulative effects are described as *"impacts that result from incremental changes caused by other development, plans or projects together with the proposed development or developments"*. The cumulative impacts of the proposed development in conjunction with current and future developments in the vicinity of the subject site are considered here.

Adjacent to the proposed development, the construction of the Castlelost Flexgen Reserve Gas Fired Generator and GIS Substation is underway.

The introduction of extensive impervious surfaces, concrete foundations for the data centre and mounting structures for solar panels, reduces natural infiltration rates, increases surface runoff, and alters local hydrological regimes. These changes can exacerbate erosion and sediment transport, potentially exposing and accelerating the weathering of the underlying bedrock.

Altered drainage patterns may accumulate to cause shifts in the water table, further influencing soil moisture regimes and geochemical processes that support long-term soil health.

Over the operational lifespan of the proposed project and the Castlelost Flexgen & GIS, although individual vibration events, such as those from HVAC systems, cooling equipment, turbines, and generators, tend to be low in amplitude, their continuous or repeated nature can lead to mechanical fatigue over decades. This long-term exposure may alter the stress distribution within the rock mass, potentially accelerating natural weathering processes or subtly shifting pre-existing geological fractures, especially if the vibrational frequencies coincide with the natural resonant frequencies of the rock.

These cumulative impacts call for enhanced surface water management strategies, to enable infiltration rates and distribution to be restored to pre-construction levels. To manage the cumulative effects of vibration on bedrock geology, use advanced vibration isolation systems, such as resilient mounts, base isolation pads, or floating foundations, for heavy machinery (e.g., HVAC systems, turbines, generators) to dampen vibrational transmission to underlying bedrock. Engineer foundations with vibration-damping materials and decoupling strategies (like floating slabs or reinforced, resilient concrete elements) to reduce the cumulative vibrational load on the rock mass. Where possible, adjust the operational frequencies of equipment to avoid exciting the natural resonant frequencies of the underlying geology.

7.10 MONITORING AND FURTHER WORKS

Whilst the development proposals have the potential to cause detriment to receptors identified, the recommended mitigation measures will ensure that the risk of potential impacts are reduced to negligible. Given the receptor sensitivities are classed as low at and in the vicinity of the development lands, no future monitoring is recommended during the construction programmes.

8 WATER ENVIRONMENT

8.1 INTRODUCTION

This chapter of the EIAR identifies and assesses the potential effects associated with the proposed development on the Water Environment.

For the purpose of the Environmental Impact Assessment (EIA) the following is defined:

- The term *"Hydrology"* refers to surface waters;
- The term *"Hydrogeology"* refers to groundwater.

The assessment of potential effects on Waters involved the following:

- Review of development proposals.
- Review of site-specific reports.
- Consultation with relevant statutory authorities /databases to help establish baseline conditions and identify any significant concerns in the area.
- Consideration of potential interactions and identification of possible impacts.
- Assessment of impacts, within the context of the receiving environment including cumulative effects.
- Identification of measures and solutions to avoid, minimise and mitigate potential impacts; and,
- Assessment of residual impacts, taking account of mitigation measures.

A full description of the proposed development is provided in Chapter 2 of this EIAR. The assessment of impacts on the Water Environment considers changes in water quality, hydrology, hydrogeology, hydromorphology, flood risk and water resources, as well as how these changes could impact on water dependent ecosystems, such as and on the Water Framework Directive (WFD) status of the identified waterbodies. A Stage 3 Flood Risk Assessment (FRA) report have been prepared and are provided in Appendix 8.2 which assesses flood risk for the Site. An additional technical report supporting the findings of the FRA is provided in Appendix 8.3 to the EIAR.

The EU Water Framework Directive (2000/60/EC), as amended by Directives 2008/105/EC, 2013/39/EU and 2014/101/EU, was established to ensure the protection of the water environment. The Directive was transposed in Ireland by the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 3002). It applies to rivers, lakes, groundwater, and transitional coastal waters and provides for the protection of the quality status of all waters.

The Directive requires that all member states protect and improve water quality in all waters, with the aim of achieving good status by 2027 at the latest. Any new development must ensure that this fundamental requirement of the Directive is not compromised.

The WFD is implemented through the River Basin Management Plans (RBMP) which comprises a six-yearly cycle of planning, action and review. RBMPs include identifying river basin districts, water bodies, protected areas and any pressures or risks, monitoring and setting environmental objectives. In Ireland the first RBMP covered the period from 2010 to 2015 with the second cycle plan covering the period from 2018 to 2021. The third cycle covers the period 2022-2027. The River Basin Management Plan objectives, which have been integrated into the design of the proposed development, include;

- Ensure full compliance with relevant EU legislation,
- Prevent deterioration and maintain a 'high' status where it already exists,
- Protect, enhance and restore all waters with aim to achieve at least good status by 2027,
- Ensure waters in protected areas meet requirements; and,
- Implement targeted actions and pilot schemes in focused sub-catchments aimed at (a) targeting water bodies close to meeting their objectives, and (b) addressing more complex issues that will build knowledge for the third cycle.

Our understanding of these objectives is that water bodies, regardless of whether they have *'Poor'* or *'High'* status, should be treated the same in terms of the level of protection and mitigation measures employed. A Water Framework Directive Assessment has been prepared and is provided in Appendix 8.4 to the EIAR.

8.2 METHODOLOGY & SIGNIFICANCE CRITERIA

8.2.1 ASSESSMENT METHODOLOGY

This assessment has been undertaken in line with the Conceptual Model approach, as per the documents 'Guidelines on the Information to be contained in Environmental Impact Assessment Impact Assessment Reports', EPA May 2022 and 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements' IGI April 2013.

During the impact evaluation process, the potential positive or negative effects linked to the development are recognized and analysed in relation to the existing environmental conditions. This involves an evaluation of:

- Sensitivity/value of the receptor,

- Magnitude of the impact,
- Impact duration,
- Whether impact occurs in isolation, is cumulative or is interactive; and
- Performance against environmental quality standards or other relevant thresholds.

8.2.2 ASSESSMENT CRITERIA AND IMPACT ASSESSMENT METHODOLOGY

This evaluation examines the potential risks posed to environmental receptors, along with the routes through which these receptors may be influenced. Below are definitions of the key terms:

- **Source** – origins of possible contaminants,
- **Pathway** – how a source may impact a receptor, and
- **Receptor** – specific elements that could be affected, determined by the site's level of sensitivity.

The efficacy of a contaminant migration pathway between a source and a receptor is governed by both spatial separation and the physical characteristics of the medium through which migration occurs. The fundamental principles of hydrogeology and contaminant transport dictate that permeability, porosity, hydraulic conductivity, and attenuation mechanisms play crucial roles in determining the strength of a pathway.

In lithological settings dominated by impermeable clay strata, groundwater migration is significantly constrained due to the low permeability and minimal pore connectivity within the matrix. Clays exhibit a high attenuation capacity, adsorbing contaminants onto their mineral surfaces and thereby restricting contaminant mobility even over relatively short distances. Consequently, the potential for pollutant dispersion via groundwater transport is weak, often necessitating alternative vector analyses such as surface water runoff, vapor intrusion, or preferential flow through structural discontinuities like fissures or fractures.

Conversely, granular formations such as sand or gravel exhibit high permeability and hydraulic conductivity, facilitating rapid contaminant transport within the saturated zone. The increased interconnectivity of pore spaces allows for efficient advective and dispersive movement, meaning that receptors near the source experience stronger exposure due to the limited natural attenuation processes inherent to these substrates. However, at greater distances, dilution and dispersion mechanisms gradually weaken the migration pathway, reducing contaminant concentrations as groundwater flows toward downgradient receptors.

Moreover, the presence of secondary permeability features such as fractures in bedrock or karstic voids within carbonate terrains can significantly alter expected migration behaviour, sometimes bypassing conventional attenuation mechanisms entirely. In such environments, contaminant transport may exhibit non-linear dynamics, where high-velocity preferential pathways result in unpredictable receptor exposure risks.

The significance of expected impacts throughout all stages of the proposed development was assessed by evaluating the importance and sensitivity of key attributes potentially affected, alongside the scale of the anticipated impact.

8.2.3 DETERMINING THE VALUE AND SENSITIVITY OF THE RECEPTOR THROUGH BASELINE STUDIES

The significance or sensitivity of a receptor is primarily influenced by its quality, rarity, and extent. Evaluating its value or sensitivity considers the scale at which the attribute holds importance. To determine the significance of predicted environmental impacts within this assessment, the value of receptors is categorized based on their relative importance, as outlined below.

- LOCAL LEVEL: On the development lands or immediately adjacent to it.
- DISTRICT LEVEL: Beyond the development land boundary but within the district.
- COUNTY LEVEL: County Level e.g., Westmeath
- REGIONAL LEVEL: Eastern and Midlands Region
- NATIONAL LEVEL: Ireland.
- INTERNATIONAL LEVEL: European Community.

Determining the value and sensitivity of a receptor is a fundamental step in assessing potential environmental impacts. This process requires the application of established guidelines, informed professional judgment, and a thorough evaluation of site-specific sensitivities to ensure an accurate classification of each receptor.

In some cases, a receptor's inherent importance is formally recognized through statutory designations, such as Special Areas of Conservation (SACs), Sites of Special Scientific Interest (SSSIs), or Natura 2000 sites. These designations help streamline the assessment process by providing clear criteria for assigning value, as they indicate that a receptor has already been identified as ecologically, culturally, or scientifically significant at national or international levels. However, not all receptors benefit from such formal classification, necessitating a more nuanced approach to evaluating their sensitivity and importance.

The significance of a receptor is determined on a case-by-case basis, considering various factors such as ecological function, rarity, vulnerability to change, and its role within

broader environmental systems. Sensitivity may also be influenced by external pressures, such as existing pollution, habitat fragmentation, or previous human interventions. For receptors without statutory protection, expert judgment plays a crucial role in assessing their sensitivity based on comparative studies, historical records, and site-specific observations.

Additionally, receptors may vary in their response to different types of impact, requiring tailored methodologies to ensure that both direct and indirect effects are considered. While some receptors may exhibit resilience and adaptability to changes introduced by a development, others may be highly susceptible, necessitating mitigation strategies to safeguard their integrity. The classification of receptor sensitivity informs decision-making processes, guiding measures that can minimize adverse impacts while supporting conservation objectives where appropriate.

Regardless of their acknowledged value, all receptors or features possess a certain level of sensitivity to changes introduced by new development. The sensitivity aspect of the assessment ensures that this characteristic is thoroughly evaluated for each receptor. Table 8.1 outlines the classification system used to determine receptor sensitivity. This framework serves as a general methodology, with professional judgment applied in each instance to ensure accurate assessment.

Table 8.1 Receptor Sensitivity and Typical Descriptors

Sensitivity	Descriptors
Very Low	Feature / receptor is generally insensitive to impact, no discernible changes e.g., soils are not in use, the land is used for industrial/commercial purposes and /or mainly covered by hard standing.
Low	Feature / receptor has some tolerance to accommodate the proposed change. It responds in a minimal way that only minor changes are detectable e.g., landscaped areas.
Medium	Feature / receptor has a low capacity to accommodate the proposed form of change. It clearly responds to effects in a quantifiable manner e.g. low-grade agricultural land and recreational ground.
High	Feature / receptor has a very low capacity to accommodate the proposed form of change. The response is a major change e.g. agricultural land use for food production, allotments.

8.2.3.1 Magnitude of Impacts

Magnitude refers to the 'scale' or 'amount' of an impact. Key impacts have been identified, and the likely magnitude of each potential impact has been determined through the

predicted change from the baseline conditions throughout the various phases of development. The magnitude of an impact is a measure of aspects such as the impacts:

- Extent (i.e., the geographical area over which the impact occurs),
- Duration (i.e., the time for which the impact is expected to last prior to recovery or replacement of the resource or feature: short, medium or long term),
- Likelihood (i.e., the probability that the impact will occur),
- Direct or Indirect (i.e., difficult to avoid), and,
- Reversibility (i.e., an irreversible (permanent) impact is one from which recovery is not possible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it: Temporary or Permanent).

In order to help define the level of impact magnitude the following guidance (see Table 8.2) has been adopted for the purpose of providing a transparent assessment. The professional judgement of the technical author is used in the decision-making process when describing impacts in accordance with the criteria set out in Table 8.2.

Table 8.2 Assessment Criteria for Magnitude

Magnitude	Assessment Criteria
No Change	• No loss or alteration of characteristics, features or elements. • No observable impact on receptors/features.
Negligible	• Noticeable, temporary (for part of the development duration) change; or • Barely discernible change for any length of time, over a small area, to any key characteristics or features. • Impact unlikely or rarely to occur. • Results in effects on attribute of insufficient magnitude to affect the use/integrity.
Slight	• Noticeable, temporary (during the project duration) change, over a partial area, to key characteristics or features. Impact will possibly occur. • Impact predicted to extend over a small area. • Impact predicted to affect small numbers of people. • Impact predicted to affect a small number of other receptors (ecological, businesses, facilities). • Impact not predicted to have trans-boundary effects, but possibility remains. • Slight but discernible change in environmental conditions predicted. • Impact not predicted to entail unusual/complex effects for receptors. • Impact not predicted to affect particularly scarce features/resources. • Impact not predicted to result in breaches of legislation or statutory Environmental Quality Standard or Objectives. • Impact not predicted to result in loss of attribute.

Magnitude	Assessment Criteria
	• Impact will continue for a short period of time only. • Impact will be temporary. • Impact will be intermittent and/or rare. • Impact will be reversible. • Impact will be possible to avoid, reduce, repair, or compensate for; or • Slight positive change in environmental conditions resulting in minor improvements in quality or value of a receptor.
Moderate	• Significant, permanent / irreversible changes, over the majority of the development area and potentially beyond, to key characteristics or features. Impact certain or likely to occur. • Impact predicted to extend over a moderate area. • Impact predicted to affect moderate numbers of people. • Impact predicted to affect some other receptors (ecological, businesses, facilities). • Impact unlikely to have trans-boundary effects, but possibility remains. • Moderate change in environmental conditions predicted. • Impact unlikely to entail unusual/complex effects for receptors but possibility remains. • Impact unlikely to affect particularly scarce features/resources but possibility remains. • Impact entails a low probability that breaches of legislation or statutory Environmental Quality Standard or Objectives will occur; • Impact unlikely to result in loss of attribute but possibility remains. • Impact will continue for a moderate period of time. • Impact will be semi-permanent. • Impact will be intermittent. • Impact will be possible to avoid, reduce, repair, or compensate for; or • Notable positive change in environmental conditions resulting in measurable improvements in quality or value of a receptor.
Substantial	• Very significant, permanent / irreversible changes, over the whole development area and beyond (i.e. off-site), to key characteristics or features of character or distinctiveness. Impact certain or likely to occur. • Impact predicted to extend over a large or very large area. • Impact predicted to affect considerable numbers of people. • Impact predicted to affect considerable numbers of other receptors (ecological, businesses, facilities). • Impact predicted to have trans-boundary effects. • Significant change in environmental conditions predicted. • Impact will entail unusual/complex effects for receptors. • Impact will affect particularly scarce features/resources.

Magnitude	Assessment Criteria
	• Impact entails a high probability that breaches of legislation or statutory Environmental Quality Standard or Objectives will occur. • Impact will result in total loss of attribute. • Impact will continue for extended periods of time. • Impact will be permanent rather than temporary. • Impact will be continuous rather than intermittent, or where intermittent, frequent rather than rare. • Impact will be irreversible. • Impact will be very difficult to avoid, reduce, repair, or compensate for; or • Significant positive change in environmental conditions resulting in major improvements in quality or value of a receptor.

8.2.3.2 Impact Significance

Section 236 of the Planning and Development Act, 2024 (as amended) state that it is necessary to *"identify, describe and assess the direct and indirect significant effects of the relevant development concerned"*. Therefore, an assessment of significance is necessary to identify the main environmental effects of the proposed development and assist in determining what weight these effects should be given.

Definitive guidance in the preparation of EIA in the soils and geological environment exists in *"Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements",* issued by the Institute of geologists of Ireland. From the guidance, a significant effect is defined as "an impact, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment".

It is widely acknowledged that the significance of an impact is determined by the relationship between its magnitude and the sensitivity or value of the affected environmental receptor.

To support the evaluation process, the Impact Significance Matrix (ISM) (Table 7.3) offers a clear and systematic approach, ensuring consistency and facilitating the interpretation of impact significance.

An initial assessment of whether an impact is adverse or beneficial is derived by integrating magnitude and sensitivity/value according to the ISM framework. While this matrix provides a robust methodology for assessing impacts across diverse environmental factors, professional judgment and further objective analysis remain essential in refining the final significance determination. Given that the criteria operate along a continuum

rather than fixed thresholds, expert evaluation is required to balance the relative importance of magnitude and sensitivity/value in each case.

Receptors with formal legal designations are inherently classified as high-value entities, typically holding greater importance than non-designated features. Consequently, impacts affecting designated receptors are assigned a higher significance level compared to those affecting non-designated features. The value classification for these designated receptors establishes a preliminary assumption that impacts will be significant. However, sensitivity assessments can be used to either validate or adjust this initial determination, ensuring a more precise evaluation.

Table 8.3 Impact Significance Assessment

Magnitude[1]	Value/sensitivity of receptor[2]			
	Very Low	Low	Medium	High
No Change	Negligible	Negligible	Negligible	Minor
Negligible	Negligible	Minor	Minor	Moderate
Slight	Minor	Minor	Moderate	Major
Moderate	Minor	Moderate	Major	Major
Substantial	Moderate	Major	Major	Major

Note 1 Refer to Table 8.2
Note 2 Refer to Table 8.1

Given the use of professional judgement in the assessment process, there may be some variation between subject areas (i.e., different environmental parameters) in the significance rating process. This may be because of limited information on the sensitivity of features and / or the complexity of interactions that require assessment in determining the magnitude of change. However, the ratings derived through the impact assessment process, as set out in Table 8.3 can also be described in a generic fashion as given in Table 8.4. The following definitions are proposed in relation to the significance of environmental impacts predicted throughout this EIAR

Table 8.4 Impact Significance Definitions

Level of Significance	Description
Negligible	No discernible effect. An impact that is likely to have imperceptible or insignificant impact.
Minor	Slight, very short or highly localised impact of no significant consequence. These effects may be raised as local issues but on their own are unlikely to be of importance in the decision-making process. When combined with other effects these could have a more material influence.

Moderate	Intermediate limited (extent / duration / magnitude) impact that may be considered as significant. These effects are likely to be important considerations at a local level. These could have influence on decision making especially when combined with other similar effects.
Major	Very large or considerable impact (extent/duration/magnitude). Effects, both adverse and beneficial, which are likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or, could result in exceedance of statutory objectives and / or breaches of legislation. In isolation, these could have a material influence on the decision-making process.

8.2.3.3 Impact Mitigation Measures

Following the implementation of mitigation measures the identified impacts may be reduced to environmentally acceptable levels (or not).

It is best practice to consider mitigation measures for all impacts that are of a minor negative significance (i.e., slight, very short or highly localized impact of no significant consequence) or higher and this has been adopted for the purpose of this assessment.

The purpose of mitigation is to reduce the significance of the residual impact (see below) to a minor adverse or imperceptible level, which is a level that is expected to be acceptable by local authority, environmental regulators, and the public. Individual impacts assessed as being of minor adverse or imperceptible significance have not automatically been considered to require mitigation. However, where appropriate, and considering views and comments received through consultation, consideration has been given to the implementation of mitigation measures designed to reduce minor adverse impacts to an imperceptible level.

Mitigation measures can be incorporated at various stages in the proposed development. The preferred hierarchy of mitigation is as follows:

- Prevention: At the design stage: avoid, relocate, modify the design and / or do not process with the development.
- Reduction: introduce design modification or additional structures (e.g., screens), reduce size and scale of development etc.; and,
- Compensation or remediation: compensation to provide like-for-like replacement for any lost environmental elements. When adverse impacts are unavoidable, it may also be possible to limit the duration of an impact by undertaking remedial works. For example, the impact on the landscape of mineral extraction is largely

unavoidable, but the land can be progressively restored following the completion of extraction to complement or enhance the character of the landscape.

8.3 DESCRIPTION OF PROPOSED DEVELOPMENT

Red Admiral DC Limited propose to develop a DC facility and DER on lands in the townlands of Gneevebane, Oldtown, Farthingstown, Castlelost and Kiltotan and Collinstown in the south of County Westmeath. The project includes two main elements, namely:

- The Data Centre (DC) facility, comprising six two-storey Data Centre buildings, car parking, landscaping, drainage and other associated works. The DC facility will be constructed and secured within a 39ha campus. Each DC building will have a footprint of 13,978 m^2 (sqm). Each DC building will contain:
  - Data halls fitted with server racks and distribution units,
  - Mechanical and electrical (M&E) plant rooms /spaces which will house advanced cooling equipment, pumps, piping and medium voltage (MV) and low voltage (LV) switchgear, and
  - Administration and support areas including, reception, offices, meeting rooms and welfare facilities.
- Decentralised Energy Resource (DER), which will be constructed across approximately 200ha of lands adjoining the DC facility. The DER incorporates several power assets which will generate, store and manage electricity close to the DC facility. The DER comprises the following assets:
  - Fuel Cell Power System – 160MW,
  - Battery Energy Storage System (BESS) – 250MW,
  - Solar PV farm (nominal 180MWp), and
  - 220kV IPP GIS Grid connection to the 220kV Castlelost GIS substation which adjoins the proposed development site.

It is proposed that three groundwater wells will be installed to supply the site with water, equivalent to 40m^3 per day. Firewater retention provision is included within the development, with an emphasis on using these to increase local biodiversity. Uisce Éireann has issued a Confirmation of Feasibility (CoF) confirming that 10m^3 per day can be supplied from the public water network. Taking account of this confirmed public supply contribution, reliance on groundwater abstraction will be reduced relative to the ≤40m^3 day envelope assessed in the EIAR. The maximum groundwater abstraction will therefore not exceed approximately 30m^3 per day and is anticipated to be approximately 26m^3 per day based on current operational demand calculations.

A full description of the proposed development is provided in Chapter 2 of this EIAR.

8.4 DESCRIPTION OF RECEIVING ENVIRONMENT

The main development site is situated approximately 3 kilometres southwest of Rochfortbridge and about 3 kilometres east-north-east of Tyrrellspass, within the townlands of Farthingstown and Kiltotan & Collinstown, County Westmeath. The development area consists of greenfield lands with the site also adjacent to the M6 motorway. Surrounding the site to the east, northeast and northwest are one-off existing residential properties, which are themselves adjacent to agricultural lands which are used for a combination of either horticulture or for pasture (Figure 8.1).

The primary access point to the main site is via the regional road R446, which runs across the northern section of the development lands. Lands in which solar PV development are proposed are currently access from the R446 (northern parcel), the L51251 and L11272 (middle and southern parcels). Within and adjacent to the development lands, the Castlelost Flexgen Reserve Gas-Fired Generator (275MWe capacity) is under construction (nearing completion) along with a newly constructed 220kV Gas Insulated Switchgear (GIS) Electrical Substation

Figure 8.1 Location of Development Lands



8.4.1 HISTORICAL LAND USE

Review of historical aerial imagery and mapping indicates that the site was historically used as agricultural land. There are areas of extensive cutaway bogs, quarries and

forestry located to the south. Lands in the general area of the site are predominantly agricultural pastures with some arable lands.

8.4.2 TOPOGRAPHY

The topography in the general area of the site gently slopes from the agricultural pastures to the north towards peatlands, beyond the M6 to the south /southeast (Figure 8.2). The highest feature in the general area of the site is Croghan Hill, which is located approximately 6.3km southeast of the site. In terms of the proposed development lands, topography is best described as gradually sloping from higher ground in the west and north to lower ground in the southeast. The lands within the development boundary gently rise from the lowest point of 93.5m OD in the southeast, close to the boundary with the M6 motorway, to 107.1m OD in the west of the site and 105m OD and 107m OD (at the proposed main entrance to the development lands from the R446).

Figure 8.2 Ground Elevation in the vicinity of the development lands



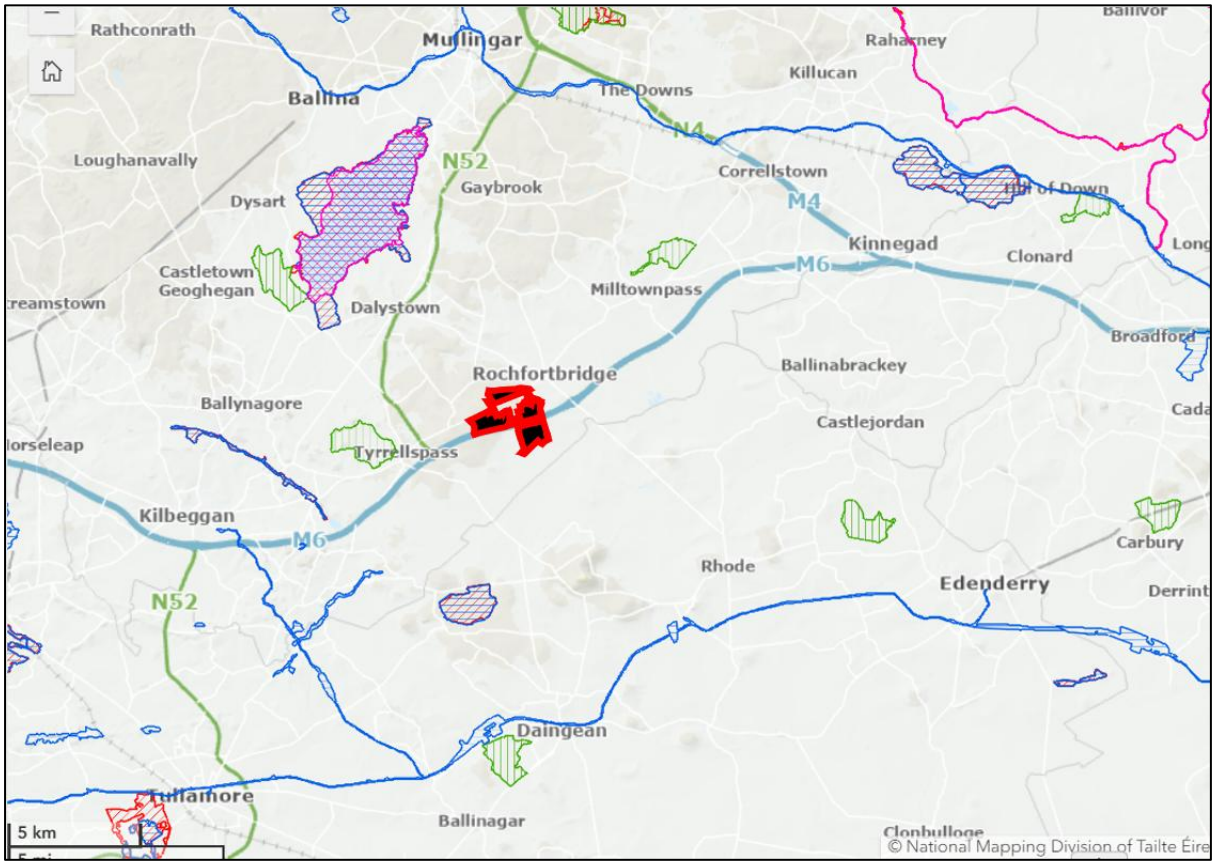
Note
1. Ground Elevation in the vicinity of the development lands. Red highlighting = >130mOD; Yellow highlighting = 130-100mOD; Green highlighting = <100mOD.

There are no Natura 2000 sites (European Sites) within or immediately close to the development lands (Figure 8.3). The nearest European sites to the development lands are associated with Raheenmore Bog and include the Raheenmore Bog SAC (Site Code 000582), which is located just over 4.5km to the south. Other designated ecological sites within a 15km radius of the site are as follows:

- Cloncrow Bog (New Forest) NHA, Site Code 000677, is located 2.5km west of the development lands.
- Lough Ennell SAC and NHA, site code 000685, is located 6.25km northwest of the development lands.

- Split Hills and Long Hill Esker SAC, site code 001831 is located 6.2km west of the development lands.
- Wooddown Bog SAC, site code 002205, is located approximately 14.33km northwest of the development lands.
- Lough Ennell SPA, site code 004044, is located 6.94km northwest of the development lands.
- Milltownpass Bog NHA, site code 002323, is located approximately 7km northeast of the development lands.
- Black Castle Bog NHA site code 000570 is located 12.5km southeast of the development lands.
- Grand Canal NHA, site code 002104, which is located approximately 10km south of the development lands at its closest point.
- Royal Canal NHA, site code 002103, which is located 11.8km northeast of the development lands at its closest point.
- Daingean Bog NHA, site code 0020033, which is located 11.4km south of the development lands.
- Rahugh Ridge (Kiltober Esker), NHA, which is located 6.7km southeast of the development lands.
- Murphys Bridge Esker NHA, site code 0017756, which is located 9.4km southeast of the development lands.
- Nure Bog NHA, site code 001725, which is located 8km northwest of the development lands.

Figure 8.3 Distribution of conservation areas adjacent to the development lands



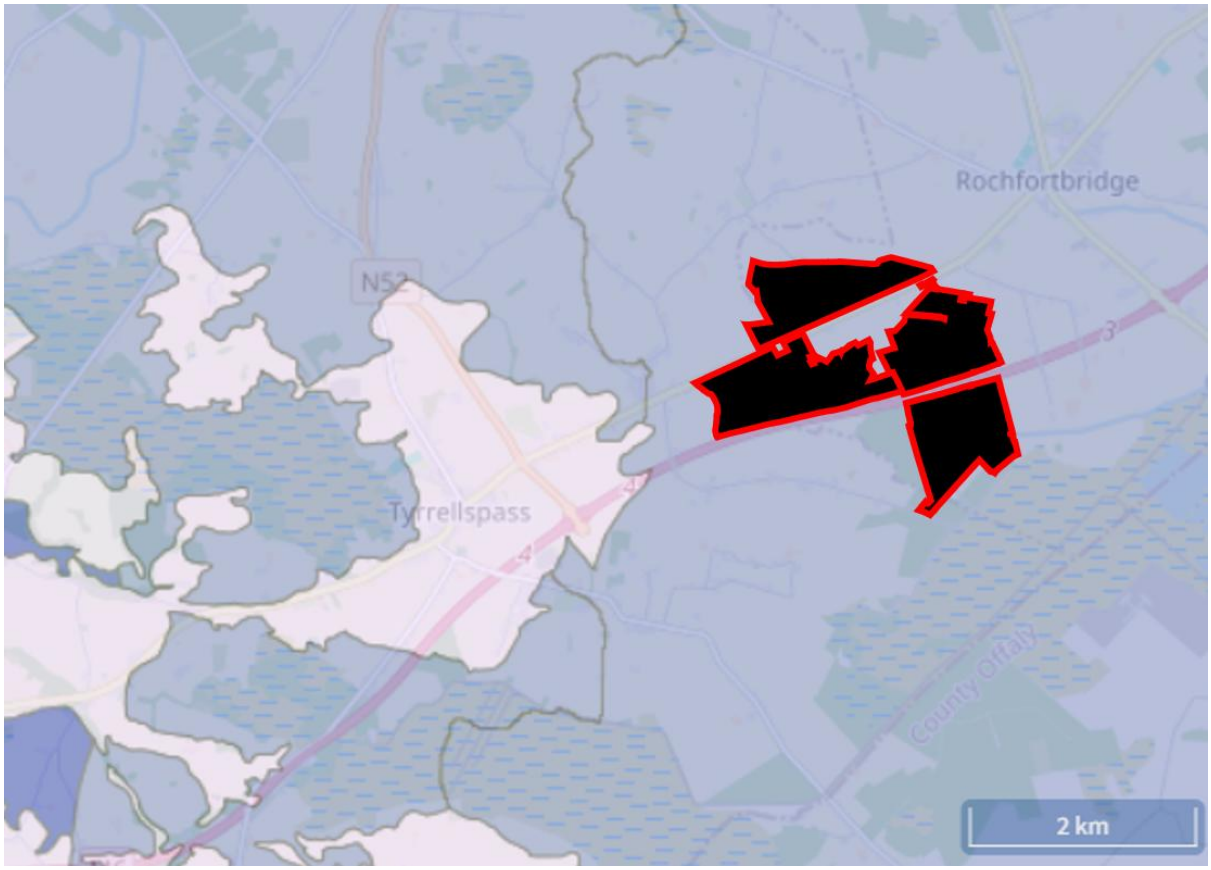
8.4.3 HYDROGEOLOGICAL SETTING

8.4.3.1 Groundwater Body

The development lands are situated within the Athboy groundwater body (WFD site code IE_EA_G-001), classified by the EPA as "Not at Risk." This groundwater body (Figure 7.4) extends from Navan in the northeast to Tyrrellspass and Rochfortbridge in Westmeath. Its gently undulating topography, shaped by glacial activity, features isolated hills that seldom exceed 150 meters above ordnance datum (OD). The aquifer system is composed of Dinantian Upper Impure Limestones, Dinantian Pure Unbedded Limestones, and Dinantian Lower Impure Limestones, with contributions from Dinantian Early Sandstones, Shales, and Limestones. Groundwater flow occurs in the upper fractured zones within the first 3 to 10 meters of bedrock. Pumping tests at locations such as Ballivor and Athboy reveal transmissivity values between 10 and 230 m²/day, with some areas exhibiting confined conditions. The groundwater body sustains several surface water bodies, including the Yellow, Stonyford, and Blackwater rivers, alongside terrestrial ecosystems such as Raheenmore Bog and Mount Hevey Bog, playing a vital role in water supply and ecological stability.

In aquifers of local importance, groundwater flow is primarily concentrated within the upper 3-meter weathered zone and extends through fractures in the top 10 meters. Occasionally, deeper flows occur in cavities where pure limestone has been enlarged by karstification. Diffuse recharge is the main process replenishing the aquifer, influenced by factors such as slope and the permeability of soil and subsoil. Given the aquifer's low permeability, a substantial portion of recharge quickly discharges into surface water bodies via upper weathered layers, limiting the available groundwater resources. This groundwater body primarily feeds the overlying rivers and streams, with occasional discharge to the adjacent Trim groundwater body to the east. Discharge to rivers occurs as baseflow, with Dry Weather Flows (DWF) rated from moderate to low. EPA data indicates that the groundwater in this region is hard (250–350 mg/l CaCO3) and has high electrical conductivity (600–700 µS/cm).

Figure 8.4 Distribution of groundwater bodies adjacent to the development lands



Note

1. Grey shading represents the Athboy Groundwater Body (GWB), Pale shading represents Kilbeggan Gravels, and Blue shading represents the Tullamore GWB

8.4.3.2 Bedrock Aquifer

An aquifer is a geological structure capable of storing and supplying substantial amounts of water. These formations are typically composed of clean, coarser geological materials, with permeability developing through various natural processes. In Ireland, aquifers vary in type, bedrock aquifers include limestone, dolomite, sandstone, and volcanic formations, while unconsolidated aquifers consist of sands and gravels. The aquifer beneath the proposed development site is classified as a *"locally important aquifer – bedrock that is moderately productive but only in specific areas."*

The entire land surface of Ireland is assessed and categorized into four groundwater vulnerability levels (Table 8.5): extreme (E), high (H), moderate (M), and low (L), based on geological and hydrogeological characteristics. Groundwater vulnerability refers to how easily contaminants from human activities can infiltrate the water supply (DELG et al., 1999). Several factors determine this vulnerability, including the time required for infiltrating water (and pollutants) to reach the groundwater, the volume of contaminants that may enter the system, and the ability of geological materials to absorb or filter pollutants.

At a specific site, groundwater vulnerability is influenced by factors such as the type and permeability of subsoils, the thickness of the unsaturated zone through which contaminants travel, and the recharge mechanism—whether through direct infiltration (point recharge) or widespread percolation (diffuse recharge). According to guidelines published by the Geological Survey of Ireland (GSI), the thicker and less permeable the overlying materials, the lower the risk of contamination to the aquifer

Table 8.5 GSI Groundwater Vulnerability Guidelines

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) & Thickness			Unsaturated Zone	Karst Features
	High Permeability (sand/gravel)	Moderate permeability (e.g. sandy subsoil)	Low permeability (e.g. clayey subsoil, clay, peat)	(sand/gravel aquifers only)	(<30m radius)
Extreme (E)	0 – 3.0m	0 – 3.0m	0 – 3.0m	0 – 3.0m	-
High (H)	>3.0m	3.0 – 10.0m	3.0 – 5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0 – 10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A

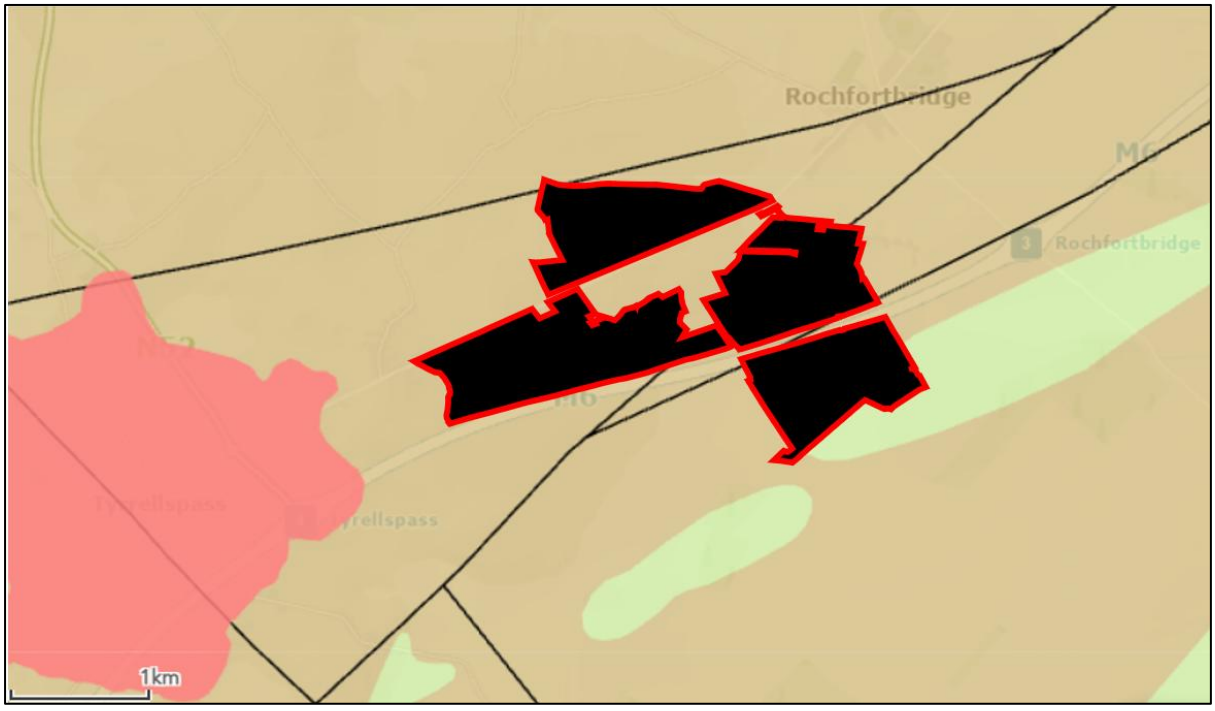
Notes: (1) N/A = not applicable
(2) Precise permeability values cannot be given at present
(3) Release point of contaminants is assumed to be 1-2m below ground surface.

At the proposed development site, the aquifer is defined as Locally Important, and Moderately or Poorly productive in local zones (Figure 8.5 and Figure 8.6). A Locally Important aquifer is one that can supply water for local needs, such as smaller public water supplies or group schemes, but it does not have the capacity to support large-scale regional water demands.

When an aquifer is classified as Moderately Productive in Local Zones, it means that while the aquifer has limited water-bearing capacity, there are specific areas within it where groundwater is more readily available. These productive zones may be due to localized geological features, such as fractures or fissures in the bedrock, which allow water to flow and be extracted more efficiently.

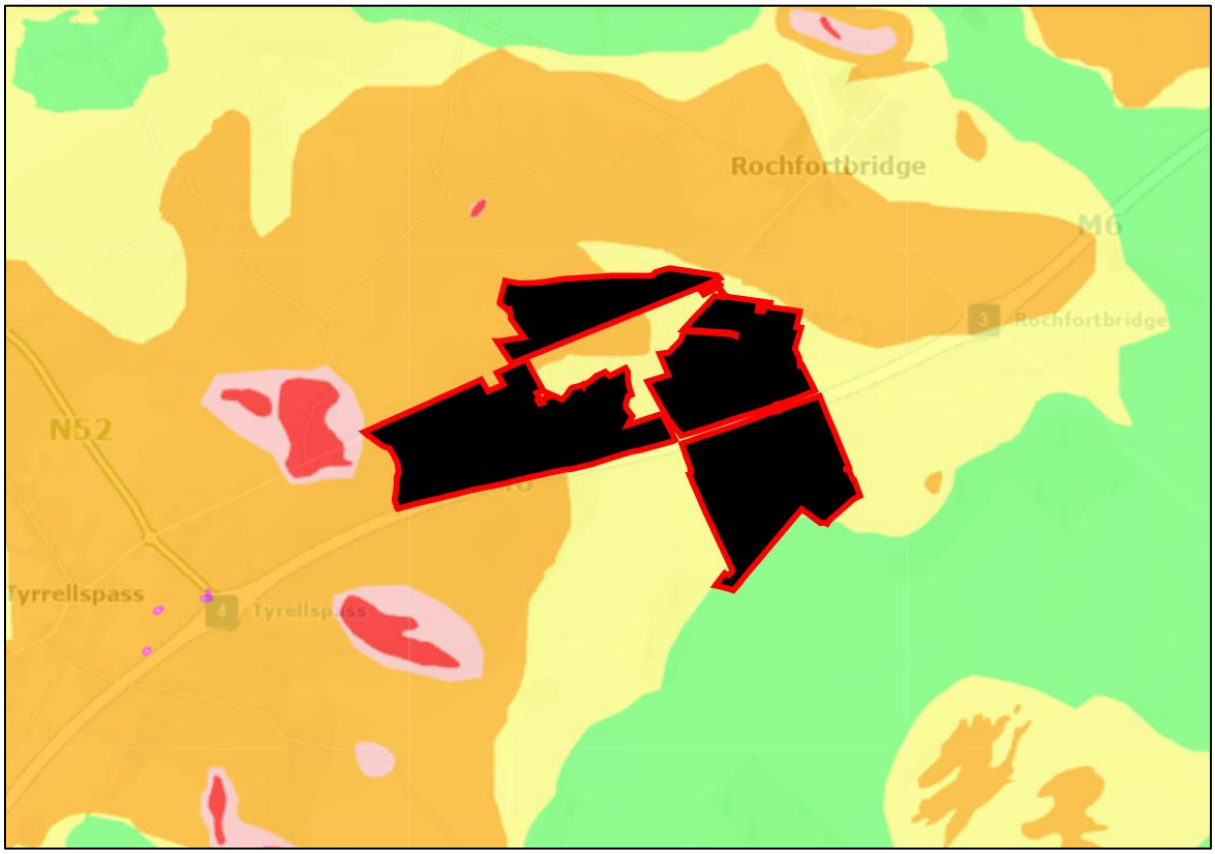
This classification helps in groundwater management by indicating that while the aquifer may not be consistently productive across its entire extent, certain areas within it can still provide useful water supplies for local communities.

Figure 8.5 Aquifer Classification



Note
1. Brown and pale green shading denotes Locally important aquifer; red shading denotes Locally important gravel aquifer.

Figure 8.6 Aquifer Vulnerability



Note

1. The development lands are in areas with Low (Green) Moderate (Yellow) or High (Orange) vulnerability.

8.4.3.3 Aquifer Vulnerability

The Geological Society Ireland (GSI) defines groundwater vulnerability as the natural characteristics of the ground that determine the ease with which groundwater may be contaminated by human activities. In practice, the classification is based on how easily infiltrating water and any contaminants can move downward through soil, subsoil and bedrock to the water table or aquifer. Where the pathway is short, permeable or highly connected, groundwater is more vulnerable; where the pathway is thicker, less permeable and slower, groundwater is less vulnerable.

A moderate vulnerability (M) rating indicates that groundwater has a reasonable degree of natural protection, but contamination can still occur if pollutants are persistently or significantly introduced at the ground surface. Under GSI examples, moderate vulnerability commonly occurs where there is a greater than 10m thickness of moderately permeable till (boulder clay) above the groundwater body. In these settings, the subsoil can slow down percolation and provide some attenuation of contaminants, reducing but not eliminating the risk. As a result, pollutants from poorly maintained septic systems,

agricultural activities, leaking tanks or other diffuse and point sources may still reach groundwater over time, particularly where local permeability is higher or where preferential flow paths are present.

A low vulnerability (L) rating means that groundwater is well protected by natural geological conditions and that the downward movement of water and contaminants is strongly restricted. GSI examples show this class in areas with around 10 m of low-permeability till (boulder clay) overlying the groundwater body. Such low-permeability overburden acts as an effective barrier, limiting recharge rates and significantly reducing the likelihood that contaminants introduced at the surface will penetrate to groundwater. Even so, low vulnerability does not mean zero risk. Contamination may still arise where the protective cover is disturbed, where excavations or poorly constructed boreholes create direct pathways, or where local fractures and sand /gravel lenses increase permeability.

8.4.3.4 Groundwater Flow

Field data was available to determine groundwater flow direction and gradient across the site. Monitoring boreholes were installed at 5 x locations across the development lands, using a rotary coring method, and drilled to an average depth of 9.7m below ground level. Within these boreholes, PVC pipes were installed to facilitate monitoring of groundwater levels. Using a combination of manual dipping of the wells, and the installation of water level dataloggers, it is possible to determine the direction of flow, and it is possible to estimate the rate of groundwater flow through the aquifer underlying the development lands.

Combining the water level data with rainfall data derived from a local weather station (in this case, Mullingar AWS), enables the response to rainfall at each borehole location to be observed, with implications for how the aquifer responds to rainfall at each borehole location.

Figure 8.7 Location of borehole BH01, BH08, BH12, BH13 and BH15 across the development lands.



Borehole water level dataloggers are pivotal in delineating groundwater flow by precisely recording temporal variations in hydraulic head within monitoring wells. These dataloggers utilize high-accuracy pressure transducers to capture fluctuations in water levels at set intervals, enabling the computation of the hydraulic gradient—a key factor in applying Darcy's Law for flow estimation. By assembling time series data across multiple boreholes, hydrogeologists can analyse the spatial distribution of the potentiometric surface, which reflects the aquifer's transmissivity and storativity.

Using high-resolution, time-stamped water level measurements alongside detailed rainfall intensity and duration data, researchers can identify temporal correlations and lag times between rainfall events and subsequent rises in the hydraulic head.

Figure 8.8 Water level (mOD) and Rainfall (mm/hr) records for BH01

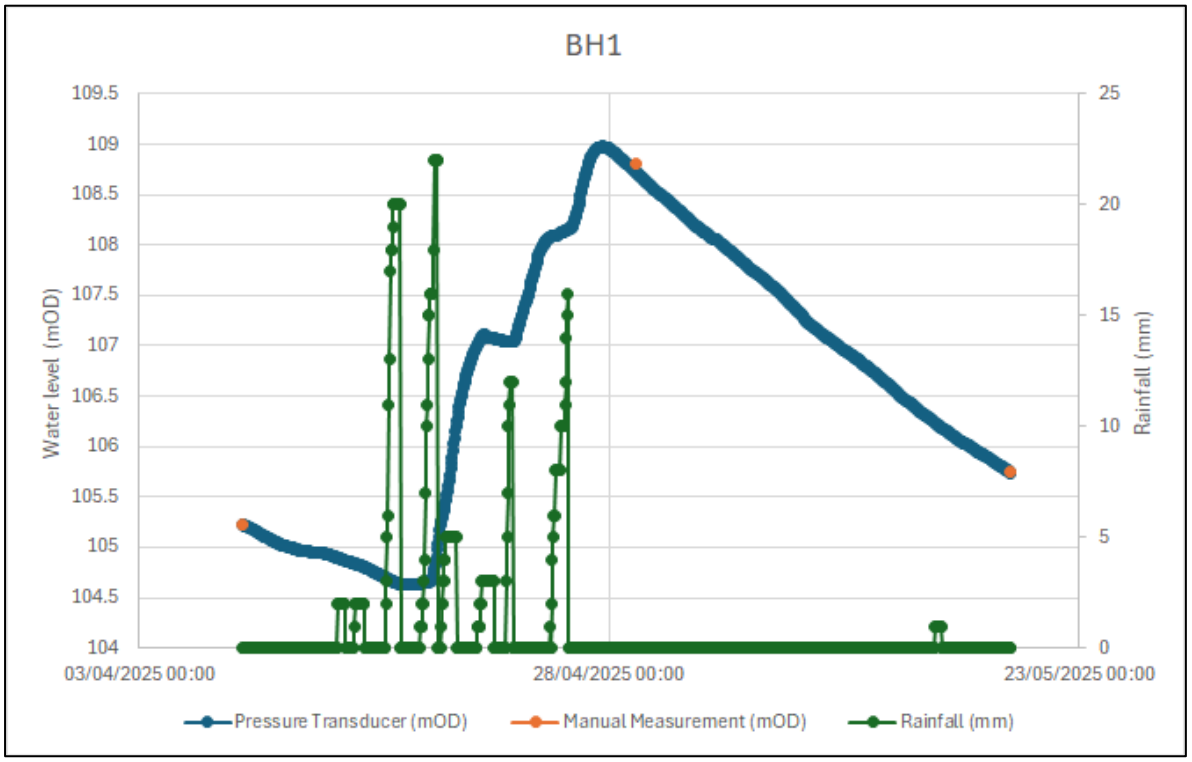


Figure 8.9 Water level (mOD) and Rainfall (mm/hr) records for BH12.

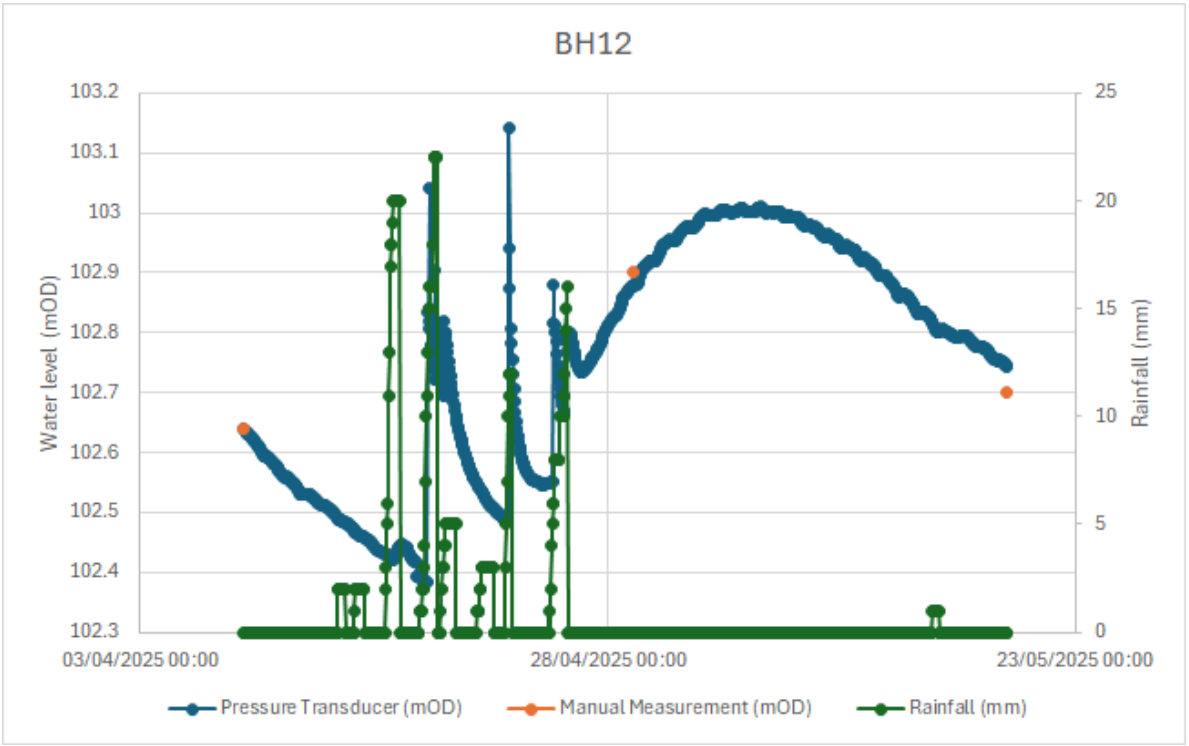


Figure 8.10 Water level (mOD) and Rainfall (mm/hr) records for BH13.

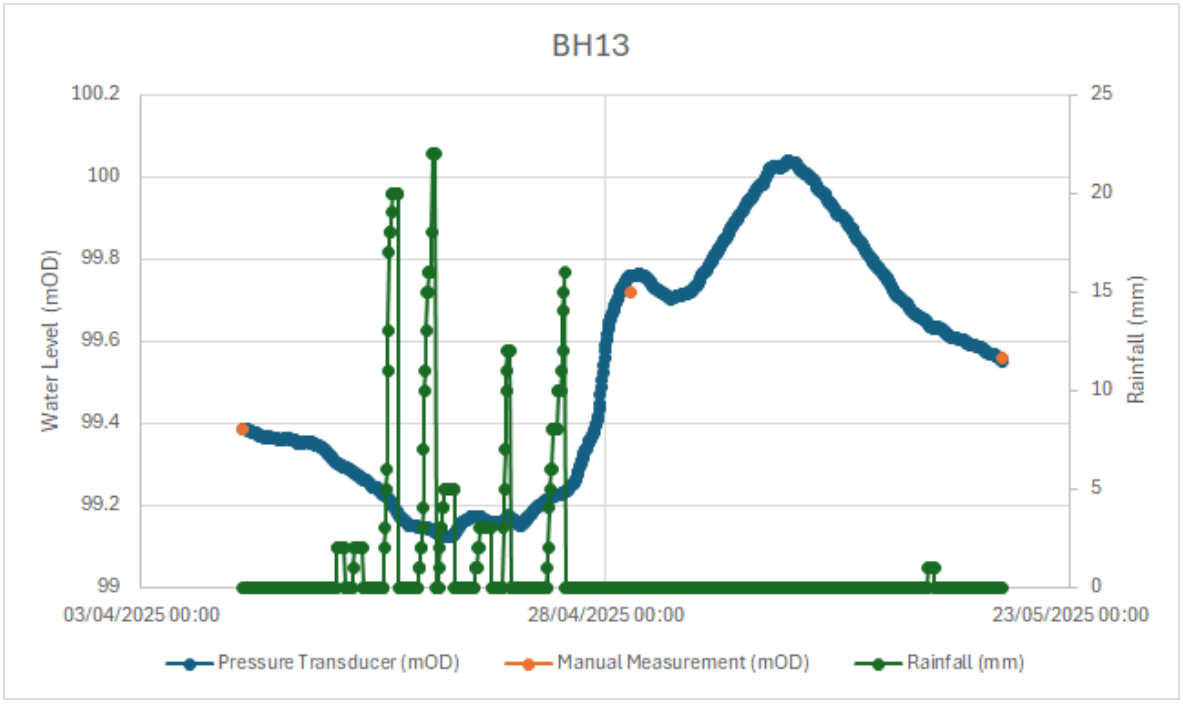
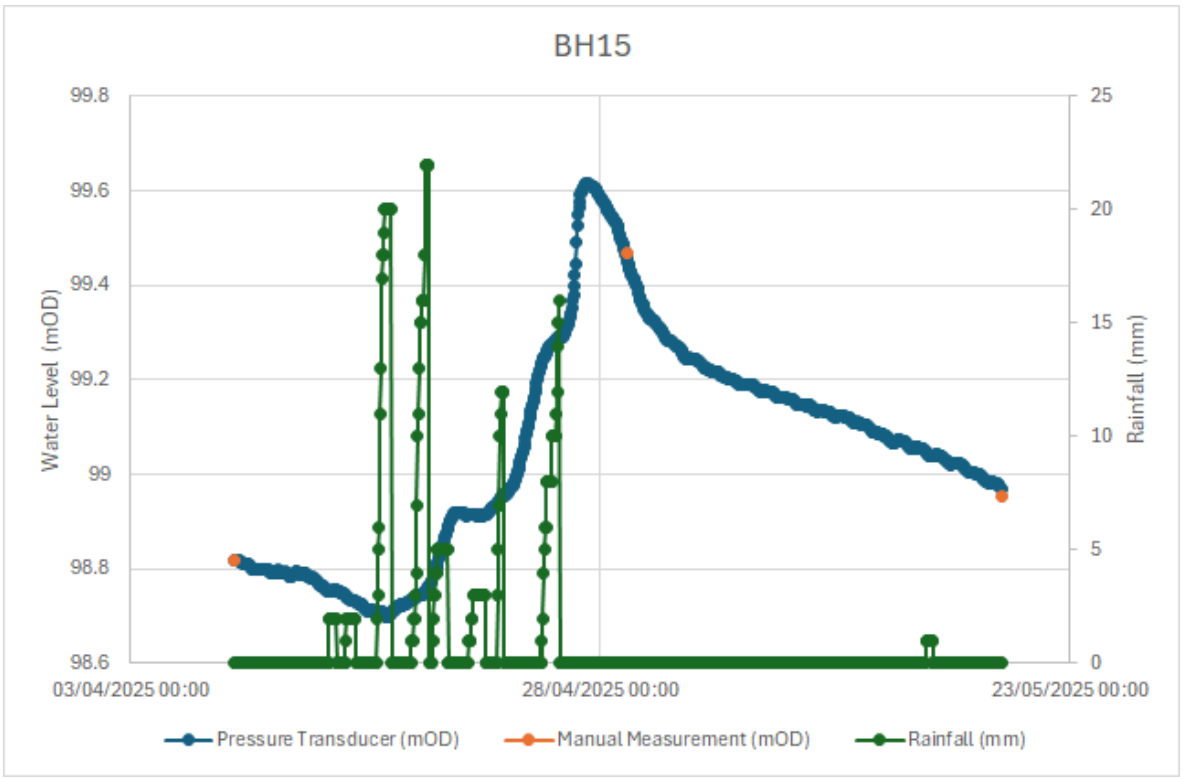


Figure 8.11 Water level (mOD) and Rainfall (mm/hr) records for BH15.



All boreholes display a clear response to rainfall events, but both the magnitude and timing of water level rises vary. For example, BH01 experiences a steep increase of 4.2 m, while BH12, BH13, and BH15 show more modest rises of 0.6 m, 0.9 m, and 0.9 m respectively.

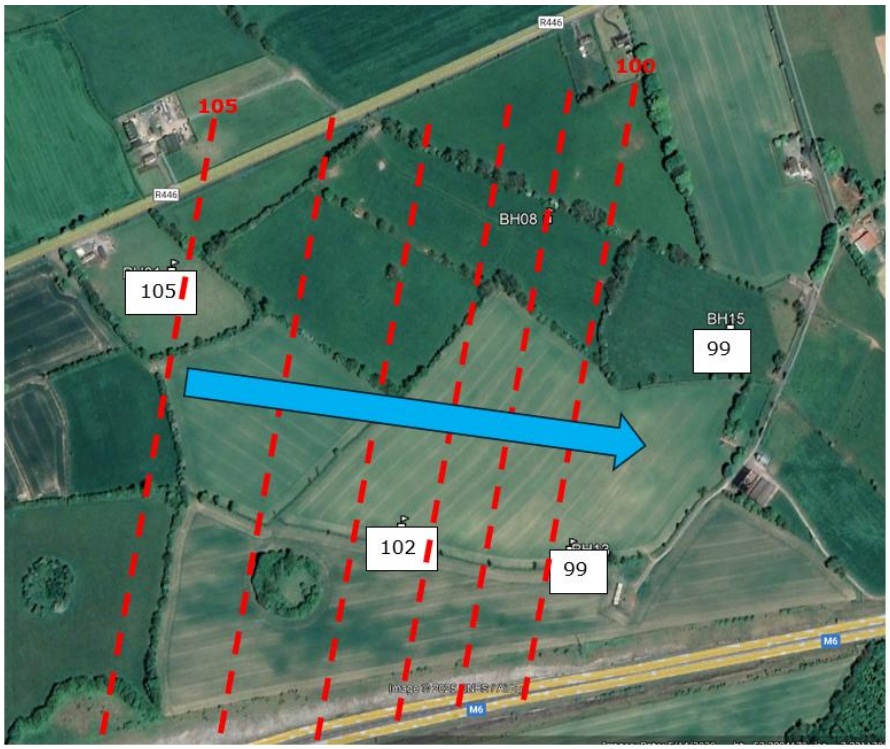
The significant rise in BH01 indicates very efficient recharge or distinct aquifer conditions at that location. In contrast, the intermediate response observed in BH15 could be due to proximity to a focused recharge area or being situated in a zone with higher hydraulic conductivity. Although borehole log data suggest a homogeneous sediment stratigraphy and well construction (see Appendix 7.1), even subtle heterogeneities, such as minor variations in sediment grain size, porosity or the existence of micro-channels, can influence local hydraulic properties.

The slower responses observed in BH12 and BH13 imply that these locations may have lower hydraulic conductivity or higher storativity, which dampens and delays the water level rise despite rainfall. Factors such as increased distance from recharge zones or the presence of confining layers may also play a role. Overall, these variations suggest that the potentiometric surface is not uniform but is warped by the interplay between variable recharge, aquifer properties, and subsurface flow. This heterogeneity has important implications for groundwater flow directions and could lead to preferential pathways for water or contaminant movement.

During dry spells, groundwater systems often achieve hydraulic equilibrium, resulting in similar water levels across wells regardless of their location (Figure 8.12). This uniformity indicates that, in the absence of transient inputs such as rainfall, the properties of the aquifer (like hydraulic conductivity and storativity) allow water to laterally redistribute until a balanced potentiometric surface is achieved. In this state, long-term recharge and discharge processes have smoothed out local differences, meaning that minor heterogeneities in sediment or aquifer structure become inconsequential under low-recharge conditions.

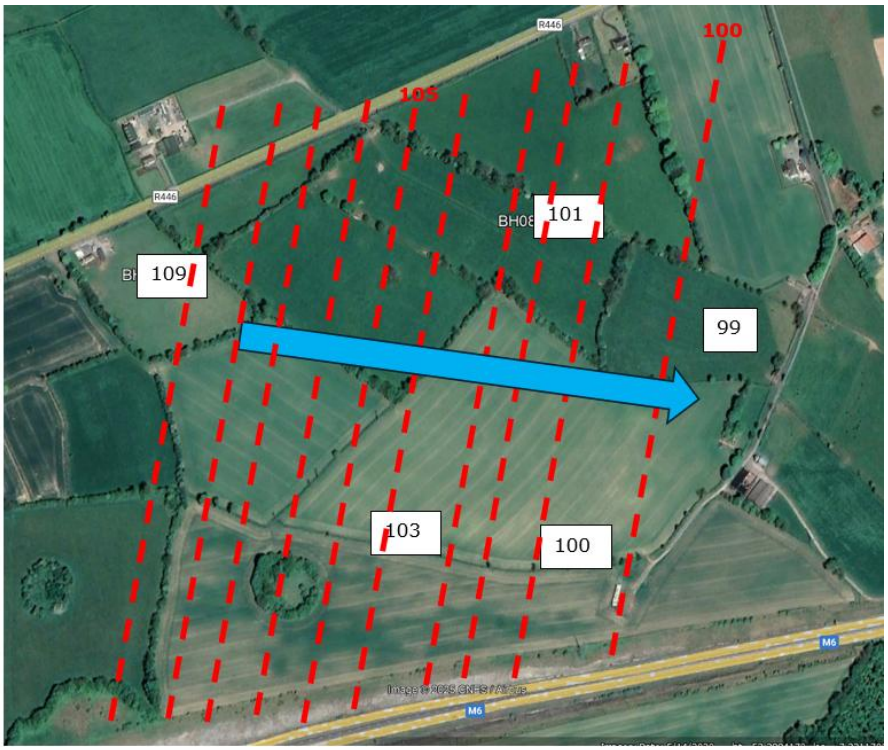
After a rainfall event (Figure 8.13), these same underlying heterogeneities become much more pronounced. Rainfall acts as a dynamic forcing function, and even subtle local differences in recharge capacity, permeability, or the presence of preferential flow paths will cause water levels to respond at different rates. For example, areas with high hydraulic conductivity or direct, focused recharge can quickly transmit the extra water, leading to steep rises in water levels (BH01), while zones with lower permeability or minor confining layers will exhibit a delayed or more modest response (BH12, BH13 and BH15). This divergence reveals that while the overall system may appear homogeneous during equilibrium, its transient behaviour under active recharge conditions exposes variable local hydraulic properties, which can have significant implications for understanding groundwater flow directions and the potential migration of solutes or contaminants.

Figure 8.12 Groundwater flow direction (blue arrow)



Note 1 Red dashes denote groundwater contour lines in mOD. Text boxes denote water levels recorded relative to mOD on 17 April 2025.

Figure 8.13 Groundwater flow direction (blue arrow)



Note 1 Red dashes denote groundwater contour lines in mOD. Text boxes denote water levels recorded relative to mOD on 29th April 2025.

Determining the direction of groundwater flow involves collecting water level data from strategically placed observation wells or piezometers within an aquifer. These measurements reflect the hydraulic head at each site, which is essentially the potential energy of water due to elevation and pressure. By mapping these heads on a contour diagram, one can visualize the hydraulic gradient—the slope representing the direction and magnitude of water movement (Figure 8.12 and Figure 8.13). Groundwater naturally flows from areas of higher hydraulic head to those of lower head, so by linking the highest and lowest readings, the flow path becomes clear. Measurements recorded at boreholes within the development lands demonstrate that groundwater flow direction coincides with topography and is towards the east/southeast towards the Monagh and Castlejordan Rivers (Figure 8.12 and Figure 8.13).

8.4.3.5 Groundwater Wells and springs

The following Groundwater wells and springs (Figure 8.14) are listed on the Geological Survey of Ireland webpage as located within a 5km radius of the development lands. This list excludes Trial Pits.

- IE_GSI_GW_Well_32279, approximately 50m to the east, used for agriculture and domestic supply.
- IE_GSI_GW_Well_32242, approximately 1.5km north-north-west, used for agriculture and domestic supply.
- IE_GSI_GW_Well_27153, approximately 3.5km southeast, domestic supply only

In terms of Source Protection Areas (SPA) for groundwater fed public water supplies, the closest area is the Toberdaly Public Water Scheme (Figure 8.15), approximately 8km southeast of the development lands. The proposed development is far outside the protection area for that supply.

Figure 8.14 Groundwater wells and springs adjacent to the development lands

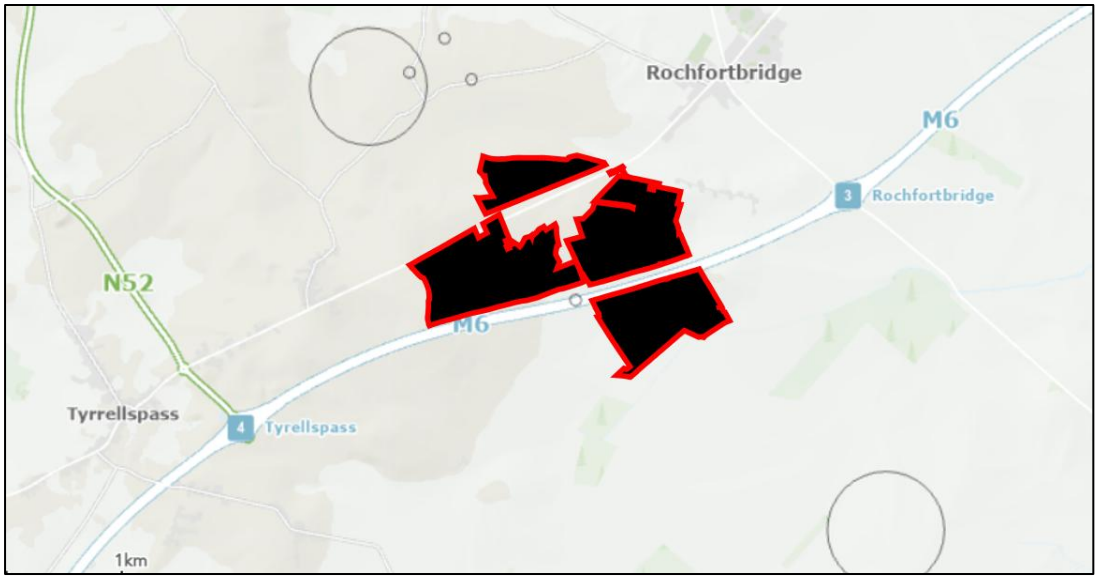
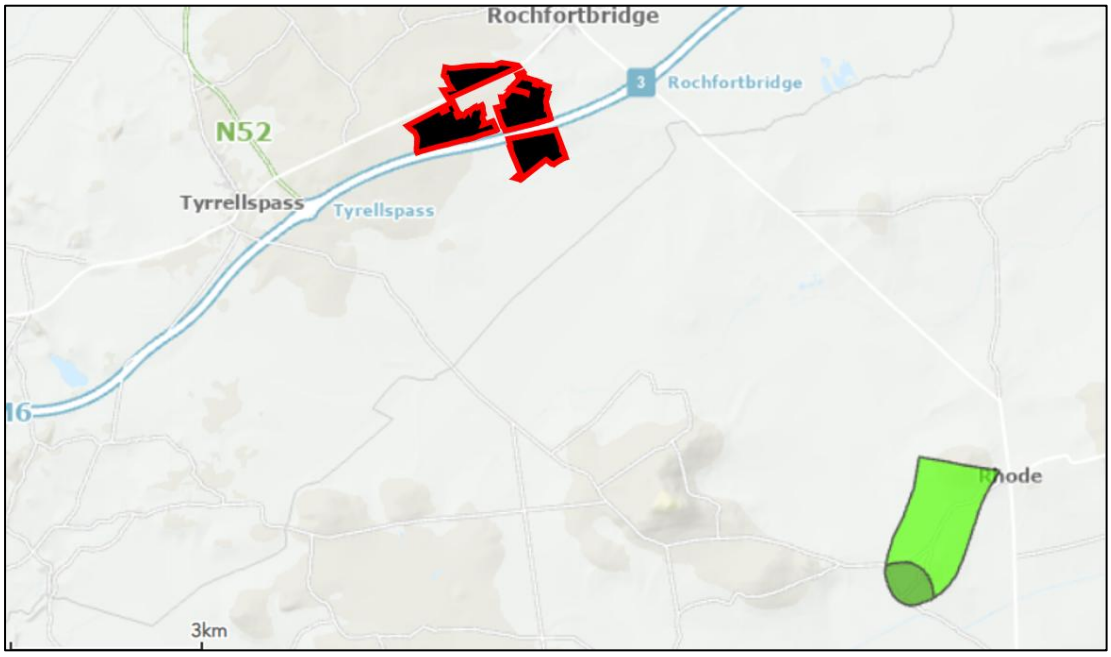


Figure 8.15 Source Protection Area for the Toberdaly Public Water Scheme (green shaded area)



8.4.3.6 Groundwater recharge

Groundwater recharge is the fundamental process by which water infiltrates and replenishes an aquifer, ensuring its sustained availability for ecological and human use. This recharge primarily occurs through the downward movement of water from surface sources, driven by hydraulic gradients and facilitated by geological and hydrological conditions. The mechanisms of groundwater recharge can be broadly categorized into

diffuse recharge and point recharge, each governed by distinct hydrodynamic and geological characteristics.

Diffuse recharge occurs over large areas and is driven by precipitation percolation through permeable subsoil and rock formations. When rainfall occurs, water infiltrates the unsaturated zone, moving vertically through interstitial spaces in soil and rock until it reaches the water table. The rate of infiltration depends on several factors, including soil permeability, antecedent moisture conditions, evapotranspiration rates, and the presence of vegetation cover, which can enhance or impede percolation. In highly permeable lithologies, such as sandstones or well-fractured limestones, the percolation rate is high, whereas low-permeability substrates (e.g., clay-rich deposits) may significantly reduce infiltration, leading to surface runoff rather than recharge.

Point recharge refers to localized areas where groundwater recharge occurs more directly and rapidly, typically through features that provide preferential flow paths. These include:

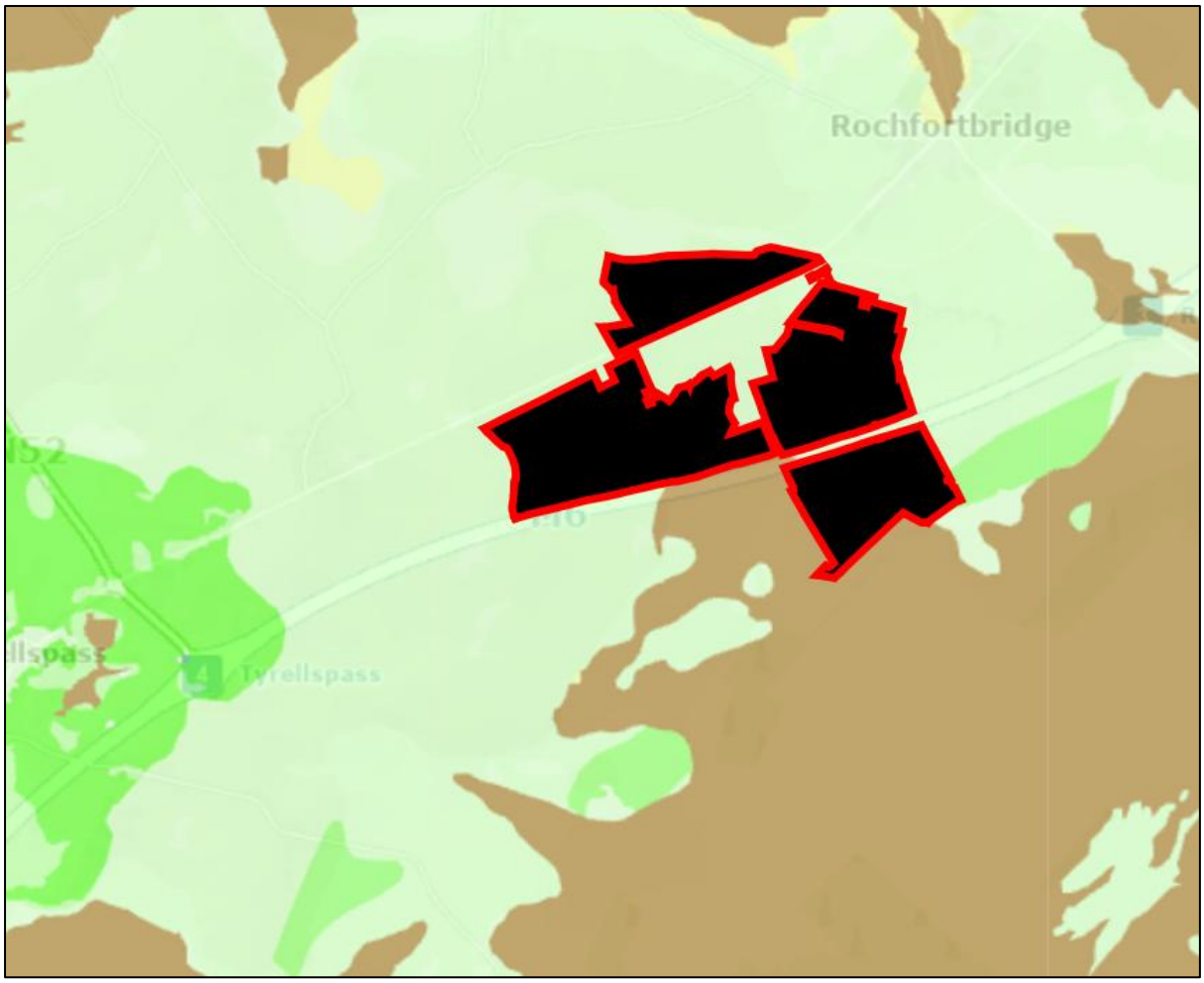
- Swallow holes: Naturally occurring openings in karst landscapes where surface water drains directly into the subsurface through enlarged fractures or conduits.
- Collapse features (dolines): Depressions in the terrain formed due to subsurface dissolution or mechanical failure of overlying rock, creating zones of enhanced infiltration where water bypasses the typical slow percolation process.
- Epikarst zones: The highly weathered upper layer of karstified carbonate rocks, where concentrated flow occurs within fractures, conduits, and dissolution-enhanced pathways, accelerating the transport of recharge water to deeper aquifer levels.

In karst environments, point recharge plays a particularly critical hydrological role, given the high connectivity of subterranean drainage systems. Water enters the aquifer rapidly through discrete openings, often bypassing filtration through fine-grained sediments, making these systems highly vulnerable to contamination from surface pollutants.

Recharge rates are influenced by climatic variability, with prolonged dry periods reducing infiltration capacity and intense precipitation events potentially increasing rapid, localized infiltration through fracture networks. Anthropogenic activities such as urbanization and agriculture also impact recharge dynamics by altering natural infiltration pathways, introducing impervious surfaces, or modifying drainage patterns. The study of recharge processes involves hydrogeological modelling, isotopic tracing, and geophysical surveys to quantify infiltration rates and optimize sustainable water resource management.

Data acquired by the Geological Survey of Ireland shows the average recharge rate for the development area (Figure 8.16) in pale green and brown (which encompasses the development lands) to be 200mm/year with a recharge coefficient of 60%. The hydrogeological setting for the areas highlighted in brown are described as having "Moderate permeability subsoil overlain by well-drained soil". This suggests that the area highlighted in pale green has favourable conditions for groundwater recharge, likely due to permeable soils and subsoils allowing water to percolate efficiently. The combination of these factors suggests that the pale green areas likely support reasonable infiltration rates while also allowing lateral movement of water, which can influence groundwater flow and availability.

Figure 8.16 Groundwater Recharge at the development lands.



The implications are that the area appears to contribute significantly to groundwater replenishment due to its high recharge rate and coefficient and will likely facilitate natural drainage, minimising risks of surface water pooling or stagnation. Furthermore, careful groundwater management will be necessary to preserve infiltration conditions and avoid excessive extraction and, depending on the depth and characteristics of the underlying

aquifers, the area could be suitable for controlled groundwater abstraction while ensuring sustainability.

8.4.4 HYDROLOGICAL SETTING

The development lands are located within the hydrological catchment of the Mongagh River (Figure 8.17 and Figure 8.18). The proposed Data Centre Campus and a parcel of compensatory habitat is located approximately 500-550m northwest of the River Mongagh watercourse. The *River Mongagh watercourse* flows through the southern parcel of the proposed solar farm. The Mongagh River flows east into the River Boyne with its associated European sites, the River Boyne and River Blackwater SAC (Site Code 002299) and the River Boyne and River Blackwater SPA (Site Code 004232), which are located over 20km to the northeast of the proposed development lands.

Figure 8.17 Location of the development lands within the Monagh River catchment (blue shaded area).

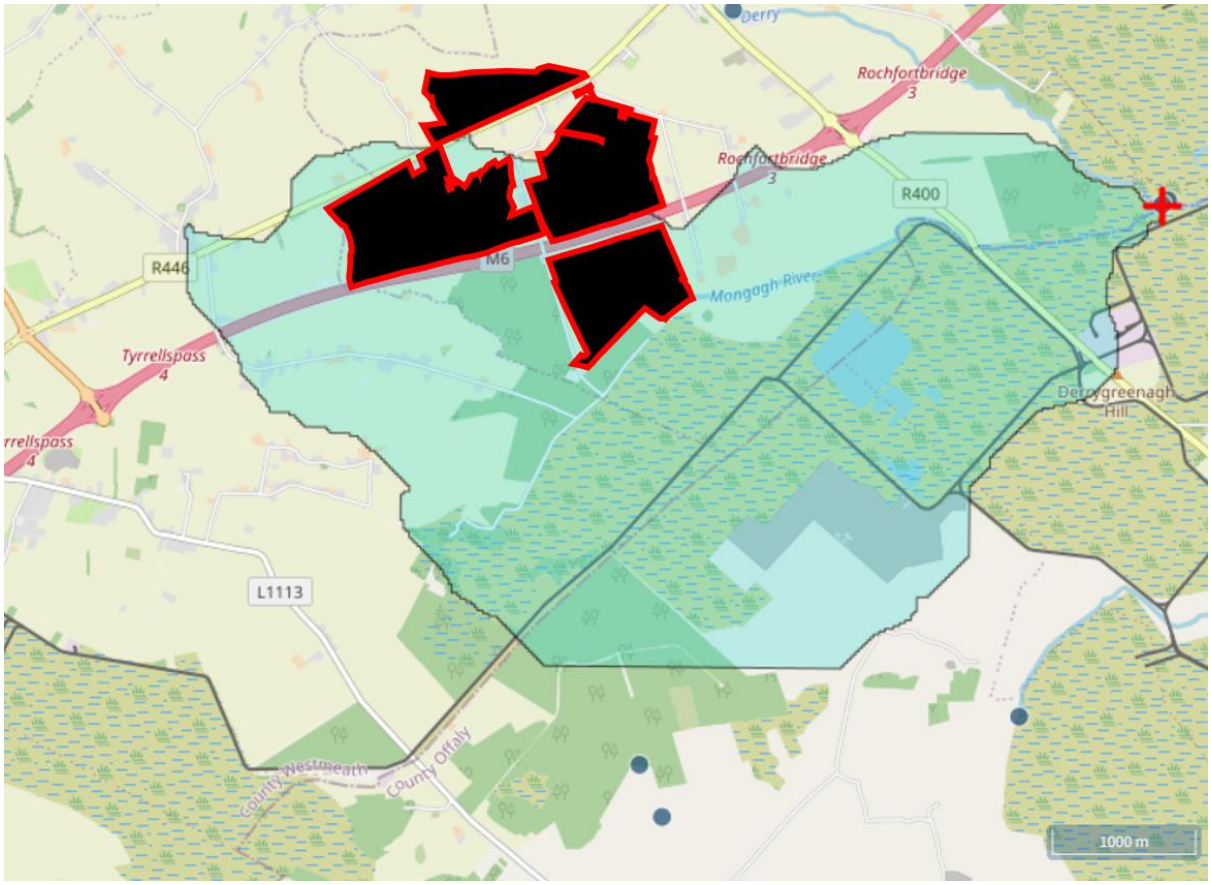
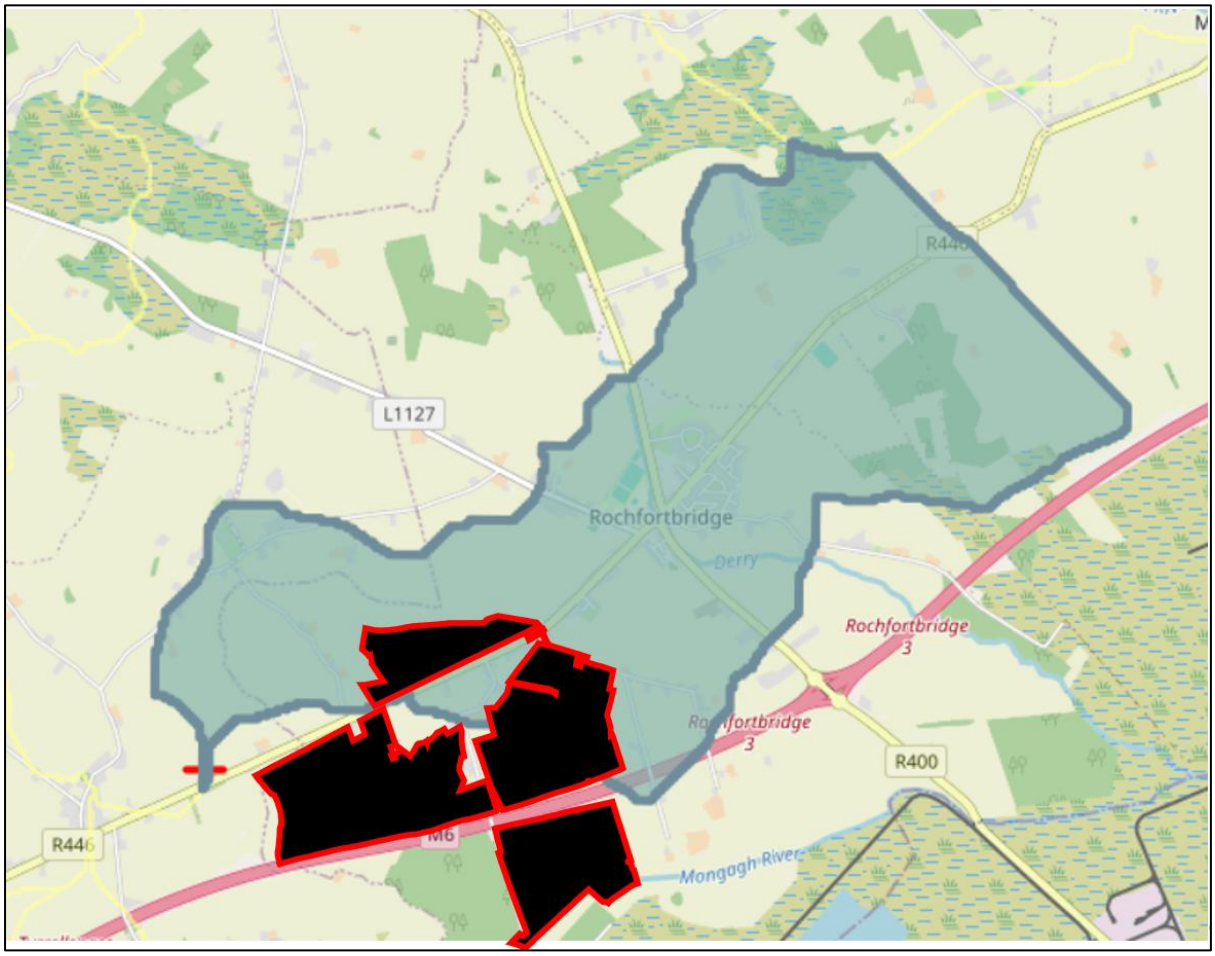
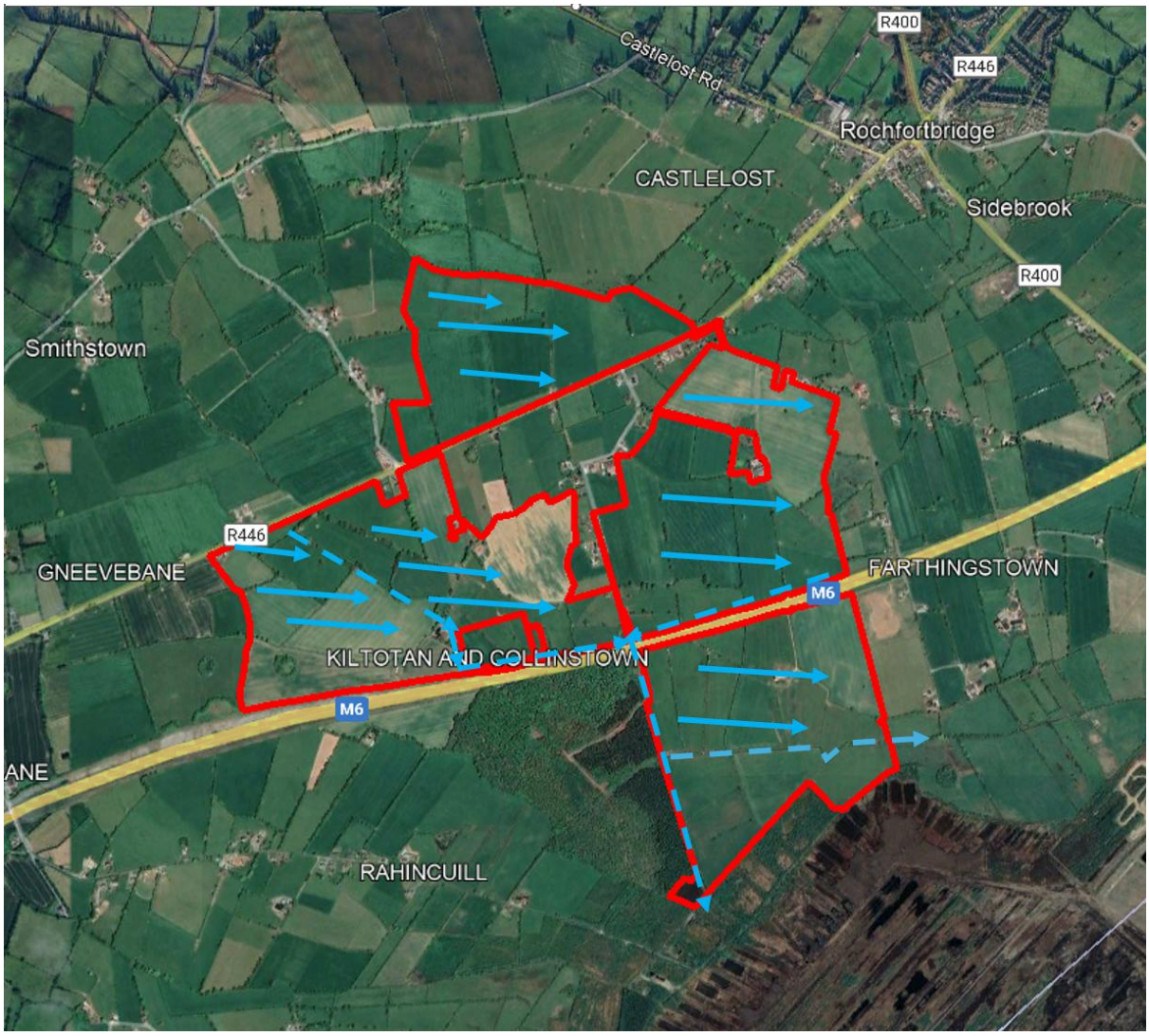


Figure 8.18 Location of the development lands within the Monagh River catchment (blue shaded area).



Some surface water drains (drainage ditches) were identified within the site boundary. The drainage ditches originate within the site boundary and run in a south westerly direction before flowing in culvert under a gravel surfaced access road (farmers lane) and then into a TII drain that runs along the crest of the motorway cutting in an easterly direction within an oversized grassy channel. The TII drain meets a headwall and culvert that goes under the M6 in a southerly direction. Water from the drain is discharged to the Mongagh River to the south (refer to Figure 8.18 and Figure 8.19). On various dates when site walkover visits were undertaken during the months of March to May 2025, the drainage ditches within the boundary of the development lands were found to be dry and overgrown with vegetation.

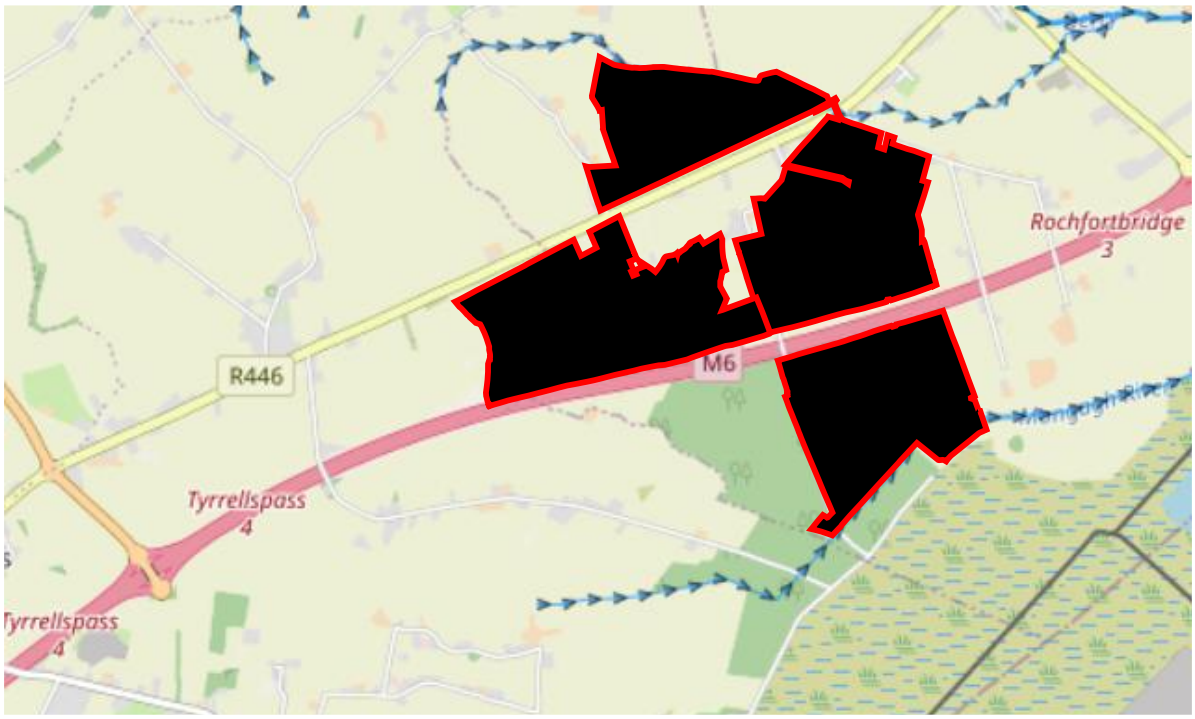
Figure 8.19 Site location map showing the location of drainage ditches (dashed lines) across the development area.



8.4.4.1 Flood Risk

A flood risk assessment (FRA) was prepared and is provided in Appendix 8.2. The FRA was undertaken to inform the future development of the site as it relates to flood risk. The development lands are at low risk of inundation from fluvial, coastal and groundwater sources and are appropriate for development at this location. Furthermore, the FRA has determined that the proposed development will not have a negative impact, in terms of flood risk, on the local drainage network, on local private property, or to the surrounding environment and human health.

Figure 8.20 Site location map showing local surface water features. Drainage across the development area flows towards the River Monagh to the southwest.



8.4.4.2 Water Regions /Catchment Identification

The EU Water Framework Directive (2000/60/EC) (WFD) outlines a comprehensive approach to safeguarding, enhancing, and overseeing both surface water and groundwater resources. Catchment datasets are structured around groups of sub catchments, derived from river waterbody polygons. These sub catchments are entirely enclosed within the larger Catchment polygons dataset. The proposed development site falls within the Boyne WFD Catchment, specifically within the Yellow [Castlejordan]_SC_010 subcatchment and the Castlejordan_020 River Sub Basin (see Figure 8.21 to Figure 8.23 below).

The Boyne catchment encompasses the area drained by the River Boyne and its tributaries, including all waterways flowing into tidal waters between The Haven and Mornington Point, Co. Meath. This region spans a total of 2,694 km^2 The primary urban hub within the catchment is Drogheda, with additional key towns such as Navan, Trim, Kells, Virginia, Bailieborough, Athboy, Kinnegad, Edenderry, and Enfield. The total population residing in the catchment is estimated at 196,400, with an average population density of 73 individuals per km^2.

The landscape of the catchment varies, featuring gently rolling terrain in the southern region, transitioning into a more pronounced, drumlin-dominated topography—

characterised by steep-sided, elongated hills—in the north. Underlying the catchment are metamorphic rocks in the northern sector and limestone bedrock in the central and southern areas. Additionally, significant sand and gravel deposits are prevalent, particularly along the upper sections of the Boyne River.

The Cycle 3 HA 07 Boyne Catchment report identifies the Yellow_(Castlejordan)_020 sub river basin as having "Good" status and being Not at Risk since 2021. Being classed as having "Good" status means that the water body meets the ecological quality requirements set out by the Water Framework Directive. This status suggests that the water chemistry, biological communities, and overall habitat structure within the sub basin are in a condition that supports a healthy aquatic ecosystem.

The designation *"Not at Risk"* implies that, based on the latest monitoring data, the sub basin has not experienced any significant deterioration or pressures that would threaten its good condition. It signals that current land-use practices, management measures, and environmental controls are effective.

Figure 8.21 WFD Catchment (Boyne (07))

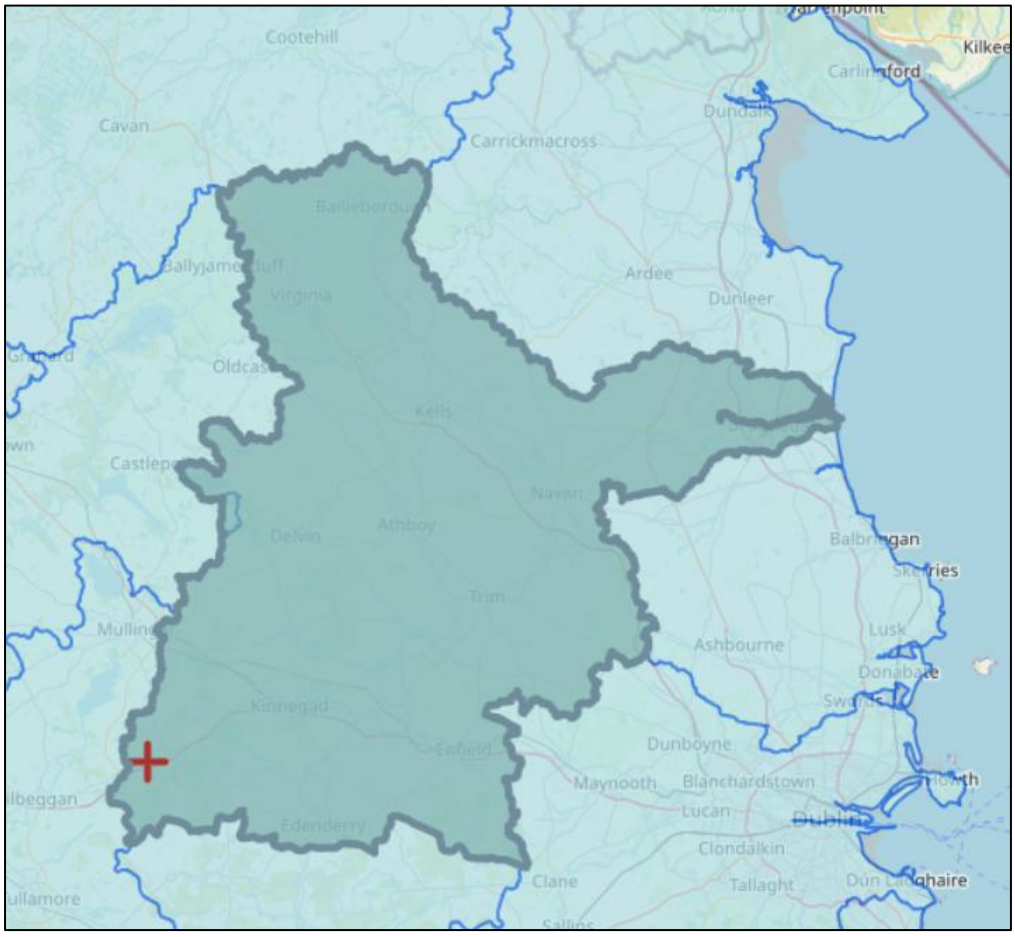


Figure 8.22 WFD Subcatchment (Yellow [Castlejordan]_SC_010))

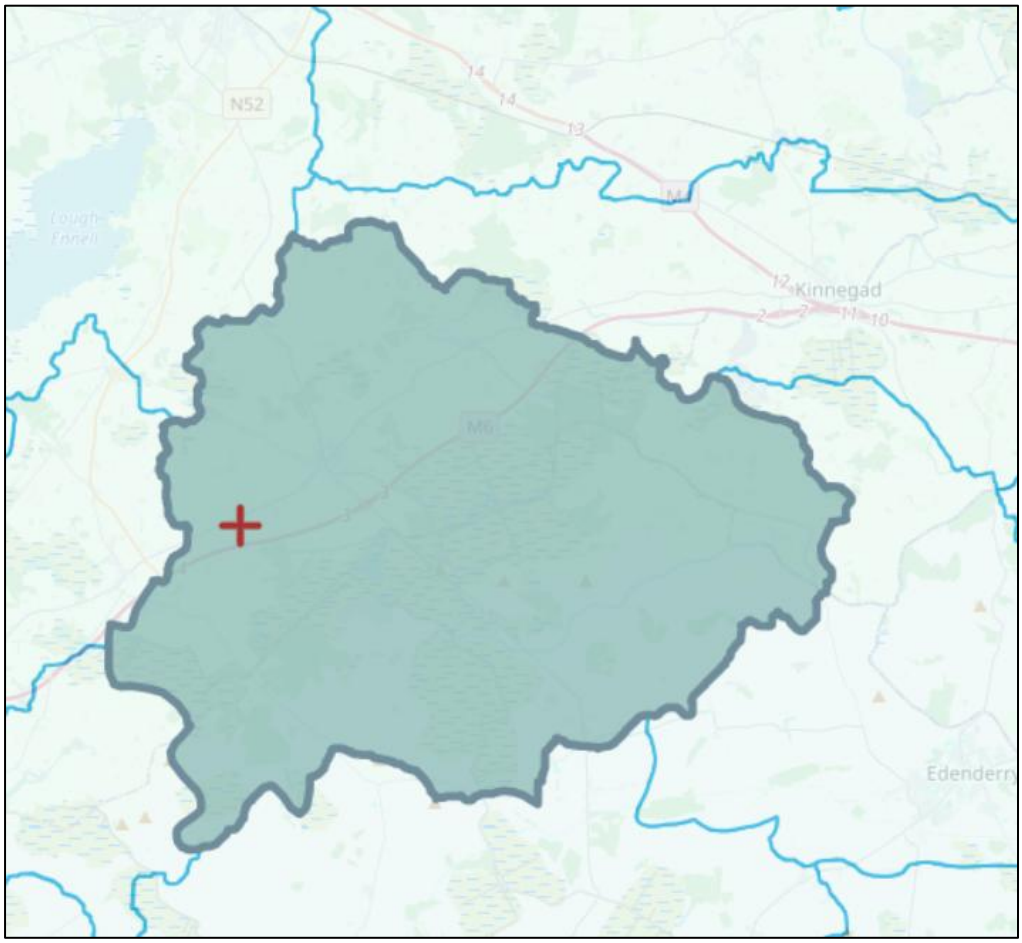
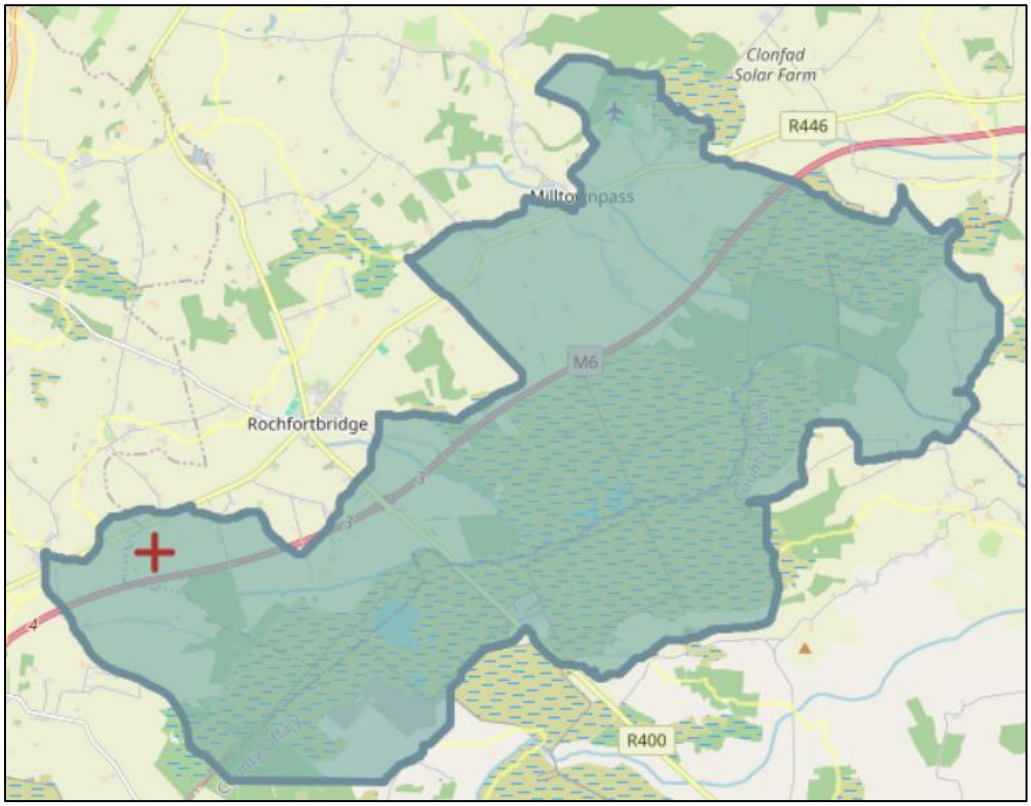


Figure 8.23 WFD River Sub Basin (Castlejordan_020)



8.4.4.3 Soil absorption

Soakaway tests, conducted in trial pits (Figure 7.23), determine how quickly water percolates through the soil by rapidly filling the pit and recording the water level decline—typically repeated three times in accordance with standards such as BRE 365—to calculate the infiltration rate in meters per second, which indicates drainage capacity during heavy rainfall. Simultaneously, the tests measure the effective storage volume by assessing the water held between specific pit depths, ensuring the system can accommodate peak stormwater loads. Additionally, observing how the infiltration rate changes during the test provides insights into soil heterogeneity, revealing any transitions from well-draining layers, like sand, to less permeable materials, such as clay.

Soakaway tests were performed on six trial pits (SA01 to SA06) within the development lands, with the reports included as Appendix 7.1. The only successful soakaway test occurred at Trial Pit SA01, with failures recorded at the other five locations. Failures at the five locations signifies that the intended stormwater infiltration is not occurring. Without a functioning soakaway, excess water from rainfall will not be effectively absorbed into the ground, increasing the risk of surface water pooling and localized flooding. This suggests that these locations may be unsuitable for a conventional soakaway and alternative drainage measures may need to be considered. For the successful soakaway test at SA01, the step-wise nature of the graph suggests that water is gradually draining through less permeable sediments before reaching a more permeable layer, rapidly draining, then draining through a less permeable layer towards the base.

Figure 8.24 Locations of trial pits within the development lands.



8.5 ASSESSMENT OF POTENTIAL ENVIRONMENTAL EFFECTS

This section evaluates the possible environmental effects of the proposed development on water resources during both the construction and operational stages. The analysis is informed by a review of contamination sources and geotechnical risks. It is based on desk studies, pre-existing ground investigations, and monitoring data. These elements establish baseline conditions, guiding an assessment rooted in the source–pathway–receptor framework and identified pollutant linkages.

A detailed examination has been conducted of the overall development site and its immediate surroundings to determine alterations in ground conditions. Potentially affected receptors are identified below, along with an evaluation of their relative sensitivity. Criteria listed in Table 8.6 is used to enable predicted impact to be determined.

8.5.1 RECEPTOR SENSITIVITY

The receptors considered for the risk assessment are detailed Table 8.6 below and considered in relation to their relative importance and receptor sensitivity; justifications for the classification are provided.

Table 8.6 Receptor Sensitivity

Receptor	Relative Importance	Receptor Sensitivity	Justification
Groundwater	County Level	Low	The groundwater's "good status" must be maintained through proper environmental safeguards. A moderate groundwater vulnerability classification is supported by factors such as subsurface lithology, contaminant migration potential, and depth to the water table.
Surface Water	County Level	Low	The site is characterized by a notable absence of prominent surface water bodies within its boundary or immediate vicinity, with hydrological assessments indicating minimal hydraulic connectivity to adjacent sensitive aquatic receptors. The "Good" status of the Yellow_(Castlejordan)_020 sub river basin must be maintained.

8.5.2 CONSTRUCTION PHASE

The main potential environmental effects during the construction phase have been tabulated below.

Table 8.7 Construction Phase Potential Environmental Effects

Receptor with (sensitivity)	Effect	Quality of impact	Significance of impact	Duration of impact	Type of impact	Summary and discussion
Groundwater aquifer (low)	Construction activities typically generate runoff containing sediments and pollutants from construction materials (like concrete additives, paints, solvents, and fuels). If these substances reach the soil, they may leach into groundwater.	Negative	Moderate, without mitigation	Temporary	Worst case	Mitigation is proposed in Table 8.9
	The disturbance of soils can lead to enhanced erosion during rain events. Eroded sediments might be washed into nearby water bodies or percolate into groundwater systems.	Negative	Moderate, without mitigation	Temporary	Worst case	Mitigation is proposed in Table 8.9
	Alteration of local hydrogeology - Excavation and land grading during construction disturb the natural soil and rock formations.	Negative	Moderate, without mitigation	Temporary	Worst case	Mitigation is proposed in Table 8.9
Surface water (low)	Enhanced Runoff Contaminants - When construction activities disturb land and remove vegetation, the exposed soil and construction materials are more easily picked up by stormwater.	Negative	Moderate, without mitigation	Temporary	Worst case	Mitigation is proposed in Table 8.9
	The disruption of soil during excavation and grading increases the risk of erosion. Loose soil particles can be entrained in runoff and deposited into surface water.	Negative	Slight, without mitigation	Permanent	Worst case	Mitigation is proposed in Table 8.9

Receptor with (sensitivity)	Effect	Quality of impact	Significance of impact	Duration of impact	Type of impact	Summary and discussion
	Land grading or excavation can alter existing drainage networks. This may cause water to concentrate in areas that were not previously subject to intense runoff.	Negative	Slight, without mitigation	Short term	Worst case	Mitigation is proposed in Table 8.9
	During construction, on-site storage and handling of fuels, lubricants, or other hazardous chemicals may expose surface water to toxic substances if spills occur or if containment measures fail.	Negative	Slight, without mitigation	Permanent	Indeterminate	Mitigation is proposed in Table 8.9

8.5.3 OPERATIONAL PHASE

The main potential environmental effects during the operational phase have been tabulated below.

Table 8.8 Operational Phase Potential Environmental Effects

Receptor with (sensitivity)	Effect	Quality of impact	Significance of impact	Duration of impact	Type of impact	Summary and discussion
Groundwater aquifer (low)	Drainage - Improperly managed drainage can modify natural groundwater recharge rates, potentially altering soil moisture regimes and affecting local hydrogeological balance	Negative	Moderate, without mitigation	Temporary	Worst case	Mitigation is proposed in Table 8.10
	Chemical spills and leaks from cooling fluids or other chemicals during routine operations can seep into the soil.	Negative	Moderate, without mitigation	Temporary	Worst case	Mitigation is proposed in Table 8.10
	Replacing natural or vegetated areas with impervious materials like concrete and asphalt. This limits natural infiltration of rainwater and aquifer recharge.	Negative	Slight, without mitigation	Permanent	Cumulative	Mitigation is proposed in Table 8.10
	Reduced Infiltration - Depending on how a solar farm is constructed, the soil underneath might become compacted or altered, reducing its ability to absorb rainwater. This could decrease groundwater recharge in certain areas.	Negative	Slight, without mitigation	Long term	Worst case	Mitigation is proposed in Table 8.10
	Aquifer depletion due to excess abstraction	Negative	Negligible	Temporary	Worst case	No mitigation necessary
Surface water (Low)	Stormwater Runoff: Large buildings and paved surfaces can increase stormwater runoff	Negative	Moderate, without mitigation	Temporary	Worst case	Mitigation is proposed in Table 8.10
	Operations can involve maintenance and cleaning processes that may introduce chemicals into the aquatic environment. If not properly managed, these pollutants can enter surface water bodies.	Negative	Moderate, without mitigation	Temporary	Worst case	Mitigation is proposed in Table 8.10

8.6 MITIGATION MEASURES

8.6.1 CONSTRUCTION PHASE

Mitigation is presented in a separate table for both the construction and operational phases of projects below.

Table 8.9 Mitigation of Potential Construction Environmental Effect

Potential Environment effect	Significance of Impact	Receptor	Mitigation	Significance of Impact following mitigation
Construction activities typically generate runoff containing sediments and pollutants from construction materials (like concrete additives, paints, solvents, and fuels). If these substances reach the soil, they may leach into groundwater. The disturbance of soils can lead to enhanced erosion during rain events. Eroded sediments might be washed into nearby water bodies or percolate into groundwater systems. Alteration of local hydrogeology - Excavation and land grading during construction disturb the natural soil and rock formations.	Moderate	Groundwater aquifer	Install silt fences along site perimeters to intercept sediment-laden runoff. Use temporary basins or sediment traps to allow suspended particles to settle out of the runoff. Incorporate small, strategically placed check dams within drainage channels to slow water movement. Store construction materials like concrete additives, paints, solvents, and fuels in dedicated, covered areas with secondary containment systems (e.g., bunds or spill pallets) to prevent accidental spills. Implement a robust spill response plan that includes accessible spill kits, immediate containment procedures, and predefined cleanup protocols. Regularly train all site personnel on spill response actions. Where possible, incorporate permeable pavements or ground surfaces to encourage water infiltration. Establish buffer strips of vegetation around the construction site.	Imperceptible

Potential Environment effect	Significance of Impact	Receptor	Mitigation	Significance of Impact following mitigation
			Use erosion control blankets on slopes and areas with disturbed soil. Develop a sediment and erosion control plan. This plan should outline all control measures, monitoring schedules, and defined response actions for spills or unexpected runoff events. Conduct frequent inspections to assess the integrity of all control measures (e.g., silt fences, sediment basins, storage facilities).	
Enhanced Runoff Contaminants - When construction activities disturb land and remove vegetation, the exposed soil and construction materials (calcium-based additives, solvents, oils, or other chemicals) are more easily picked up by stormwater The disruption of soil during excavation and grading increases the risk of erosion. Loose soil particles can be entrained in runoff and deposited into surface water bodies During construction, on-site storage and handling of fuels, lubricants, or other hazardous chemicals may expose surface water to toxic substances if spills occur or if containment measures fail.	Moderate	Surface water	Develop and document a site-specific Stormwater Pollution Prevention Plan (SWPPP) or construction management plan that integrates BMPs and regulatory requirements. Install erosion control blankets on slopes. Erect silt fences and sediment barriers around the perimeter and at vulnerable points to intercept sediment-laden runoff. Install temporary sediment traps that allow particles to settle before water is discharged off-site and ensure regular maintenance of these systems. Construct diversion channels, check dams, or other structures to direct runoff away from pollutant sources and toward treatment units. Designate bunded areas for storing chemicals, fuels, oils, and other hazardous substances to prevent accidental spills from contaminating runoff.	Imperceptible

Potential Environment effect	Significance of Impact	Receptor	Mitigation	Significance of Impact following mitigation
			Set up isolated zones for fuelling, equipment cleaning, and concrete washing—ensuring that activities performed in these areas do not lead to direct discharge into drainage systems. Install wheel-washing stations and establish protocols for cleaning construction machinery away from stormwater inlets to limit the spread of contaminants. Schedule regular inspections of all erosion, sediment, and runoff control measures, and perform maintenance or repairs as needed.	

8.6.2 OPERATIONAL PHASE

The main potential environmental effects during the operational phase of the project hs been tabulated below.

Table 8.10 Mitigation of Potential Operational Environmental Effect

Potential Environment effect	Significance of Impact	Receptor	Mitigation	Significance of Impact following mitigation
Drainage - Improperly managed drainage can modify natural groundwater recharge rates, potentially altering soil moisture regimes and affecting local hydrogeological balance. Replacing natural or vegetated areas with impervious materials like concrete and asphalt. This limits natural infiltration of rainwater and aquifer recharge. Reduced Infiltration - Depending on how a solar farm is constructed, the soil underneath might become compacted or altered, reducing its ability to absorb rainwater. This could decrease groundwater recharge in certain areas.	Moderate	Aquifer	Design the site's grading to encourage water to flow slowly towards infiltration zones rather than rapidly directed off-site via sealed channels. Design shallow basins or trenches that store stormwater temporarily and allow water to percolate slowly through the soil into the groundwater system. Incorporate green infrastructure (e.g., permeable pavements, bioswales) on-site to promote natural water infiltration and counterbalance the water extracted from groundwater. Construct small-scale detention ponds or retention areas that hold water for a controlled period. Gradual release from these features prevents sudden surges that bypass natural infiltration areas and helps align discharge volumes with the soil's absorption capacity. Landscape with Native Vegetation -Planting deep-rooted, native vegetation helps increase soil porosity and promotes water infiltration.	Imperceptible
Chemical spills and leaks from cooling fluids or other chemicals during routine operations can seep into the soil.	Moderate	Groundwater aquifer	Use double-walled tanks, spill-proof containers, and secured storage systems.	Imperceptible

Potential Environment effect	Significance of Impact	Receptor	Mitigation	Significance of Impact following mitigation
			Implement strict protocols for the transportation of hazardous chemicals. Construct secondary containment systems—such as bunded areas—that are designed to capture any spills from primary storage containers. Enhance bund lining systems with chemically resistant liners (e.g., HDPE geomembranes) to create durable barriers that prevent leaked chemicals from seeping into the ground. Install leak detection sensors and automatic shut-off valves on storage tanks, pipes, and transportation units. Use early warning alarms that promptly alert staff to a leak or spill. Develop detailed emergency response procedures that outline containment and cleanup actions. Conduct frequent inspections of storage areas, containment systems, and spill detection devices to ensure they are in optimal condition. Design the facility with proper grading to divert potential spills away from groundwater recharge zones, using diversion channels and berms. Incorporate spill containment walls and safe drains.	
Stormwater Runoff: Large buildings and paved surfaces can increase stormwater runoff	Moderate	Groundwater aquifer	Install pervious paving materials to enhance water infiltration.	Imperceptible

Potential Environment effect	Significance of Impact	Receptor	Mitigation	Significance of Impact following mitigation
			Incorporate vegetated swales or rain gardens along the edges of paved areas to slow down and filter runoff. Design site grading to direct stormwater toward designated infiltration or detention areas instead of channelling it off-site. Install engineered trenches or shallow basins that capture and slowly release water. In solar farms, these become particularly important given that the panels may create concentrated driplines that increase runoff locally. Capture runoff from large roofs and paved areas into rainwater storage tanks. Establish buffer strips and landscaped zones with native, deep-rooted plants adjacent to large impervious surfaces. Create a network of subsurface drains that capture runoff beneath building foundations and discharge it to infiltration zones or treatment areas. Minimize additional paved surfaces for support and service areas to keep the overall imperviousness low, ensuring that natural soils and engineered controls can handle the runoff. Since solar panels direct precipitation to specific dripline areas, design the layout with open interspaces and engineered drainage controls at these locations.	
Operations can involve maintenance and cleaning processes that may introduce chemicals into the aquatic environment.	Moderate	Surface water	Use double-walled tanks, spill-proof containers, and secured storage systems.	Imperceptible

Potential Environment effect	Significance of Impact	Receptor	Mitigation	Significance of Impact following mitigation
If not properly managed, these pollutants can enter surface water bodies.			Implement strict protocols for the transportation of hazardous chemicals. Construct secondary containment systems—such as bunded areas—that are designed to capture any spills from primary storage containers. Enhance bund lining systems with chemically resistant liners (e.g., HDPE geomembranes) to create durable barriers that prevent leaked chemicals from discharging into water bodies. Install leak detection sensors and automatic shut-off valves on storage tanks, pipes, and transportation units. Use early warning alarms that promptly alert staff to a leak or spill. Develop detailed emergency response procedures that outline containment and cleanup actions. Conduct frequent inspections of storage areas, containment systems, and spill detection devices to ensure they are in optimal condition. Design the facility with proper grading to divert potential spills away from groundwater recharge zones, using diversion channels and berms. Incorporate spill containment walls and safe drains.	

8.6.3 DECOMMISSIONING

Prior to decommissioning, a site closure and decommissioning plan will be completed to ensure the identification and mitigation of any further effects present at that time.

8.7 POSITIVE IMPACTS OF THE DEVELOPMENT

The positive impacts on the Water Environment of the proposed development include;

- Improved water quality due to reduced inputs of fertilisers & pesticides on lands no longer used for agriculture
- Agricultural fields are typically heavy water users, with irrigation sometimes leading to over-extraction of local water resources. This overuse can concentrate salts and chemicals in remaining water supplies, degrading water quality. Solar farms, on the other hand, require very little water aside from occasional cleaning of panels. Moreover, data centres, particularly those designed with modern cooling technologies, often employ closed-loop water systems that minimize withdrawals and discharges, thereby reducing the potential for contamination.
- Improved biodiversity associated with firewater retention ponds – designed with gently sloping margins, varied depths and clusters of native marginal plants to provide habitats for vulnerable species.

8.8 RESIDUAL IMPACTS OF THE DEVELOPMENT

The proposed developments will not have any significant residual effects on the water environment after the post implementation of mitigation. The management of drainage at the development will result in minimal disruption to natural drainage flowpaths and volumes, and infiltration to ground will suffer minimal disruption, with the creation of low permeability and impermeable surfaces, limiting the potential for contamination of the subsurface aquatic environments.

8.9 CUMULATIVE EFFECTS

Within the European Commission - Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions, dated May 1999, cumulative effects are described as *"impacts that result from incremental changes caused by other development, plans or projects together with the proposed development or developments"*. The cumulative impacts of the proposed development in conjunction with current and future developments in the vicinity of the subject site are considered here.

Adjacent to the proposed development, the construction of the Castlelost Flexgen and GIS Substation is nearing completion.

Grade work and foundation installations for both the data centre campus and the Castlelost Flexgen and GIS development would involve deep excavations, while solar farm layouts typically involve installing support systems. These activities can alter pre-existing drainage networks by creating new surface slopes, intercepting natural flow paths, and turning previously pervious areas into more impervious ones. Consequently, the cumulative effect may be an increased volume and velocity of water runoff during storm events, which has the potential to overwhelm local drainage systems and exacerbate downstream flooding. The mitigation measures suggested should reduce the risk of this effect to Imperceptible.

Solar farms, while generally using passive operational methods, change land cover dramatically. The solar panels themselves are impervious, redirecting rainfall into concentrated runoff. Studies have shown that while the panels might not significantly alter total runoff volume, their presence can increase peak discharge rates, especially when the land underneath is maintained as gravel or bare ground rather than vegetated. Increased kinetic energy in the runoff can lead to erosion at panel bases and along adjacent drainage channels. Over time, this persistent change in flow dynamics can contribute to channel incision and alterations in local hydrology.

The cumulative effects call for enhanced stormwater management strategies. Techniques such as engineered drainage channels, permeable pavements, and restored vegetation buffers will mitigate excess runoff.

8.10 MONITORING AND FURTHER WORKS

Whilst the development proposals have the potential to cause detriment to receptors identified, the recommended mitigation measures will ensure that the risk of potential impacts are reduced to imperceptible. Given the receptor sensitivities are classed as low at and in the vicinity of the development lands, no future monitoring is recommended during the construction programmes.

9 MATERIAL ASSETS

9.1 INTRODUCTION

This Chapter of the EIAR evaluates the impacts, if any, which the development will have on material assets. Material assets are resources that are valued and intrinsic to the Site and the surrounding area. With regard to Material Assets, the 2022 EPA EIAR Guidelines ("EPA Guidelines") state:

> *"Material assets can now be taken to mean built services and infrastructure. Traffic is included because in effect traffic consumes transport infrastructure. Sealing of agricultural land and effects on mining or quarrying potential come under the factors of land and soils."*

Material assets of *natural origin* and the existing quality of natural resources such as air, water, soils, landscape, lands and soil, etc., are discussed in depth in earlier Chapters of the EIAR along with those of human origin such as traffic and transport infrastructure, soils, archaeological /architectural heritage and flood protection.

Material assets of natural and human origin which are included in this assessment are the following

- Ownership and access
- Land Use
- Services
- Demolition works

The objective of the assessment is to ensure that these assets are used in a sustainable manner, so that they will be available for future generations, after the development of the project.

9.2 ASSESSMENT METHODOLOGY & SIGNIFICANCE CRITERIA

9.2.1 METHODOLOGY

This assessment was carried out by a desktop study from publicly available information and from information provided by the Applicant to determine the baseline environment existing utility arrangements within the study area which could be impacted by the proposed development.

9.2.1.1 Desktop Study

The study area for the assessment is defined as the proposed development lands and lands immediately adjoining the development lands. This is considered a reasonable distance in terms of sensitive land uses and built services asset receptors (such as residential receptors) with respect to the proposed project.

A desk study of the proposed development area and the surrounding study area was completed in advance of undertaking the walkover survey. This involved consultation with publicly available environmental and planning datasets:

- Environmental Protection Agency database https://gis.epa.ie/EPAMaps/
- Geological Survey of Ireland database (www.dcenr.maps.arcgis.com);
- Tailte Eireann https://store.osi.ie/
- Geohive Environmental Sensitivity Mapping https://airomaps.geohive.ie/ESM/
- Westmeath County Council Planning Database Westmeath County Council (WCC) Our Services
- Property Registration Authority (PRA) land registry services
- (https://www.landdirect.ie/)
- EirGrid and ESB Networks asset registers and load-flow reports;
- Uisce Eireann hydraulic models and the *"2020 Code of Practice for Water Infrastructure" water-code-of-practice.pdf*
- Traffic counts undertaken in accordance with Transport Infrastructure Ireland (TII) *Traffic and Transport Assessment Guidelines* (2014)
- Site topographic, ground-penetrating-radar and utility-detection surveys
- Consultation with the Commission for Regulation of Utilities (CRU), local authority roads and environment sections, Gas Networks Ireland and fibre-optic carriers.

9.2.1.2 Field Work

Various site walkover surveys of the proposed development lands and windscreen survey of the wider study area were undertaken and include three during the period February to June 2025 to inform this assessment.

9.2.2 SIGNIFICANCE CRITERIA

The purpose of the population assessment is to identify the likely significant impacts as they might affect material assets. Impacts result from direct, indirect, secondary and cumulative effects on existing environmental conditions. Effects can be positive, neutral or negative.

The significance of an effect depends on, among other considerations, the nature of the environmental effect, the timing and duration of an effect and the probability of the occurrence of an effect. The impacts may be short term, medium-term or long-term. The duration of an effect may be momentary, brief, temporary, short-term, medium-term, long-term, permanent or reversible in accordance with the timescales. The frequency of that effect can also influence significance i.e., if the effect will occur once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually.

The criteria used to describe the predicted effects is outlined Table 9.1 in accordance with Table 3.4 of the 2022 EPA Guidelines[47]. A matrix for determining significance is presented in Table 9.2.

Table 9.1 Description of Effects

Effect Characteristic	Description
Value of Change	
Major	Effects, both adverse and beneficial, which are likely to be important considerations at a regional or national level because they contribute to achieving national, regional or local objectives, or, could result in exceedance of statutory objectives and / or breaches of legislation. In isolation, these could have a material influence on the decision-making process.
Moderate	Intermediate limited (extent / duration / magnitude) impact that may be considered as significant. These effects are likely to be important considerations at a local level. These could have influence on decision making especially when combined with other similar effects.
Minor	Slight, very short or highly localised impact of no significant consequence. These effects may be raised as local issues but on their own are unlikely to be of importance in the decision-making process. When combined with other effects these could have a more material influence.
Negligible	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Sensitivity	
High	Feature / receptor has a very low capacity to accommodate the proposed form of change. The response is a major change e.g. agricultural land use for food production, allotments.
Medium	Feature / receptor has a low capacity to accommodate the proposed form of change. It clearly responds to effects in a quantifiable manner e.g. low-grade agricultural land and recreational ground.
Low	Feature / receptor has some tolerance to accommodate the proposed change. It responds in a minimal way such that only minor changes are detectable e.g., landscaped areas.

[47] EPA, Guidelines of the Information to be contained in Environmental Impact Assessment Report, 2022

Effect Characteristic	Description
Very Low	Feature / receptor is generally insensitive to impact, no discernible changes e.g., soils are not in use, the land is used for industrial/commercial purposes and /or mainly covered by hard standing .
Magnitude	
Substantial	Loss of resource and/ or quality and integrity of resource, severe damage to key characteristics, features or elements. Large scale or major improvement of resource quality; extensive restoration or enhancement major improvement of attribute quality (Beneficial).
Moderate	Loss of resource, but not adversely affecting the integrity; partial loss of/ damage to key characteristics, features or elements (Adverse). Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Slight	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse). Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse). Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No Change	No loss or alteration of characteristics, features or elements, no observable impact in either direction.

Table 9.2 Matrix for Determining Significance

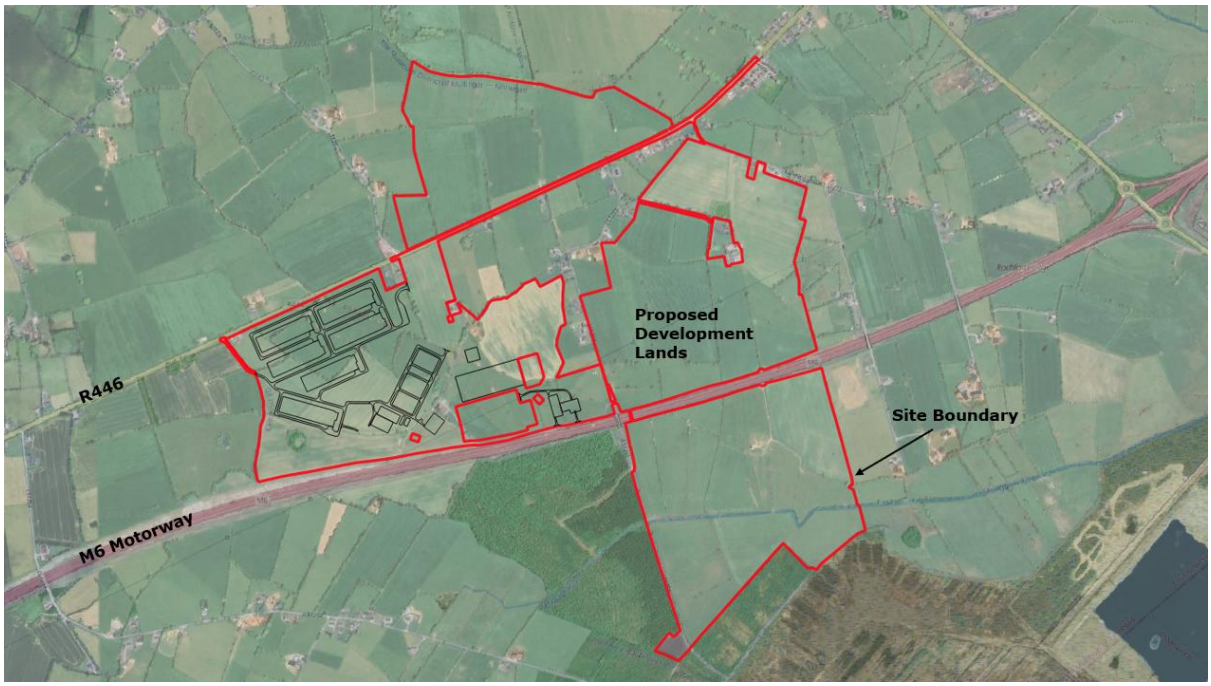
Magnitude	Sensitivity			
	Very Low	Low	Medium	High
No Change	Negligible	Negligible	Negligible	Minor
Negligible	Negligible	Minor	Minor	Moderate
Slight	Minor	Minor	Moderate	Major
Moderate	Minor	Moderate	Major	Major
Substantial	Moderate	Major	Major	Major

9.3 DESCRIPTION OF RECEIVING ENVIRONMENT

The proposed development lands is a c. 243-hectare greenfield site located in the townlands of Gneevebane, Oldtown, Farthingstown, Castlelost and Kiltotan and Collinstown in the south of County Westmeath. The site is currently used for agricultural purposes. The southern boundary of the site is defined by the existence of the M6 which

connects Dublin and Galway. The development lands are currently accessed via the R446 and the L51251. The 220kV Shannonbridge-Maynooth transmission line transects the southern area of the development lands and a new electricity node (Castlelost GIS Substation) has recently been constructed and is operational at the site. Development of the proposed project will not involve the installation of new infrastructure for the extraction of natural resources. A detailed description of receiving environment is provided in Chapter 2 of the EIAR.

Figure 9.1 Map showing layout within development lands



9.3.1 OWNERSHIP AND ACCESS

Red Admiral DC Limited is applying for full planning permission for the proposed development. There will be no severance of land as a result of the proposed development or loss of rights of ways or amenities. The vast majority of the proposed development lands are privately owned. Relevant landowner consents letters associated with the development proposal are provided in Volume 3 of this EIAR. The proposed development lands are currently accessed from the R446 which is connected to the M6 motorway.

There are no known proposed planning developments that affect or impact this consented development. Planning permissions (Westmeath Co. Co Ref 21/532) was granted to Lumcloon Energy (company affiliated to Red Admiral DC) on 21 March 2022 for development of an Energy Storage System (ESS) within the proposed development lands. Due to the extent of changes associated with the proposed BESS including the technology

how it connects to the electricity grid, planning permission is being sought for the proposed BESS as presented in this planning application.

9.3.2 LANDUSE

The proposed development is located on greenfield lands and are not zoned under the County Development Plan (white lands). In terms of existing land use, the principal form of land cover within the study area and is agricultural farmland (pastures and parcels of tillage) bound by mixed mature hedgerow vegetation. The surrounding local landscape comprises relatively flat terrain. The lands are not being used by the public and there are no public open spaces or community lands within or adjoining the lands. There are no ground stability issues identified within the proposed development lands and there the historic land use doesn't differ from its current use (agricultural).

There are no active or expired waste licences within the proposed development lands. The Castlelost Flexgen Reserve Gas-Fired Generator is the closest EPA licensed site (Reg. No. P1193). Bord na Móna Energy Limited (Derrygreenagh) and Bord na Mona Biomass Limited, EPA Reg. No. P0501 and Reg. No. P0503 respectively are located approximately 3.5km southeast of the site. Skeagh Farms (Reg. No. P0503) are located approximately 3km south of the proposed development lands. There are no other EPA licensed sites within a 5km radius of the site.

Siting and selection of the development proposals was undertaken following consideration of alternatives. The existence of the Castlelost 220kV GIS substation, the existence of the natural gas transmission line and dark fibre connections were a major consideration in the selection of the proposed site along with landbank sufficiency and public transport (in particular the M6 corridor. The development proposals conform with overriding policy and best practice in relation to the siting of such infrastructure. For locational and siting considerations please refer to Chapter 3.

9.3.3 SERVICES

9.3.3.1 Water and Wastewater

The existing on farm residence and farm activity is served by a groundwater well on site. Similarly foul wastewater from the existing residence is management and treatment by an on-site wastewater treatment system.

It is proposed to drill three groundwater wells across the site to serve the water requirements of the development proposals which are very low (<40m^3 per day across the

DC facility and DER, equivalent to ~0.46l/sec)[48]. Modular water-treatment units will be placed close to each groundwater abstraction point. The unit will house conventional plant, pumps, filtration, disinfection, monitoring and control equipment.

Uisce Éireann has also issued a Confirmation of Feasibility (CoF) confirming that 10m^3 per day can be supplied from the public water network. Taking account of this confirmed public supply contribution, reliance on groundwater abstraction will be reduced relative to the ≤40m^3 day envelope assessed in the EIAR. The maximum groundwater abstraction will therefore not exceed approximately 30m^3 per day and is anticipated to be approximately 26m^3 per day based on current operational demand calculations. This remains within, and below, the abstraction envelope assessed in the EIAR.

Each data-centre building will have its own local foul network that conveys flows by gravity to a centrally aligned sewer. This then discharges to a pumping station positioned adjacent to the security building near the campus entrance. The duty/standby submersible pumps in the pumping station are sized to limit the off-site discharge to 13.3l/s. Flow is lifted by rising main that tracks towards the main entrance of the project and then east towards Rochfortbridge along the public road (R446). The private network will terminate in a new stand-off manhole from which gravity flow enters the existing Uisce Éireann public foul sewer. All works within the public domain will be carried out under a Road Opening Licence and to Uisce Éireann Standard Details IW-CDS-5030-01.

Foul wastewater generated from IPP Buildings spread across the DER will be discharged to individual sealed holding tanks (each 32m^3) collocated with associated IPP buildings. (proposed due to low occupancy of the plant when operational). The list of locations where foul holding tanks are located across the project's lands are as follows:

- Fuel Cell IPP
- BESS IPP
- Solar IPP
- 220kV IPP
- 33kV IPP

The holding tanks are proposed due to the low occupancy nature of the IPP buildings (essentially substations). The low volumes of foul waste and low biological loading, associated with this type of building, may impact the successful continual operation of a

[48] Note all abstractions ≥ 25 m³ per day but < 2 000 m³ per day are shall be registered with the EPA; any need for a licence is decided afterwards through the EPA's significance test rather than by a fixed intermediate threshold. (https://www.epa.ie/our-services/licensing/freshwater--marine/water-abstraction/)

conventional septic tank and any polishing filter system reliant on bacterial action. The foul drainage proposals will cater for the wastewater generated by the toilet and wash hand basin provided in each of the IPP buildings. The IPP building will be unmanned save for infrequent inspections and routine maintenance resulting in low rates of foul flow. The holding tanks will be fully watertight with no inlet settlement chamber, no biological treatment and crucially no discharge to ground or water. The system includes a single inlet pipe from the building's gravity drain and are fitted with an air vent and high-level alarm as standard. The alarm will connect back to a control centre in each IPP. Effluent from the tanks will be emptied biannually by a licensed wastewater contractor and taken to a municipal treatment plant.

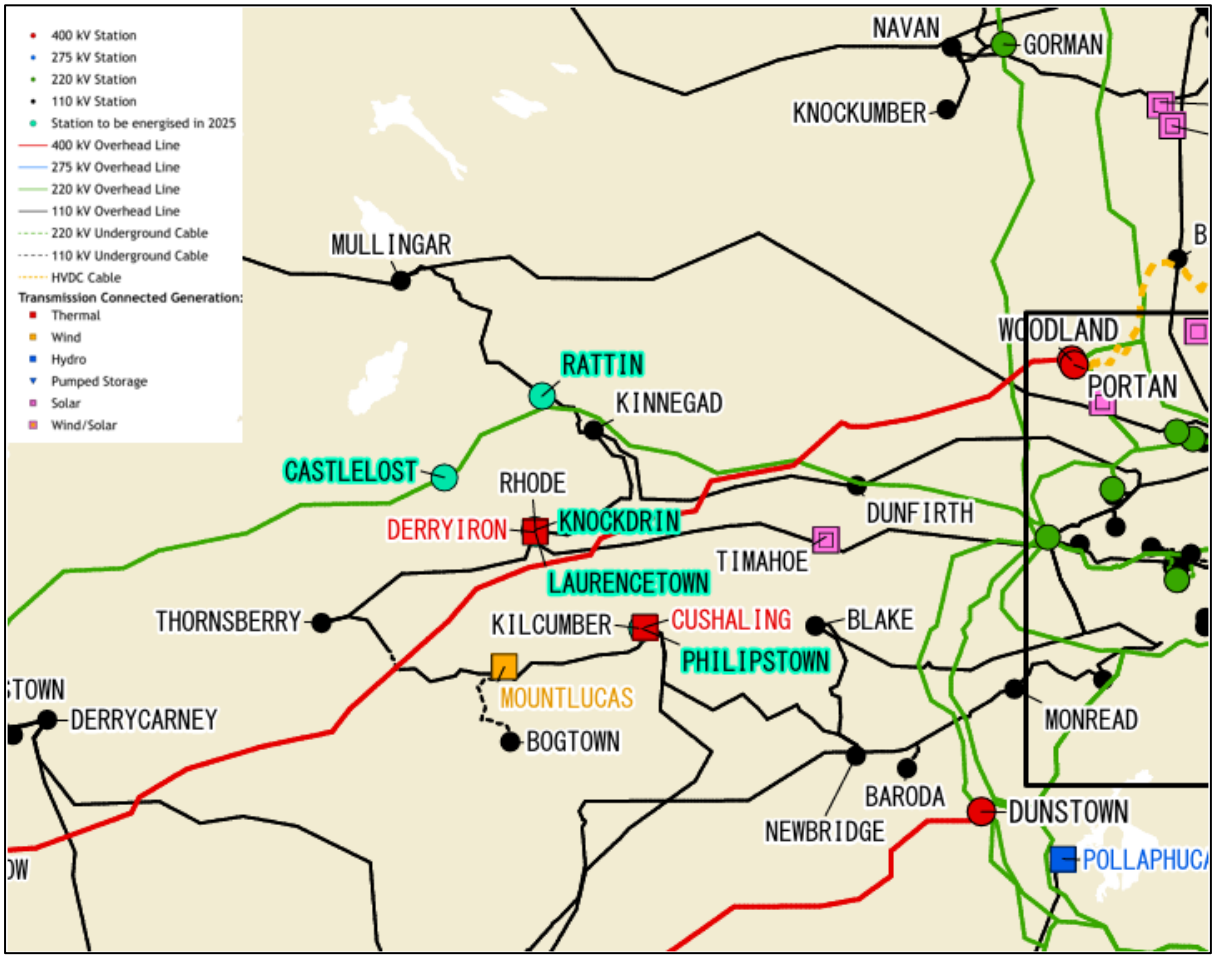
In accordance with best practice, stormwater arising from development of impermeable surfaces (e.g., roof of buildings, roadways) stormwater will be collected and infiltrated to or attenuated before being discharged at greenfield run-off rates to a nearby watercourse traversing the site.

(Please also refer to Planning Statement for further information related to water and wastewater details provided in response to the further information request issued by Westmeath County Council, dated 01 September 2025.

9.3.3.2 Electricity

The 220kV Shannonbridge-Maynooth transmission line transects the southern area of the development lands. The Admiral Project will connect to the electricity transmission system via the existing 220kV Castlelost GIS Substation (an existing node on the system), which is located adjacent to the proposed project (See Figure 9.2).

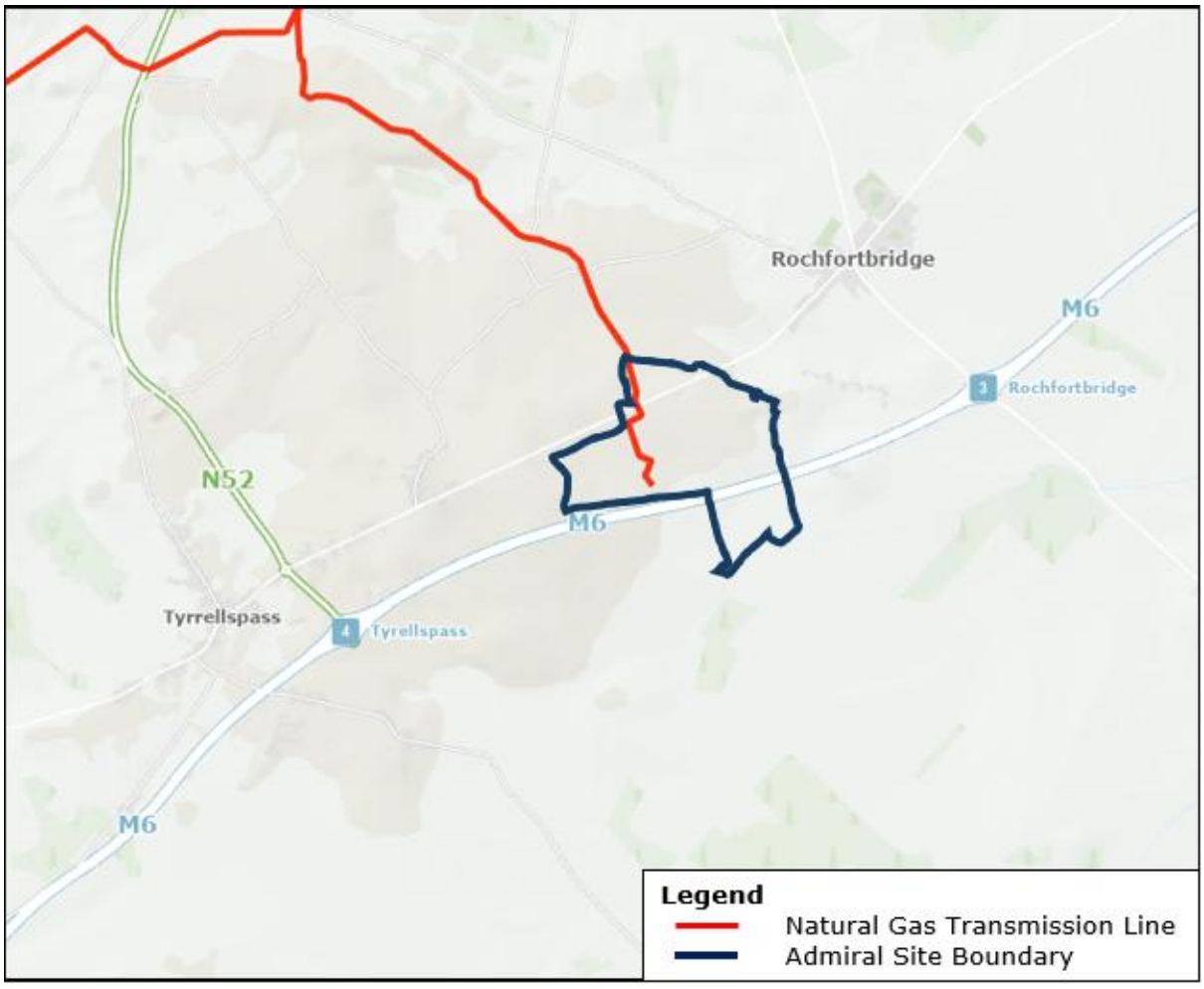
Figure 9.2 Map of EirGrid Transmission System (source–EirGrid All-Island Transmission System)



9.3.3.3 Gas

Natural gas will be supplied to the proposed Fuel Cell from the GNI transmission system which is located within the development site as shown in Figure 9.3, via a proposed Above Ground Installation (AGI).

Figure 9.3 Natural Gas Transmission Line Map (Source-Gasnetworks.ie)



9.3.4 DEMOLITION WORKS

The development site includes for the demolition and removal of minor agricultural buildings and associated outhouses and farm sheds within the site. The buildings will be demolished and removed from site in accordance with best practice. Works will involve careful decommission and removal of all structures at the site. Anticipated wastes which will be generated include soils, bricks and blocks; concrete and reinforced concrete; timber; metal sheeting and steel. Materials arising from this process will be recycled /disposed of at authorised waste management facilities. Further information on waste management is detailed in Chapter 2 of this EIAR and the CEMP (Appendix 2.2).

9.3.5 SETTLEMENTS

Impacts and mitigation measures associated with population are detailed in Chapter 5 (Population and Human Health) as outlined previously.

9.4 ASSESSMENT OF POTENTIAL ENVIRONMENTAL EFFECTS

9.4.1 DO NOTHING SCENARIO

In the "do-nothing" scenario, the site would remain as agricultural land (pastures and arable fields). Biodiversity studies confirm the absence of rare or protected habitats, with the area offering generally low ecological value aside from some treelines of local significance. There are no links to European protected sites, and existing habitats for certain species would be preserved within the project design. Choosing not to proceed would merely shift environmental impacts elsewhere, without delivering climate or digital benefits for Ireland. Please refer to Chapter 3 for further details.

9.4.2 PROPOSED PROJECT

Construction of the proposed development will result in change of use of lands from agricultural to industrial use. Soils excavated as part of development works will be used within the overall development boundary to create landscaped berms to screen development from sensitive receivers. The planted berm will be constructed to enhance the terrestrial ecosystem and ensure biodiversity net gain (BNG).

Stormwater arising from newly constructed impermeable area will be controlled and managed in accordance with SUDS principles before being attenuated in open lagoons prior to being discharged to receiving waters. The effect on landuse is classed as Minor; it is acknowledged that there will be a change in landuse (agricultural to industrial), however the sensitivity of the receptor is considered as low and the magnitude is considered slight. In addition, it should be noted that even though the project is proposed across c.243ha a substantial portion of lands within the proposed development lands will remain as "*green areas*" and will be landscaped and enhanced to provide for biodiversity gain.

The proposed abstraction of groundwater for use across the DC facility and DER will have a negligible impact water service. There are no private domestic wells or ecologically sensitive springs within 500m, so no significant effect on neighbouring receptors is predicted. A connection of feasibility letter received from Uisce Éireann demonstrates that the proposed discharge of foul wastewater from the DC facility will have no change on the existing municipal wastewater treatment system in Rochfortbridge.

The proposed development will be located on lands under the control of the applicant. The development will not impact existing access rights associated with the lands. No changes

are proposed to existing roads within the development lands with respect to rights of way. The potential effect on landownership is described as negligible.

There are no direct or indirect negative effects on services. The Project will also support and promote sustainable improvement and expansion of fibre, the electricity system (by importing renewable electricity rather than being curtailed) and gas network (the proposed fuel cells is future proofed to promotes future greening of the gas network with blends of biomethane and hydrogen). The potential effect of the proposed development on services is Moderate-Major Beneficial.

9.5 MITIGATION MEASURES

Construction of the proposed development will require connections to infrastructure and services but will not require any connections outside the proposed development land boundary. Soils arising from earth movement works will be used to create boundary berms and will be retained on site.

9.6 RESIDUAL IMPACTS OF THE DEVELOPMENT

Construction of the proposed development will result in temporary short-term effects on material assets examined in this chapter during construction and no negative impact on the material assets once operational. Improvement to the built environment in the area will have a long-term positive benefit to the local community.

9.7 CUMULATIVE EFFECTS

The proposed project does not affect or impact the Castlelost Flexgen Reserve Gas-Fired Generator or the Castlelost GIS. Development of the project described as part of the proposed development will have a positive, significant, long-term synergistic effect on material assets.

9.8 SUMMARY OF SIGNIFICANT EFFECTS

Overall, there are no predicted significant adverse impacts arising from the proposed development on material assets. The potential effects of the proposed development are deemed to be positive, long-term and beneficial at local, regional and national level.

10 AIR QUALITY

10.1 INTRODUCTION

This chapter assesses the potential significant effects of the proposed development on air quality. Impacts of site operations are considered by taking account of the existing baseline, the projected impacts and compliance with relevant standards.

10.2 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

Red Admiral DC Limited propose to develop a DC facility and DER on lands in the townlands of Gneevebane, Oldtown, Farthingstown, Castlelost and Kiltotan and Collinstown in the south of County Westmeath. The project includes two main elements, namely:

- The Data Centre (DC) facility, comprising six two-storey Data Centre buildings, car parking, landscaping, drainage and other associated works. The DC facility will be constructed and secured within a 39ha campus. Each DC building will have a footprint of 13,978 m^2 (sqm). Each DC building will contain:
  - Data halls fitted with server racks and distribution units,
  - Mechanical and electrical (M&E) plant rooms /spaces which will house advanced cooling equipment, pumps, piping and medium voltage (MV) and low voltage (LV) switchgear, and
  - Administration and support areas including, reception, offices, meeting rooms and welfare facilities.
- Decentralised Energy Resource (DER), which will be constructed across approximately 200ha of lands adjoining the DC facility. The DER incorporates several power assets which will generate, store and manage electricity close to the DC facility. The DER comprises the following assets:
  - Fuel Cell Power System – 160MW,
  - Battery Energy Storage System (BESS) – 250MW,
  - Solar PV farm (nominal 180MWp), and
  - 220kV IPP GIS Grid connection to the 220kV Castlelost GIS substation which adjoins the proposed development site.

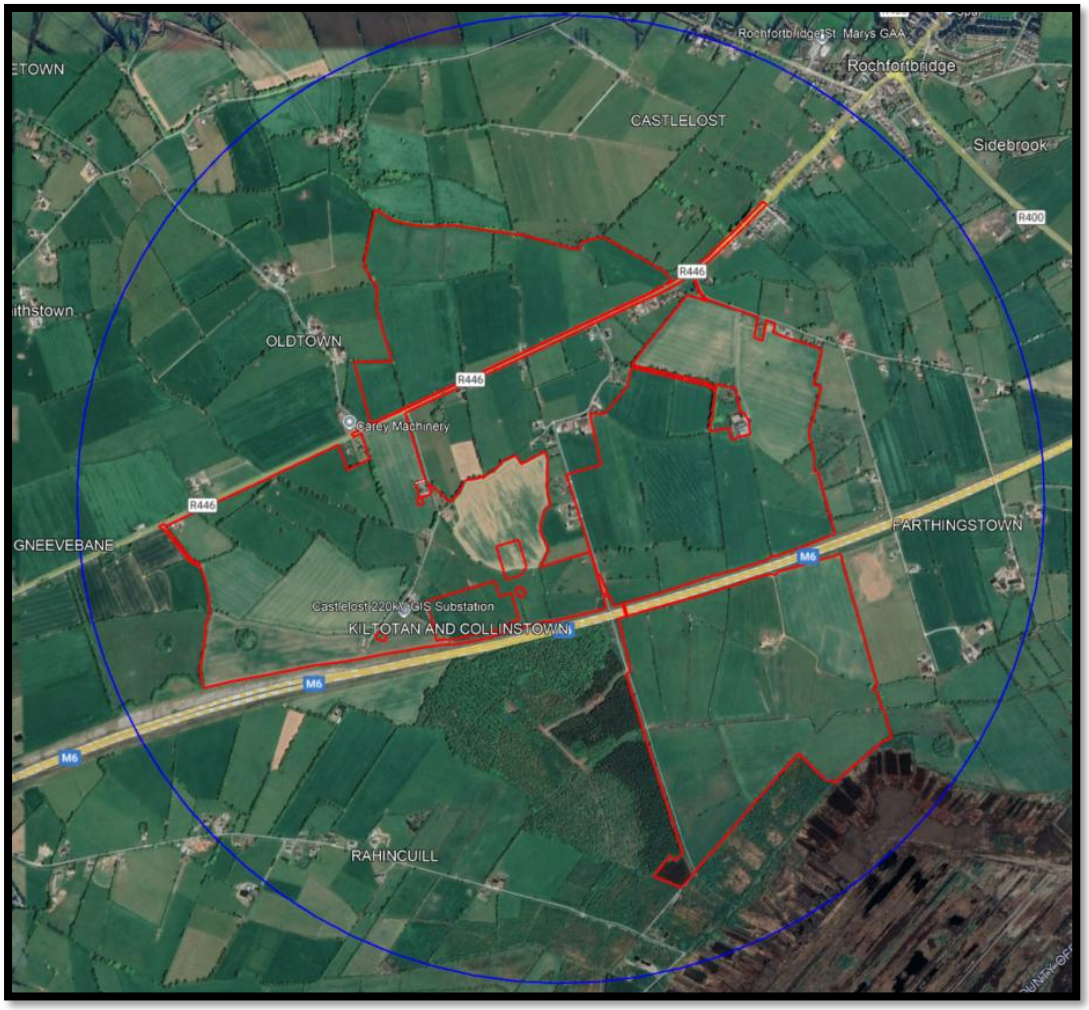
A full description of the proposed development is provided in Chapter 2 of this EIAR.

10.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

10.3.1 STUDY AREA

Air quality impacts of the proposed project on receptors which could potentially be affected by the proposed development are considered in this Chapter of the EIAR. The study area includes all areas that could potentially be affected by the emissions from the proposed project. The study area for the Construction Phase air quality impact assessment was defined according to the Institute of Air Quality Management's (IAQM's) *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM 2024), and includes sensitive receptors (e.g. houses, schools and hospitals) that are located within 250m of construction activities. The study area for the construction phase is shown in Figure 10.1 below.

Figure 10.1 Construction Phase Study Area

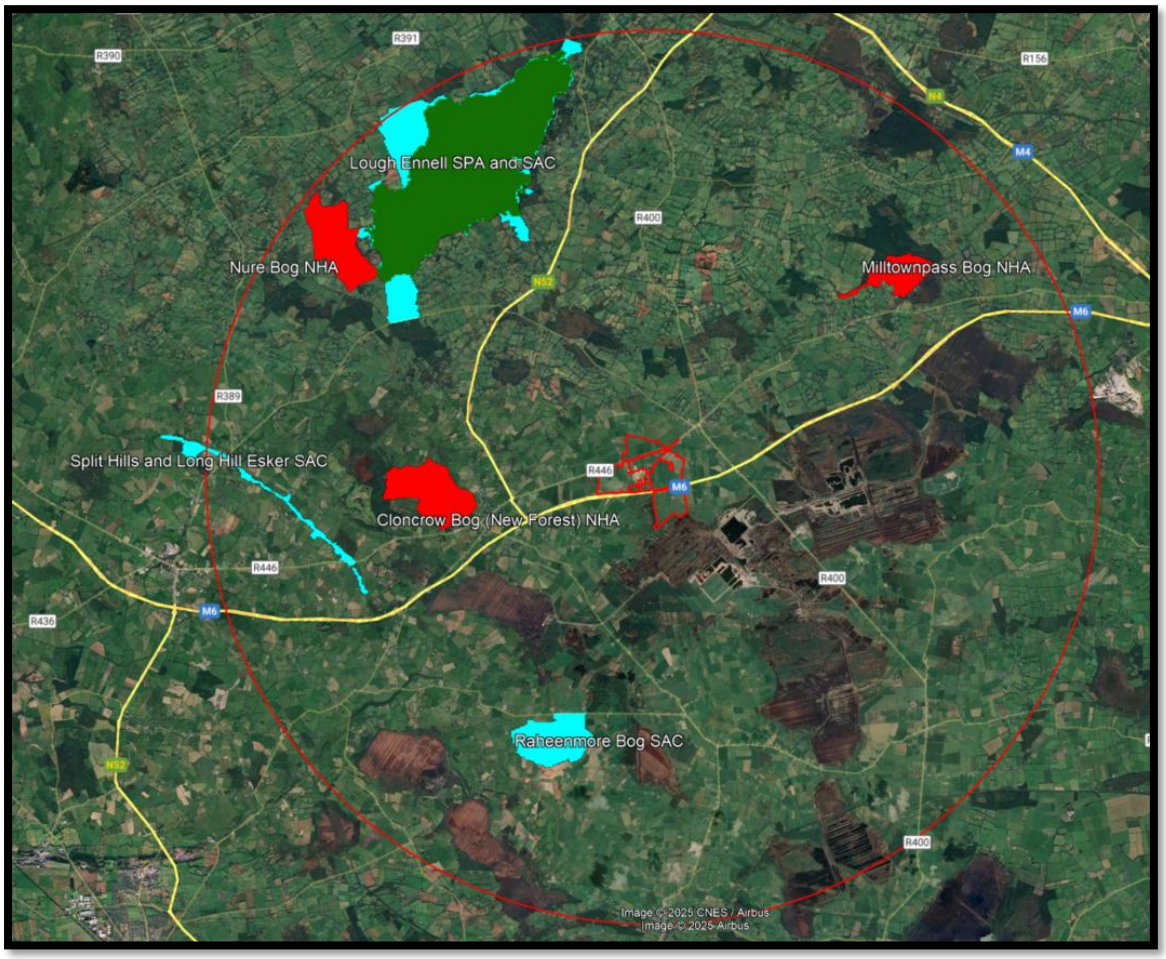


The study area for the Operational Phase air quality assessment includes receptors and ecological designated sites that could be affected by the proposed project. The study area for the Operational Phase air quality assessment was determined using professional

judgement and from a consideration of the potential impacts on receptors located near the proposed project. The potential impact on ecological receptors does not extend beyond a distance of 10km from the centre of the proposed development site. The designated sites within 10km of the site are shown in Figure 10.2 below.

In addition to the general description of the Study Area specified Receptors are selected for detailed study as representative receptors to assess impacts of the proposed development.

Figure 10.2 Designated Sites



10.3.2 IMPACT ASSESSMENT METHODOLOGY

10.3.2.1 Air Quality Assessment Methodology

The impact assessment methodology involves identification and characterisation of the air quality impacts that may be associated with the proposed project, characterisation of the baseline environment to benchmark the existing situation, quantitative prediction of air

quality impacts and assessment of the impacts against recognised Air Quality Standards (AQS) and Guidelines. From this assessment comes a definition of mitigation measures that are required to ensure that all aspects of the impacts of the proposed project, through the Construction Phase and the Operational Phase, are managed and controlled to protect human health, the environment and amenity.

The effects of the proposed project are described by considering the possible impacts that could occur as a result of the proposed project, the probability of their occurrence and the nature and significance of such impacts. The Environmental Protection Agency's (EPA's) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (2022) take account of Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment and have been considered in this assessment. Impacts are described in the Guidelines under various headings which are summarised as follows:

- Probability – likely, possible, unlikely;
- Quality – positive, neutral, negative;
- Significance – e.g. Imperceptible, Moderate, Profound; and
- Magnitude – duration, frequency, extent, context.

A description of the significance of effects is presented in Table 10.1, which shows the approach taken towards quantifying the significance and magnitude of potential air quality impacts in this assessment.

In addition to considering the above guidance, the general approach adopted for the air quality impact assessment is summarised as follows:

- Describe the existing baseline air quality at the proposed project site and in the vicinity of receptors;
- Describe the potential impacts of the proposed project on air quality;
- Identify appropriate criteria against which to assess the significance of the impacts associated with the proposed project;
- Propose avoidance and mitigation measures where required; and
- Identify and assess all cumulative impacts with potential to impact upon the baseline environment.

The IAQM's (2024) *Guidance on the Assessment of Dust from Demolition and Construction* describes a five-step approach to the assessment which is summarised as follows:

- Screen the proposed project to determine if there is a requirement for a more detailed assessment;
- Assess the risk of dust impacts for each of the four activities (demolition, earthworks, construction and construction traffic) and take account of the scale and nature of the works, and the sensitivity of the area;
- Determine the site-specific mitigation for each potential activity;
- Examine the residual effects and determine whether these are significant; and
- Prepare the dust assessment report.

This approach has been applied to the proposed project. A detailed assessment is required when there are human receptors within 250m of the boundary of the project site, and since the closest human receptors to the proposed project site boundaries are within this distance, a detailed assessment was required.

Table 10.1 Describing the Significance and Magnitude of Environmental Effects (EPA 2022)

Aspect	Description
Significance of Effects	
Imperceptible	An effect capable of measurement but without significant consequences
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging trends.
Significant	An effect which, by its character, magnitude, duration or intensity, alters most of a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity, significantly alters most of a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics
Magnitude of Effects	
Extent	This is described by the size of the area, the number of sites and the proportion of the population affected by the effect.
Duration	**Momentary** effects last seconds to minutes.
	Brief effects last less than a day.
	Temporary effects last less than one year.
	Short-term effects last from one to seven years.
	Medium-term effects last from seven to 15 years.
	Long-term effects last from 15 to 60 years.

Aspect	Description
Significance of Effects	
	Permanent effects last over 60 years.
	Reversible effects are effects that can be undone for example through remediation or restoration
Frequency	How often the effect will occur
Context	The contextual relationship between the effect and the existing baseline; it is important to establish if the effect is unique or commonly or increasingly experienced.

There are no European or Designated Sites within 50m of the site boundary, which is the threshold distance for ecological sensitivity to dust. Therefore, there are no significant Construction Phase air quality impacts predicted for ecological sites from the construction works, and this element is not assessed further.

The impacts on air quality from the Construction Phase will arise through the generation and subsequent deposition of dust and elevated local PM_{10} concentrations. The four construction activities have been assessed on the basis of the area sensitivity and the emission magnitude. The dust emission magnitude is based on the scale of the anticipated works and should be classified as Small, Medium, or Large. Dust emissions are defined according to the scale and nature of the work for each activity, as described in

Table 10.2 below.

The two types of sensitive receptors that may be impacted by dust from construction activities, as defined by IAQM (2024), are human and ecological. These are defined as "a location that may be affected by dust emissions during demolition and construction. Human receptors include locations where people spend time and where property may be impacted by dust. Ecological receptors are habitats that might be sensitive to dust".

The guidance refers to human receptors as those properties that may be subject to adverse impacts of dust or PM_{10} over a time period relevant to the Air Quality Standard. Specific properties include dwellings, cultural heritage collections, food manufactures, etc. According to IAQM (2024) a single dwelling is classified as one receptor, whereas a school counts as 100. In addition, relevant designated (ecological) sites and their sensitivity to dust impacts have also been considered. Designated sites include nature sites that have special status as protected areas because of their natural importance.

Receptor sensitivity is defined by a number of factors including:

- specific sensitivities of those receptors;

- number of receptors;
- proximity to construction site;
- background PM_{10} concentrations; and
- site-specific factors.

The sensitivity of key receptors to each construction-related activity is determined for each of the following dust impacts:

- dust soiling;
- human health impacts; and
- impacts on ecological receptors.

The sensitivity of an area to the potential impacts of each activity is defined at various distances from the work site depending on the sensitivity and number of receptors. IAQM categorises these in several distance bands for different impacts at 20, 50, 100, and 250m. Receptor sensitivity to dust soiling is assessed for only four IAQM distance bands, whereas sensitivity to human health impacts is assessed for all five defines the levels of sensitivity of areas at different distances for each of the impacts listed above.

The estimated magnitudes of each construction activity (small, medium, large or negligible) are combined with the area sensitivity, which is determined by the number and proximity of receptors to the construction boundary and the background PM_{10} concentration. High sensitivity receptors include properties such as residences, care homes, hospitals and schools, and medium sensitivity receptors include hotels, offices and supermarkets. There are high sensitivity receptors close to the proposed project, and therefore as a worst-case approach, the assessment is based on a high sensitivity rating for all receptors.

Since the potential emissions are predominantly in the 30µm to 75µm size range, PM_{10} impacts are screened out as insignificant for this assessment. The assessment therefore focuses on the larger particle sizes. This qualitative analysis provides the overall level of risk of impacts for dust soiling, human health and ecology. The level of risk of each impact is used to identify appropriate mitigation measures.

Table 10.2 Quantitative Determination of the Magnitude of Dust Emissions for Demolition and Construction Activities (IAQM 2024)

Activity	Dust Emission Magnitude	
Demolition	Large	Total building volume >75,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >12 m above ground level;
	Medium	Total building volume 12,000 m^3 – 75,000 m^3, potentially dusty construction material, demolition activities 6-12 m above ground level; and
	Small	Total building volume <12,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <6m above ground, demolition during wetter months.
Earthworks	Large	Total site area >110,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >6 m in height, total material moved >100,000 tonnes;
	Medium	Total site area 18,000 m^2 – 110,000 m^2, moderately, dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 3 m - 6 m in height; and
	Small	Total site area <18,000 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <3 m in height.
Construction	Large	Total building volume >75,000 m^3, on site concrete, batching, sandblasting;
	Medium	Total building volume 12,000 m^3 – 75,000 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching; and
	Small	Total building volume <12,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).
Trackout	Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m;
	Medium	20-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m; and
	Small	<20 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m.

Table 10.3 Area Sensitivity to the Effects of Dust Soiling (IAQM 2024)

Receptor Sensitivity	Number of Receptors	Distance from the Source, m			
		<20	<50	<100	<250
High	>100	High	High	Medium	Low
	10 – 100	High	Medium	Low	Low
	1 – 10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

10.3.2.2 Methodology for Assessing Impacts due to Aspergillus

The fungal disease known as *"invasive Aspergillosis"* may be contracted as result of disturbance of materials that release fungal spores into the atmosphere and is a potential concern that requires consideration. This is a disease which is detrimental to persons with suppressed immune systems, such as hospital patients. The "National Guidelines for the prevention of Nosocomial Invasive Aspergillosis during construction/renovation activities" deals specifically with construction works occurring within or adjacent to hospitals. The report states that the fungal spores responsible for invasive Aspergillosis can originate from a number of sources such as construction, demolition, renovation, disturbance of soil, removal of fibrous insulation material, removal of suspended ceiling tiles and from poorly maintained air ventilation systems. The potential sources of the fungal spores associated with invasive Aspergillosis, as detailed above, are related to the occurrence of these operations either within or in very close proximity to the hospital buildings.

Fungal spores (the Aspergillus moulds) are found everywhere but are of particular concern when large scale demolition, excavation and earth-moving activity takes place and especially in close proximity to areas where vulnerable individuals are located. The dispersion of spores (or indeed dust or any other substance) which are released at a particular location depends on a significant number of factors which include the rate and temperature of the release, the release height, the wind speed, rainfall, wind direction, topography, local meteorological conditions, the nature of the substances released, the potential for physical or chemical interactions and the concentrations of the substances released and other factors. The dispersion of fungal spores will depend on all of the above factors and this dispersion is evaluated by considering the factors noted above and the distances from the source at which the predicted impacts are to be assessed. In the first instance, the key factors are the concentration of the spores released and the distance to

sensitive receptors. Dispersion of fungal spores released as a result of any activity is a function of time and distance and would be completely dispersed i.e. no measurable concentration at approximately 250m from the source of the release.

The National Guidelines report referred to above notes that the fundamental requirement in respect of eliminating Aspergillus infection from construction works is first to minimise the dust generated during construction and second to prevent dust infiltration.

10.3.2.3 Methodology for assessing Operation Phase Impacts

The assessment of air quality impacts during operation is based on a comparison of predicted impacts with air quality standards and guidelines, and consideration of the magnitude and duration of the potential impact. This assessment is undertaken by carrying out predictive modelling to determine the potential magnitude of any air quality impacts and comparing the predictions with the relevant air quality standards and guidelines.

10.3.2.4 Methodology for Assessing Cumulative Impacts

The cumulative impacts of known permitted developments with the proposed developed were considered using the same methodologies outlined under the previous headings. The consideration of the potential incremental impact of the other known developments in combination with those of the subject development leads to a conclusion in respect of cumulative impacts.

10.3.3 AIR QUALITY STANDARDS

Air Quality Standards (AQS) in Ireland have been defined to ensure compliance with European Commission Directives; they are developed at different levels for different purposes. European legislation on air quality has been framed in terms of two categories: limit values and guide values. Limit values are concentrations that cannot be exceeded and are based on World Health Organisation (WHO) guidelines for the protection of human health. Guide values are set as a long-term precautionary measure for the protection of human health and the environment. The WHO Guidelines differ from the European Union Air Quality Standards (EU AQS) in that they are primarily set to protect public health from the effects of air pollution, whereas AQS are recommended by governments, and other factors, such as socio-economic factors, may be considered in setting the standards.

The AQS and guidelines referenced in this report are summarised in Table 10.4. These criteria have been chosen to ensure that the potential impacts of the proposed project during both the Construction Phase and the Operational Phase will be benchmarked against appropriate standards. Directive 2008/50/EC of the European Parliament and of the

Council of 21 May 2008 on ambient air quality and cleaner air for Europe (Clean Air for Europe Directive) is an amalgamation of Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management (Air Quality Framework Directive) and its subsequent daughter Directives and sets out limit and target values for named air quality parameters. The Clean Air for Europe Directive was transposed into Irish legislation by the Ambient Air Quality Standards Regulations 2022 (S.I. No. 739 of 2022) published on January 10th, 2023. Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air (Fourth Daughter Directive) was transposed into Irish legislation by the Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Quality Standards Regulations 2022 (S.I. No. 739 of 2022). These Directives and the Irish Regulations set out the main standards against which the potential impacts of the proposed project on air quality are assessed, as summarised in

Table 10.4.

In addition to the Ambient Air Quality Standards Regulations 2022 and the Clean Air for Europe Directive standards, it is also appropriate to consider the WHO Guidelines. These Guidelines were developed by the WHO to provide appropriate air quality targets worldwide, based on the latest health information available. The air quality guidelines for PM_{10}, NO_2 and SO_2, and $PM_{2.5}$ are considered in this Chapter. While the WHO Guidelines are not mandatory, they represent the current informed opinion on the levels to which we should be aspiring in order to minimise the adverse health impacts of air pollution. The WHO guidelines referenced in this report are summarised in Table 10.5.

There are no national or European AQS with which dust deposition can be compared. However, a figure of 350mg/m^2/day, based on the German Standard, Technical Instructions on Air Quality Control (TA Luft) Regulations, is commonly applied by Local Authorities and the Environmental Protection Agency (EPA) to ensure that no nuisance effects will result from specified industrial activities.

Table 10.4 Ambient Air Quality Standards Regulations 2022 (based on EU Clean Air for Europe [CAFE] Directive 2008/50/EC)

Pollutant	EU Regulation	Limit Type	Margin of Tolerance	Value
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	None	200 µg/m^3 NO_2
		Annual limit for protection of human health	None	40 µg/m^3 NO_2

		Annual limit for protection of vegetation	None	30 µg/m^3 NO +NO_2
Sulfur Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 24 times/year	150 µg/m^3	350 µg/m^3
		Daily limit for protection of human health - not to be exceeded more than 3 times/year	None	125 µg/m^3
		Annual & Winter limit for the protection of human health and ecosystems	None	20 µg/m^3
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50%	50 µg/m^3
		Annual limit for protection of human health	20%	40 µg/m^3
Particulate Matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health (Stage 1)	20% from June 2008. Decreasing linearly to 0% by 2015	25 µg/m^3
		Annual limit for protection of human health (Stage 2)	None To be achieved by 2020	20 µg/m^3
Carbon Monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health	60%	10 mg/m^3 (8.6 ppm)
Benzene	2008/50/EC	Annual limit for protection of human health	0% by 2010	5 µg/m^3

Note The Ambient Air Quality Standards Regulations 2022 (SI 739 of 2022) transposed EU Directive 2008/50/EC (CAFE) into Irish law.

Table 10.5 WHO Air Quality Standards

Pollutant	Averaging time	Interim target				2021 Guidelines
		1	2	3	4	
Particulate matter (as $PM_{2.5}$), µg/m³	Annual limit for protection of human health	35	25	15	10	5
	24-hour limit for protection of human health Note [1]	75	50	37.5	25	15
Particulate matter (as PM_{10}), µg/m³	Annual limit for protection of human health	70	50	30	20	15
	24-hour limit for protection of human health Note [1]	150	100	75	50	45
Ozone, µg/m³	Peak season Notes [2]	100	70	NA	NA	60
	8-hour Note [1]	160	120	NA	NA	100
Nitrogen Dioxide, µg/m³	Annual limit for protection of human health	40	30	20	NA	10
	24-hour limit for protection of human health Note [1]	120	50	NA	NA	25
Sulfur Dioxide, µg/m³	24-hour limit for protection of human health Note [1]	125	50	NA	NA	40
Carbon Monoxide, mg/m³	24-hour limit for protection of human health Note [1]	7	NA	NA	NA	4

Note 1 Expressed as the 99th percentile
Note 2 Average of daily maximum 8-hour mean O_3 concentration in the six consecutive months with the highest six-month running-average O_3 concentration.

10.4 RECEIVING ENVIRONMENT

10.4.1 METEOROLOGICAL CONDITIONS

The magnitude of potential impacts of the proposed development on air and climate will largely be influenced by the local meteorological conditions, in particular by wind speed and direction and by precipitation rates. An evaluation of the climatic conditions at the site is therefore useful for an assessment of the type required for this study.

Met Éireann operate a Synoptic Network of weather stations at Belmullet, Malin Head, Rosslare (closed since 2008), Johnstown Castle, Birr, Clones, Kilkenny and Mullingar while the Aviation Division of Met Éireann maintains observing stations at Shannon Airport, Knock Airport, Casement Aerodrome, Dublin Airport and Cork Airport. There is no continuous meteorological monitoring on the subject site but the general guidance on selection of meteorological data for air quality impact assessments is to choose representative data, recently acquired, which best represents conditions at the site. At least five years of recently acquired data is preferred. Comprehensive monitoring data is

available for Dublin Airport (located 68km east of the subject site) and for Mullingar (approximately 13km north of the subject site) which would be indicative of the meteorological conditions that are experienced at the proposed site. Therefore, for the purpose of obtaining reliable information about the climatological conditions at the site of the proposed development, a full set of meteorological data for the period 2018 – 2022 recorded at Dublin Airport and 2016 – 2020 recorded at Mullingar was analysed. This is considered an appropriate data set for the study because of the close proximity of the station to the site and the similarity in topography in the immediate area of both Dublin Airport and Mullingar and the site of the proposed development.

Wind speed and direction in particular is important in determining how emissions associated with the activity are dispersed. The prevailing wind direction determines which areas are most significantly affected by the emissions from the activity and wind speed determines in part the effectiveness of the dispersion of the emissions. The windroses for Dublin Airport and Mullingar are presented in Figure 10.3 for each of the years 2018 – 2022 (Dublin Airport) and 2016 – 2020 (Mullingar). The dominant wind direction for Dublin Airport is from the west. The average long-term wind speed over the period 1985 to 2010 is 5.3m/s. (The dominant wind direction for Mullingar is from the southwest quadrant with wind blowing from this quadrant for more than 50% of the time. The average long-term wind speed over the period 1985 – 2010 is 5.5m/s.)

Figure 10.3(a) Windrose for Dublin Airport (2018-2022)

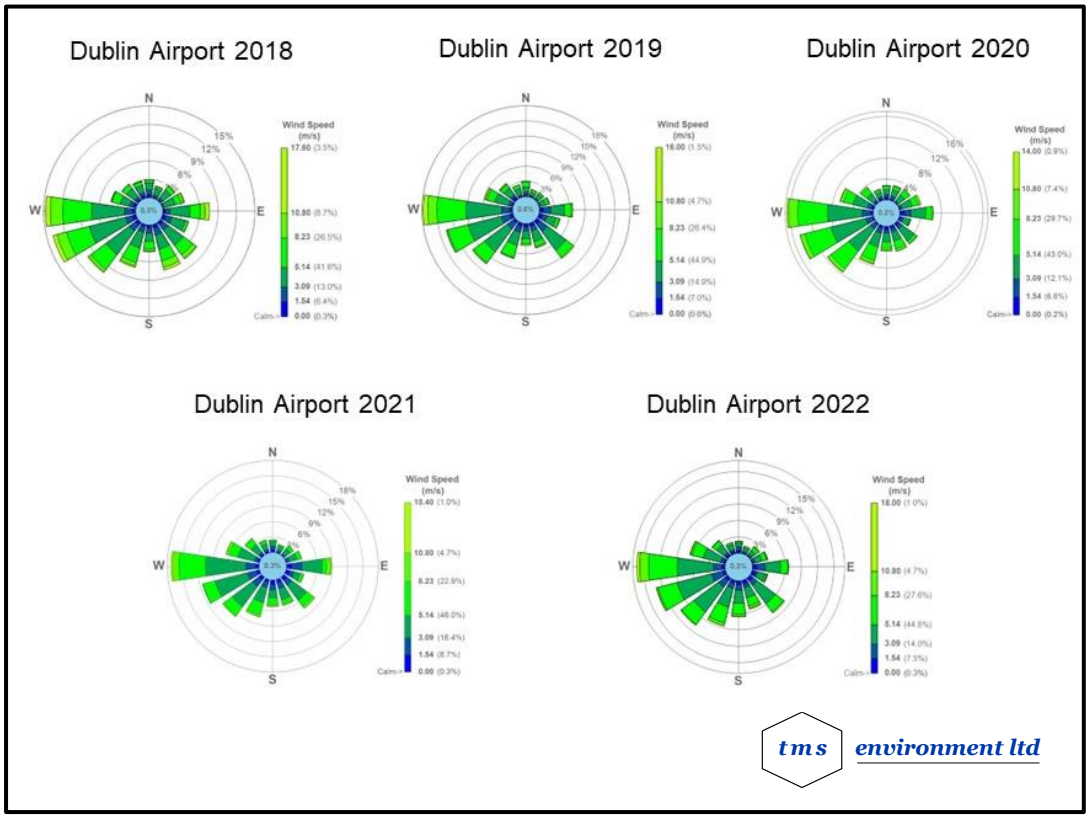
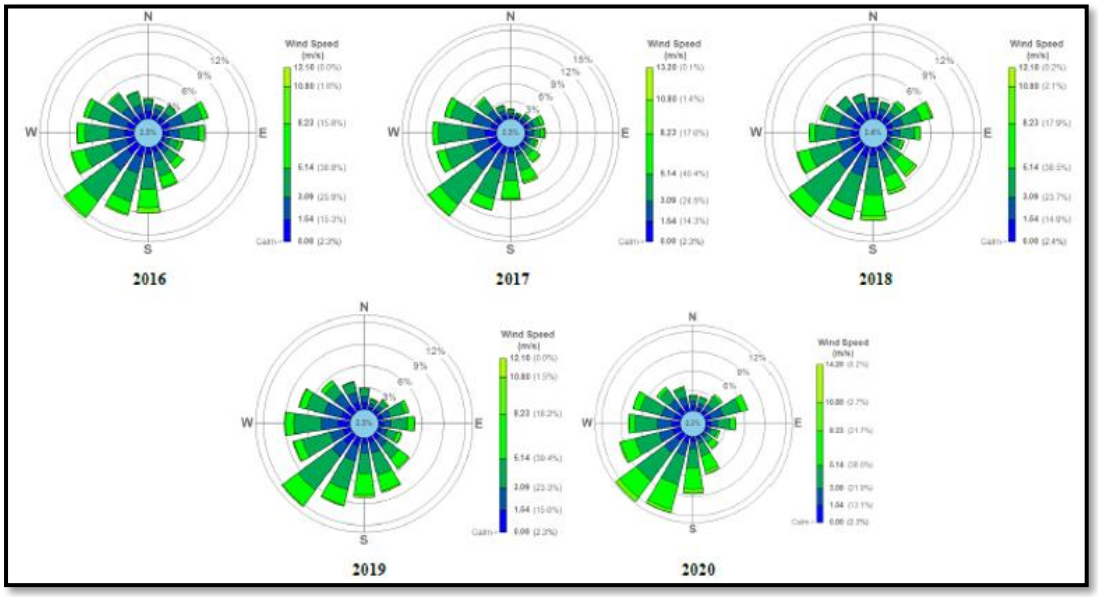


Figure 10.3(b) Windrose for Dublin Airport (2018-2022)



10.4.2 INFLUENCES ON AMBIENT AIR QUALITY

The existing activities at and in the vicinity of the proposed site have the potential to exert an influence on ambient air quality by release of emissions to atmosphere as follows:

- emissions of fine particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO) from domestic, commercial and industrial heating;
- emissions of particulate matter (PM_{10} and $PM_{2.5}$), SO_2, NO_x, CO and benzene from traffic on adjoining roads; and
- emissions of dust and particulate matter from agricultural activities.

Overall, the contribution of traffic to air quality is considered to be the most significant influence on air quality in the immediate vicinity of the proposed project site, but all other sources also exert significant influences on air quality.

The main substances which are of interest in terms of existing air quality are sulfur dioxide, nitrogen oxides, particulate dusts including PM_{10} and $PM_{2.5}$ which could originate from combustion sources and traffic.

A description of existing levels of the various substances in ambient air is required to allow completion of the evaluation of air quality impacts associated with the development and is presented in the following section.

10.4.3 EXISTING AMBIENT AIR QUALITY

The main substances which are of interest in terms of existing air quality are sulfur dioxide, nitrogen oxides (nitric oxide, NO and nitrogen dioxide NO_2, collectively referred to as NO_x), fine particulate matter including PM_{10} and $PM_{2.5}$ which could originate from combustion sources, traffic and the existing commercial activities in the area. Carbon monoxide is also potentially of interest, and benzene may also be of interest from traffic sources. There are no significant new substances expected to be present in emissions released from the proposed development relative to the existing situation.

Particulate matter is made up of tiny particles in the atmosphere that can be solid or liquid and is produced by a wide variety of natural and manmade sources. Particulate matter includes dust, dirt, soot, smoke and tiny particles of pollutants. Particulate matter of 10 micrometers in aerodynamic diameter or less are also referred to as PM_{10} or more strictly, particles which pass through a size selective inlet with a 50% efficiency cut-off at 10µm aerodynamic diameter. Similarly, $PM_{2.5}$ refers to particulate matter of 2.5 micrometers or less in aerodynamic diameter. In the past domestic coal burning was a major source of particulate matter in Irish cities during winter months. Levels of particles have decreased significantly since then following the introduction of abatement strategies including Special Control Areas and other Regulations regarding the use, marketing, sale and distribution of certain fuels. The significance of particulate matter is predominantly related to human health and respiratory effects.

Nitrogen oxides (NO_x, which is the sum of NO and NO_2), are generated primarily by combustion processes. The main anthropogenic sources are mobile combustion sources (road, air and traffic) and stationary combustion sources (including industrial combustion). The main source of nitrogen oxides in the vicinity of the site is traffic. The significance is health-related for nitrogen dioxide (NO_2) and ecological for nitrogen oxides (NO_x).

Sulfur dioxide also originates from combustion but predominantly from heating sources and not traffic. The trend in ambient SO_2 concentrations in Ireland is very clearly downward and this pollutant is not a matter for concern in Ireland. This reduction can be attributed to fuel switching from high-sulfur fuels, such as coal and oil, to natural gas and to decreases in the sulfur content of oil.

Carbon Monoxide (CO) is a colourless and odourless gas, formed when carbon in fuel is not burned completely. It is a component of motor-vehicle exhaust, which accounts for most of the CO emissions nationwide. Consequently, CO concentrations are generally higher in areas with heavy traffic congestion.

A description of existing levels of the various substances in ambient air is required to allow completion of the evaluation of air quality impacts associated with the development. The available data from the National Ambient Air Quality Network is a reliable data set for consideration in this study.

The Environmental Protection Agency (EPA) and local authorities maintain and operate a number of ambient air quality monitoring stations throughout Ireland in order to implement EU Directives and to assess the country's compliance with national air quality standards. Ireland's small population and generally good air quality means that a relatively small number of monitoring stations are sufficient across the country for the purposes of implementing the EU Air Directives. For ambient air quality management and monitoring in Ireland, four zones, A, B, C and D are defined in the Ambient Air Quality Standards (AQS) Regulations (S.I. No. 739 of 2022) and are defined as follows:

- Zone A: Dublin Conurbation.
- Zone B: Cork Conurbation.
- Zone C: 24 cities and large towns. Includes Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise.
- Zone D Rural Ireland, i.e. the remainder of the State excluding Zones A, B & C.

The Proposed Development site is located within County Westmeath and Air Quality Data from representative air monitoring stations in Zone D are therefore considered representative of air quality at the subject site. The EPA publishes Ambient Air Quality Reports every year which details the air quality in each of the four zones. The most recent report, published by the EPA in 2024, is the Air Quality in Ireland 2023, which contains monitoring data collected during 2023. Best practice requires that an average of at least three years of recent monitoring data is used for assessments of this type and therefore data from 2021 to 2023 has been reviewed.

The EPA maintains monitoring stations in a number of rural locations including Castlebar, Claremorris, Emo, Enniscorthy, Kilkitt and Longford to monitor rural background air quality. Other monitoring stations have operated at various times and some new stations have been added to the network, but long-term data is available for the above stations. Data from the Air Quality Monitoring Annual reports for 2021 to 2023 was reviewed and a summary of the data for representative stations for the three most recent years is presented for each parameter of interest in Table 10.6.

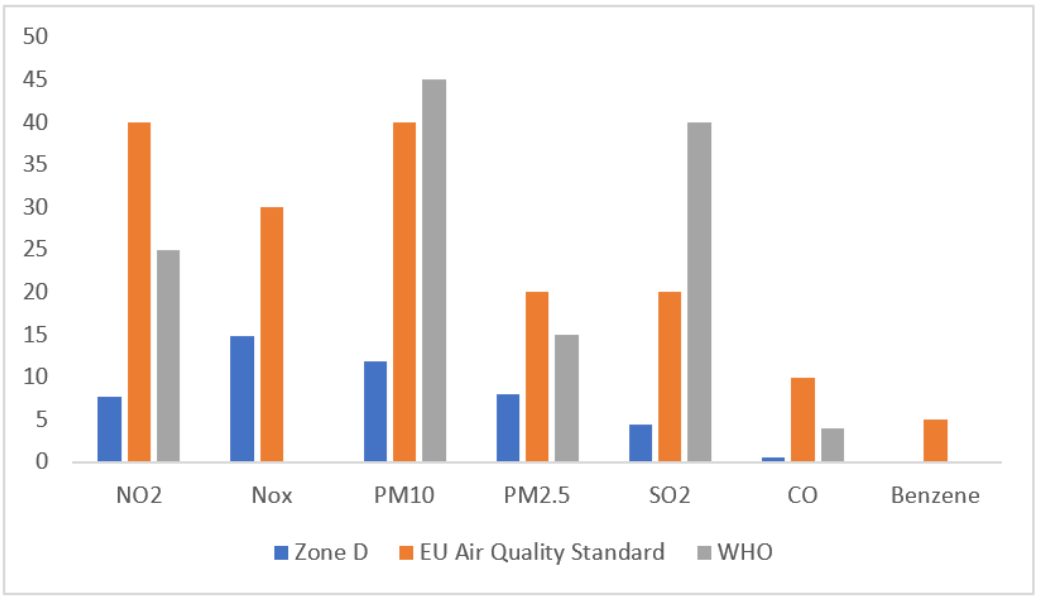
The approach taken is to take the average of the three most recent years for each of the Zone D rural stations detailed above and the averages of the values for the stations are reported in Table 10.6. This is the data set which is used in the assessment of the potential impact of the proposed development on air quality. A graphical presentation comparing the data with the relevant Air Quality Standards (discussed further in Section 10.5 below) is presented in Figure 10.4. It is noted from the data that existing ambient air quality is good for all health-related pollutants. All concentration levels are well within the EU Standards for all parameters of interest.

Table 10.6 Summary Background Air Quality for Stations in Zone D (2021-2023)

Data Set	Parameter and Averaging Interval		Concentration µg/m³
Rural Ireland (Zone D)	Nitrogen dioxide NO_2	Annual Mean, µg/m³	7.7
Rural Ireland (Zone D)	Nitrogen oxides, NO_x	Annual Mean, µg/m³	14.8
Rural Ireland (Zone D)	Particulate Matter PM_{10}	Annual Mean, µg/m³	11.8
Rural Ireland (Zone D)	Particulate Matter $PM_{2.5}$	Annual Mean, µg/m³	8.1
Rural Ireland (Zone D)	Sulfur dioxide, SO_2	Annual Mean, µg/m³	4.5
Rural Ireland (Zone D)	Carbon Monoxide CO	Annual Mean 8-hour, mg/m³	0.6
Kilkenny (Zone C)[2]	Benzene	Annual Mean, µg/m³	0.2

Note
1. Data summarised from the EPA Annual Ambient Air Quality Monitoring Reports 2021 to 2023.
2. No Zone D measurements recorded during this interval but a value of 0.2 µg/m3 was recorded for Zone C.

Figure 10.4 Comparison of Zone D Background Air Quality Data with Ambient Air Quality Standards



10.4.4 SITE SPECIFIC AMBIENT AIR QUALITY MONITORING

Multiple surveys of air quality in the area of the site were carried out during March – May 2024, and April – May 2025. The 2024 survey consisted of deployment of a series of diffusion tubes to measure ambient levels of nitrogen oxides, Sulfur dioxide, and Ammonia at 5 locations in the vicinity of the site. The 2025 survey included ambient nitrogen oxides diffusion tubes at the same 5 locations. The locations are shown in Figure 10.5 below. The detailed results of the surveys are presented in Appendix 10.1. A summary of the results is presented in Table 10.7 and Table 10.8. The results are consistent with expectations in that the levels are generally low and in most cases below the detection limit of the diffusion tubes. All of the monitoring results are compliant with the annual mean air quality standard for nitrogen oxides and sulfur dioxide and the results are consistent with the longer-term EPA monitoring data for rural locations. The EPA monitoring data is generally lower for the annual mean than the values recorded in this survey which is not surprising given the limited duration of this survey. The longer-term EPA data is likely to be more representative of the annual average concentrations and is therefore selected for use in this assessment. The data from the recent monitoring survey is a useful benchmark, it confirms the dominant influence of traffic emissions on air quality at the site.

Figure 10.5 Locations of diffusion tubes

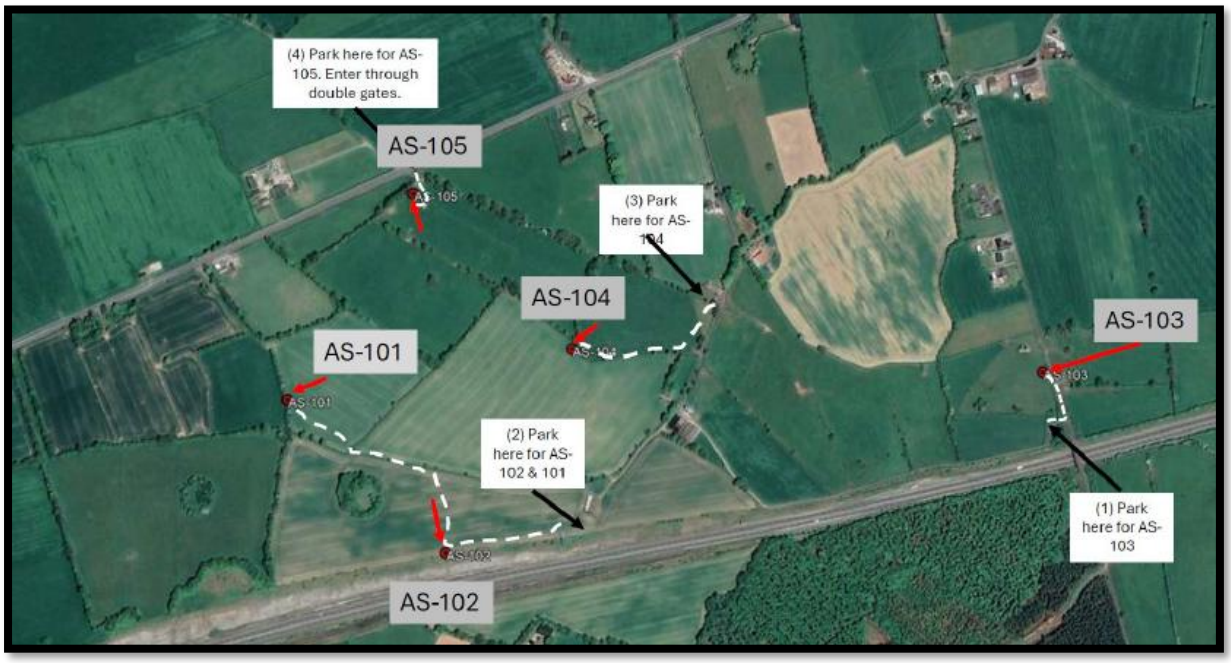


Table 10.7 Ambient air quality survey 2024-2025 (NO_2, NO_x [$\mu g/m^3$])

NO_2									
Location	**26 Mar – 09 Apr 2024**	**09 – 24 Apr 2024**	**24 Apr – 14 May 2024**	**2024 Average**	**04 – 18 Apr 2025**	**18 Apr – 02 May 2025**	**02 – 16 May 2025**	**2025 Average**	**Overall Average**
AS-101	2.7	2.0	3.9	2.9	6.4	4.5	7.1	6.1	4.4
AS-102	5.4	3.8	5.5	4.9	9.8	6.6	7.5	8.0	6.4
AS-103	3.5	2.4	3.0	3.0	7.2	5.5	5.7	6.1	4.6
AS-104	3.0	2.1	3.3	2.8	9.2	6.1	5.3	6.9	4.8
AS-105	2.9	2.5	2.5	2.6	5.0	10.0	N/A	7.5	4.6
NO_x									
AS-101	<3.3	<3	3.9	3.4[1]	9.7	7.5	14.7	10.6	9.0
AS-102	5.4	3.8	5.5	4.9	20.1	11.0	16.1	15.7	10.3
AS-103	3.5	<3	3.0	3.3[1]	10.0	10.4	5.7	8.7	6.5
AS-104	<3.3	<3	3.3	<3.3	15.0	6.1	10.6	10.6	8.8
AS-105	<3.3	<3	2.5	<3.3	10.6	26.2	N/A	18.4	13.1

Note 1: The value 3.2 was used to determine the average, but the actual may be lower as 3.2 is the detection limit

Table 10.8 Ambient air quality survey 2024 (SO_2, NH_3 [µg/m^3])

SO_2				
Location	**26 Mar – 09 Apr 2024**	**09– 24 Apr 2024**	**24 Apr – 14 May 2024**	**Average**
AS-101	< 2	<1.9	<1.4	< 2
AS-102	< 2	<1.9	<1.4	< 2
AS-103	< 2	<1.9	<1.4	< 2
AS-104	< 2	<1.9	<1.4	< 2
AS-105	< 2	<1.9	<1.4	< 2
NH_3				
AS-101	0.7	1.4	6.3	2.8
AS-102	1.2	1.5	17.3[1]	6.7
AS-103	1.2	1.3	1.7	1.4
AS-104	1.3	2.2	11.2	4.9
AS-105	0.7	1.1	1.8	1.2

Note 1: Attributed to slurry spreading in advance of tillage season

10.5 IDENTIFICATION OF LIKELY SIGNIFICANT IMPACTS

10.5.1 INTRODUCTION

The proposed development for which planning permission is sought will involve a significant amount of earthworks to prepare the site, construction of the buildings on the site and installation of plant and machinery. The potential air quality impacts on the surrounding environment that requires consideration for a proposed development of this type includes two distinct stages, the short-term construction phase and the long-term operational phase.

10.5.2 CONSTRUCTION PHASE IMPACTS

The potential air quality impacts during Construction are summarised as follows:

a) Dust Emissions Associated with Excavations

The most significant of the potential air quality impacts associated with the construction site is dust. Dust can be generated as a result of disturbance of materials, because of wind

blowing across exposed surfaces and as a result of construction vehicle movements across exposed surfaces.

There are three potential impacts of the dust / particulate matter emissions on air quality. Dust deposition on surfaces is the main potential impact associated with the larger particles, nuisance effects such as reduced visibility could be associated with excessively high levels of suspended particulate matter and respiratory effects could occur as a result of excessive levels of fine particles such as PM_{10} and $PM_{2.5}$.

Dust emissions associated with the Construction Phase of the proposed development are expected to be predominantly in the 30 – 75µm particle size range so these particles, because of their size, will generally be deposited within 100m of the emission source. Only under exceptional meteorological conditions would the dusts be carried further downwind.

Suspended particulate matter (SPM) may also be released and this matter may remain suspended in the air. The main effect would be on visibility, but this type of material could also be a respiratory nuisance if present at excessive levels. Emissions of dust in the form of fine particulate matter, PM_{10} and $PM_{2.5}$, may also occur, primarily as a result of materials handling and storage since the dominant particle size of the main construction materials is in the lower size ranges. There may also be some emissions of particles in these size ranges from the general site activities.

b) Construction Transport Emissions

Emissions of dust raised by vehicle movement on the roads near the site and on site are considered under the general construction phase emissions in section (a) above. Emissions from the construction vehicles as a result of fuel combustion are considered here. The emissions include PM_{10} and $PM_{2.5}$, NO_2 and NO_x and CO and benzene.

c) Aspergillus Emissions from Excavation and Earthmoving Activity

There is concern about a fungal disease, "invasive Aspergillosis" which may be contracted as result of disturbance of materials that release fungal spores into the atmosphere. Fungal spores (the Aspergillus moulds) are found everywhere but are of particular concern when large scale demolition, excavation and earth-moving activity takes place.

10.5.3 OPERATIONAL PHASE IMPACTS

The most significant potential impacts remain the same as those associated with existing activities at and in the vicinity of the site - emissions of particulate matter and combustion gases such as carbon monoxide (CO), sulfur dioxide (SO_2) and nitrogen oxides (NO_2) from traffic. There is no combustion process associated with the proposed SOFC and therefore

emissions to atmosphere are negligible. There are six fuel cell towers from which a small amount of nitrogen oxides is released, the amount being proportional to the power output of the plant.

There is a 1MW generator that will operate for less than 100 hours per year. The operation will be to ensure ongoing operability in the event of an emergency requirement. There are emissions of particulate matter and combustion gases such as carbon monoxide (CO), sulfur dioxide (SO_2) and nitrogen oxides (NO_2) associated with operation of the generator.

There are no emissions to atmosphere associated with operation of the Battery Energy Storage System (BESS) or the solar farm.

10.5.4 TRAFFIC IMPACTS

The traffic associated with the proposed development during construction and operation will lead to emissions to atmosphere which are considered in the assessment. The principal substances that are associated with transport activity are particulate matter, nitrogen oxides and carbon monoxide. Dust emissions associated with construction traffic are also possible. Emissions of particulate matter and combustion gases such as carbon monoxide (CO), sulfur dioxide (SO_2) and nitrogen oxides (NO_2) are possible.

10.5.5 DO NOTHING IMPACT

There will be no change in air quality impacts if no change takes place. In the absence of the development proposal, the air quality is unlikely to change.

10.6 AIR QUALITY IMPACT ASSESSMENT

10.6.1 CONSTRUCTION PHASE IMPACTS

The construction of the proposed development will involve general construction activities. Site clearance will require the use of heavy earth-moving machinery and equipment that will be used for soil stripping, excavation, importation of materials to site and foundation laying equipment. Conventional construction work will then be required to build up the individual units that will be required on-site.

10.6.1.1 Dust

The risk of dust being emitted in sufficient quantities to cause a nuisance or health impacts is evaluated by considering the scale of the works programme. The IAQM's (2024) Guidance on the Assessment of Dust from Demolition and Construction gives advice on classifying the magnitude of the potential dust impacts and using the advice and

information derived from the Construction Plan for the site, the magnitude of the dust emissions is estimated as shown in Table 10.9. The assessment is based on the closest receptors to any section of the proposed site and therefore represents a worst-case assessment scenario whereby the maximum potential impact is assessed.

Table 10.9 Assessment of Magnitude of dust emissions and area sensitivity for Construction Programme

Activity	Magnitude of Dust Emission	Sensitivity of receptors and surrounding areas		
		Dust Soiling	Human Health	Ecological
Demolition	Small	High	High	Low
Earthworks	Large	High	High	Low
Construction	Large	High	High	Low
Construction Traffic	Small	High	High	Low

The significance of the dust emissions and impacts is evaluated in terms of the sensitivity of the receptors in the area that could be affected by the emissions. In general, receptors located close to the construction site boundary are considered high sensitivity with sensitivity decreasing with increasing distance from the source reflecting the exponential decrease in dust levels as distance increases. The highest receptor sensitivity in the immediate vicinity of the proposed site is high and is high for the vast majority of the construction activity.

The potential air quality impact arises from emissions of particulate matter and may result in deposition of dust around the site, and trackout onto the roads in the vicinity of the site. The magnitude of the potential emissions associated with Construction is assessed as high using the above criteria.

Using the alternative assessment approach outlined in the Guidelines on Environmental Impact Assessment as outlined in Section 10.3 the significance of potential dust emissions during construction is summarised in Table 10.10.

This assessment shows that the most significant potential impacts are those associated with excavation work which is very dependent on weather conditions. Damp weather and low wind speeds will reduce the level of impact experienced at the receptor locations. There will be a slight, temporary impact on the closest receptors during the demolition phase. There will be a short-term, moderate impact on the closest receptors during the excavation programme and a short-term, moderate impact on the closest receptors during the construction works. Construction traffic impacts will be slight and experienced in the

short-term. In the absence of mitigation measures, the overall impact of dust arising during the construction phase is considered to be short term in duration and its significance will vary from moderate to slight.

The impact assessment of the dust emission risks for the proposed project using the IAQM Methodology are presented in Table 10.11.

Table 10.10 Assessment of Significance of dust emissions for Construction Programme

Activity	Significance of Dust Emission	Duration of Dust Emission
Demolition	Slight	Temporary
Earthworks	Moderate	Short Term
Construction	Moderate	Short Term
Trackout	Slight	Short Term

Table 10.11 Dust Risk Table

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium Risk	High Risk	High Risk	Medium Risk
Human Health	Medium Risk	High Risk	High Risk	Medium Risk
Ecology	Negligible	Low Risk	Low Risk	Low Risk

The potential air quality impact arises from emissions of particulate matter and may result in deposition of dust around the site and trackout onto the roads in the vicinity of the site. The potential impacts of the four defined phases of construction works (demolition, earthworks, construction and trackout) have been assessed as high risk, medium risk, low risk, or negligible risk as shown in Table 10.11. Mitigation measures will be implemented at the site to ensure that dust impacts are prevented or minimised during the Construction Phase of the development.

10.6.1.2 Transport

Raw materials required for the construction will be delivered to the sites using conventional Heavy Goods Vehicles (HGVs) and any wastes requiring removal from the site will be removed using HGVs. The principal substances that are emitted from the vehicles are fine particulate matter, nitrogen oxides and carbon monoxide. Dust and particulate matter impacts associated with the passage of vehicles on roads has already been assessed as

part of the dust and particulate matter impacts. The level of traffic movements has been reviewed in the context of potential contributions to air quality in the area.

Construction traffic will consist of private vehicles of site construction staff along with excavation plant and dumper trucks involved in site development works and material delivery vehicles.

It is anticipated that heavy goods vehicle (HGV) traffic movements will occur at a steady rate throughout the course of the day. It is envisaged that peak hour heavy goods vehicle (HGV) traffic would be in the region of 10 HGV movements at peak production when considering the worst-case construction scenario.

Potential emissions from construction traffic using the local road network have been assessed to contribute less than 1% change to the existing air quality emission levels. It can therefore be concluded that the additional traffic will not generate significant emissions in terms of local air quality and no material change in air quality relative to the existing situation is predicted.

10.6.1.3 Aspergillus

The fundamental requirement in respect of eliminating Aspergillus infection from construction works is first to minimise the dust generated during construction and second to prevent dust infiltration into patient care areas. There are no patient care areas within 250m of a possible release source at the site and dust infiltration will therefore not occur. It is considered that in the absence of mitigation measures the potential construction phase impact of Aspergillus is short term and imperceptible.

In the absence of mitigation measures the construction phase activities will range from an imperceptible to slight impact on local air quality depending on the activities occurring and, in all cases, will be short-term in duration.

10.6.2 OPERATIONAL PHASE IMPACTS

The only predicted air quality impacts associated with operation of the proposed development are emissions to atmosphere from the emergency generator and some trace emissions of nitrogen oxides from the fuel cells. The assessment of the impact of the emissions from these sources is carried out by dispersion modelling. A detailed modelling assessment was undertaken using the current version of the United States EPA's model AERMOD Prime model in accordance with the guidance offered by the Environmental Protection Agency (EPA) in their AG4 Guidance Note. The dispersion model computes average ground-level concentrations of pollutants emitted from either elevated or ground-

level emission sources. Separate utilities associated with the dispersion modelling software allow for computation of ground-level concentrations of pollutants over defined statistical averaging periods, and additional features permit suitable consideration to be given to building downwash effects and the effects of elevated terrain near the proposed development.

The Air Dispersion Model considered information relating to topography at the site and in the surrounding areas, design details for the building structures and emission sources and five years of meteorological data. The output from the Dispersion Model is the predicted ambient concentrations of substances emitted from the proposed development at locations beyond the site boundary for every hour of the five-year meteorological data sets. In addition to predicting concentrations in the broader environment, the Model predicted concentrations at individual sensitive human and ecological receptors. A detailed description of the Model and methodology is provided in Appendix 10.2.

The emissions to atmosphere arise due to the combustion process for the emergency generator and as a by-product of the fuel cell activity. The generator may be required in emergency situations to provide power in the event of an emergency; their operation is therefore very limited and will not exceed 100 hours per year. The dispersion model considered the following operating scenario.

(i) Operating Scenario: Normal Operation at full load

A conservative assumption of 100 operating hours per year was made for the emergency generator. An assumption of 2 hours operation per week during the morning (06:00 – 08:00) or evening (16:00 – 19:00) peak demand periods was made.

Continuous operation of the fuel cells with a low level emission of NOx was assumed. For this scenario, 1.4MkWhr/year results in a low emission rate of 1.081 tonne NOx emitted per year.

(ii) Operating Scenario: Normal Operation at 10% base load and intermittent full load

A conservative assumption of 100 operating hours per year was made for the emergency generator. An assumption of 2 hours operation per week during the morning (06:00 – 08:00) or evening (16:00 – 19:00) peak demand periods was made.

Continuous operation of the fuel cells with a low level emission of NOx was assumed. For this scenario, 10% baseload operation and intermittent full load for ca 50% of the time was assumed. This scenario results in a low emission rate of 0.594 tonne NOx emitted per year.

The modelling predictions are summarised in Table 10.12 for nitrogen oxides, the only pollutant of any significance emitted from the activity. The modelling predictions show that the predicted concentrations are all significantly lower than the relevant air quality standard. For the most sensitive pollutant, nitrogen dioxide, the predicted ambient concentrations expressed as the Process Contribution for the 99.8-percentile of 1-hour concentrations will not exceed 0. 1% of the air quality standard.

The cumulative air quality impact expressed in terms of the Predicted Environmental Concentration (PEC) is assessed by considering the background air quality in the area and the incremental contribution to ambient concentrations from the proposed process. The modelling predictions indicate that the cumulative impact of the operation of the facility with existing activities will not exceed the Air Quality Standards. The highest predicted Process Contributions (PCs) are close to the facility with concentrations reducing with distance from the source as expected.

Table 10.12 Predicted NO_2 concentrations for Normal Operation (Scenario #1)

Met data	Averaging interval	Process Contribution (PC) µg/m³	Background concentration µg/m³	Predicted Environmental Concentration (PEC) µg/m³	Air Quality Standard µg/m³	PC as % of Air Quality Standard
2016	99.8th %ile of 1-hour means	0.21	15.4	15.6	200	0.1
	Annual mean	0.11	7.7	7.8	40	0.3
2017	99.8th %ile of 1-hour means	0.22	15.4	15.6	200	0.1
	Annual mean	0.11	7.7	7.8	40	0.3
2018	99.8th %ile of 1-hour means	0.22	15.4	15.6	200	0.1
	Annual mean	0.12	7.7	7.8	40	0.3
2019	99.8th %ile of 1-hour means	0.27	15.4	15.7	200	0.1
	Annual mean	0.11	7.7	7.8	40	0.3
2020	99.8th %ile of 1-hour means	0.20	15.4	15.6	200	0.1
	Annual mean	0.13	7.7	7.8	40	0.3

Note:

1. The background concentration is the annual mean when evaluating annual or daily predictions. The background concentration is twice the annual mean when evaluating hourly predictions.

10.6.3 IMPACT OF EMISSIONS ON ECOSYSTEMS

The impact of nitrogen oxides (NOx) emissions on sensitive ecosystems was assessed by modelling the NOx emissions from the worst case operating scenario with maximum emissions. The impact predictions are presented in Table 10.12.

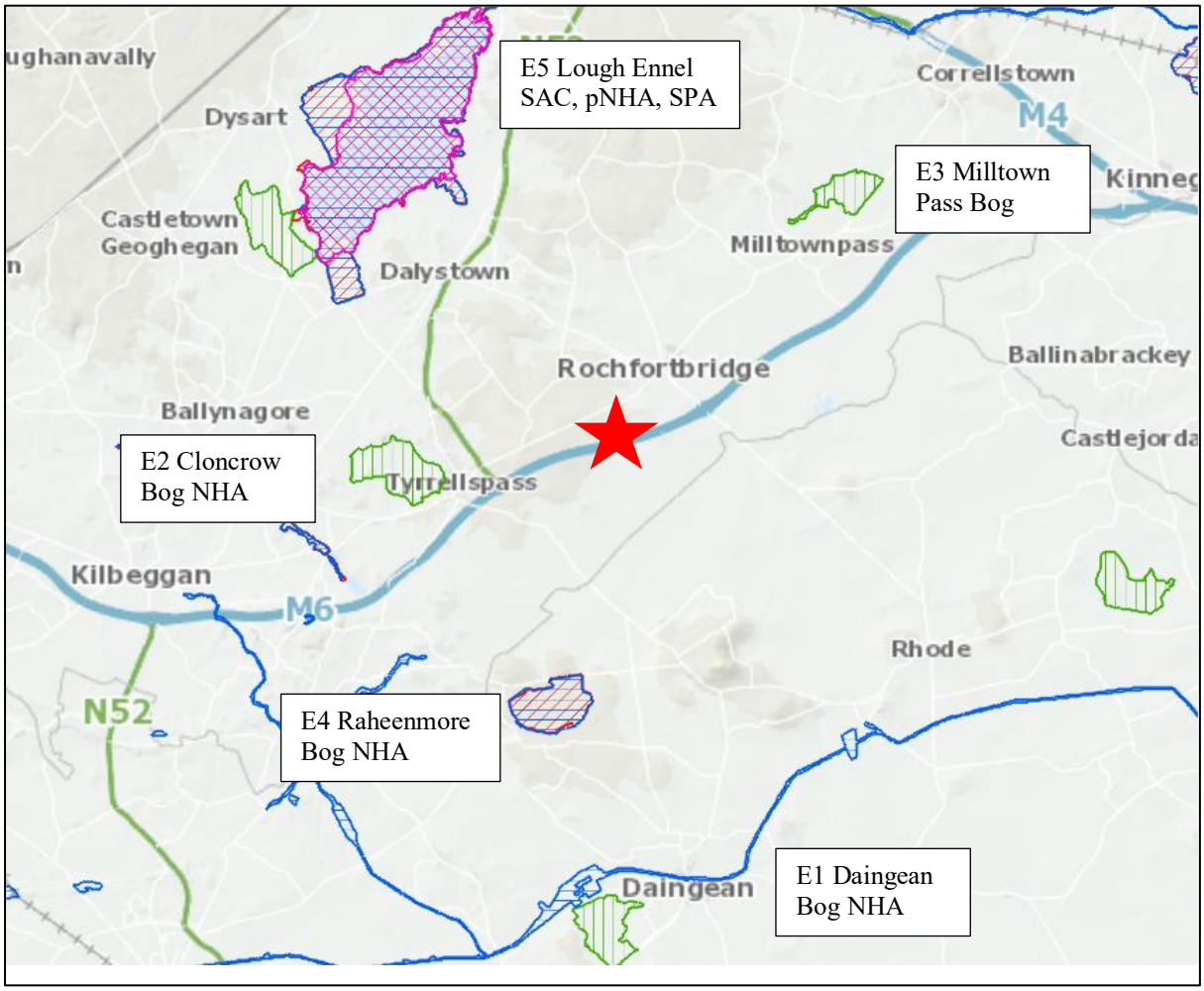
The assessment of impact is based on consideration of the predicted ground level airborne concentration of nitrogen oxides on the environment and on designated ecological sites as well as considering the impact of nitrogen deposition on the environment and on designated ecological sites. One element of the assessment considered all receptors outside the site boundary regardless of designated status, and the second element of the assessment considered the designated sites specifically.

Designated ecological sites within 15km of the site were identified and included in the assessment. There were five designated ecological sites selected for inclusion in the assessment as follows and as shown in Figure 10.6:

- E1 Daingean Bog NHA;
- E2 Cloncrow Bog NHA;
- E3 Milltown Pass Bog NHA;
- E4 Raheenmore Bog SAC, pNHA;
- E5 Lough Ennel SAC, SPA, pNHA;

Receptors within these designated sites were included in the dispersion modelling assessments.

Figure 10.6 Ecological receptors for detailed study



The maximum predicted Process Contributions are considered with the background concentrations to arrive at a PEC. The background concentration selected is for the areas closest to the site where maximum predicted PCs arise which is likely to be conservative given the surrounding land uses and the dominating influence of traffic from the motorway on ambient air quality.

The impact predictions for the concentration of nitrogen oxides in air at ground level are presented in Table 10.13. The predictions are the highest concentrations predicted at any location at the ecological sites.

The maximum predicted Process Contributions are considered with the background concentrations to arrive at a Predicted Environmental Concentration (PEC). The background concentration selected is for the areas closest to the site where maximum predicted Process Contributions (PCs) arise which is likely to be conservative given the surrounding land uses and the dominating influence of traffic from the motorway on ambient air quality.

The results indicate that the cumulative impact of the proposed development with existing activities will not exceed the air quality standard of 30 µg/m^3 expressed as an annual mean for ground level concentration of NO_x. The results therefore indicate that the emissions from the facility will not exert a significant adverse impact on any receptor outside the site boundary or, specifically, any designated ecosystems. The maximum predicted process contribution to ground level concentration as a result of the proposed development is 1% of the Air Quality Standard for full time operation at any ecological receptor.

Table 10.13 Predicted NO_x concentrations for Worst Case Operation

Met data	Averaging interval	Process Contribution (PC) µg/m^3	Background concentration µg/m^3	Predicted Environmental Concentration (PEC) µg/m^3	Air Quality Standard µg/m^3	PC as % of Air Quality Standard
2016	Annual mean	0.11	14.8	14.9	30	1.1
2017	Annual mean	0.11	14.8	14.9	30	1.1
2018	Annual mean	0.12	14.8	14.9	30	1.1
2019	Annual mean	0.11	14.8	14.9	30	1.1
2020	Annual mean	0.13	14.8	14.9	30	1.1

Note:
The background concentration is the annual mean when evaluating annual or daily predictions.

The results indicate that the cumulative impact of the proposed development with existing activities will not exceed the air quality standard. The results therefore indicate that the emissions from the facility will not exert a significant adverse impact on ecosystems. The maximum values predicted for the representative ecological receptors are below a level that could be differentiated from background contributions.

10.6.4 IMPACT OF NITROGEN DEPOSITION FROM THE PROPOSED FACILITY ON ECOSYSTEMS

The potential impact of the emissions on ecosystems is also considered using the projected nitrogen deposition rate which is derived from the gaseous nitrogen oxides concentration. The most sensitive habitat for this purpose is bog ecosystems and a recommendation of 5kg N ha^{-1} year^{-1} has been made [UNECE 5 – 10 kg N ha^{-1} year^{-1} and EPA *Research Report 390: Nitrogen–Sulfur Critical Loads: Assessment of the Impacts of Air Pollution on Habitats (2016-CCRP-MS.43)* 5kg N ha^{-1} year^{-1}] as the critical load for habitat protection. The maximum rate of deposition of total nitrogen at any of the designated ecological receptors within 15km of the proposed site was determined from dispersion modelling as follows with data provided for the highest concentration predicted from the five years of

meteorological data for any receptor at the designated ecological sites represented by E1 – E5.

Table 10.14 Total Nitrogen deposition at designated ecological sites as a result of emissions from the proposed facility

Maximum impacted Ecological Receptor	Maximum Total nitrogen deposition, kg N ha^{-1} $year^{-1}$	
	Deposition velocity 0.0015m/sec	Deposition velocity 0.003m/sec
Process Contribution	0.055	0.11
Total environmental contribution	2.3	4.4

The predicted deposition rates for the worst-case scenarios are well within the critical loads. The contribution from the process to the nitrogen deposition rate is less than 2% of the recommended level under maximum adverse conditions. The levels may also be considered in the context of measured nitrogen deposition rates at Valentia Observatory [EPA *Research Report 390: Nitrogen–Sulfur Critical Loads: Assessment of the Impacts of Air Pollution on Habitats (2016-CCRP-MS.43)*]. This study estimated deposition rates of 8.3 kg N ha−1 y−1 for 2006 - 2015, with a maximum deposition of 19.3 kg N ha−1 y−1 during 2009. The Research Report found that dry deposition made up 40% of total deposition, which was dominated by reduced species (56%), that is, wet ammonium, dry particulate ammonium and dry gaseous ammonia. None of these species are significant in the current study but it is useful to note that nitrogen oxides are not the dominant contributor to nitrogen deposition in Ireland. Agricultural emissions are a much more significant source of deposition in rural environments than traffic or any facility of the type proposed here.

When these concentrations are converted to nitrogen deposition rates following the methodology outlined in the EPA Guidance Note AG4, and using the specified deposition velocities of 0.0015 (grassland) or 0.003 (forest), the assessment predicted a maximum potential nitrogen deposition rate at ecological sites as shown in Table 10.14. The data presented in Table 10.14 shows that even if the plant runs continuously, the maximum potential impact at any location in the protected ecological sites, is significantly lower than the relevant critical loads as set out above.

10.7 DO NOTHING SCENARIO

If the proposed project does not proceed there will be no significant change in air quality at the site location and surrounding areas. Traffic is a dominant influence on air quality in

the study area as discussed above, and if the proposed project does not proceed, this will continue to be the case.

10.8 POTENTIAL CUMULATIVE IMPACTS

The cumulative impacts of the proposed project in conjunction with current and future developments in the vicinity of the subject site are considered in this section.

The main project with the potential of cumulative impacts is that of Lumcloon Energy Ltd, Westmeath County Council planning reference 21/515 (Castlelost Flexgen). This development is currently under construction and consists of a 275MWe reserve gas-fired generator to boost and back up the power system and includes five open cycle gas turbines and associated activities and infrastructure.

In the event that the construction phase of the proposed development coincides with the construction of any other permitted developments within the zone of influence of the subject site (< 250m) there is the potential for cumulative dust impacts to the nearby sensitive receptors. The Castlelost Flexgen project could potentially fall within this zone of influence and this development has been considered in particular to ensure no significant cumulative impacts arise. The dust mitigation measures outlined in Section 10.9 should be applied throughout the construction phase of the proposed development and with similar mitigation measures applied for other permitted developments including the Lumcloon development then this will prevent any significant cumulative impacts on air quality. With appropriate mitigation measures in place, the predicted cumulative impacts on air quality associated with the construction phase of the proposed development are deemed not significant and temporary. Since the Castlelost Flexgen facility is at an advanced stage of completion, it is unlikely that any overlap of construction works would occur.

The potential cumulative operation phase air quality impacts are limited to the potential impact of nitrogen oxide emissions from the two facilities. The rate of emission from the proposed facility is very low and the predicted impacts are not discernible from background impacts. The assessment considered cumulative impacts by considering the ambient levels of nitrogen oxides including the minor contributions from the Castlelost Flexgen facility.

10.9 MITIGATION MEASURES

A Dust Management Plan will be formulated for the construction phase of the project, as construction activities are likely to generate some dust emissions. The principal objective of the Plan is to ensure that dust emissions do not cause significant nuisance at receptors

in the vicinity of the site. The most important features of the Dust Management Plan are summarised as follows:

- A designated Site Agent will be assigned overall responsibility for Dust Management;
- The design of the site and Construction programme considers dust impact management and chooses design approaches to minimise dust emissions;
- An effective training programme for site personnel will be implemented for the duration of the Construction Programme;
- A strategy for ensuring effective communication with the local community will be developed and implemented;
- A programme of dust minimisation and control measures will be implemented and regularly reviewed;
- A monitoring programme will be implemented.

The design of the construction programme and the location and layout of the construction compound and the storage of materials will be carefully planned to ensure that air quality impacts are minimised. The following is a summary of the main mitigation features of the project and the specific mitigation measures which will be employed in order to minimise emissions from the activity and the associated impacts of such emissions:

- Activities with potential for significant emissions will wherever possible be located at a position as far as possible removed from the nearest residential and commercial receptors;
- The areas on site which vehicles will be travelling on will generally be hard-surfaced or compressed ground thus significantly reducing the potential for dust emissions from the vehicles;
- The construction compound area will have hard standing areas to minimise dust generation from wind-blow.
- In order to minimise the potential for wind-generated emissions from material storage bays, these bays will be oriented away from the dominant wind direction to minimise the effects of wind on release of dust and particulate.
- The relatively coarse particle size (30 – 75µm) associated with the activity means that the particles will generally be deposited close to the emission source and will not travel significant distances away from the site.
- Fixed and mobile water sprays will be used to control dust emissions from material stockpiles and road and yard surfaces as necessary in dry and/or windy weather.

- A daily inspection programme will be formulated and implemented in order to ensure that dust control measures are inspected to verify effective operation and management.

A dust deposition monitoring programme will be implemented at the site boundaries for the duration of the construction phase in order to verify the continued compliance with relevant standards and limits.

Table 10.15 below presents a summary of the main mitigation features of the project and the specific mitigation measures which will be employed in order to minimise emissions from the activity and the associated impacts of such emissions.

10.10 RESIDUAL IMPACTS

During the construction phase of the proposed development there will be some dust impacts experienced at the nearest receptors to the subject site. It is predicted that the mitigation measures proposed will ensure that the air quality impacts are kept to a minimum. The predicted air quality impacts on the receiving environment during the construction phase are considered to be not significant and short-term and may affect a small number of properties.

Due to the size and nature of the development and the nature and volume of the potential emissions, the construction phase activities will have a not significant impact on climate and will be short-term in duration while the operational phase activities will have an imperceptible impact on climate and will be long-term in duration.

10.11 INTERACTIONS ARISING

The main interactions with air quality are in relation to human beings and flora and fauna.

The impact of air quality on human beings living in the area of the proposed development has been addressed above for both the construction and operational phase of the proposed development. The impact assessment shows that the air quality impacts that will be experienced by human beings in the vicinity of the proposed development are all within the prescribed criteria. This interaction is described as negative for the construction phase and neutral for the operational phase and is quantified as Not Significant to Slight for the construction phase and Imperceptible for the operation phase.

In relation to the interaction of emissions to atmosphere from the proposed development with flora and fauna,

Table 10.4 sets out Air Quality Standards for the protection of vegetation and ecosystems. This assessment has shown that the emissions generated from the development are very limited and do not have potential to generate a significant adverse impact on the local ecosystems including birdlife and wildlife. Air Quality in the area is generally good as shown in Section 10.4 and the Air Quality Standards will not be exceeded as a result of the development thereby ensuring that no significant adverse impact on ecosystems arises. This interaction is described as neutral and quantified as Not Significant for both the construction and operational phases.

Table 10.15 Table of Mitigation Measures

Character of potential impact	Mitigation measure
Construction Phase	
Dust	A designated Site Agent will be assigned overall responsibility for Dust Management;
Dust	Implementation of the Construction and Environmental Management Plan.
Dust	The design of the site and Construction programme considers dust impact management and chooses design approaches to minimise dust emissions;
Dust and general air quality	An effective training programme for site personnel will be implemented for the duration of the Construction Programme;
Dust and general air quality	A strategy for ensuring effective communication with the local community will be developed and implemented;
Dust	A programme of dust minimisation and control measures will be implemented and regularly reviewed;
Dust	A monitoring programme will be implemented.
Dust	Activities with potential for significant emissions will wherever possible be located at a position as far as possible removed from the nearest residential and commercial receptors;
Dust	The areas on site which vehicles will be travelling on will generally be hard-surfaced or compressed ground thus significantly reducing the potential for dust emissions from the vehicles;
Dust	The construction compound area will have hard standing areas to minimize dust generation from windblow.
Dust	In order to minimise the potential for wind-generated emissions from material storage bays, these bays will be oriented away from the dominant wind direction to minimise the effects of wind on release of dust and particulate.
Dust	Fixed and mobile water sprays will be used to control dust emissions from material stockpiles and road and yard surfaces as necessary in dry and/or windy weather.
Dust	A daily inspection programme will be formulated and implemented in order to ensure that dust control measures are inspected to verify effective operation and management.
Dust	A dust deposition monitoring programme will be implemented at the site boundaries for the duration of the construction phase in order to verify the continued compliance with relevant standards and limits.

Aspergillus Risks	The National Guidelines will be followed with regard to the effective management of Aspergillus risks.

10.12 HUMAN HEALTH

Air Quality Standards (AQS) are set to protect vulnerable people, such as those with respiratory illnesses, the old and infirm. Hence, the human health impact assessment has relied on compliance with the AQS to determine whether significant impacts will arise on human health or not.

The air quality impact assessment notes that dust and particulate matter are the primary sources of construction related impacts for all of the Proposed Project elements. A short-term moderate adverse impact is predicted for the closest receptors during the Construction Phase. There will be no lasting impact, and the short-term impact will be managed by means of an effective and specific Dust Minimisation Plan which will ensure that dust impacts are prevented or minimised during the Construction Phase of the Proposed Project.

10.13 MONITORING

In order to mitigate against air quality effects at receptors during the Construction Phase, Best Practice Measures will be adopted. These measures will include techniques such as those outlined in the IAQM's (2024) *Guidance on the Assessment of Dust from Demolition and Construction*.

The Contractor will be required to produce an Air Quality and Dust Management Plan including Best Practice Measures to control dust and, in particular, measures to prevent dust nuisance. The principal objective of the Air Quality and Dust Management Plan will be to ensure that dust emissions do not cause significant nuisance at receptors near the Proposed Project. The Air Quality and Dust Management Plan will include a daily inspection programme which will be formulated and implemented in order to ensure that dust control measures are being operated and managed effectively. A dust deposition monitoring programme will be implemented during the Construction Phase in order to verify the continued compliance with relevant standards and limits.

Dust deposition monitoring shall be undertaken monthly from a representative number of monitoring locations around the site boundary as follows:

- The monitoring will be carried out using Bergerhoff dust deposition gauges;
- The off-site analysis of the Bergerhoff jars will be undertaken at a suitably accredited laboratory and deposition will be expressed as mg/m^2/day.

- The laboratory results will be compared against the Technical Instruction on Air Quality Control – TA Luft 2002 emission value for dust fall of 350 mg/m^2/day; and
- Where the results of dust monitoring are found to exceed the limit, the cause or source of the excessive dust will be identified, and any feasible measures to reduce the impact shall be taken.

10.14 DIFFICULTIES ENCOUNTERED

There were no specific difficulties encountered when carrying out this assessment.

10.15 ACCIDENTS OR UNPLANNED EVENTS

There are no accidents or unplanned events as a result of the proposed development that could occur that will have an adverse or significant impact on air quality or climate that have not already been considered in this chapter.

10.16 REFERENCES

- Environmental Protection Agency (2022). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.
- Environmental Protection Agency. Air Quality in Ireland 2020, 2021, 2022, 2023: Indicators of Air Quality.
- Health Protection Surveillance Centre (2018). National Guidelines for the Prevention of Nosocomial Invasive Aspergillosis During Construction/Renovation Activities.
- Institute of Air Quality Management (2024). Guidance on the Assessment of Dust from Demolition and Construction.
- Institute of Air Quality Management (2017). Land-Use Planning and Development Control: Planning for Air Quality.
- Word Health Organisation (2021). WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide.
- European Union (1996). Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management [1996].
- European Union (2004). Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air [2004].
- European Union (2008). Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe [2008].

- European Union (2014). Directive 2014/52/EU of 16 April 2014 on the assessment of the effects of certain public and private projects on the environment [2014].
- Climate Action and Low Carbon Development Act 2015.
- Ambient Air Quality Standards Regulations 2022 – S.I. No. 739/2022
- Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations 2009 – S.I. No. 58 of 2009.

11 NOISE & VIBRATION

11.1 INTRODUCTION

This chapter identifies and assesses the potential noise and vibration impacts and related effects arising from both the construction and long-term operational phases of the proposed data centre campus and collocated flexible decentralised energy resource (DER) at Castlelost, Co. Westmeath.

Key issues to be addressed in this chapter include identification and assessment of potential temporary/short-term construction noise and vibration impacts arising from the construction and site development phases and potential long-term noise impact and effects at nearby Noise Sensitive Receptors (NSRs) arising from the operational phase of the proposed development. The cumulative impacts and effects of the proposal with existing permitted development at Castlelost have also been assessed for both the short and long-term phases.

11.2 ASSESSMENT METHODOLOGY & SIGNIFICANCE CRITERIA

11.2.1 CHARACTERISATION OF THE RECEIVING ENVIRONMENT

The receiving sound environment or existing soundscape has been characterised by field survey. Two site visits were completed on 07 and 09 April 2025 by Redkite Environmental personnel to:

- identify existing sources, the location of the nearest NSRs and local topographical features that may influence noise propagation,
- set up unattended sound level meters (SLMs) for continuous monitoring over a number of days,

The programme of monitoring was primarily designed to establish existing ambient and background sound levels at the nearest Noise Sensitive Receptors (NSRs) to the overall main development Site.

Continuous monitoring using unattended SLMs was completed within the period between 07-11 April 2025.

The measurement methodology followed was in accordance with the recommendations of the following:

- International Standards Organisation Document: ISO 1996 Acoustics – Description, Measurement and Assessment of Environmental Noise, Part 1, Basic Quantities and Assessment Procedures (2016) and Part 2 Determination of Environmental Noise Levels (2017), and,
- The EPA Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities, (NG4), revised January 2016, and,
- The draft EPA Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities, (NG4), December 2024.

Ambient noise monitoring was undertaken at the Noise Monitoring Points (NMP1 to NMP4) as illustrated in Figure 11.1 below and as described in Table 11.1.

Figure 11.1 Noise Monitoring Points (NMP 1- 4)



Unattended monitoring was conducted as follows:

- 96-hour period at NMP1 and NMP2 commencing between 14.45hrs on the 7th, April 2025 to 16.45 hrs on the 11th, April 2025, and,
- 48-hour period at NMP3 and NMP4 from 13.20 hrs on the 7th, April 2025, to 14.25 hrs on the 9th, April 2025.

Table 11.1 Noise Monitoring Points

Location	Grid Ref.	Description
NMP1	244191E, 239180N	SLM placed in a field (at location of proposed data centre buildings) off the R446 in line with the façade of the nearest 1-storey dwelling (NSR1) approx. 115m to the west.
NMP2	245534E, 239222N	In an agricultural field, approx. 76m east of existing NSRs (14&15) to the west.
NMP3	245856E, 239907N	In an agricultural field off the L11272, approx. 30m south of existing NSRs (21-27) to the north/northwest.
NMP4	246483E, 238603N	In an agricultural field south of the M6, approx. 186m west of existing NSRs to the east.

Note: NSR locations are indicated on Figure 11.2

Photographs of each monitoring location are contained in Appendix 11.1.

Ambient monitoring was conducted during the day (07.00 – 19.00hrs), evening (19.00-23.00hrs) and night – time (23.00 – 07.00hrs) periods at all four locations.

The parameters measured included L_{AFeq}, L_{AF90}, L_{AF10}, L_{AFmax} and L_{AFmin}. Unweighted 1/3 octave band data was also recorded. Two Cirrus SLMs located at NMP1 and 2 were set to record over 15-minute intervals. The remaining two Nti SLMs, located at NMP3 and 4, were set to record continuously. The data was then post-processed into day, evening, night and 15-minute intervals using dedicated Nti Noise Explorer software V. 2.26 and Cirrus Noise Tools V1.8.9.

Survey personnel noted all primary noise sources contributing to the ambient sound environment during the set-up and collection of the meters. Audio was also recorded.

Overall weather conditions prevailing during the surveys were suitable for noise monitoring. Weather data from the nearby Met Eireann station approximately 6km to the northeast at Corcloon, Co. Westmeath was reviewed.

Temperatures ranged from 0 – 21 ^{o}C. Lowest temperatures occurred during the night-time.

Windspeeds were on average 3m/sec with lower windspeeds occurring during the night-time period when calm conditions prevailed. Wind direction was mainly from the north/northwest/northeast. No rainfall occurred.

11.2.1.1 Equipment

Sound measurement was carried out using Type 1 SLMs and associated equipment (calibrators, tripods, outdoor kit etc) and software. The meters were placed in open areas

>3.5m from reflecting surfaces and a minimum of 1.2m above ground level at all locations. The microphones were placed at approx. 4m high at all NMPs with the exception of NMP1 which was placed at approx. 1.5m in height as the nearest NSRs were one storey dwellings. The microphones were calibrated before and after use at each location. The observed drift during measurement was within acceptable limits. Further details of the monitoring equipment used are set out in Table 11.2 below.

Table 11.2 Monitoring Equipment

Manufacturer	Model Number	Serial Number
Sound Level Meters		
Nti	XL2-TA	A2A-16311-E0 A2A-08898-E0
Cirrus	CR171C	G300784, G080561
Calibrators		
Larson Davis	CAL200	1178
Bruel & Kjaer	4231	1795641

The meters and calibrators are all externally calibrated by Nti Audio, NSAI and Cirrus Research PLC in accordance with recommended standards. Copies of the external calibration certificates are available on request.

11.2.2 DESK-BASED STUDY

Road traffic noise mapping in accordance with the requirements of the Environmental Noise Directive 2002/49/EC and available on the EPA Mapping Website https://gis.epa.ie/EPAMaps/ was reviewed as part of the characterisation of the baseline soundscape. The M6 is mapped in the vicinity of the proposed development.

In addition, baseline monitoring undertaken in 2021 – 2023 for earlier phases of energy-related developments in the immediate vicinity (was reviewed as part of the characterisation of the baseline soundscape. The details are contained in the IE license (P1193-01) application to the EPA by Castlelost Flexgen Ltd. https://epawebapp.epa.ie/terminalfour/ippc/ippc-view.jsp?regno=P1193-01.

11.2.3 IMPACT ASSESSMENT

The EPA document entitled Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2022 contains general guidance on the assessing of environmental effects in terms of quality, significance, duration, magnitude and type. This document has been considered where appropriate in defining noise and vibration impacts, however the following guidance and standards form the main basis for setting of suitable

noise and vibration criteria and assessment of impacts and effects on human beings related to noise:

11.2.3.1 Short-term Construction Phase:

- BS5228-1:2009 +A1:2014: Code of Practice for Noise and Vibration Control on Construction and Open Sites: Part 1: Noise and Part 2: Vibration;
- BS 7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration;
- BS6472-1:2008: Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting;
- UK Highways Agency Design Manual for Roads and Bridges, Sustainability and Environmental Appraisal, LA11, Noise and Vibration, Rev 2, May 2020;
- Transport Infrastructure Ireland (TII) publication Guidelines for the Treatment of Noise & Vibration in National Road Schemes, March 2014, and,
- Guidelines for the Treatment of Noise and Vibration in National Road Schemes, Rev1, TII, (formerly National Roads Authority (NRA)), October 2004.

11.2.3.2 Long-Term Operational Phase:

The latest draft edition of NG4 was followed in the determination of suitable limits and conditions related to noise for the proposed development:

- The draft EPA Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities, (NG4), December 2024.

In line with NG4, BS4142:2014+A1:2019 was also considered in the identification and assessment of potential significant effects arising from the noise impact of the proposed development on human beings.

BS4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound uses outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

In simple terms, this method relies on comparing the specific noise level from an activity (including penalties for characteristics such as tonality to determine a rating level), to existing background noise levels to determine the impact magnitude or change in noise levels. However, the assessor must also take account of the context in which the change

occurs to determine the significance of the change. Context can include other extraneous sources present, frequency of occurrence of the specific noise, absolute level of sound etc.

The following is noted in Clause 11 of BS4142 with regards to the assessment of impacts:

> *"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."*

The following is noted with regards to the initial estimate of magnitude of impact i.e. where the measured background is subtracted from the rating level:

- Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on context.
- A difference of around +5 dB is likely to be an indication of an adverse impact depending on context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on context.

11.2.3.3 Noise Model

Predicted noise levels at the nearest NSRs as a result of the likely future operations of the proposed development were calculated in accordance with the requirements of ISO 9613-2-2024 Acoustics – Attenuation of sound during propagation outdoors – Part 2: Engineering Method for Prediction of Sound Pressure Levels Outdoors.

A noise model has been developed for the site and immediate surroundings using iNoise V. 2024.3 software developed by DGMR engineering consultancy https://dgmr.nl/en/ iNoise is quality assured software which complies with the recommendations of Quality Standard ISO17534.

ISO 9613 calculates the equivalent continuous downwind octave band sound pressure level at a receiver point using the equation:

$L_{ft(}DW)-L_w+D_c-A$

Where:

L_w is the octave band sound power level, in decibels produced by the point sound source relative to a reference sound power of 1 picowatt expressed in decibels;

DW means downwind.

D_c is the directivity correction, in decibels, that describes the extent by which the equivalent continuous sound pressure level from the point sound source deviates in a specified direction from the level of an omnidirectional point sound source producing sound power level L_w expressed in decibels

A is the octave band attenuation, in decibels, that occurs during propagation from the point sound source to the receiver.

The attenuation term A in the above equation is given by the following:

$A=A_{div}+A_{atm}+A_{gr}+A_{bar}+A_{misc}$

A_{div} is the attenuation due to geometrical divergence.

A_{atm} is the attenuation due to atmospheric absorption.

A_{gr} is the attenuation due to the ground effect.

A_{bar} is the attenuation due to a barrier.

A_{misc} is the attenuation due to miscellaneous other effects (details in Annex A of the standard).

General methods for calculating the first four terms in the above equation are specified in the standard. Information on the 4th term is detailed in Annex A of the standard and covers reflection of noise due to curvature of reflecting surfaces (new to the 2024 standard), attenuation due to propagation through foliage, industrial sites and through regions built up of houses.

The effects of meteorological conditions are simplified in the standard to calculate downwind sound pressure at receivers under the following conditions:

- Wind direction at an angle of ±45° to the direction connecting the centre of the dominant noise sound source and the centre of the receiver region, with the wind blowing from source to receiver, and,
- Wind speeds range 1-5m/sec, measured at a height of 3-11m above ground.

The equations and calculations also hold for average propagation under a well-developed moderate ground-based temperature inversion, such as commonly occur on clear calm nights.

11.2.3.3.1 Model Calculation Parameters:

The following (Table 11.3) atmospheric attenuation has been assumed for all calculations:

Table 11.3 Atmospheric Attenuation Assumed

Temp. °C	Humidity (%)	Air Pressure (kPa)	Frequency (Hz)								
			31	63	125	250	500	1k	2k	4k	8k
10	70	101.33	0.03	0.12	0.41	1.04	1.93	3.66	9.66	32.77	116.88
Air absorption dB/km											

Ground Factor = 1 for soft ground. Areas of hard ground were delineated where relevant in the model.

Meteorological Correction C_0 = 2

Further detail on the source sound power values inputted into the model are provided later in Section 11.4.2.

11.2.3.3.2 Mapping and Layout:

Both dwg and shp files of the proposed development site (including the solar farm) and 3D information on the surrounding area including the nearest NSRs were imported into the model. A terrain model was developed.

11.2.3.3.3 Accuracy of Calculation Method

ISO9613 notes that the following accuracy applies to the method.

The attenuation of sound propagating outdoors between a source and receiver fluctuates due to variation in meteorological conditions along the propagation path. Restricting attention to moderate downwind conditions of propagation limits the effect of variable meteorological conditions on attenuation to reasonable values (although C0 was adjusted in the model to account for some variation).

The estimated accuracy for predicted broadband noise is:

Table 11.4 Accuracy of Calculation Method 9613-2:2024

Height (mean height of source and receiver)	0<d<100m (d is distance from source to receiver)	100<d<1000m
0<h<5m	+/3dB	+/3dB
5m<h (< 30m)	+/-1dB	+/3dB

Therefore, due to the size and distance to NSRs from sources, accuracy is +/-3 dB. However, it should be noted that the standard notes that the above estimates have been made from these situations where there are no effects due to reflection or attenuation due to screening.

11.2.4 DEFINITIONS

- **L_{Aeq}** is the A – weighted equivalent continuous sound level – the sound level of a steady sound having the same energy as a fluctuating sound over a specified measurement period.
- **L_{A10}** is the A-weighted noise level which is exceeded for 10% of the specified measurement period. This gives an indication of the upper limit of fluctuating noise such as that from road traffic.
- **L_{A90}** is the A-weighted noise level exceeded for 90% of the measurement period and is useful in providing an indication of the background noise level experienced over the measurement period.
- **L_{AFmax}** is the maximum A-weighted noise level measured during a cycle with a fast time weighting.
- **L_{AFmin}** is the minimum A-weighted noise level measured during a cycle with a fast time weighting.
- **L_{ASmax}** is the maximum A-weighted noise level measured during a cycle with a slow time weighting.
- **$L_{Ar,T}$** The Rated Noise Level is equal to the L_{Aeq} during a specified time interval (T), plus specified adjustments for tonal character and/or impulsiveness of the sound.
-
- **L_{den}** Day-evening-night level. It is a descriptor of noise level based on energy equivalent noise level (Leq) over a whole day with a penalty of 10 dB(A) for night-time noise (23.00-07.00) and an additional penalty of 5 dB(A) for evening noise (i.e.19.00-23.00).
- **L_{night}** Night equivalent level: Leq. A-weighted, Sound Level, measured overnight 23.00 – 07.00 hours.

- ***L_{ft}*(DW)** Predicted equivalent continuous downwind octave band sound pressure level in decibels. A-weighted.
- ***L_{Pa}*** Predicted equivalent continuous total downwind sound pressure level in decibels. A-weighted.
- **L_w** Sound power level is the sound power measured on a decibel scale. Sound power is the sound energy radiated per unit time by a sound source measured in watts. It is an absolute value associated with a sound source.
- **Residual sound** – ambient sound remaining at an assessment location when the specific sound source (source under assessment) is absent.
- **Rw** Weighted sound reduction index – a single number quantity which characterises the airborne sound insulation of a material or building element over a range of frequencies.
- **SPL** Sound Pressure Level
- **Specific sound source** – source under assessment.
- **Tonal** sounds are defined as sounds which cover a range of only a few Hz which contains a clearly audible tone, i.e. distinguishable, discrete or continuous noise (whine, hiss, screech, or hum etc.) are referred to as being 'tonal'.

The "A" suffix denotes sound levels that have been "A-weighted" in order to account for the non-linear nature of human hearing to sounds of different frequencies.

All sound levels in this report are expressed in terms of decibels (dB) relative to 2x10-5 Pa.

11.3 DESCRIPTION OF RECEIVING ENVIRONMENT

11.3.1 SITE CONTEXT

The proposed development site covers a total land holding of 243 ha and is located across a number of townlands; - Gneevebane, Farthingstown, Oldtown, Castlelost and Kiltotan & Collinstown, Co. Westmeath.

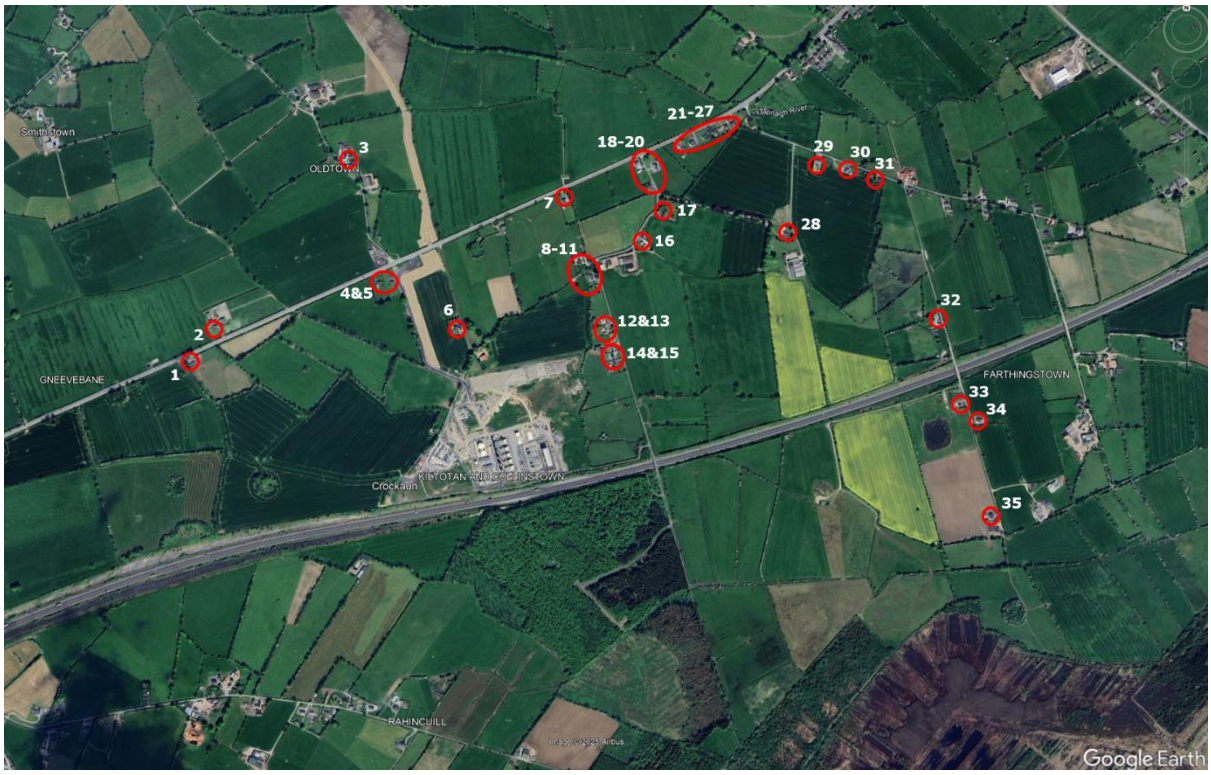
The M6 runs along part of the southern site boundary and cuts through the easterly portion of the landbank at Farthingstown.

At present, the M6 and the R446 are the predominant anthropogenic noise sources influencing the area. Earlier phases of permitted energy developments including Castlelost Flexgen and GIS Substation are currently under construction but are expected to be completed shortly.

The majority of the landbank is currently in agricultural use with the exception of the installation of the natural gas pipeline/interconnector within a small corridor of the landbank to the north of the R446 (close to NSR 3 - Figure 11.2). The location of the existing construction compound for the Flexgen project is located in an area to the south of the proposed footprint for the data centre and north of the M6.

NSRs comprise individual dwellings and/or small clusters off the R446 as indicated in Figure 11.2.

Figure 11.2 Location of Nearest NSRs



A total of 35 individual dwellings have been identified in the immediate vicinity of the proposed development. Table 11.5 provides more detail on each NSR.

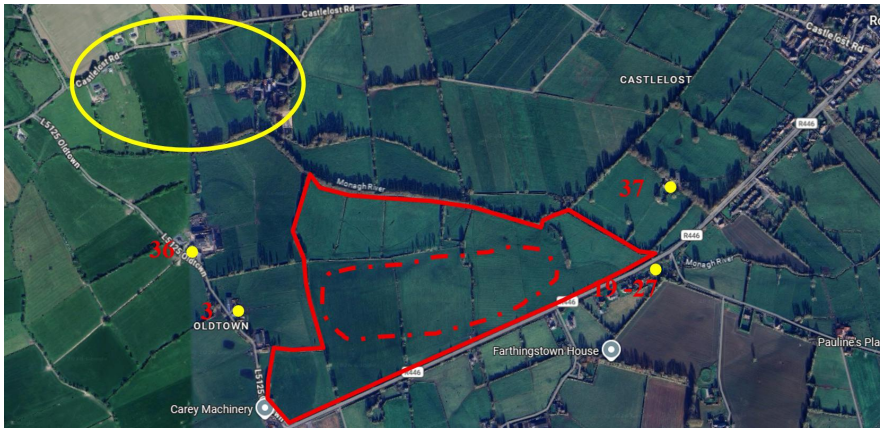
NSRs12-15, and 32-34 are most influenced by motorway noise although it is audible at other more distant NSRs. NSRs 1,2,4,5,7 and 18-27 are located just off the R446.

Table 11.5 Nearest NSRs

No.	Grid Ref.	Description
1	244082E, 239129N	1-storey cottage
2	244155E, 239249N	1-storey bungalow
3	244590E, 239790N	2-storey house
4	244683E, 239401N	1-storey bungalow
5	244730E, 239400N	1-storey bungalow
6	244940E, 239247N	Dormer bungalow
7	245286E, 239672N	Dormer bungalow

No.	Grid Ref.	Description
8	245340E, 239472N	Dormer bungalow
9	245322E, 239401N	2-storey cottage
10	245377E, 239423N	Dormer bungalow
11	245394E, 239381N	1-storey bungalow
12	245419E, 239279N	1-storey bungalow
13	245429E, 239249N	1-storey bungalow
14	245450E, 239162N	2-storey house
15	245457E, 239138N	1-storey bungalow
16	245544E, 239560N	1-storey cottage
17	245612E, 239629N	1-storey bungalow
18	245570E, 239711N	1-storey bungalow
19	245582E, 239786N	1-storey bungalow
20	245523E, 239801N	1-storey bungalow
21	245675E, 239851N	1-storey bungalow
22	245702E, 239872N	1-storey bungalow
23	245743E, 239889N	1-storey bungalow
24	245773E, 239905N	1-storey bungalow
25	245793E, 239918N	1-storey bungalow
26	245820E, 239924N	1-storey bungalow
27	245836E, 239936N	1-storey bungalow
28	246010E, 239572N	2-storey house
29	246114E, 239811N	1-storey bungalow
30	246213E, 239782N	2-storey house
31	246318E, 239752N	2-storey house
32	246516E, 239286N	1-storey cottage
33	246577E, 239018N	1-storey bungalow
34	246637E, 238970N	1-storey bungalow
35	246671E, 238663N	2-storey house

In addition, Noise Sensitive Receptor (NSR36) was added to the noise model along with NSRs further north of NSR3 and NSR36. There is one NSR to the northeast of the R446 close to the solar farm which has been numbered NSR37 - The village of Rochfortbridge lies further northeast.



Note. Red-Line boundary indicative only. Location of proposed solar inverters in dashed area. Yellow circle represents NSRs further north

11.3.2 AMBIENT SOUND SURVEY SUMMARY RESULTS

Tables 11.6 - 11.9 below present the summary results for unattended measurements at monitoring points NMP1- NMP4. More comprehensive logged field data for each individual

15-minute interval is contained in Appendix 11.2. The data in Appendix 11.2 is provided for each 15-minute interval as $L_{Aeq,15min}$, L_{Amax} and percentiles. L_{n3} is $L_{A10,\ 15min}$ while L_{n5} is $L_{A90,15min}$ for the data from the Cirrus meters.

Table 11.6 Summary Results NMP1

L_{Aeq}	Range			Description of Ambient Noise Environment
	L_{A10}	L_{A90}[49]	L_{AFmax}	
Daytime (07.00 – 19.00 hrs)				
62	59-69	44, 40 35-55	72-101	Traffic noise from the R446, birdsong.
Evening time (19.00 – 23.00 hrs)				
60	44-68	42,45 37-48	70-94	Traffic noise from the R446, birdsong.
Night-time (23.00 – 07.00 hrs)				
53	35-67	36,37 24-51	42-79	Traffic noise from the R446, birdsong, dawn chorus at approx. 05.50 hrs.

Table 11.7 Summary Results NMP2

L_{Aeq}	Range			Description of Ambient Noise Environment
	L_{A10}	L_{A90}[1]	L_{Amax}	
Daytime (07.00 – 19.00 hrs)				
53	45-63	48,46 40-57	51-82	Distant motorway traffic, birdsong. Some agricultural sources.
Evening time (19.00 – 23.00 hrs)				
53	51-61	48,46 44-53	54-73	Distant motorway traffic, birdsong. Some agricultural sources.
Night-time (23.00 – 07.00 hrs)				
51	47-61	40,40 24-56	52-73	Dawn chorus at approx.05.50 hrs. Distant motorway related traffic noise.

Table 11.8 Summary Results NMP3

L_{Aeq}	Range			Description of Ambient Noise Environment
	L_{A10}	L_{A90}[1]	L_{Amax}	
Daytime (07.00 – 19.00 hrs)				
54	55-63	44, 41 39-52	64-83	Traffic on surrounding road network, birdsong and fighter jets noted during initial site visit.
Evening time (19.00 – 23.00 hrs)				
52	44-61	42,44 37-45	64-76	Road traffic noise and birdsong.
Night-time (23.00 – 07.00 hrs)				
49	40-64	37,40 25-50	46-73	Road traffic noise and occasional overhead aircraft.

[49] NG4 requires that the average background noise levels for a specific period is calculated as the arithmetic average of the measured $L_{AF90,15min}$ values during the relevant period to determine if an area is defined as low background. The values in Tables 10.5 to 10.8 for L_{A90} are presented as arithmetic means with a modal value and range also presented.

Table 11.9 Summary Results NMP4

L_{Aeq}	Range			Description of Ambient Noise Environment
	L_{A10}	L_{A90}[1]	L_{Amax}	
Daytime (07.00 – 19.00 hrs)				
56	43-69	45,45 37-53	56-83	Occasional overhead aircraft, birdsong and motorway traffic continuously audible. Some agricultural sources also audible at times.
Evening time (19.00 – 23.00 hrs)				
52	47-63	43,48 36-49	52-75	As above.
Night-time (23.00 – 07.00 hrs)				
51	42-68	34, 36 23-51	48 - 77	Dawn chorus at approx.05.50 hrs. Motorway related traffic noise was lower on second day of monitoring during night-time.

The results of monitoring at NMPs 1-4 indicate that the nearest NSRs are not in an area of low background noise as defined in Section 5.3.2 of the draft NG4 as follows:

- Average Daytime Background Noise Level ≤ 40dB L_{AF90}, and;
- Average Evening Background Noise Level ≤ 35dB L_{AF90}, and;
- Average Night-time Background Noise Level ≤ 30dB L_{AF90}.

11.3.3 DESK-BASED STUDY

Ambient noise monitoring was completed in 2022-2023 as part of the assessment of impacts of existing permitted energy projects in the area. Unattended monitoring data from three monitoring points as shown on Figure 11.3 below also indicated that the nearest NSRs were not in an area of low-background noise.

Figure 11.3 Historic Noise Monitoring Points (2022-2023)



The summary data is presented in Tables 11.10 – 11.12 below.

Table 11.10 Summary Results NMP2 – 10th - 12th November 2023

L_{Aeq}	Range			Description of Ambient Noise Environment
	L_{A10}	L_{A90}[1]	L_{Amax}	
Daytime (07.00 – 19.00 hrs)				
52	50 - 55	49, 48 46 - 52	55 - 67	Motorway and R446 audible as continuous background sources.
Evening time (19.00 – 23.00 hrs)				
49	44 - 55	44, 46 35 - 50	55 - 63	Motorway and R446 audible as continuous background sources.
Night-time (23.00 – 07.00 hrs)				
44	40 - 51	36, 43 29 - 43	46 - 65	Traffic on motorway and R446 reducing at night. The lowest $L_{A90,t}$ values generally occur between from 00.30 – 04.45 hrs.

Table 11.11 Summary Results NMP6 – 23rd Sept - 4th October 2022

L_{Aeq}	Range			Description of Ambient Noise Environment
	L_{A10}	L_{A90}[1]	L_{Amax}	
Daytime (07.00 – 19.00 hrs)				
48	43 - 55	43, 42 36 - 51	50 - 84	Motorway traffic audible as a continuous source.
Evening time (19.00 – 23.00 hrs)				
48	43 - 55	43,44 36 - 50	51 - 67	Motorway traffic audible as a continuous source
Night-time (23.00 – 07.00 hrs)				
47	39 - 59	37, 40 21 - 54	45 - 64	Traffic on motorway reducing at night.

Table 11.12 Summary Results NMP7 – 10th -16th November 2023

L_{Aeq}	Range			Description of Ambient Noise Environment
	L_{A10}	L_{A90}[1]	L_{Amax}	
Daytime (07.00 – 19.00 hrs)				
52	48 - 56	49, 51 41 - 52	54 - 74	Traffic noise is more predominant at this location as it is clearly audible from the local road R446 and the M6 which is less screened to the southwest compared to the monitoring locations further east where the M6 is in cut.
Evening time (19.00 – 23.00 hrs)				
50	46 - 56	46, 43 39 - 52	52 - 69	Traffic noise predominant.
Night-time (23.00 – 07.00 hrs)				
46	41 - 55	39, 37 31 - 50	47 - 62	Traffic on roads reducing at night.

11.3.4 VIBRATION

No existing sources of vibration were noted during the site visits.

11.4 ASSESSMENT OF POTENTIAL ENVIRONMENTAL EFFECTS

The proposed project comprises a data centre and a co-located DER as described in detail elsewhere in this EIAR. In the long-term, a number of new noise sources will be introduced into the soundscape in the immediate vicinity of the proposed development. These are detailed later in Section 11.4.2.

11.4.1 SHORT TERM SITE DEVELOPMENT & CONSTRUCTION PHASE

The site development and construction phase of the proposed development can potentially give rise to temporarily increased noise levels and potential vibration impact at the nearest NSRs through the use of mobile and non-mobile heavy machinery and equipment. The following sections address the short-term noise and vibration impact assessments including recognised criteria applied to site development and construction phase noise and vibration.

11.4.1.1 Noise

11.4.1.1.1 Applicable Construction Noise Criteria

There is no definitive published Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project.

BS5228:2009 + A1:2014: *Code of Practice for Noise and Vibration Control on Construction and Open Sites – Noise* describes applicable noise level thresholds not to be exceeded at noise sensitive receptors, depending upon existing ambient levels, as described in Table 11.13 below.

Table 11.13 Threshold of Significant Effect at Dwellings

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A	Category B	Category C
Night-time (23:00-07:00)	45	50	55
Evening and Weekends	55	60	65
Daytime (07:00-19:00) and Saturday (07:00-13:00)	65	70	75
A) Cat A: Threshold values to use when ambient noise levels (rounded to nearest 5dB) are less than these values B) Cat B: Threshold values to use when ambient noise levels (rounded to the nearest 5dB) are the same as Cat A values C) Cat C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than Cat A values D) 19:00-23:00 weekdays, 13:00-23:00 Saturday and 07:00-23:00 Sunday is deemed 'evening and weekend' period.			

Category A threshold values can be applied to NSRs in the area based on the ambient sound levels recorded during the baseline survey. The threshold values apply to the sum of both the ambient and construction noise levels.

There will be no requirement for night-time (23.00 -07.00 hrs) or evening (19.00 – 23.00 hrs) construction works.

Accordingly, based on current ambient sound levels and BS5228 methodology, the following construction noise threshold is proposed for NSRs arising from the construction of the proposed project:

- 65 dB $L_{Aeq,1hr,}$ Mon-Fri (07.00 – 19.00hrs) and Sat (07.00 – 13.00 hrs).

Limits or threshold values are typically applied to control demolition and construction noise as it is temporary to short term in nature and will not have long-term effects on NSRs. BS5228-1 notes that a potentially significant negative effect will occur if the predicted construction noise level plus ambient at an NSR is equal to, or exceeds, the applicable threshold value. BS5228-1 also notes that factors such as the number of receptors affected, and the duration and character of the impact may need to be considered to determine if there is an actual significant effect.

The recently published UK LA111 similarly notes that the magnitude of impact is major if the construction noise impact is greater than or equal to the threshold value (from BS5228-1) +5dB e.g. ≥ 65+5 dB = 70 dB. A moderate impact magnitude is above or equal to the threshold value and below the threshold value +5 dB. Impacts of major and moderate magnitude are then considered to constitute a significant effect *depending* on duration.

In this regard, the standard notes that construction noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

- 10 or more days or nights in any 15 consecutive days or nights;
- A total number of days exceeding 40 in any 6 consecutive months.

The following summary table applies with regards to magnitude of impact and construction noise level:

Table 11.14 Magnitude of Impact & Construction Noise Descriptors

Magnitude of Impact	Construction Noise Description
Major	Above or equal to threshold value +5 dB
Moderate	Above or equal to threshold value and below threshold value +5 dB
Minor	Above or equal to baseline and below threshold value
Negligible	Below baseline.

LA111 also offers guidance on short-term construction related traffic noise as follows:

Table 11.15 Magnitude of Impact at NSRs for Construction Traffic

Magnitude of Impact	Increase in Baseline Noise Level of Closest Public Road Used for Construction Traffic (dB)
Major	Greater than or equal to 5.0
Moderate	Greater than or equal to 3.0 and less than 5.0
Minor	Greater than or equal to 1.0 and less than 3.0
Negligible	Less than 1.0

11.4.1.1.2 Prediction of Site Development and Construction Phases Noise Impact

A detailed description of the construction programme is provided earlier in Chapter 2. In summary, the construction stage will be phased across the landbank over five-year period. Accordingly, noise impacts during the construction phase are likely to vary.

Initial phases of site clearance will mainly involve earthmoving/excavation works and the preparation of level surfaces for the berm, siting of the equipment and buildings. The excavation and stockpiling of soils and sub-soils presents one of the highest risks of construction noise impact as generally, the loudest machinery such as tracked excavators, lorries and dump trucks will be used during this period.

Most site clearance and construction works will be concentrated in the area of the proposed data centre buildings, BESS and SOFC power centre.

Less intensive excavation and construction will be required with regards to the solar farm as the installation will follow existing ground contours.

Piling will not be required.

BS5228 provides sound level data on equipment used in construction. Typical values for sources used during earthworks are presented in Table 11.16 below.

Table 11.16 Source Data Used for Construction Noise Impact

Source	Frequency (Hz)								SPL@ 10m
	63	125	250	500	1k	2k	4k	8k	
	dB(A)								
Earthworks									
Tracked Excavator	50	63	66	72	76	74	71	64	80
Tracked Excavator loading lorry	54	63	67	74	73	71	67	58	78
Articulated Dump Truck Tipping Fill	54	60	64	67	69	67	64	57	74

The nearest NSRs to the proposed main construction area are listed in Table 11.17 below:

Table 11.17 Distance from NSRs to Construction Works

Project Element	Nearest NSRs	Distance (m)
Proposed Berm	8-15	50 - 105
Proposed Data Centre	1, 2, ,4, 5 and 6	70 – 165
Proposed SOFC	6, 4 and 5	170
Proposed BESS	6, 14 and 15	250 - 265
Proposed Solar Farm	3, 8-31	35 - 255

The proposed 2nd berm will be constructed early to screen NSRs from future works. The calculated noise levels at NSR9 (closest to the berm construction), using the data above from BS5228:1, taking account of geometric divergence, are presented in Table 11.18 below for earthworks during a typical 1-hour period and without mitigation. It is important to note that the construction process is subject to change e.g. through a tendering process. Therefore, with regards to prediction of construction noise at NSRs the following factors are relevant:

- The sound power ratings (or sound pressure levels at known distance) used in the assessment may vary from the ratings for the actual equipment chosen by the contractor and used on site;
- Depending on conditions encountered in real-time, different types of equipment may be chosen and the number of units may vary. Usage may also vary in terms of length of time operating or in terms of intensity, character and location.

The predicted values are conservative as only geometric divergence (attenuation with distance) is considered.

Table 11.18 Conservative Estimated Construction Noise at NSR9

NSR9		
Source & Assumptions	**Source Data from BS5228 $L_{Aeq,t}$ @10m**	**Predicted $L_{Aeq,1hour}$ (dB)**
Earthworks		
1 No. Tracked Excavators, 66% of time on @50m	80	66*
1 No. Tracked Excavators, 66% of time on @100m	80	
Articulated Dump Truck, tipping fill, 10% of time on @50m	74	
Articulated Dump Truck, tipping fill, 10% of time on @100m	74	

**Value includes daytime ambient value $L_{Aeq,12hr}$ 52 dB measured at NMP7.*

As can be seen from Table 11.18, the threshold value of 65 dB ($L_{Aeq,1hr}$) will be exceeded. The impact magnitude rating, based on Table 11.4 is therefore temporary (<1 year) moderate negative in the absence of mitigation. However, to determine if a significant effect will occur, the duration of the impact should be considered. The total construction of the berm element will be intermittent within the 1st year (or less) of the proposed programme. However, as the berm increases in height, NSR9 (and other NSRs within the area to the northeast and east of the proposed berm) will be screened from the activity. Therefore, the duration will be temporary and typically will not be above the following:

- 10 or more days or nights in any 15 consecutive days or nights;
- A total number of days exceeding 40 in any 6 consecutive months.

Accordingly, a significant effect on any individual NSR arising from the proposed berm construction is not predicted to occur.

Similar equipment will be used during earthworks for other elements of the proposal. Due to the size of the site, works will mainly be at distance from NSRs. However, where works take place close to NSRs 1, 2, 4 and 5 mitigation measures will be implemented such as temporary screening (where no screening exists) to ensure construction noise levels are controlled to below the threshold value where practicable. Where levels are at or above the threshold value, timing and duration will be planned to ensure that a significant effect is avoided.

Some NSRs are within close proximity to the proposed solar farm. However, as noted earlier, this element of the proposal will typically involve less intensive earthworks. The

main activity will be solar panel frame construction. The frames will typically be pushed into the ground by mobile equipment similar in size to a tractor. Some NSRs are close to the solar farm site boundary @ 35m (NSRs 16, 27, 30) and therefore may experience temporary elevated noise levels however these are expected to be below the threshold value (*65 dB $L_{Aeq,1hr}$).* Works are expected to move away relatively quickly from NSRs close to the solar farm boundary thus reducing construction noise levels with distance.

11.4.1.1.3 Construction Phase Traffic

The number of HGVs accessing the construction site is likely to be negligible in the context of existing traffic flows on the R446. Existing NSRs 4 and 5 are located close to the existing construction site entrance for the Flexgen project. However, a wall separates the construction access route from the NSRs thus ensuring that any related construction traffic noise is mitigated. Communication is also maintained with the property owners and complaints if any are addressed. The same route will be used by construction traffic for the proposed development.

11.4.1.2 Vibration

11.4.1.2.1 Applicable Vibration Criteria

Vibration impacts can typically potentially occur during demolition and construction phases of development particularly through the use of equipment such as rock breakers (transient), HGVs on uneven surfaces (transient) or piling (transient or continuous, depending on method employed). Vibration can affect both human beings and buildings. Humans are more sensitive to vibration stimuli although the risk of cosmetic or structural damage to buildings is the more usual concern for site development/ construction.

Guidance relevant to the protection of building structures is contained in the following documents:

- British Standard BS 7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration, and;
- British Standard BS 5228: 2009+A1 2014: Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration.

Both standards contain similar guidance relating to building damage criteria. Table 11.19 below details the transient vibration guide values for cosmetic damage to buildings as set out in BS5228-2:

Table 11.19 Transient Vibration Guide Values for Cosmetic Damage

Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
	4 – 15 Hz	15 Hz and above
Reinforced or Framed Structures Industrial and Heavy Commercial Buildings	50mm/sec at 4 Hz and above	50mm/sec at 4 Hz and above
Unreinforced or Light-weight Structures Residential or Light Commercial Buildings	15mm/sec at 4Hz increasing to 20mm/sec at 20Hz	20mm/sec at 15Hz increasing to 50mm/sec at 40Hz

Note 1: Values Referred to are at the base of a building. Note 2: For Line 2, at frequencies below 4Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.

The above values are for transient or intermittent vibrations which do not cause a resonant response in buildings. The criteria should be reduced by 50% for more sustained or continuous vibration which may occur during activities such as continuous piling methods which are not proposed as part of the works. The values should also be reduced by 50% for listed buildings although they may not necessarily be more vulnerable than new builds.

The following limits therefore apply for continuous vibrations:

- Light Buildings – 7.5mm/sec
- Heavy Buildings – 25mm/sec

BS7385-2 indicates that the probability of damage tends towards zero at a component PPV of 12.5 mm/sec.

The TII Guidelines (2004 & 2014) suggest that vibration levels should be limited to 8 mm/sec at frequencies of <10Hz, to 12.5 mm/sec at frequencies 10 – 50Hz and to 20 mm/sec at 50Hz and above.

BS5228-2 also provides the following range of vibration values and associated potential effects on humans:

Table 11.20 Vibration Criteria – Human Beings

Vibration Level mm/sec PPV	Effect
0.14	Vibration might just be perceptible in the most sensitive in the most sensitive situations for most vibration frequencies.
0.3	Vibration might just be perceptible in residential environments.
1	A vibration level of this magnitude is likely to cause complaint.
10	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

As can be seen from Table 11.20 above, the limits for humans are much lower than for cosmetic damage to buildings.

Prediction of vibration levels at receptors is complex and dependent on several variables such as the excavation method, the nature of the used equipment, the properties of the subsoil, the heterogeneity of the soil deposit, the distance to the receptor and the dynamic characteristic of the adjacent structures. Therefore, limits or threshold criteria as set out in BS5228-2 are applied for buildings and humans.

BS5228-2 provides some historic data on vibration levels measured on sites from different types of piling equipment under specific conditions e.g. soil type, however there is no data for other types of equipment.

No piling is proposed. Vibratory rollers may be used and HGVs travelling on uneven surfaces can also generate transient vibrations. Rock-breakers may be used on occasion with potential transient vibrations generated.

Taking account of the distances to nearby receptors and notwithstanding ground conditions present, it is not anticipated that the vibration criteria in Table 11.19 and Table 11.20 will be exceeded. Nevertheless, precautionary vibration monitoring at the boundary with receptors such as NSR1 is proposed to ensure compliance with the limits or threshold values and will be included in the CEMP as a preventative measure.

There are no buildings of architectural heritage within the study area that require consideration.

11.4.2 LONG TERM OPERATIONAL PHASE

11.4.2.1 Noise

As noted earlier in Section 11.2.3.3, the long-term noise impact of the proposed development was predicted using the methodology set out in ISO 96013-2-2024.

A total of 1,455 sources were entered into the noise prediction model as described below.

11.4.2.1.1 Fuel Cell

The technology developer provided data indicating that each fuel cell module emits a SPL of 65dB(A) at 3m. No L_{WA} or frequency data was provided. Therefore, a L_{WA} of 84 dB was derived for each module with all energy at 500Hz. Each tower contains a total of 80 modules split 50:50 between Levels 1 and 2. Therefore a total of 6x80 = 480 fuel cell modules were entered into the noise model as point sources.

11.4.2.1.2 Solar Farm Inverters

A total of 45 solar inverters were entered into the model as point sources. The technology developer provided data indicating that each inverter emits a SPL of <79dB(A) at 1m. No L_{WA} or frequency data was provided. Therefore, a L_{WA} of 87 dB was derived for each inverter with all energy at 500Hz.

11.4.2.1.3 Data Centre

A L_{WA} of 67 dB was provided for each roof-top dry cooler. No frequency data of dimensions were provided. 98 units will be placed on each roof. These were therefore condensed to 16 point sources per data centre roof with higher L_{WA} values to match a total of 98 per roof at 67dB. All energy was entered at 500Hz. A total of 96 sources were modelled.

Table 11.21 Noise Source Data

Source	Frequency (Hz)									Total L_{WA}
	31.5	63	125	250	500	1000	2000	4000	8000	
BESS Inverter	65.5	71.5	82.7	78.9	84.7	90.3	83.4	79.3	74.4	93
BESS Batteries	-	45	52	61	69	73	75	67	61	78
D15, D17, D18 Transformers	55	55	70	77	82	79	75	70	61	83
D8 Transformers	70	70	85	92	97	94	90	85	76	100
AHU Exhaust Outlet	-	61	63	66	64	63	65	64	58	73
AHU Supply Inlet	-	56	71	67	69	73	67	61	47	77

The following number of sources listed in Table 11.21 were modelled:

- 138 No. BESS inverters;
- 138 No. BESS batteries;
- 3 No. Step-down Transformers;
- 3 No. Step-up Transformers;
- 20 No. AHU Exhaust outlets at roof level per data centre building = 120 in total
- 72 No. AHU Supply Inlets per data centre split between 2 levels emitting from the long side facades = 432 in total

The predicted value at each NSR (at façade most affected) is provided in Table 11.22 below. The values range from 31 - 46 dB(A) and are below the night-time limit of 45 dB(A) with the exception of NSR6. The SOFC energy centre element which may require an industrial emissions license from the EPA is predicted to be < 45dB(A) at all NSRs.

NSR6 represents a landowner associated with the proposed development. Therefore, any additional mitigation requirements will be agreed directly with the occupant.

It should be noted that the predicted noise level at a number of NSRs to the east is predominantly due to the solar inverters which do not operate at night-time except during the hours 05.00- 07.00hrs in the summer months only when the sun rises early. In the absence of the solar inverters, the predicted noise level at all NSRs is also listed in Table 11.22 below. Predicted noise levels at NSRs 20-31 reduce to below 30 dB(A) during night-time hours with the exception of 05.00 -07.00hrs during the summer months.

Table 11.22 Predicted Noise Levels at each NSR as a result of the Proposed Development

Receptor No.	Receptor Height (m)	Total Predicted Noise Level (dB(A))	Total Predicted Noise Level (dB(A)) (no solar)
1	2	37	37
2	2	40	39
3	4	36	35
4	2	42	42
5	2	42	42
6	2	46	46
7	2	36	34
8	4	39	38
9	4	39	39
10	2	37	36
11	2	37	37
12	2	38	37
13	2	38	37
14	4	40	40
15	2	36	35
16	2	33	31
17	2	33	31

Receptor No.	Receptor Height (m)	Total Predicted Noise Level (dB(A))	Total Predicted Noise Level (dB(A)) (no solar)
18	2	34	31
19	2	34	31
20	2	34	29
21	2	32	29
22	2	32	29
23	2	31	29
24	2	32	28
25	2	32	29
26	2	31	28
27	2	31	26
28	4	37-39*	23 -32*
29	2	33	27
30	4	34	27
31	4	32	27
32	2	33	31
33	2	32	30
34	2	31	30
35	4	32	29

Note: *4 facades assessed.

The significance of the noise impact has been considered in accordance with BS4142:2014+A1:2019. The existing mode values for the night-time background ($L_{A90,15min}$) values are summarised for each NMP in Table 11.23 below.

Table 11.23 Mode Values for $L_{A90,15min}$ During the Night-time

Location	Mode Value (dB(A))	Represented NSRs
NMP1	37	1,2, 4,5, 7
NMP2	40	3, 8 -15
NMP3	40	16-31
NMP4	36	35
NMP2 (2023)	43	8-12
NMP6	40	14,15
NMP7	37	6

The predicted noise level in each instance has not been adjusted for impulsivity (not expected given the nature of the development) or tonality on the basis of overall low individual source Lw values for sources close to NSRs e.g. AHU supply inlets and exhausts and distance to NSRs for sources with higher noise levels. Data centres contain sensitive equipment which will require a strict maintenance schedule for equipment ensuring that tones are not inadvertently introduced.

In all instances, with the exception of NSRs, 2, 4, 5 and 6, the predicted noise level is at or below existing background levels.

The difference between background levels and predicted noise levels at NSRs 2, 4,5, 6 ranges from +3 (NSR2), +5 (NSR4 and 5) to +9 (NSR6) and therefore represents a potentially adverse to significant adverse impact *depending on context.*

The model represents a worst-case scenario. For example, the AHU supply inlets on the sides of the data centre buildings will be placed behind acoustic louvres. Therefore, actual noise levels at NSR2 (and 1) are likely to be lower than predicted and below the existing mode value for background levels at NSR1 and 2.

The predicted noise levels at NSRs 4, 5 and 6 are predominantly influenced by the BESS and the SOFC energy centre. In terms of total noise impact, the placing of the AHU supply inlets behind acoustic louvres as proposed will reduce the total predicted noise level at NSRs 4 and 5 by 1 dB(A). The magnitude rating or excess over background at these NSRs is therefore + 4 dB(A). The magnitude of impact indicates a likely adverse impact depending on context. Context takes account of factors such as the existing ambient or residual noise level; - e.g. will the proposal be incongruous or not with the existing ambient noise environment. Taking account of context and the magnitude rating, it is expected that a minor negative long-term noise impact is expected to occur at NSRs 4 and 5.

The impact is not considered to be significant.

Furthermore, in this regard, internal noise levels required for good sleeping conditions as set out in BS8233:2014 will not be exceeded with closed or partially open windows in the dwellings as a result of the proposed development.

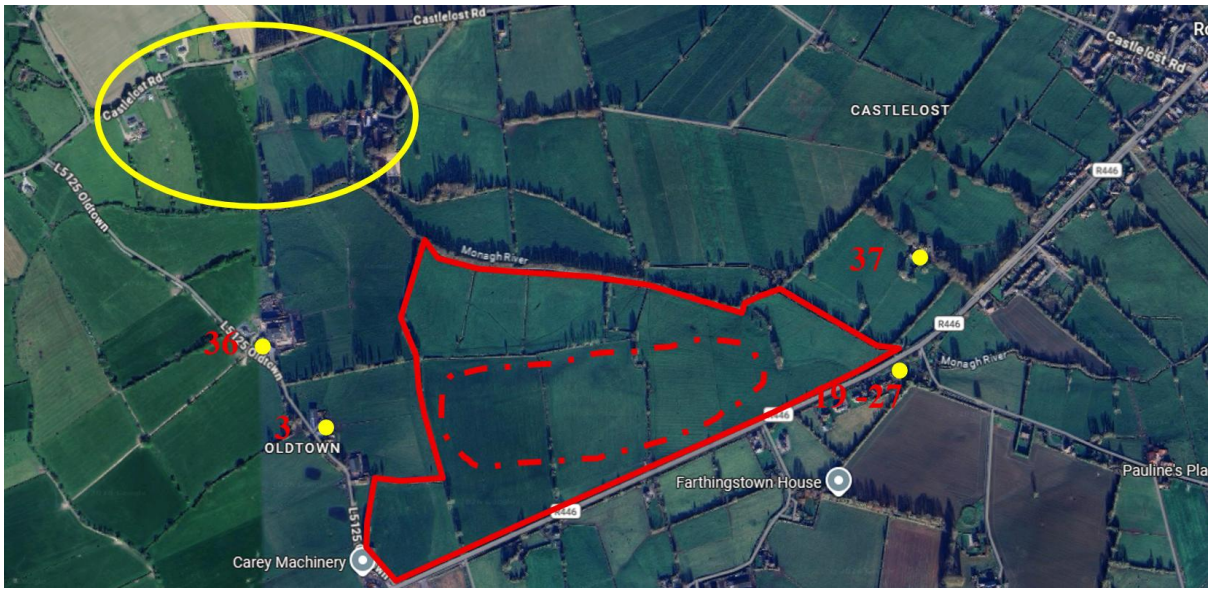
As noted earlier, NSR6 represents a landowner associated with the proposed development. Therefore, any further mitigation requirements will be agreed directly with the occupant.

NSR3 is located to the north of the R446. The breakdown of predicted noise levels from the grouped sources including the cumulative total predicted noise level with the permitted Flexgen development at NSR3 is set out in the Table below:

Table Breakdown of Source Contributions to Total Predicted Noise Level at NSR3

Source	R3_Southern Façade dB(A)	R3_Eastern Façade dB(A)
SOFC Energy Centre	31.2	31.2
Solar Farm Inverters	25.5	28.8
Data Centre Sources	28.4	25.0
BESS	30.2	30.4
Transformers	10.4	10.4
Flexgen	27.8	27
Total Project Admiral	**36**	**36**
Total Project Admiral without Solar	**35**	**34**
Total Cumulative with Flexgen	**36**	**36**

NSR36 has also been added to the noise model. This is located north of NSR3 as shown below.



Note. Red-Line boundary indicative only. Location of proposed solar inverters in dashed area. Yellow circle represents NSRs further north

The breakdown of the predicted noise levels for NSR36 is given in the Table below.

Table 11.24 Breakdown of Source Contributions to Total Predicted Noise Level at NSR36

Source	R3_Southeast Façade dB(A)	R3_Northeast Façade dB(A)
SOFC Energy Centre	29.4	30.2
Solar Farm Inverters	27.3	24.4
Data Centre Sources	25.9	20.7
BESS	28.2	30.1
Transformers	12.0	11.3
Flexgen	26	26.4
Total Project Admiral	**35**	**35**
Total Project Admiral without Solar	**33**	**33**
Total Cumulative with Flexgen	**35**	**35**

As can be seen from the Tables above, there is little difference between NSR3 and NSR36 in terms of predicted noise level as noise calculations are logarithmic. In simple terms, with every doubling of distance, a source, radiating sound spherically with no screening will reduce by 6 decibels (db). Initially, there will be a greater reduction close to the source e.g. a reduction from 10m to 20m distance will give the same theoretical reduction as from 500m to 1000m.

Receptors further north (circled in yellow on Figure 1) of NSR3 and NSR36 will experience reducing noise levels albeit reductions will be smaller than closer to the source. e.g. the SOFC energy centre is approximately 950m from NSR36 and approximately 1,400m distant from the next NSR north. Reductions therefore for this source due to distance alone will be approximately 3 dB. It can be concluded that the predicted noise levels at receptors further north as circled in yellow will be ≤ 31dB(A) during the daytime and < 30 dB(A) at night-time (without solar). These estimates are conservative in nature. Predicted noise levels for NSRs to the north are expected to be below existing background noise levels.

11.4.3 RECEPTORS NORTH-EAST OF THE R446:

There is one NSR to the northeast of the R446 close to the solar farm which has been numbered NSR37 on Figure 1. Taking account of the preceding discussion, it is considered that the NSRs south of the R446 and numbered 21 – 27 sufficiently represent this NSR in terms of noise impact. The village of Rochfortbridge lies further northeast.

The breakdown of sources impacting NSR27 to the south of the R446 is listed in Table 3 below:

Table 11.25 Breakdown of Source Contributions to Total Predicted Noise Level at NSR27

Source	R27_Southern Façade dB(A)	R27_Northern Façade dB(A)
SOFC Energy Centre	23.8	23.8
Solar Farm Inverters	28.6	27.3
Data Centre Sources	16.6	16.2
BESS	20.9	20.6
Transformers	6.3	5.6
Flexgen	22.1	21.6
Total Project Admiral	**31**	**30**
Total Project Admiral without Solar	**26**	**26**
Total Cumulative with Flexgen	**31**	**30**

It is therefore conservatively estimated that receptors to the northeast will experience noise levels during the day-time as < 30 dB(A) and < 25 dB(A) at night-time. The predicted noise levels for NSRs to the northeast of the R446 are expected to be well below existing background noise levels as concluded for NSR3 and NSRs 21-27 in the EIAR.

11.4.3.1 Vibration

The long-term operational equipment proposed will be maintained and balanced in accordance with manufacturer's instructions. Combined with consideration of distance to receptors and the likely requirements of the proposed data centre in terms of vibration sensitivity, operational phase vibration impact assessment will not be assessed further in this chapter.

11.5 MITIGATION MEASURES

11.5.1 SITE DEVELOPMENT AND CONSTRUCTION PHASES

The following noise and vibration management measures will apply to the proposed Development to ensure the daytime threshold values specified in this chapter are complied with:

- A Site Representative will be appointed for matters related to noise and vibration.
- Any complaints received will be thoroughly investigated.
- A written complaints log will be maintained by the Site Representative. This will, at a minimum, record complainant's details (where agreed) the date and time of the complaint, details of the complaint including where the effect was observed, corrective and preventative actions taken and any close-out communications. This will ensure that the concerns of local residents who may be affected by site activities are considered during the management of activities at the site.
- Noise monitoring with capability for real-time review both on-site and remotely will be conducted at the boundary points when works are planned in close proximity.
- In the event of meeting or exceedance of the threshold values at NSRs, works will be ceased and measures implemented immediately to ensure that the limits are complied with.
- Temporary acoustic screening or hoarding will be placed along the boundaries where no existing screening exists with the proposed site and NSRs 1,2 and 4 where works take place close to the site boundary. As a general rule of thumb, it is recommended that temporary screening break the "line of sight" from the sources to the lower windows of the nearest NSRs where possible.
- The operation of certain pieces of equipment, where substitution, enclosure etc. cannot be carried out will be managed through monitoring and timing of use to ensure that noise levels remain below the threshold values/criteria specified.

- As a precautionary measure and as part of good practice, vibration monitoring will be carried out where works such as the use of rollers are in close proximity to NSRs, 1 and 2.
- Measures such as the use of low noise plant and/or the use of enclosures will be chosen to minimise construction noise impact.
- During the construction phase all equipment will be required to comply with noise limits set out in EC Directive 2000/14/EC and the 2005/88/EC amendment on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors. The directive covers equipment such as compressors, welding generators, excavators, dozers, loaders and dump trucks.

The outline CEMP submitted with this application includes the noise and vibration management measures listed above.

11.5.2 OPERATIONAL PHASE

Mitigation measures included in the design are listed as follows:

- Acoustic louvres along the long sides of the data centre buildings to reduce noise breakout from internal plant rooms. These will be selected to ensure that existing night-time background noise levels as defined in Table 11.22 are not exceeded.

During operations, equipment will be serviced and maintained to ensure that noise levels do not inadvertently increase and to avoid the introduction of potential tones or impulsive noise.

The following will also be complied with:

- During daytime and evening periods rigorous efforts shall be made to avoid clearly audible tones and impulsive noise at all sensitive locations. Penalties (as determined using recognised methods as set out in ISO1996, Parts 1, 2 and 3) will be applied for tonal and/or impulsive elements to the daytime and evening measured $L_{Aeq,T}$ values to determine the appropriate rating level ($L_{Ar,T}$)
- During the night-time period no tonal or impulsive noise from the facility shall be clearly audible or measurable at any NSR.
- In addition to the foregoing recommended licence limit values, the noise from the proposal shall not be so loud, so continuous, so repeated, of such duration or pitch and it should not occur at such times, as to give reasonable grounds for annoyance.

The following sets out the reasoning as to why additional mitigation is not required. BS4142: 2014 notes that the effect on receptors is not just dependent on the difference in noise levels between background and the predicted noise levels. The context in which the change occurs should also be considered. To reiterate:

> *The difference between background levels and predicted noise levels at NSRs 2, 4,5 and 6 ranges from +3 (NSR2), +5 (NSR4 and 5) to +9 (NSR6) and therefore represents a potentially adverse to significant adverse impact* ***depending on context.***

Additional comment: It should be noted that the potential *significant* adverse impact is in relation to NSR6 and not NSRs 2,4 and 5.

> ***The model represents a worst-case scenario.*** *For example, the AHU supply inlets on the sides of the data centre buildings will be placed behind acoustic louvres. Therefore, actual noise levels at NSR2 (and 1) are likely to be lower than predicted and below the existing mode value for background levels at NSR1 and 2.*
>
> *The predicted noise levels at NSRs 4, 5 and 6 are predominantly influenced by the BESS and the SOFC energy centre. In terms of total noise impact, the placing of the AHU supply inlets behind acoustic louvres as proposed will reduce the total predicted noise level at NSRs 4 and 5 by 1 dB(A). The magnitude rating or excess over background at these NSRs is therefore + 4 dB(A). The magnitude of impact indicates a likely adverse impact depending on context. Context takes account of factors such as the existing ambient or residual noise level; - e.g. will the proposal be incongruous or not with the existing ambient noise environment. Taking account of context and the magnitude rating, it is expected that a minor negative long-term noise impact is expected to occur at NSRs 4 and 5.*
>
> *The impact is not considered to be significant.*

Additional comment: note that a minor negative impact would not constitute a significant negative impact.

> *Furthermore, in this regard, internal noise levels required for good sleeping conditions as set out in BS8233:2014 will not be exceeded with closed or partially open windows in the dwellings as a result of the proposed development.*
>
> *As noted earlier, NSR6 represents a landowner associated with the proposed development. Therefore, any further mitigation requirements will be agreed directly with the occupant.*

In addition it should be noted that NSRs 2, 4 and 5 are located directly off the R446. Therefore, traffic noise is part of the context in which the project noise will be perceived.

Predicted noise levels at all receptors, with the exception of NSR6, will be below the typical night-time noise limit for development which is 45 dB(A).

The developer will undertake to ensure that there are no clearly audible tones at night-time.

Any additional mitigation measures can be developed into the equipment specifications during the detailed design stage to reduce noise levels further.

11.6 Residual Impacts of the Development

As mitigation measures are precautionary and/or already included in the assessment, the residual impacts and effects are as described earlier in Sections 11.5.1 and 11.5.2.

11.7 CUMULATIVE EFFECTS

11.7.1 CONSTRUCTION PHASE

Potential construction impacts at NSRs are greatest within 40m of development works, after which they reduce as noise attenuates over distance. As addition of sources is logarithmic, the highest contributing sources i.e. generally those at close distances to NSRs predominate and tend to define the noise impact magnitude. The construction of the adjacent permitted Flexgen, associated transformers and synchronous condenser will be complete before the construction of the proposed development. Accordingly, there are no further cumulative short term construction phase noise impacts to consider.

11.7.2 OPERATIONAL PHASE

The cumulative noise impact with the existing permitted energy developments (Flexgen, associated transformers and synchronous condenser) is described in Table 11.26 below for the NSRs assessed as part of the IE license application for Castlelost Flexgen Ltd. All values are below the night-time limit of 45 dB(A) with the exception of NSR6 which is 2 dB(A) above the night-time limit. The contributing source causing the increase above 45 dB(A) at this NSR is the BESS which does not require licensing. The predicted cumulative noise level associated with Flexgen and the SOFC is 43 dB(A).

Table 11.26 Predicted Cumulative Noise Levels at each NSR

Receptor No.	Receptor Height (m)	Total Predicted Noise Level (dB(A))	Predicted Noise Level Flexgen (dB(A))	Total Cumulative Predicted Noise Level (dB(A))
4	2	42	34	43
5	2	42	34	43
6	2	46	39	47
7	2	36	33	37
8	4	39	37	41
9	4	39	38	42
10	2	37	36	39
11	2	37	37	40
12	2	38	38	41
13	2	38	39	41
14	4	40	42	44
15	2	36	41	42
16	2	33	34	36
17	2	33	32	35

The significance of the cumulative noise impact has been considered in accordance with BS4142:2014+A1:2019.

The existing mode values for the night-time background ($L_{A90,15min}$) values are summarised below in Table 11.27 for each NMP relevant to the listed NSRs in Table 11.26.

Table 11.27 Mode Values for $L_{A90,15min}$ During the Night-time

Location	Mode Value (dB(A))	Represented NSRs
NMP1	37	4,5, 7
NMP2	40	8 -15
NMP3	40	16, 17
NMP2 (2023)	43	8-12
NMP6	40	14,15
NMP7	37	6

The cumulative noise level is predicted to be at or below the mode value for background levels at NSRs 7, 10, 11, 16, and 17.

The cumulative noise level is predicted to be +1 dB above the mode value for background levels at NSRs 8, 12 and 13.

The cumulative noise level is predicted to be +2 dB above the mode value for background levels at NSRs 9 and 15.

The cumulative noise level is predicted to be +4 dB above the mode value for background levels at NSR 14.

The cumulative noise level is predicted to be +6 dB above the mode value for background levels at NSRs 4 and 5. If the input from the data centre AHU supply inlets is removed (as these will be placed behind acoustic louvres) the magnitude rating reduces to +5 dB.

The cumulative noise level is predicted to be +10 dB above the mode value for background levels at NSR 6.

The magnitude of impact indicates a potential adverse cumulative impact depending on context at NSRs 4,5, 8, 9, 12, 13, 14 and 15 and a potentially significant adverse impact at NSR6 also depending on context.

It is noted that the Flexgen unit will not operate continuously and responds to demand from the grid. Therefore, taking this factor into account as part of the context of the proposed development, the conclusion on cumulative impact are the same as those listed earlier in Section 11.4.2.1 in relation to the proposed development.

In addition, the following table of results for the cumulative impact at NSRs 1-35 plus the additional NSR36 has been prepared. The model for Project Red Admiral was updated to take into account the Flexgen project which was previously modelled in accordance with ISO 9613-2 1996 which was in force at the time. The latest model is based on the 2024 updated version of ISO 9613-2 and takes account of any permitted changes to the Flexgen project. There is little variation in the results presented in Table 11.28 below compared to Table 11.24 for NSRs 4 -17. The results are either the same or slightly less by 1-2 decibels.

Table 11.28 Cumulative impact at NSRs 1-35 and NSR36 (additional)

Receptor No.	Receptor Height (m)	Total Predicted Noise Level (dB(A))	Total Predicted Noise Level (dB(A)) (no solar)	Predicted Noise Level Flexgen (dB(A))	Total Cumulative Predicted Noise Level (dB(A))	Total Cumulative Predicted Noise Level (dB(A)) (no solar)
1	2	37	37	24	37	37
2	2	40	39	23	40	39
3	4	36	35	28	37	36
4	2	42	42	33	42	42
5	2	42	42	33	43	43
6	2	46	46	39	47	47
7	2	36	34	29	37	35
8	4	39	38	32	40	39
9	4	39	39	33	40	40
10	2	37	36	31	38	37
11	2	37	37	32	38	38
12	2	38	37	33	39	38
13	2	38	37	32	39	38
14	4	40	40	38	42	42
15	2	36	35	31	37	37
16	2	33	31	27	34	33
17	2	33	31	27	34	32
18	2	34	31	24	34	32
19	2	34	31	26	35	32
20	2	34	29	24	34	30
21	2	32	29	23	32	30
22	2	32	29	25	33	30

Receptor No.	Receptor Height (m)	Total Predicted Noise Level (dB(A))	Total Predicted Noise Level (dB(A)) (no solar)	Predicted Noise Level Flexgen (dB(A))	Total Cumulative Predicted Noise Level (dB(A))	Total Cumulative Predicted Noise Level (dB(A)) (no solar)
23	2	31	29	24	32	30
24	2	32	28	23	32	29
25	2	32	29	24	33	30
26	2	31	28	24	32	29
27	2	31	26	22	32	27
28	4	37-39*	23 -32*	22-29*	37 – 39*	26 – 34*
29	2	33	27	23	33	29
30	4	34	27	25	35	29
31	4	32	27	26	33	29
32	2	33	31	26	34	32
33	2	32	30	25	33	31
34	2	31	30	24	32	31
35	4	32	29	26	33	31
36	4			26	36	34

**4 facades assessed.*

Predicted cumulative noise levels at all receptors, with the exception of NSR6, will be below the typical night-time noise limit for development which is 45 dB(A).

As noted under Item (iii) above, the revised predicted cumulative impact is slightly less than previously predicted. The revised text, taking into account all NSRs 1 – 36 is as follows:

> *The cumulative noise level is predicted to be at or below the mode value for background levels at NSRs 1, 3, 7-13, 15 – 36. A total of 31 NSRs.*
>
> *The cumulative noise level is predicted to be +2 dB above the mode value for background levels at NSR 14.*
>
> *The cumulative noise level is predicted to be +3 dB above the mode value for background levels at NSR 2.*
>
> *The cumulative noise level is predicted to be +5 dB above the mode value for background levels at NSR 4.*
>
> *The cumulative noise level is predicted to be +6 dB above the mode value for background levels at NSR 5. If the input from the data centre AHU supply inlets is removed (as these will be placed behind acoustic louvres) the magnitude rating reduces to +5 dB.*
>
> *The cumulative noise level is predicted to be +10 dB above the mode value for background levels at NSR 6.*

The magnitude of impact indicates a potential adverse cumulative impact depending on context at NSRs 2, 4,5 and 14 and a potentially significant adverse impact at NSR6 also depending on context.

It is noted that the Castlelost Flexgen unit will not operate continuously and responds to system (grid) demand. Therefore, taking this factor into account as part of the context of the proposed development, the conclusion on cumulative impact are the same as those discussed above in relation to the proposed development.

11.8 MONITORING AND FURTHER WORKS

Real-time and continuous construction noise monitoring at locations representative of the closest NSRs shall be conducted throughout all development stages at the site boundaries to ensure that the relevant criteria are not exceeded.

A noise survey shall be completed during the commissioning phase of the project to ensure that the proposed limits are not exceeded and that conditions regarding tones and impulsive noise are complied with. Measures shall be implemented in the event that the limits and conditions are not complied with fully.

11.9 SUMMARY OF SIGNIFICANT EFFECTS

11.9.1 SHORT-TERM CONSTRUCTION PHASE

No significant adverse effects are expected during the short-term construction phases of development.

11.9.2 LONG-TERM OPERATIONAL PHASE

No significant adverse effects are expected in the long-term taking account of the assumptions relating to source noise levels and mitigation measures developed in the project. Additional mitigation will be agreed directly with NSR6 where necessary.

In summary, the predicted noise levels for all NSRs with the exception of NSR6 are likely to be below the following recommended day, evening and night-time noise limits:

- Daytime (07:00 to 19:00hrs) – 55dB $L_{Ar,T}$;
- Evening (19:00 to 23:00hrs) – 50dB L_{ArT};
- Night-time (23:00 to 07:00hrs) – 45dB $L_{Aeq,T}$.

11.10 REFERENCES

- BS5228:2009 +A1:2014: Code of Practice for Noise and Vibration Control on Construction and Open Sites: Part 1: Noise and Part 2: Vibration.
- BS4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound.
- BS 7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration.
- BS6472-1:2008: Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting.
- BS8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings.
- Draft Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities, (NG4) as published by the Environmental Protection Agency in December 2024.
- Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) as published by the Environmental Protection Agency in January 2016.
- ISO 1996 Acoustics – Description, Measurement and Assessment of Environmental Noise, Part 1, Basic Quantities and Assessment Procedures (2016), Part 2 Determination of Environmental Noise Levels (2017) and Part 3 Objective Method for the Measurement of Prominence of Impulsive Sounds and for Adjustment of L_{Aeq}.
- ISO 9613-2-2024 Acoustics – Attenuation of sound during propagation outdoors – Part 2: Engineering Method for Prediction of Sound Pressure Levels Outdoors.
- Transport Infrastructure Ireland (TII) publication Guidelines for the Treatment of Noise & Vibration in National Road Schemes, March 2014.
- Guidelines for the Treatment of Noise and Vibration in National Road Schemes, Rev1, TII, (formerly National Roads Authority (NRA)), October 2004.
- UK Highways Agency Design Manual for Roads and Bridges, Sustainability and Environmental Appraisal, LA11, Noise and Vibration, Rev 2, May 2020.

12 LANDSCAPE & VISUAL

12.1 INTRODUCTION

This Landscape and Visual Assessment (LVIA) has been prepared to accompany a planning application for a proposed development southwest of Rochfortbridge in County Westmeath.

This LVIA describes the landscape context of the proposed development and assesses the likely landscape and visual impacts of the scheme on the receiving environment. Although closely linked, landscape and visual impacts are assessed separately.

- Landscape Impact Assessment (LIA) relates to assessing effects of a development on the landscape as a resource in its own right and is concerned with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character.
- Visual Impact Assessment (VIA) relates to assessing effects of a development on specific views and on the general visual amenity experienced by people. This deals with how the surroundings of individuals or groups of people may be specifically affected by changes in the content and character of views as a result of the change or loss of existing elements of the landscape and/or introduction of new elements. Visual impacts may occur from; Visual Obstruction (blocking of a view, be it full, partial or intermittent) or; Visual Intrusion (interruption of a view without blocking).

This assessment is supported by a suite of appendices, including the Landscape and Biodiversity Mitigation Plans (Appendix 12.4), the photomontage booklet (Appendices 12.2 and 12.5), Glint and Glare Assessment Report (Appendix 12.3) and the Landscape Architect Design Statement (Appendix 12.6), which should be read in conjunction with this chapter.

12.1.1 APPROACH

This LVIA adopts an approach that is founded in the following best practice guidance documents:

- Landscape Institute and the Institute of Environmental Management and Assessment (IEMA) publication entitled Guidelines for Landscape and Visual Impact Assessment, 2013 (GLVIA3);
- Environmental Protection Agency (EPA) publication 'Guidelines on the Information to be contained in Environmental Impact Statements (2022); and

- 'Photography and Photomontage in Landscape and Visual Impact Assessment', Landscape Institute Technical Guidance Note 06/2019.

12.1.2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The project includes two main elements, namely:

- The Data Centre (DC) facility, comprising six two-storey Data Centre buildings, car parking, landscaping, drainage and other associated works. The DC facility will be constructed and secured within a 39ha campus. Each DC building will have a footprint of 13,978 m^2 (sqm). Each DC building will contain:
  - Data halls fitted with server racks and distribution units,
  - Mechanical and electrical (M&E) plant rooms /spaces which will house advanced cooling equipment, pumps, piping and medium voltage (MV) and low voltage (LV) switchgear, and
  - Administration and support areas including, reception, offices, meeting rooms and welfare facilities.
- Decentralised Energy Resource (DER), which will be constructed across approximately 200ha of lands adjoining the DC facility. The DER incorporates several power assets which will generate, store and manage electricity close to the DC facility. The DER comprises the following assets:
  - Fuel Cell Power System – 160MW,
  - Battery Energy Storage System (BESS) – 250MW,
  - Solar PV farm (nominal 180MWp), and
  - 220kV IPP GIS Grid connection to the 220kV Castlelost GIS substation which adjoins the proposed development site.

A full description of the proposed development is provided in Chapter 2 of this EIAR.

12.2 ASSESSMENT METHODOLOGY & SIGNIFICANCE CRITERIA

This document uses methodology as prescribed in the previously mentioned GLVIA3, which follows the European Landscape Convention (ELC) definition of landscape:

> *'Landscape is an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors' (Council of Europe, 2000). Thus, GLVIA-2013 covers all landscapes from "high mountains and wild countryside to urban and fringe farmland (rural landscapes), marine and coastal landscapes (seascapes) and the landscapes of villages towns and cities (townscapes)" - whether protected or degraded.*

12.2.1 SCOPE OF THE ASSESSMENT

GLVIA3 establishes guidelines and not a specific methodology. The preface recognises that:

> *'This edition concentrates on principles and processes. It does not provide a detailed or formulaic 'recipe' that can be followed in every situation – it remains the responsibility of the professional to ensure that the approach and methodology adopted are appropriate to the task in hand.'*

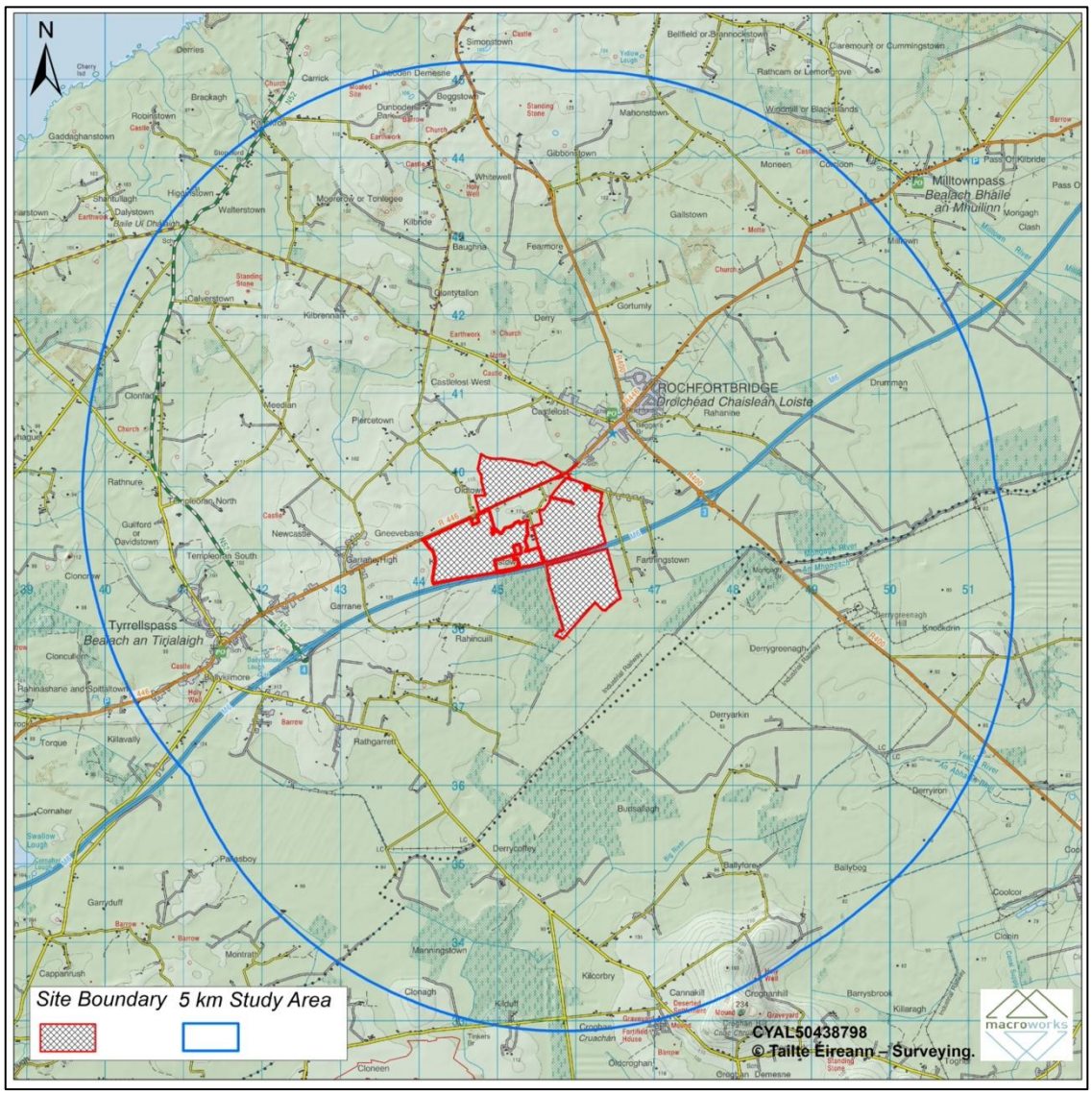
The methodology for this assessment has therefore been developed specifically for this assessment to ensure that it is appropriate and fit for purpose. The LVIA Methodology can be summarised as undertaking the following key tasks:

- Desk study and site visits in Winter/Spring 2025;
- Defining the Baseline Landscape setting and conditions;
- Identification and Evaluation of key components of the proposed development;
- Consideration of Mitigation Measures;
- Assessment of Landscape Effects;
- Assessment of Visual Effects; and
- Summary Statement of Significance.

12.2.2 STUDY AREA

From similar studies, it is anticipated that the proposed development is likely to be difficult to discern beyond approximately 5km and is not likely to give rise to significant landscape or visual impacts beyond approximately 2km. In the interests of a comprehensive appraisal, a 5km radius study area is used in this instance. However, there will be a particular focus on receptors contained within 1-2km, except where iconic or designated scenic viewpoints exist at greater distances out to 5km (refer to Figure 12.1).

Figure 12.1 5km Extent of the Study Area



12.2.3 LANDSCAPE IMPACT ASSESSMENT CRITERIA

This part of the LVIA provides an assessment of how the introduction of the proposed development will affect the physical features and fabric of the landscape, and then how the proposals influence landscape character with reference to published descriptions of character and an understanding of the contemporary character of the landscape as informed through desktop and site studies.

When assessing the potential landscape effects of the development, the value and sensitivity of the landscape receptor is weighed against the magnitude of impact to determine the significance of the landscape effect. Criteria outlined below are used to guide these judgements.

12.2.3.1 Landscape Sensitivity

The sensitivity of the landscape to change is the degree to which a particular setting can accommodate changes or new elements without unacceptable detrimental effects to its essential characteristics. In accordance with GLVIA3, the sensitivity of a landscape receptor (Landscape Character Area or feature) is derived from combining judgements in relation to its susceptibility to change and its value. The judgement reflects such factors as its quality, value, contribution to landscape character and the degree to which the particular element or characteristic can be replaced or substituted. Landscape Sensitivity is classified using the following criteria set out in Table 12.1

Table 12.1 Landscape Value and Sensitivity

Sensitivity	Description
Very High	Areas where the landscape character exhibits a very low capacity for change in the form of development. Examples of which are high value landscapes, protected at an international or national level (World Heritage Site/National Park), where the principal management objectives are likely to be protection of the existing character.
High	Areas where the landscape character exhibits a low capacity for change in the form of development. Examples of which are high value landscapes, protected at a national or regional level (Area of Outstanding Natural Beauty), where the principal management objectives are likely to be considered conservation of the existing character.
Medium	Areas where the landscape character exhibits some capacity and scope for development. Examples of which are landscapes, which have a designation of protection at a county level or at non-designated local level where there is evidence of local value and use.
Low	Areas where the landscape character exhibits a higher capacity for change from development. Typically, this would include lower value, non-designated landscapes that may also have some elements or features of recognisable quality, where landscape management objectives include, enhancement, repair and restoration.
Negligible	Areas of landscape character that include derelict, mining, industrial land or are part of the urban fringe where there would be a reasonable capacity to embrace change or the capacity to include the development proposals. Management objectives in such areas could be focused on change, creation of landscape improvements and/or restoration to realise a higher landscape value.

12.2.4 MAGNITUDE OF CHANGE – LANDSCAPE

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 proposed development and to a lesser extent the duration and reversibility of that effect. The magnitude takes into account whether there is a direct physical impact resulting from the loss of landscape components and/or a change that extends beyond the immediate setting that may have an effect on the landscape character. Table 12.2 outlines criteria used to inform this judgement.

Table 12.2 Magnitude of Change - Landscape

Criteria	Description
Very High	Change that would be large in extent and scale with the loss of critically important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to an extensive change of the landscape in terms of character, value and quality.
High	Change that would be more limited in extent and scale with the loss of important landscape elements and features, that may also involve the introduction of new uncharacteristic elements or features that contribute to a considerable change of the landscape in terms of character, value and quality.
Medium	Changes that are modest in extent and scale involving the loss of landscape characteristics or elements that may also involve the introduction of new uncharacteristic elements or features that would lead to noticeable changes in landscape character, and quality.
Low	Changes affecting small areas of landscape character and quality, together with the loss of some less characteristic landscape elements or the addition of new features or elements that would lead to discernible changes in landscape character, and quality.
Negligible	Changes affecting small or very restricted areas of landscape character. This may include the limited loss of some elements or the addition of some new features or elements that are characteristic of the existing landscape or are hardly perceivable leading to no material change to landscape character, and quality.

12.2.5 VISUAL IMPACT ASSESSMENT CRITERIA

This part of the LVIA provides an assessment of how the introduction of the proposed development will affect views within the landscape. It therefore needs to consider:

- Direct impacts of the proposed development upon views through intrusion or obstruction;
- The reaction of viewers who may be affected, e.g. residents, walkers, road users; and
- The overall impact on visual amenity.

It has been deemed appropriate to structure the assessment around a series of representative viewpoint locations. All viewpoints are located within the public domain and are representative of views available from main thoroughfares and pedestrian areas within the vicinity of the proposed development. The selected viewpoints are considered to be comprehensive in communicating the variable nature of the visual effects.

When assessing the potential visual effects of the development, the sensitivity of the visual receptor is weighed against the magnitude of the visual impact to determine the significance of the visual effect. Criteria outlined below are used to guide these judgements.

12.2.5.1 Sensitivity of Visual Receptors

As with landscape sensitivity, the sensitivity of a visual receptor is categorised as Very High, High, Medium, Low, and Negligible. Unlike landscape sensitivity however, the sensitivity of visual receptors has an anthropocentric (human) basis. It considers factors such as the perceived quality and values associated with the view, the landscape context of the viewer, the likely activity the viewer is engaged in and whether this heightens their awareness of the surrounding environment.

A list of the factors considered by the assessor in estimating the level of sensitivity for a particular visual receptor is outlined below to establish visual receptor sensitivity at each viewpoint location.

12.2.5.2 Susceptibility of Visual Receptors to Change

In accordance with GLVIA3, visual receptors most susceptible to changes in views and visual amenity are:

- "Residents at home;
- People, whether residents or visitors, who are engaged in outdoor recreation, including use of public rights of way, whose attention or interest is likely to be focussed on the landscape and on particular views;
- Visitors to heritage assets, or to other attractions, where views of the surroundings are an important contributor to the experience;
- Communities where views contribute to the landscape setting enjoyed by residents in the area;
- Travellers on road rail or other transport routes where such travel involves recognised scenic routes and awareness of views is likely to be heightened".
- Visual receptors that are less susceptible to changes in views and visual amenity include;
- "People engaged in outdoor sport or recreation, which does not involve or depend upon appreciation of views of the landscape;
- People at their place of work whose attention may be focussed on their work or activity, not their surroundings and where the setting is not important to the quality of working life".

12.2.5.3 Values attached to views

The value attached to a view is determined by considering the following:

- Recognised scenic value of the view (Development Plan designations, guidebooks, touring maps, postcards etc). These represent a consensus in terms of which scenic views and routes within an area are strongly valued by the population because in the case of County Developments Plans, for example, a public consultation process is required;
- Views from within highly sensitive landscape areas. These are likely to be in the form of Architectural Conservation Areas, which are incorporated within the Development Plan and therefore subject to the public consultation process. Viewers within such areas are likely to be highly attuned to the landscape around them;
- Primary views from residential receptors. Even within a dynamic city context, views from residential properties are an important consideration in respect of residential amenity;
- Intensity of use, popularity. This relates to the number of viewers likely to experience a view on a regular basis and whether this is significant at a national or regional scale;
- Provision of vast, elevated panoramic views. This relates to the extent of the view on offer and the tendency for receptors to become more attuned to the surrounding landscape at locations that afford broad vistas;
- Sense of remoteness and/or tranquillity. Receptors taking in a remote and tranquil scene, which is likely to be fairly static, are likely to be more receptive to changes in the view than those taking in the view of a busy street scene, for example;
- Degree of perceived naturalness. Where a view is valued for the sense of naturalness of the surrounding landscape it is likely to be highly sensitive to visual intrusion by distinctly manmade features;
- Presence of striking or noteworthy features. A view might be strongly valued because it contains a distinctive and memorable landscape / townscape feature such as a cathedral or castle;
- Historical, cultural and / or spiritual significance. Such attributes may be evident or sensed by receptors at certain viewing locations, which may attract visitors for the purposes of contemplation or reflection heightening the sense of their surroundings;
- Rarity or uniqueness of the view. This might include the noteworthy representativeness of a certain landscape type and considers whether the receptor could take in similar views anywhere in the broader region or the country;
- Integrity of the landscape character. This looks at the condition and intactness of the landscape in view and whether the landscape pattern is a regular one of few

strongly related components or an irregular one containing a variety of disparate components;

- Sense of place. This considers whether there is special sense of wholeness and harmony at the viewing location;
- Sense of awe. This considers whether the view inspires an overwhelming sense of scale or the power of nature.

Those locations which are deemed to satisfy many of the above criteria are likely to be of higher sensitivity, and no relative importance is inferred by the order of listing.

It is recognised that a viewer's interpretation and experience of the landscape can have preferential and subjective components. Where relevant, judgements are made on those elements of the landscape that are considered to contribute more prominently and positively to the visual landscape resource as well as those elements that contribute negatively. Overall sensitivity may be a result of a number of these factors or, alternatively, a strong association with one or two in particular.

12.2.6 MAGNITUDE OF CHANGE – VISUAL

The magnitude of change is again a product of the scale, extent, or degree of change that is likely to be experienced as a result of the proposed development. This is directly influenced by its 'visual presence / prominence', as experienced by visual receptors in the landscape. These terms are somewhat quantitative in nature, and essentially relate to how noticeable or 'dominant' the proposal is within a particular view. Aside from the obvious influence of scale and distance, a development's visual presence is influenced by the extent and complexity of the view, contextual movement in the landscape, the nature of its backdrop, and its relationship with other focal points or prominent features within the view. It is often, though not always, expressed using one of the following terms: Minimal; Sub-dominant; Co-dominant; Dominant; Highly dominant. Criteria used to inform judgements are provided in Table 12.3.

Table 12.3 Magnitude of Change - Visual

Criteria	Description
Very High	Complete or very substantial change in view, dominant, involving complete or very substantial obstruction of existing view or complete change in character and composition of baseline, e.g., through removal of key elements.
High	A major change in the view that is highly prominent and has a strong influence on the overall view. This may involve the substantial obstruction of existing views or a complete change in character and composition of baseline, e.g. through removal of key elements or the introduction of new features that would heavily influence key elements.

Medium	Moderate change in view: which may involve partial obstruction of existing view or partial change in character and composition of baseline, i.e., pre-development view through the introduction of new elements or removal of existing elements. Change may be prominent but would not substantially alter scale and character of the surroundings and the wider setting. View character may be partially changed through the introduction of features which, though uncharacteristic, may not necessarily be visually discordant.
Low	Minor change in baseline, i.e. pre-development view - change would be distinguishable from the surroundings whilst composition and character would be similar to the pre change circumstances.
Negligible	Very slight change in baseline, i.e. pre-development view - change would be barely discernible. Composition and character of view substantially unaltered.

12.2.7 SIGNIFICANCE OF EFFECT

The significance of a landscape or visual effect is based on a balance between the sensitivity of the receptor and the magnitude of change, and is categorised as Profound, Substantial, Moderate, Slight, or Imperceptible. Intermediate judgements are also provided to enable an effect to be more accurately described where relevant. 'No Effect' may also be recorded as appropriate where the effect is so negligible it is not noteworthy.

The significance category judgement is arrived at using the Significance Matrix at Table 12.4 as a guide. This applies the principle of significance being a function of magnitude weighed against sensitivity but employs slightly different terminology that avoids the potentially confusing use of the term 'significant' (as recommended by GLVIA3 Statement of Clarification 1/13 (Landscape institute, 10 June 2013)). Indicative criteria descriptions used in relation to the significance of effect category are presented at Table 12.5.

Table 12.4 Significance Matrix

	Sensitivity of Receptor				
Magnitude	**Very High**	**High**	**Medium**	**Low**	**Negligible**
Very High	Profound	Profound-substantial	Substantial	Moderate	Slight
High	Profound-substantial	Substantial	Substantial-moderate	Moderate-slight	Slight-imperceptible
Medium	Substantial	Substantial-moderate	Moderate	Slight	Imperceptible
Low	Moderate	Moderate-slight	Slight	Slight-imperceptible	Imperceptible
Negligible	Slight	Slight-imperceptible	Imperceptible	Imperceptible	Imperceptible

Table 12.5 Indicative significance of effect criteria descriptions

	Landscape	Visual
Profound	There are notable changes in landscape characteristics over an extensive area or a very intensive change over a more limited area.	The view is entirely altered, obscured or affected.
Substantial	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the landscape. There are notable changes in landscape characteristics over a substantial area or an intensive change over a more limited area.	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the visual environment. The proposal affects a large proportion of the overall visual composition, or views are so affected that they form a new element in the physical landscape.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends. There are minor changes over some of the area or moderate changes in a localised area.	An effect that alters the character of the visual environment in a manner that is consistent with existing and emerging trends. The proposal affects an appreciable segment of the overall visual composition, or there is an intrusion in the foreground of a view.
Slight	An effect which causes noticeable changes in the character of the landscape without affecting its sensitivities. There are minor changes over a small proportion of the area or moderate changes in a localised area or changes that are reparable over time.	An effect which causes noticeable changes in the character of the visual environment without affecting its sensitivities. The affected view forms only a small element in the overall visual composition or changes the view in a marginal manner.
Imperceptible	An effect capable of measurement but without noticeable consequences. There are no noticeable changes to landscape context, character or features.	An effect capable of measurement but without noticeable consequences. Although the development may be visible, it would be difficult to discern resulting in minimal change to views.

It is important that the likely effects of the proposals are transparently assessed and understood in order that the determining authority can bring a balanced, well-informed judgement to bear when making a planning decision.

As such, whilst the significance matrix and criteria provide a useful guide, the significance of an effect is ultimately determined by the landscape specialist using professional judgement, and also in the context of occasionally using hybrid judgements to account for nuance.

Effects assessed as 'Substantial' or greater (shaded cells) are considered to be the most notable in landscape and visual terms, and may be regarded as 'Significant', albeit it is important to note that this is not a reflection on their acceptability in planning terms.

12.2.8 QUALITY AND DURATION OF EFFECTS

In addition to assessing the significance of landscape and visual effects, the quality of the effects is also determined. Within this LVIA, effects are described as negative/adverse, neutral, or positive/beneficial, and the following criteria has been used to guide these judgements.

- Positive/beneficial - A change which improves the quality of the environment, enhancing the existing view/landscape;
- Neutral - No effects or effects that are imperceptible, within normal bounds of variation e.g. will neither detract from nor enhance the existing view /landscape;
- Negative/adverse - A change which reduces the quality of the environment, detracting from the existing view/landscape.

In the case of new energy / infrastructure developments within rural and semi-rural settings, the landscape and visual change brought about by an increased scale and intensity of built form is seldom considered to be positive / beneficial. Effects in these contexts are generally considered to be adverse in nature, or neutral, where the effect has little influence on the landscape/views.

12.3 DESCRIPTION OF RECEIVING ENVIRONMENT

12.3.1 WESTMEATH COUNTY DEVELOPMENT PLAN 2021-2027

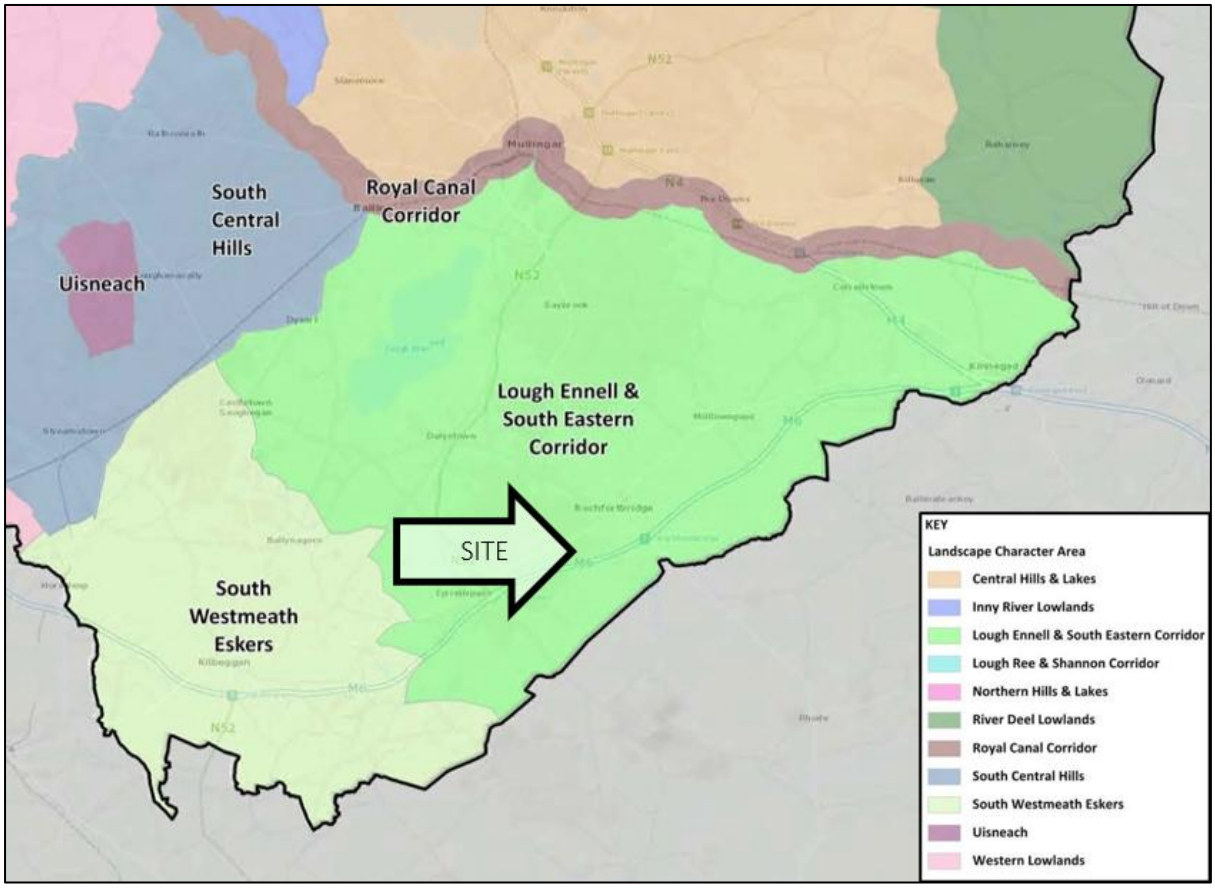
A landscape character assessment for County Westmeath was carried out as part of the 2008-2014 County Development Plan and is included within the current development plan. The landscape character assessment divides the county into 11 landscape character areas (LCAs) with the site situated in 'LCA 10 – Lough Ennell. This LCA *"comprises pasture land of mixed productivity. Lough Ennell is situated to the western side of this Landscape Character Area (LCA) and is designated as an Area of High Amenity, SPA and SAC. A number of preserved views are listed from the R446 between Tyrrellspass and Rochfortbridge…… The bog areas in this LCA are mainly exploited but some have been left intact. This area has a large number of old demesnes, which are easily recognisable in the landscape with the existence of fine mature hardwood trees and estate walls in some cases."* A number of landscape character policies are outlined in Chapter 13 of the current CDP and are included below:-

- *"CPO 13.1 – Support the implementation of the National Landscape Strategy.*

- *CPO 13.2 – Protect the distinctiveness, value and sensitivity of County Westmeath's landscapes and Lakelands by recognising their capacity to sustainability integrate development.*
- *CPO 13.3 – Support and implement objectives contained in any Regional Landscape Character Assessment.*
- *CPO 13.4 – Conserve and enhance the high nature conservation value of the Landscape Character Areas in order to create/protect ecologically resilient and varied landscapes.*
- *CPO 13.5 - Identify and integrate new green and blue infrastructure networks within the existing landscape character areas in the interests of biodiversity and climate change and in recognition of the tourism potential of these assets.*
- *CPO 13.6 - Require that development is sensitively designed, so as to minimise its visual impact on the landscape, nature conservation, archaeology and groundwater quality."*
- The current CDP also identifies a number of landscape Policy Objectives. Those that are relevant to the proposed development area are included below:-
- *"CPO 13.8 – Protect the landscapes and natural environments of the County by ensuring that any new developments do not detrimentally impact on the character, integrity, distinctiveness or scenic value of their area. Any development which could unduly impact upon such landscapes will not be permitted.*
- *CPO 13.9 - Ensure the preservation of the uniqueness of a landscape character type by having regard to the character, value and sensitivity of a landscape in new development proposals.*
- *CPO 13.10 - Ensure development reflects and, where possible, reinforces the distinctiveness and sense of place of the landscape character types, including the retention of important features or characteristics, taking into account the various elements which contribute to their distinctiveness.*
- *CPO 13.12 - Require a Landscape and Visual Impact Assessment for proposed developments with the potential to impact on significant landscape features within the county."*

A number of 'Areas of High Amenity (AHA)' are also designated in county Westmeath, however none of these are contained within the study area. The nearest of these is located just over 5km northwest of the proposed development and relates to Lough Ennell. These areas are noted for their amenity and recreational value and "*should be protected*".

Figure 12.2 Excerpt from the current Westmeath CDP (2021-2027) showing the location of the proposed development in relation to landscape character areas in County Westmeath.



12.3.2 OFFALY COUNTY DEVELOPMENT PLAN 2021-2027

Whilst the proposed development is entirely contained within County Westmeath, the southern extent of the study area is largely contained within County Offaly, and thus, relevant landscape policy and objectives in County Laois is included below.

Within County Offaly, the landscape is classified by its sensitivity and comprises the following sensitivity classes; Low, Moderate and High Sensitivity, which are described below:

- *"High Sensitivity: High Sensitivity Areas are vulnerable landscapes with the ability to accommodate limited development pressure. In this category of landscape, landscape elements are highly sensitive to certain types of change. If pressure for development exceeds the landscapes limitations the character of the landscape may change.*
- *Moderate Sensitivity: Moderate sensitivity areas can accommodate development pressure but with limitations in the scale and magnitude. In this category of*

sensitivity, elements of the landscape can accept some changes while others are more vulnerable to change.

- *Low Sensitivity: Low sensitivity areas are robust landscapes which are tolerant to change, such as the county's main urban and farming areas, which have the ability to accommodate development."*

With regard to the study area, much of the nearest sections of County Offaly to the proposed development are classified as *'Low'* to *'Moderate'* Sensitivity landscape, with the *'Moderate'* classification typically associated with broad areas of bogland, whilst areas classified as 'Low' sensitivity tend to be associated with more typical rural lands cloaked in pastoral farmland. There wider southern periphery of the study area also includes some *'High'* sensitivity classification which is associated with Croghan Hill and its surrounding lands.

12.3.3 VIEWS OF RECOGNISED SCENIC VALUE – WESTMEATH COUNTY DEVELOPMENT PLAN 2021-2027

Views of recognised scenic value are primarily indicated within Development Plans in the context of scenic views/routes designations, but they might also be indicated on touring maps, guide books, websites, roadside rest stops or on post cards that represent the area.

12.3.3.1 Westmeath County Development Plan 2021-2027

Appendix 5 and Volume 2 of the current Westmeath County Development Plan include a range of preserved views and prospects in County Westmeath. These are also identified on the current Westmeath County Development Plan – Natural Heritage Map browser. Only one designated scenic view is located within the study area and relates to Protected View 13, which is of 'County' significance and is associated with "Panoramic views from Garran Hill on the Regional Road R-446". As this scenic route is located within the study area and is oriented towards the proposed development, a representative view will be included for assessment in section 12.6.7 below.

12.3.3.2 Offaly County Development Plan 2021-2027

Section 4.14.2 of the current Offaly County Development Plan relates to 'key scenic views, prospects and key amenity routes' within the county. The only relevant scenic designations relate to views to and from Croghan Hill just outside of the 5km study radius and include protected views V07, V08 and V09. These views will be investigated during fieldwork and a representative view for assessment will be selected for the appraisal in the visual impact assessment below - refer to section 12.6.7 below.

12.4 EXISTING ENVIRONMENT

12.4.1 LANDSCAPE BASELINE

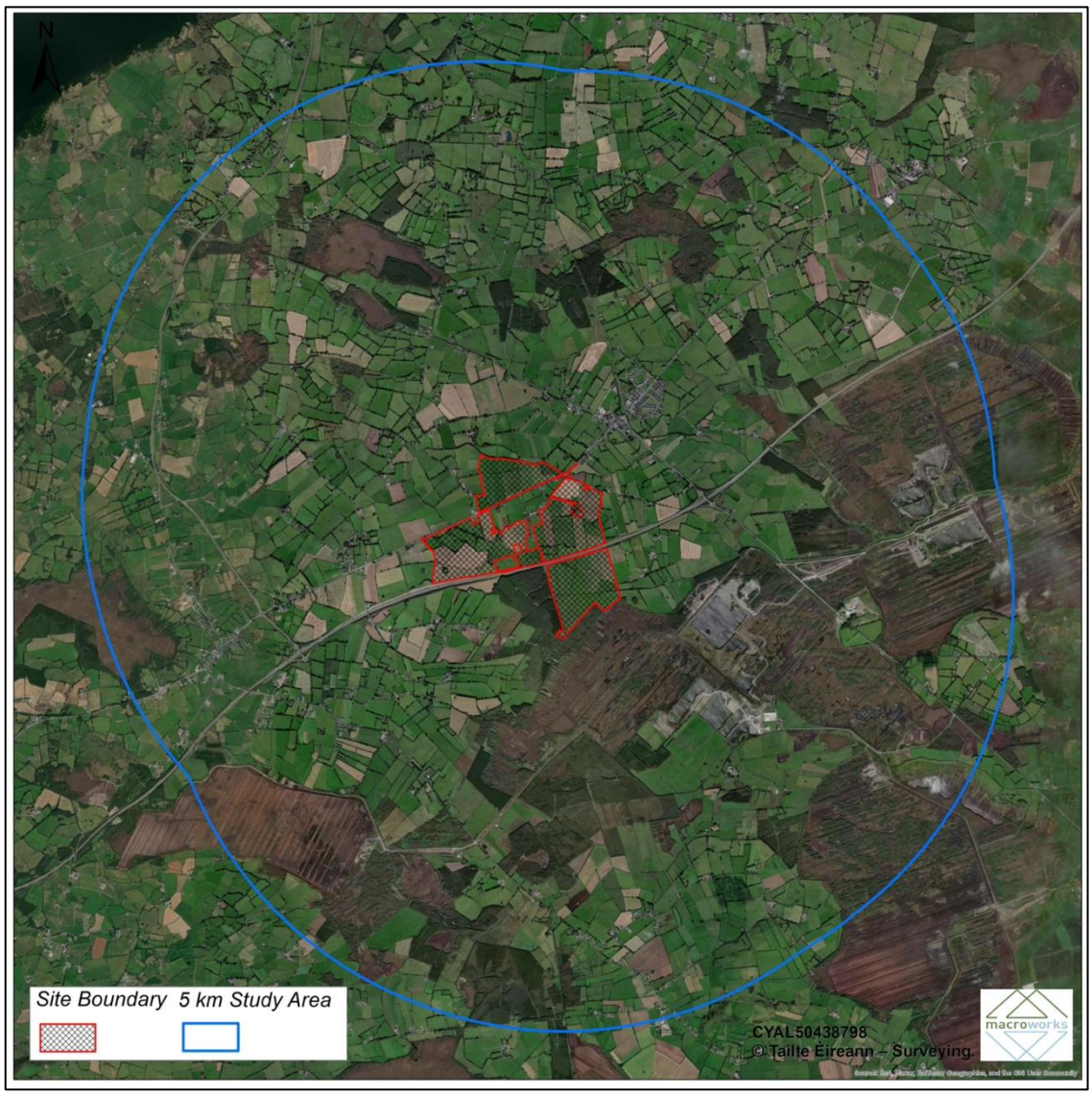
The landscape baseline represents the existing landscape context and is the scenario against which any changes to the landscape brought about by the proposed development will be assessed. A description of the landscape context of the proposed application site (and wider study area is provided below under the headings of landform and drainage, vegetation and land use, centres of population and houses, transport routes and public amenities and facilities. Although this description forms part of the landscape baseline, many of the landscape elements identified also relate to visual receptors i.e. places and transport routes from which viewers can potentially see the proposed development. The visual resource will be described in greater detail in 12.4.2.

12.4.1.1 Landform and Drainage

The landform of the study area is characterised by flat to gently rolling terrain, which is typical of the Midlands of Ireland. The site ascends gently to the north from the M6 Motorway, which is either in cut or close to grade as it passes south of the site. There is a low hill in the northwest of the study area at Garrane, as well as a subtle ridge to the east of the site.

The landscape in the southern part of the study area is generally flat, with the exception of Croghan Hill, which lies outside the principal study area but is one of the few prominent hills within this part of the Midlands. The Mongagh River is the nearest watercourse to the proposed development, passing through the southern section of the proposed solar array. The Derry River passes through the centre of Rochfortbridge, in the eastern extent of the study area, and flows in a generally southeast direction through the 5 km extent. The River Brosna flows through the wider north-western extent of the study area, south of Lough Ennell, in a generally southwest direction

Figure 12.3 Landscape Context of the study area



12.4.1.2 Vegetation and Land use

The predominant land use within the study area is agricultural farmland, comprising medium- to large-sized geometric fields that are often bounded by dense, mature, tree-lined hedgerows. Another notable land cover within the study area is large cutaway peat bogs, the nearest and largest of which are situated in the southern half of the study area within County Offaly. These areas encompass several large-scale industrial developments, some of which include tall, utilitarian built structures that are visible throughout the surrounding landscape.

Several coniferous forest plantations are also scattered across the study area and are often located on the periphery of the large-scale peat bogs. A number of large overhead transmission lines traverse the site and wider study area, serving as evidence of the area's power generation heritage (peat-fired power stations). The recently constructed Castlelost

Flexgen development is one of the more prominent single land uses in proximity to the proposed development.

The M6 Motorway corridor is also a notable linear land use within the study area, situated immediately south of the site.

Figure 12.4 Typical contained pastoral views afforded throughout the study area



Figure 12.5 Views of the existing Castlelost development from the M6 motorway corridor



12.4.1.3 Centres of Population and Housing

Within the study area, the primary centres of population are the settlements of Rochfortbridge and Tyrrellspass. Rochfortbridge is located to the east of the proposed development and represents the most notable settlement in terms of proximity to the site. Tyrrellspass, of a similar scale, is situated approximately 2.7 km to the west. Beyond these urban centres, the surrounding landscape is characterised by a dispersed rural settlement pattern. This includes a modest rural population residing in individual dwellings and small clusters, primarily arranged in a linear form along the regional and local road network. These settlement patterns contribute to the rural character of the receiving environment.

12.4.1.4 Transport Routes

The most notable transport corridor within the study area is the M6 Motorway, which lies immediately to the south of the proposed development site and traverses the study area in an east–west direction. Running broadly parallel to the M6, approximately 700 metres to the north of the site, is the R446 regional road, which provides a key connection between the settlements of Rochfortbridge and Tyrrellspass. The N52 National Secondary Route extends north from the M6 motorway corridor in the western extent of the study area and is some 2 km west of the site at its nearest point. The R400 regional road links the M6 with Rochfortbridge and is located along the eastern extent of study area. Whilst the R446 is one of the nearest road corridors to the proposed development, several local roads also occur along the site's boundary.

12.4.1.5 Tourism, Heritage and Public Amenities

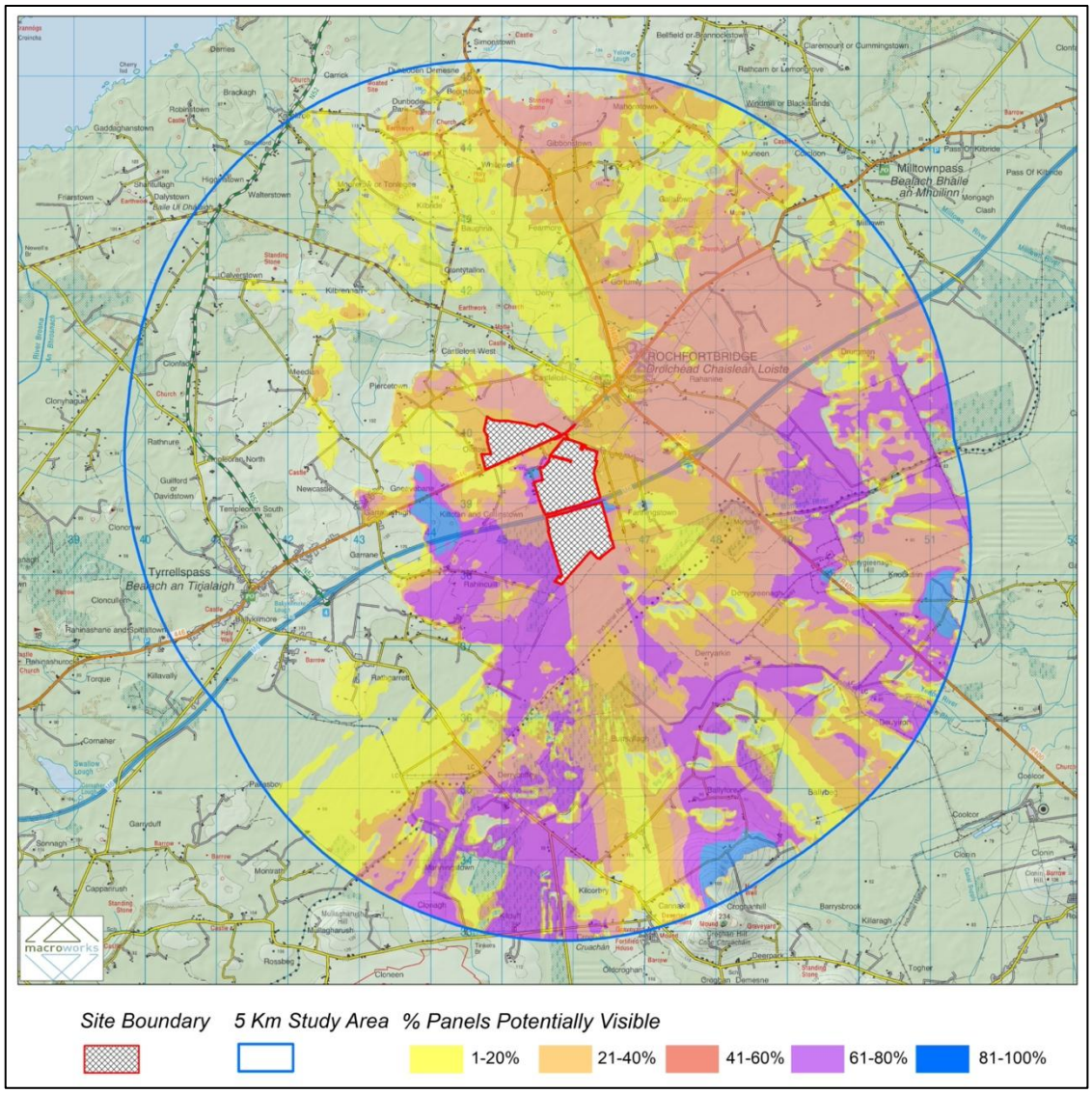
Other than local sports grounds associated with settlements such as Rochfortbridge, there are no notable recreational or amenity features within the study area.

12.4.2 VISUAL BASELINE

12.4.2.1 Analysis of ZTV (Zone of Theoretic Visibility) Mapping

Only those parts of the receiving environment that potentially afford views of the proposed development are of concern to this section of the assessment. A computer-generated Zone of Theoretical Visibility (ZTV) map has been prepared to illustrate where the proposed development is potentially visible from. The ZTV map is based solely on terrain data (bare ground visibility), and ignores features such as trees, hedges or buildings, which may screen views. Given the complex vegetation patterns within this landscape, the main value of this form of ZTV mapping is to determine those parts of the landscape from which the proposed development will definitely not be visible, due to terrain screening within the 5km study area. The ZTV mapping will be broken down into the solar aspect of the development and the main built aspect of the proposed development.

Figure 12.6 Standard (bare-ground) ZTV map - SOLAR FARM (Refer to Appendix 12.1 for larger scale version)



The following key points are illustrated by the 'bare-ground' ZTV map for the solar aspect of the development (see Figure 12.6 above):

- As illustrated by the ZTV mapping, there will be limited potential for comprehensive visibility of the proposed solar element of the development within the study area. This is primarily due to the dispersed nature of the proposed layout, which comprises three distinct land parcels, diminishing the potential for clear combined views of the full extent of the proposed solar layout. The only potential for comprehensive views of the solar parcels occurs in localised locations to the west of the site and in the wider study area to the southeast and south along locally rolling hills.
- The most notable potential for visibility of the development occurs in the eastern and southern extent of the study area where visibility ranges between 20-80% of the proposed panel area.

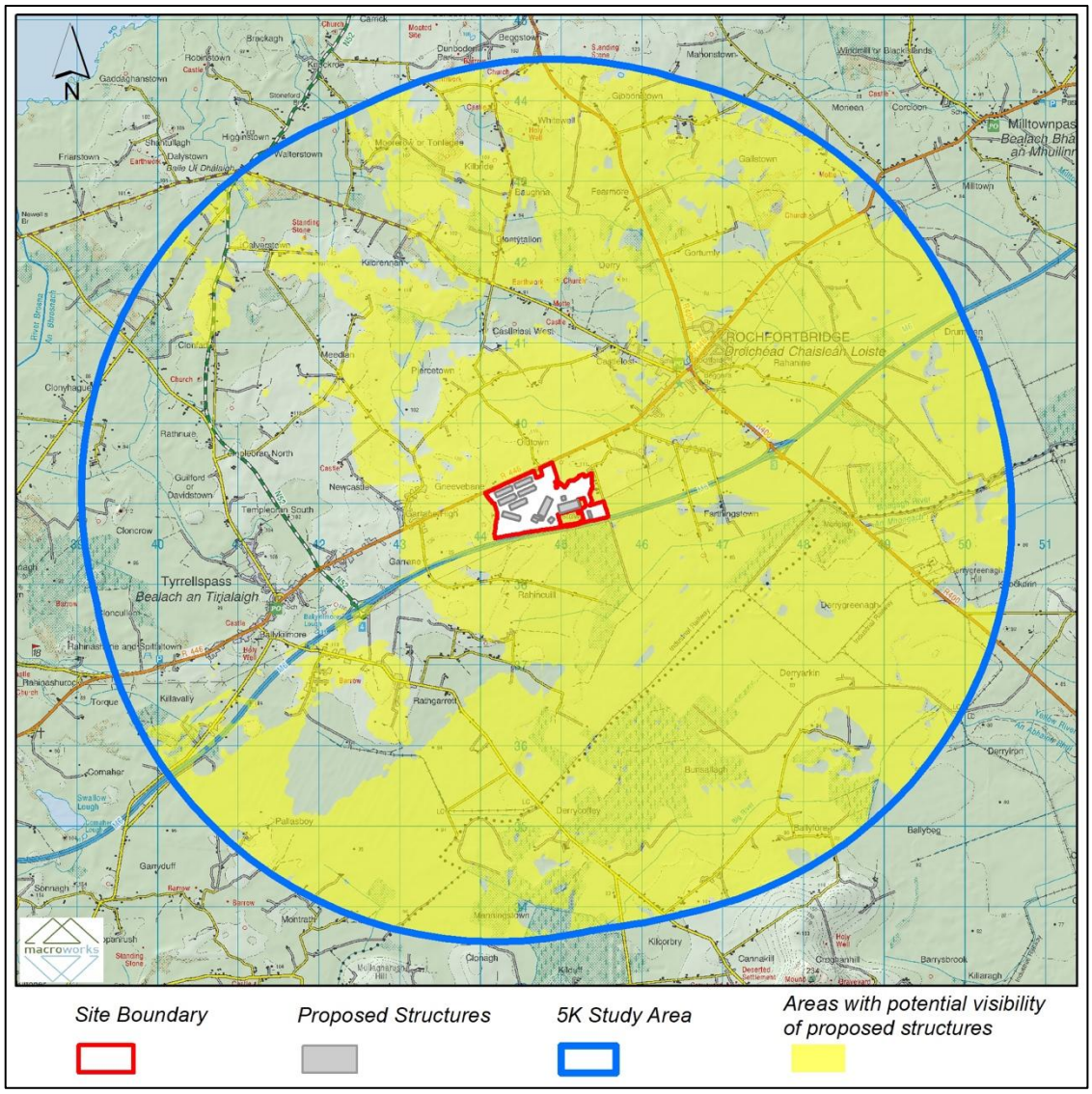
- The settlement of Rochfortbridge, located to the northeast of the proposed solar array, has the potential to afford views of between 1% and 60% of the proposed panel area, based on ZTV analysis. The highest potential for theoretical visibility occurs at the eastern extent of the settlement, where views towards the site are slightly more elevated.
- The western extent of the study area has a substantially reduced potential for visibility of the proposed development. Beyond approximately 1.5 km to the west, visibility is effectively eliminated due to the presence of a low, rolling hill, which provides screening across the wider landscape, including the settlement of Tyrrellspass.

The most important point to make in respect of this 'bare-ground' ZTV map is that it is theoretical. The proposed PV panels will not rise more than 3.84m above the underlying terrain and will therefore be considerably screened by surrounding and intervening hedgerow vegetation, trees and numerous buildings, walls and embankments scattered throughout the study area, resulting in a much lesser degree of actual visibility. Whilst some of the proposed ancillary structures (i.e. security cameras) are slightly larger, this are of a slender built form and will not be prominently visible.

The following key points are illustrated by the 'bare-ground' ZTV map for the main built aspect of the development (see Figure 12.7):

- There is potential for visibility of the proposed development across parts of the study area, with the greatest extent of theoretical visibility occurring to the north, east, and south of the site.
- To the west, beyond some c. 1.5 km from the site, the proposed development will be heavily screened as a result of the locally rolling terrain in the surrounds of Garrane. This will result in no visibility of the proposed development from the settlement of Tyrrellspass and along the N52, whilst intermittent theoretic visibility of the development has the potential to be afforded from the M6 in this aspect of the study area.
- Theoretic visibility becomes sporadic within the northern extent of the study area due to locally rolling lands located to the north of the site and north of the R446.
- As the terrain is much more homogenous in nature within the eastern and southern extent of the study area, this part of the surrounding landscape encompasses the largest areas of theoretic visibility pattern.

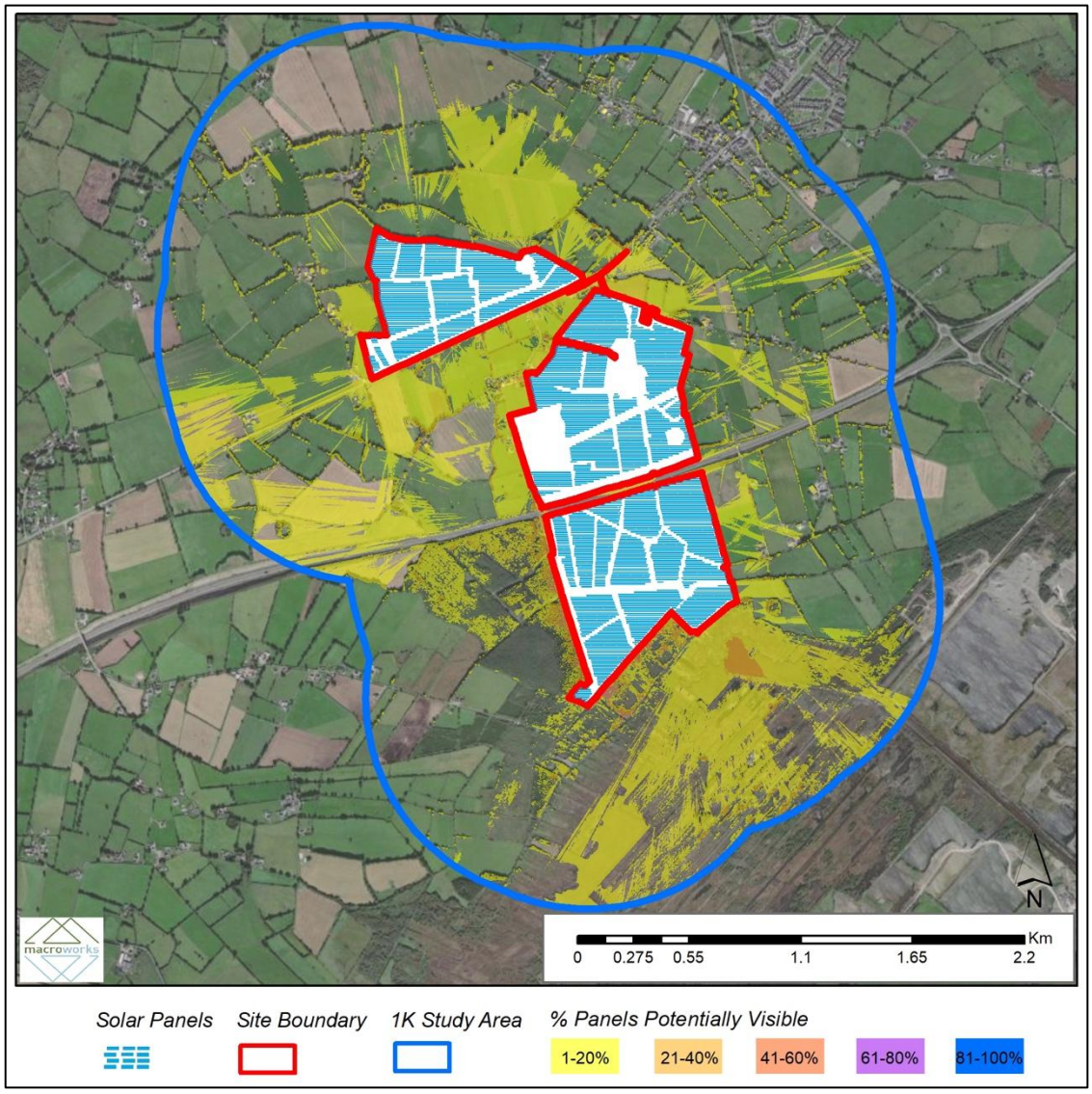
Figure 12.7 Standard (bare-ground) ZTV map - MAIN SITE (Refer to Appendix 12.1 for larger scale version)



As with the solar farm bare-ground ZTV, the most important point to make in respect of this 'bare-ground' ZTV map is that it is theoretical. Whilst the proposed Data Centre buildings and Fuel Cell structures will rise above c. 18 m above the existing ground levels, they will be afforded a notable degree of screening from existing surrounding vegetation and other forms of built development, resulting in a much lesser degree of visibility.

The second form of ZTV mapping relies on a Digital Surface Model ("DSM"), which also accounts for terrestrial land cover elements, such as hedgerows and buildings. This is of far more value in determining the likely visibility of the proposed development. For this finer grain of visibility analysis, a more consolidated area incorporating the surrounding network of roads and dwellings within approximately 1km of the application site boundary is used.

Figure 12.8 Digital Surface Model (DSM) based ZTV map (Solar Farm) accounting for screening by surface elements such as hedgerows, trees lines and forestry.

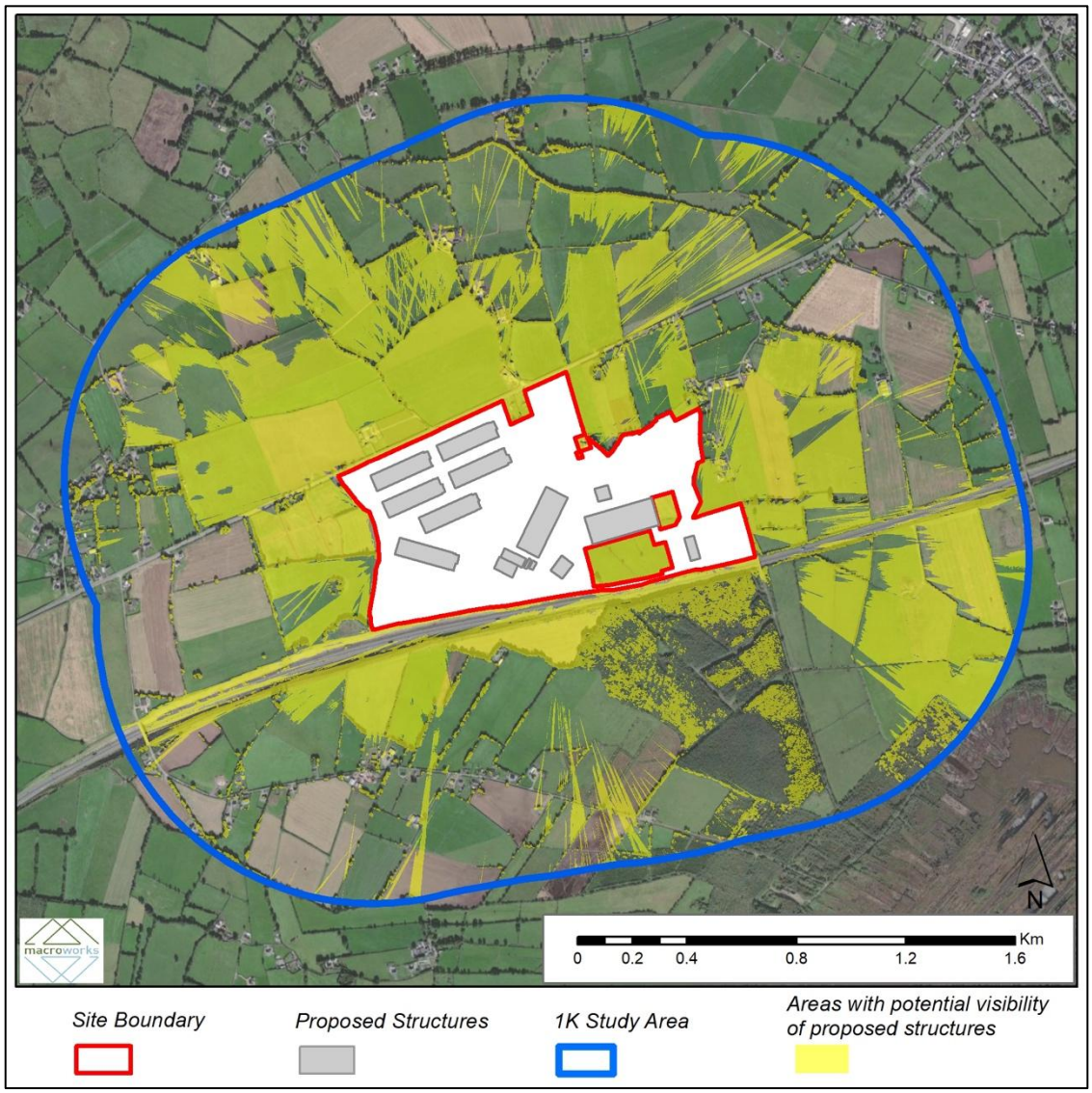


As can be seen from the comparison of the 'bare-ground' ZTV map (Figure 12.6) and the Digital Surface Model based ZTV map (Figure 12.8):

- There is a considerable reduction in the potential visibility of the proposed solar panels, primarily due to the flat nature of the surrounding landscape in combination with the presence of layered, intervening hedgerow vegetation. This vegetation acts to screen and soften views of the proposed development, even from the nearest surrounding visual receptors.
- In contrast to the Digital Terrain Model (DTM)-based Zone of Theoretical Visibility (ZTV), there will be no potential for comprehensive views of over 81% of the proposed panel array. The greatest reduction in visibility occurs in areas to the northeast and

east of the site, where screening by intervening vegetation and localised landform results in some locations affording fully screened views of the development.

Figure 12.9 Digital Surface Model (DSM) based ZTV map (Main Site) accounting for screening by surface elements such as hedgerows, trees lines and forestry.



As can be seen from the comparison of the 'bare-ground' ZTV map (Figure 12.6) and the Digital Surface Model based ZTV map (Figure 12.9):

- In comparison to the bare-ground ZTV, the Digital Surface Model (DSM)-based ZTV indicates a notable reduction in actual visibility of the proposed development within 1 km of the site.
- Whilst there will remain some potential for visibility of the proposed development within its immediate surroundings, there are areas from approximately 500 metres

from the site where the development will be fully screened by intervening vegetation. This screening effect is most notable to the west and northeast, where the potential for visibility of the proposed structures is effectively eliminated beyond this distance.

- The potential for visibility of the proposed development along the M6 Motorway corridor will be intermittent, with several sections within 1 km of the site being entirely screened by intervening vegetation and local landform.

The DSM based analysis provides the most reliable indication of likely visibility. It indicates a limited potential for visibility of the proposed solar development beyond approximately 200m from the site boundary. Along certain sections of the site boundary, most notably to the east and northwest, visibility of the proposed panels is largely contained to the immediate site perimeter, owing to the substantial degree of existing boundary vegetation together with the low-profile nature of the proposed panels, which do not exceed approximately 3.84m in height. This pattern of limited visibility is characteristic of solar developments within the Midlands of Ireland, where relatively flat terrain combined with established layers of intervening hedgerow vegetation typically results in a notable degree of screening, so that solar panels do not generally present as prominent features within the surrounding local or wider landscape context. As demonstrated in the DSM mapping (Figure 12.8), some of the more densely populated areas within the study area, including lands to the northeast on the outskirts of Rochfortbridge, are fully screened from the proposed panels.

The mitigation-based DSM analysis (Figure 12.14) provides a more robust and realistic reflection of the potential visibility of the proposed panels once the proposed landscape mitigation measures have fully established. The enhancement of existing hedgerows, together with the introduction of additional native woodland planting, further reduces the visibility of the panels from both the local and wider surrounding landscape, with a particularly notable reduction in visibility between the two northernmost parcels, including along the R446 regional road. This area encompasses the most concentrated cluster of rural residential dwellings within the immediate environs of the site and therefore represents one of the more sensitive receptor locations.

12.4.2.2 Identification of Viewshed Reference Points as a Basis for Assessment

Viewshed Reference Points (VRP's) are the locations used to study the visual impacts of a proposed development in detail. It is not warranted to include each and every location that provides a view of a development as this would result in an unwieldy report and make it

extremely difficult to draw out the key impacts arising from the proposed development. Instead, the selected viewpoints are intended to reflect a range of different receptor types, distances and angles. The visual impact of a proposed development is assessed by Macro Works using up to 6 no. categories of receptor type as listed below:

- Key Views (from features of national or international importance) (KV);
- Designated Scenic Routes and Views (SR/SV);
- Local Community views (LCV);
- Centres of Population (CP);
- Major Routes (MR);
- Amenity and heritage features (AH).

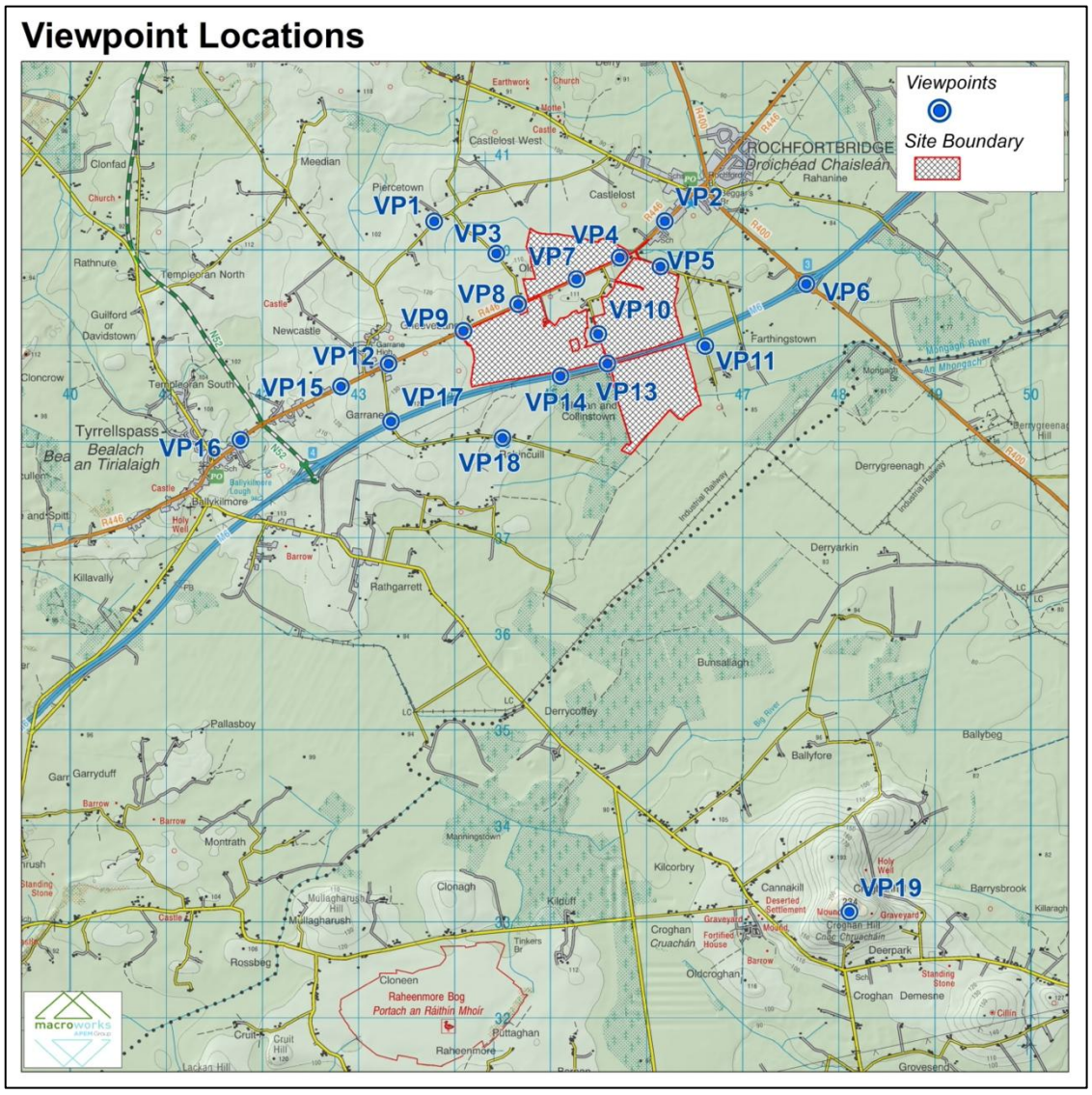
VRP's might be relevant to more than one category and this makes them even more valid for inclusion in the assessment. The receptors that are intended to be represented by a particular VRP are listed at the beginning of each viewpoint appraisal. The Viewshed Reference Points selected in this instance are set out in Table 12.6 below.

Table 12.6 Outline Description of Selected Viewshed Reference Points (VRPs)

VRP No.	Location	Representative of	Direction of view
VP1	L5125 at Piercetown	LCV	S/SE
VP2	R446 at Castlelost southwest of Rotchfortbridge	CP, LCV, MR	W/S
VP3	L5125 at Oldtown	LCV	S/E
VP4	R446 at Farthingstown	MR, LCV	N/S/W
VP5	L11272 at Farthingstown	LCV	S/W
VP6	R400 overpass of M6	MR	W
VP7	R446 at Oldtown	MR, LCV	N/S/E/W
VP8	R446 at Oldtown west of its intersection with the L5125	MR, LCV	S/E
VP9	R446 at Gnevebane	MR, LCV	S/E
VP10	L51251 at Kiltotan and Collinstown	LCV	E/W
VP11	Local road laneway south of M6 at Farthingstown	LCV	W
VP12	R446 at Garrane	SV, LCV, MR, CP	E
VP13	L51251 overbridge of the M6	MR	N/S
VP14	M6 Motorway Layby at Kiltotan and Collinstown	MR	N

VP15	R446 at Newcastle	MR, LCV	E
VP16	R446 east of Tyrrellspass	MR, CP	E
VP17	L51254 overbridge of the M6 at Garrane	MR	E
VP18	L51254 at Rahincuill	LCV	N
VP19	Croghan Hill	AH, SV	N

Figure 12.10 Viewpoint location map (showing viewing extents and direction of view)



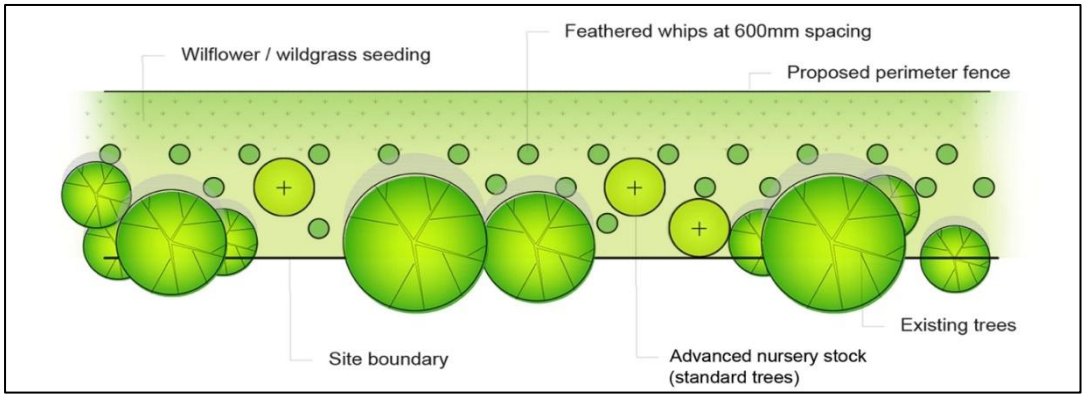
An updated photomontage booklet (Appendix 12.4), comprising the representative viewpoints located closest to the proposed development was prepared in February 2025. Viewpoints VP2 and VP3 are representative of the nearest surrounding local residential receptors.

The main mitigation by avoidance measure employed in this instance is the siting of the proposed development in a relatively flat part of the surrounding landscape that avails of a notable degree of existing screening along the site boundary and further layers of intervening hedgerow vegetation throughout the immediate surrounding landscape. The site is also located in a robust part of the surrounding landscape with limited highly susceptible landscape or visual designations. Indeed, the immediate site context is influenced by the existing recently operational Flexgen development, the M6 motorway corridor and typical rural land uses including pastoral farmland and conifer forest plantations. In this regard, the site and immediate study area is not considered highly distinctive or susceptible to change.

In addition to mitigation by avoidance measures, retention of existing hedgerow boundaries around the site aids visual screening, and maintains the existing field pattern. In this respect, whilst there will be some removal of hedgerow vegetation and trees within the main site compound, the proposed development is not considered to heavily impose itself on the surrounding receiving landscape.

In addition to retaining the existing hedgerows within around the site, it is also proposed to bolster existing perimeter and some internal hedgerows with under-planting and inter-planting of whip transplants (i.e. Hedgerow Type 1 - see Figure 12.11) in order to ensure dense and consistent screening of the site in perpetuity. This will be undertaken where required to thicken and fill gaps in the existing hedgerow network prior to the construction phase, thus allowing for any growth in the period between a grant of planning permission and construction of the development. Advanced nursery stock in the form of 8-10cm girth trees will be used to fill any noticeable gaps and plant species will be selected to complement the existing broadleaf hedgerow species mix around the site and will be of local provenance. Where not already exceeded by existing vegetation, it is intended to manage hedgerows up to 3-4m in height. This height will be achieved by a combination of allowing lower sections of existing hedgerows to mature, filling obvious gaps with advanced nursery stock and providing an additional line of whip planting to selected hedgerows that require densification. Refer to the Landscape Mitigation Plan for details.

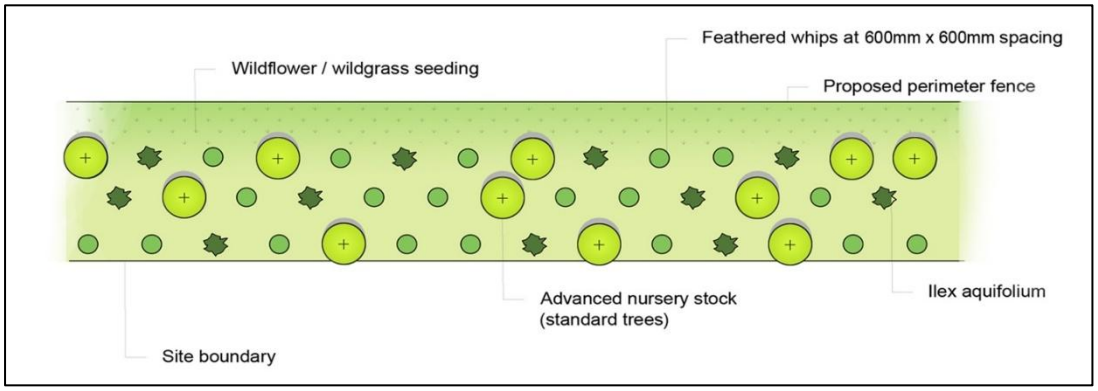
Figure 12.11 Hedgerow Type 1: indicative boundary planting detail showing the approach to inter-planting and under-planting of existing hedgerows (where consolidation is needed).



It is also proposed to plant new 'Type 2' hedgerows (Figure 12.12 refers), with whips and a high proportion of advance nursery stock trees (c.3m planted height), within the site (refer to Landscape Mitigation Plan drawing package LD.PRJT_ADMRL), to screen and create a sense of separation from archaeological receptors within the main site. Extensive sections of new native hedgerow is also proposed throughout the solar aspect of the proposed development to screen and soften the nearest surrounding landscape and visual receptors. All of this planting will be allowed to mature up to a maintained height of 3-4m to aid in the screening and softening of the proposed development from nearby dwellings and surrounding local and regional roads.

Extensive area of native woodland planting is also proposed throughout the main site and the solar farm development This native woodland mix will be provided in the form of high canopy (dominants) species, low canopy (sub-dominant) species, understory and fringe (higher shrubs) species and understory and edge (lower shrub) species, and will comprise of a mix of advanced nursery stock and whip planting of local provenance. The proposed planting, which will be combined with earthen berms in the western extent of the site, will be allowed to grow out to reach maturity and will break up the visual mass of the main built components of the proposed development and the solar array.

Figure 12.12 Indicative boundary planting detail showing the introduction of new boundary hedgerow TYPE 2



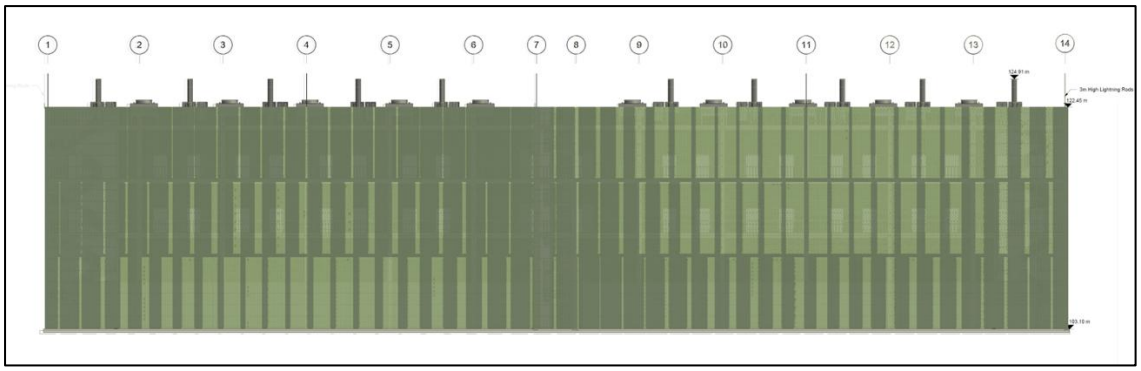
In addition to the bolstered hedgerows, new native hedgerows and native woodland planting, it is also proposed to incorporate extensive native planting throughout the site to further anchor the proposed development within its landscape context. Native parkland tree planting will be established across new meadows within the site, creating a parkland-like aesthetic. The proposed data halls will be flanked by corridors of new native tree planting and underplanting, alongside rain gardens that will include pollinator-friendly native shrubs and perennials.

The new waterbodies within the site will be planted with riparian vegetation and aquatic plants, further enhancing the site's biodiversity value and strengthening the internal green and blue infrastructure networks. These measures will also contribute to improved ecological connectivity within the site and across the wider surrounding landscape.

It is also proposed to finish the data halls in various muted tones of grey, to further break up the visual mass of these structures when viewed from surrounding receptors. The proposed 220kV GIS Building (D16) will also adopt a colour scheme designed to complement the mitigation screen planting and respond to the likely backdrop in terms of tonal contrast. For the lowest 5 metres of the main structures, a dark olive-green plinth will be used to de-emphasise the height of the buildings and to integrate them with the dense lower sections of the surrounding vegetation network. The next 3 metres (i.e., up to 8 metres from floor level) will incorporate a mid-green tone intended to blend with the tree canopies of existing and proposed planting around the site. The upper sections of the buildings (above 8 metres) will feature a light green/grey finish, chosen to recede against the typically light backdrop of the sky. This visual mitigation strategy aligns with the approach adopted for the existing LEL Flexgen Castlelost development, further assimilating the proposed development into its context and presenting both schemes as a cohesive development type within the local landscape setting.

In addition, the proposed Fuel Cells, which are one of the larger built structures encompass a site-specific design to further assimilate them into this landscape context whilst diminishing their overall perceived visual mass. As per Figure 12.13, the architectural treatment of the facade employs a layered palette of green tones with subtle tonal shifts and a vertical emphasis that mimics the rhythm of hedgerows, tree lines, and vertical natural forms commonly found in the rural Irish landscape. This deliberate variation in tone and finish helps break up the perceived mass of the building and prevents the development from appearing as a monolithic or intrusive structure when viewed from nearby visual receptors. The façade treatment also encompasses earth-toned, muted greens that draw from the palette of the surrounding agrarian landscape. The vertical striping echoes the structure of surrounding conifer forest plantations and field boundary planting, helping to visually anchor the building into its broader agricultural setting. Furthermore, whilst the principal of the design is to diminish the perceived scale of the development, the proposed treatment introduces a contemporary architectural aesthetic that acknowledges the scale and function of the building, whilst also providing visual interest without appearing overtly industrial, especially for road users travelling along the neighbouring motorway corridor.

Figure 12.13 Integration of visual mitigation measures on the proposed fuel cell structures



As can be seen by the mitigation-based ZTV in (Figure 12.14), the combination of consolidated and proposed 3-4m high hedgerows and native thicket (c.8-10m high) within the solar aspect of the proposed development will further reduce the potential for visual impacts within the surrounding area. There will be a further screening effect within the intervening landscape between the northern and central parcel where residual visibility of the proposed development will be in the form of fleeting glimpses and brief views of the panels. Indeed, overall, the residual visibility of the solar aspect of the proposed development will be in the form of very brief views, with large areas of the immediate surrounding landscape heavily and in some cases, fully screened by the proposed and existing vegetation. With regard to residual visibility of the main built aspect of the proposed development (refer to Figure 12.15) there will be a comparably greater degree

of residually visibility, which principally relates to the scale and height of the proposed buildings and ancillary structures. Indeed, whilst the proposed landscaping measures will notably screen and soften views of the proposed development, there is still potential for clear views of the proposed structures from the immediate surrounding landscape. What the mitigation based ZTV below does not account for is the reduction in the perceived visual presence and scale of the development that will be afforded from the surrounding comprehensive landscape intervention, which are further depicted in the visual impact appraisal below (refer to section Figure 12.14).

Figure 12.14 Mitigation ZTV illustrating the effect of proposed mitigation planting (Solar Farm)

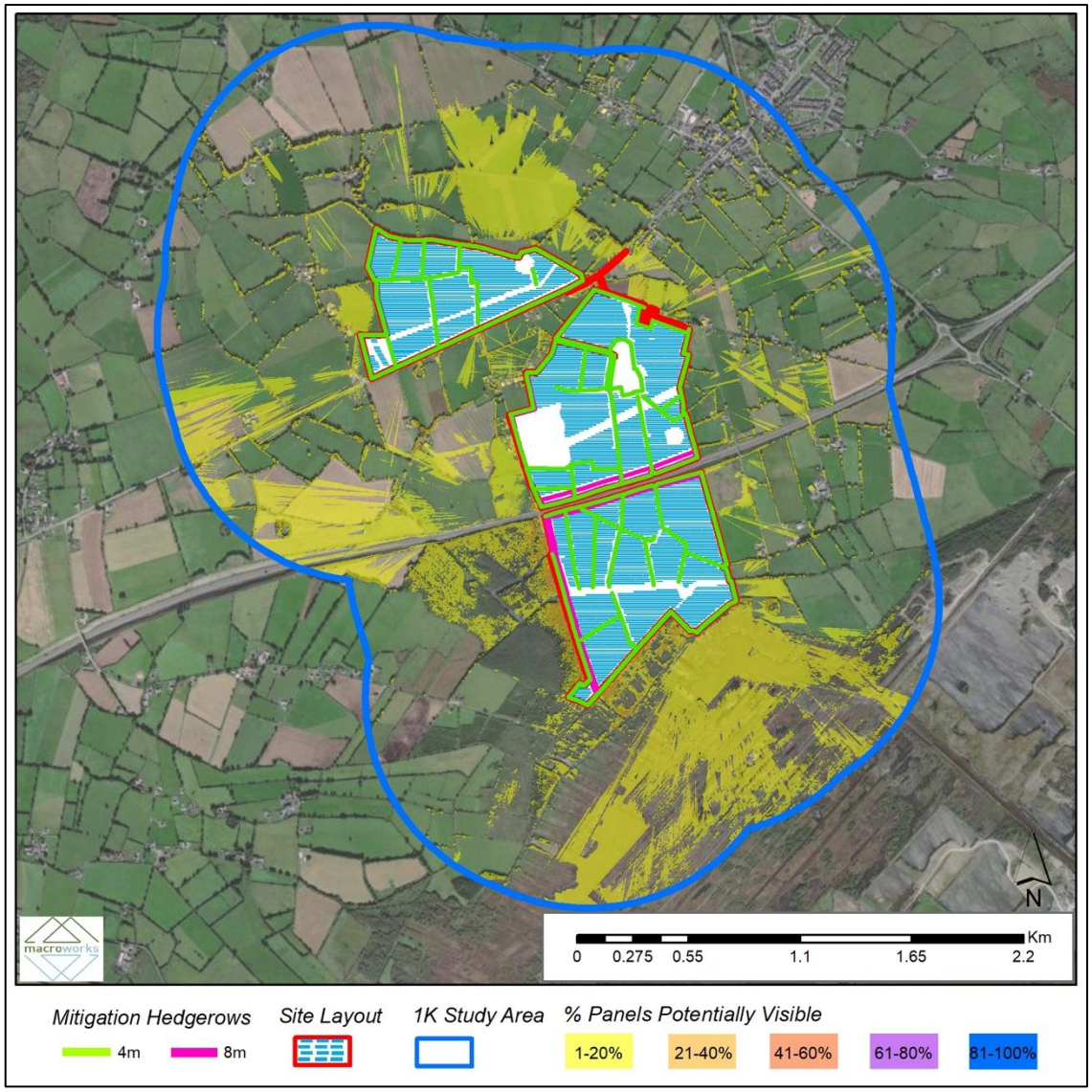
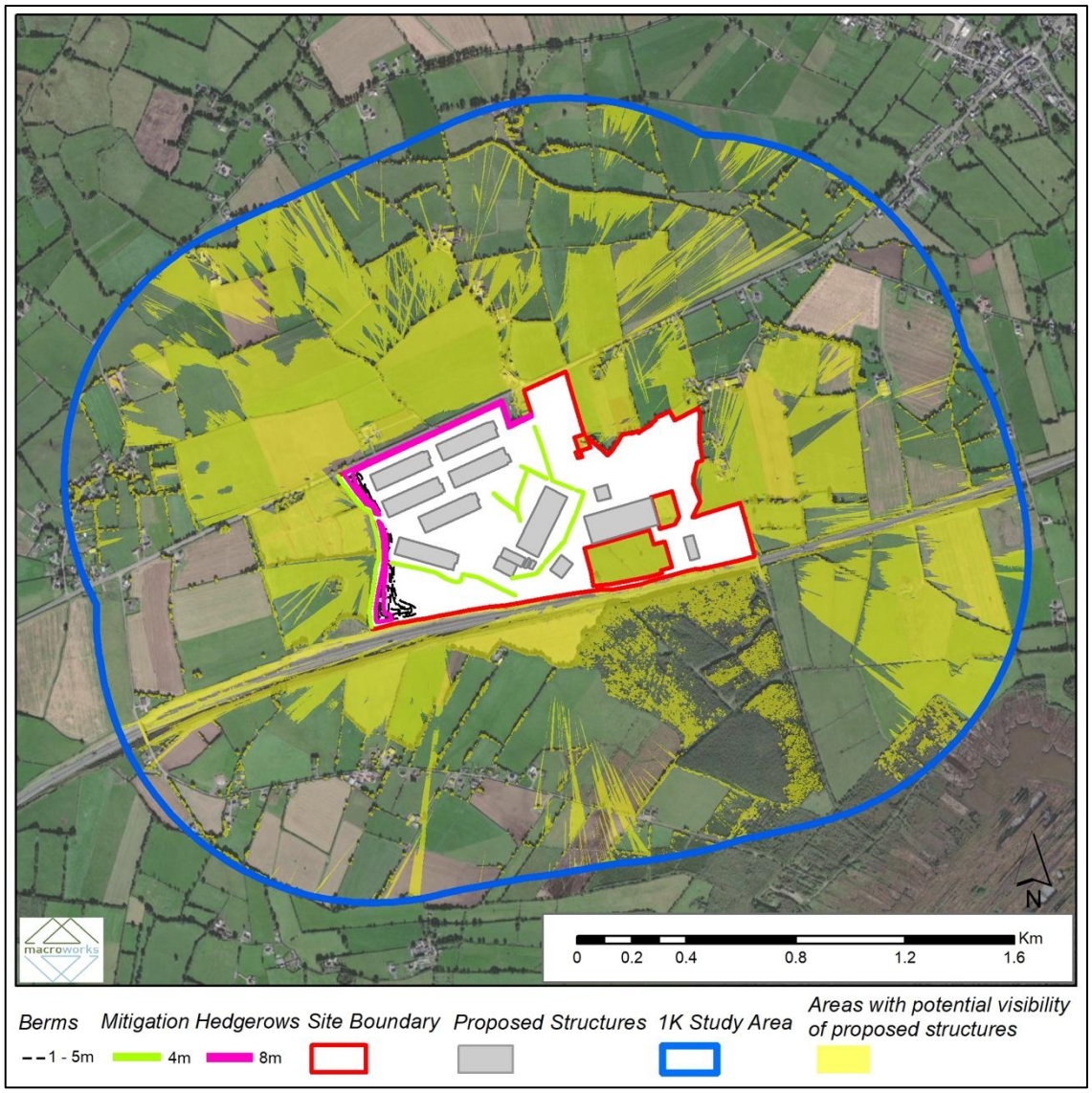


Figure 12.15 Mitigation ZTV illustrating the effect of proposed mitigation planting (Main Site)



With regard to the solar aspect of the development, the installation method for these types of solar panels and mounting frames is undertaken using local piling to reduce the impact deriving from construction to facilitate the long-term use of the field as farmland. Panels are constructed using small-scale machinery causing very limited effect to the existing grass surface. This process is akin to timber post fence construction, whereby the post is driven a short length into the ground. This ensures that the fields' general green characteristics can be retained or quickly redressed following construction. All new cabling within the site will be buried underground. The proposed perimeter 2.45m stock proof fence will be set to the inside of the site boundaries. This will be maintained throughout the operational phase of the development to ensure access is prevented for both stray farm animals and human trespass. However, a small gap at the base of the fence will allow wild fauna to continue passage throughout the site. An un-grazed margin between deer

fencing and the solar panels will be left for biodiversity enhancement measures. When feasible, ancillary structures such as inverters, transformer cabins and other plant will be coloured in green or muted shades to help blend them in with the surrounding countryside.

Low intensity sheep grazing is anticipated to be the main land use under and beside the proposed panels, to ensure that the areas of shorter swards and scrub will be managed. The proposed layout allows sufficient width between module rows for pastureland to be productive. Upon completion of construction, the area temporarily affected by the construction process, which includes one construction compound areas will be re-seeded with agricultural grassland species.

Wherever possible, the on-site access roads utilise the existing farm tracks and follow existing topography in order to minimise ground disturbance, alteration of physical landscape character and visual intrusion. Reinstatement of temporary construction areas, construction compounds and cable trenches to the preconstruction conditions will be carried out at the end of the construction phase. Restoration of any areas disturbed during the construction process will be undertaken on construction completion by appropriate grass seeding to return a green characteristic.

The decommissioning of the solar site will involve the removal of all solar panels and associated fencing, storage and operation facilities. The site will be fully restored to agricultural use through reseeding of appropriate grass species to reflect the grass sward mix in the immediate vicinity. Any site access tracks not required for on-going agricultural purposes will be excavated and top-soiled in order to reinstate them to productive agricultural use. The site will be fully restored to agricultural use in accordance with a detailed restoration plan.

Existing hedgerow field boundaries, which will have been maintained and reinforced with additional planting during the construction and operational phases, will remain intact following the restoration phase. Indeed, due to the supplementary planting proposed as part of the landscape mitigation the field boundaries are likely to be more consistent and consolidated than they are at present.

12.5 IMPACT ASSESSMENT

12.5.1 DO-NOTHING SCENARIO

The *'do-nothing'* impact refers to the non-implementation of the proposed development. The primary effect of this would be that the impacts and effects identified would not directly occur. In this regard the following issues are relevant. The site, which is currently primarily contained in pastoral farmland, would likely be managed for typical agricultural practices, whilst the surrounding perimeter vegetation would continue to grow out, some of which would be maintained by the current landowners. Due to the sites location adjacent to the recently constructed Flexgen and GIS developments, further applications for associated development types are likely.

12.5.2 ASSESSMENT OF RECEPTOR SENSITIVITY – LANDSCAPE

Landscape value and sensitivity are considered in relation to a number of factors highlighted in the Guidelines for Landscape and Visual Impact Assessment 2013, which are set out below and discussed relative to the proposed development site and wider study area.

The landscape of the study area comprises a mix of agricultural farmland and large-scale peat bogs. Major road corridors, cutaway peatland, intensive farming, commercial forestry, and high-voltage electricity lines and the recently constructed Flexgen development all contribute to identifying the study area as a utilitarian, working landscape. The site and its immediate surroundings are characterised by typical rural land uses, including improved agricultural fields and small blocks of coniferous forest plantation, whilst the M6 motorway and the existing Flexgen Castlelost development are also notable land uses. A minor sense of rural tranquillity is evident in some parts of the study area, particularly in locations that are sparsely populated and enclosed by vegetation. However, this is predominantly a landscape where values are more closely associated with productivity and rural subsistence, rather than with distinctiveness, scenic quality, or a strong sense of naturalness. The terrain across the study area is generally flat, which results in restricted visibility due to the presence of dense hedgerow vegetation. Nonetheless, in areas of relative elevation, more open, long-distance views can be experienced, although such instances are infrequent and limited in extent. Croghan Hill, situated on the southern periphery of the study area represents one of the most elevated locations within the surrounding landscape.

The landscape typology found within the study area is representative of much of the Irish midlands and is neither particularly rare nor highly distinctive. This assessment is

supported by the current Westmeath County Development Plan, which does not identify any part of the study area as an 'Area of High Amenity'. The site falls within Landscape Character Area (LCA) – Lough Ennell and Southeast Corridor, although the influence of the southeast transport corridor is considerably more pronounced than that of Lough Ennell, which lies some 6.5 km to the northwest and is visually and perceptually disconnected from the site.

In summary, the landscape context is one of long-standing human modification, shaped historically by peat extraction and presently by agriculture, commercial forestry, transport infrastructure and existing industrial/electrical infrastructure development. It is a productive rural landscape of fair integrity, which serves the subsistence and amenity needs of the local population. Taking the above into account, the overall sensitivity of the receiving landscape is considered to be Medium–Low, consistent with guidance in GLVIA3 for landscapes of ordinary character and limited susceptibility to change.

The most concentrated cluster of rural residential dwellings within the immediate environs of the site lies between the two northernmost solar parcels along the R446 regional road and therefore represents one of the more sensitive receptor locations within the study area.

12.5.3 ASSESSMENT OF RECEPTOR SENSITIVITY – VISUAL

The study area generally presents as a typical rural landscape, characterised by a mix of agricultural land uses and influenced by various forms of built development. These include the existing motorway corridor, the Flexgen Castlelost development, and the nearby urban centres of Rochfortbridge and Tyrrellspass. While much of the study area retains a rural character, certain visual receptors within the surrounding landscape exhibit slightly heightened sensitivity due to the presence of locally elevated terrain, which allows for broader visibility across the wider countryside and areas of high amenity.

One such location is at the western extent of the study area along the R446 regional road. This area occupies a locally elevated position and includes designated scenic view, classified as being of County Importance in the current Westmeath County Development Plan. This designation relates to the locally elevated 360-degree panorama from this local context. The visual amenity at this location is primarily associated with the elevated nature of this context as opposed to particular views of any one distinct landscape feature. However, even from this elevated position, the view includes a variety of typical rural elements, alongside built infrastructure such as overhead electricity lines and distant wind energy developments, which further highlights the modified nature of this landscape context.

Further scenic amenity exists in the south-western extent of the study area, most notably associated with Croghan Hill, a prominent topographical landmark with recognised recreational and heritage value. Several scenic view designations are located in proximity to Croghan Hill. While some of these designations are oriented towards the hill, others are positioned outside the study area and face away from it. Nonetheless, due to its elevated profile within an otherwise flat landscape, Croghan Hill remains a distinctive landscape feature that contributes a degree of recognised scenic amenity to the wider area.

Views of the working agricultural landscape are generally pleasant in terms of its rolling pastoral aesthetic and 'green', settled working character. The network of hedgerows and vegetation throughout it contributes to some sense of naturalness and, combined with its undulating topography, generates a sense of containment in many locations. However, whilst a pleasant pastoral aesthetic is noted throughout some parts of the study area, as noted above, the surrounding local and wider landscape is also influenced by an array of anthropogenic features such as major transport routes, urban settlements, and industrial development. Overall, the sensitivity of visual receptors within the more typical working landscape context tends to range between Medium and Medium-low, with those of a Medium sensitivity representing more open expansive views across the wider landscape.

Key differentials in terms of visual receptor sensitivity relate to the occupation of the visual receptor and whether views of the surrounding landscape are an inherent part of the experience. Static residential receptors are considered generally more susceptible to changes in views over those where views are experienced transiently by those travelling through the landscape, particularly on major transport routes where road infrastructure and traffic volume draw from visual amenity. Likewise, receptors located in closer proximity to the site are considered more susceptible to changes in views over those where views are experienced at a distance.

On the basis of the site-specific factors outlined above and in accordance with the general visual receptor sensitivity considerations contained in the methodology Section 12.2.5, visual receptor sensitivity judgement are provided for each representative viewpoint below.

The nearest residential receptors along the R446 regional road are generally well contained by existing boundary vegetation and do not afford any broad or distant views across the wider landscape in the direction of the proposed development. Representative viewpoints VP2 and VP3 represent the nearest surrounding local residential receptors, while representative viewpoints VP4 and VP7, both located along the R446 regional road,

represent the nearest surrounding residential receptors as well as the principal route corridor.

12.5.4 MAGNITUDE OF LANDSCAPE EFFECTS – CONSTRUCTION STAGE

During the construction phase there will be a far higher intensity of activity at the site than during the operational phase. This will consist of heavy vehicle movement to and from the site as well as construction machinery within the site.

In terms of physical landscape effects, the proposed development will result in the permanent removal of the prevailing agricultural grassland land cover, as well as the permanent loss of certain notable hedgerow sections, to accommodate the full footprint of the built development. In contrast, the solar aspect of the scheme will involve limited vegetation clearance, with much of the existing pasture and hedgerow corridors retained, resulting in minimal direct physical alteration of the landscape in these areas.

Within the main built area of the site, some levelling of the landform will be required to facilitate the construction of various elements of the data centre. However, this will be mitigated through the use of minor terracing between compound elements, thereby balancing the required cut and fill operations and reducing the overall extent of landform modification. Surplus soil generated from these cut operations and from excavations for building foundations will be used to form perimeter embankments along the western boundary of the site. These embankments will be integrated into the landscape mitigation strategy and planted to assist in softening the visual impact of the development and enhancing biodiversity.

The main construction phase effects related to the data centre aspect of the development are summarised below;

- HGVs transporting materials to and from the site;
- Movement of heavy earth-moving machinery and tower cranes on-site;
- Temporary storage of excavated materials and construction materials on-site;
- Gradual emergence of the proposed development, and associated works, including tower cranes;
- Security hoarding and site lighting.
- Areas of soil stripping to facilitate the proposed parking area.
- Trees and hedgerows to be retained will be protected in accordance with British Standard BS5837: 2012 'Trees in Relation to Design, Demolition and Constriction

The main construction phase effects related to the solar aspect of the development are summarised below;

- HGVs transporting materials to and from the site;
- Pile driving solar structures into the ground;
- Temporary storage of construction materials on-site;
- Gradual emergence of the proposed solar development and associated works;
- Security hoarding and site lighting.
- Trees and hedgerows to be retained will be protected in accordance with British Standard BS5837: 2012 'Trees in Relation to Design, Demolition and Construction

The intensity of on-site activity during the construction phase will be considerably higher than during the operational phase. This includes movement of machinery, HGV traffic, and temporary infrastructure such as cranes, lighting, hoarding, and materials storage. The landscape impacts are expected to occur towards the latter part of the construction programme, when large built structures are in place in combination with ongoing site activity and associated visual clutter. The construction of the development is expected to take approximately five years. Thus, construction related effects are, therefore, relatively brief and intermittent in nature and will only result in 'short-term' landscape and visual impacts in accordance with EPA definitions.

On the basis of the factors outlined above, the construction stage landscape impacts are deemed to be High within the site and its immediate setting (<c. 500m), thereafter reducing to Medium and Low at increasing distances and with a higher degree of screening. It should be noted that the construction stage effects related to the solar aspect of the development will be considerably less than those experienced at the data centre aspect of the proposed development. Combined with the Medium-low landscape sensitivity of the study area, the significance of construction stage effect is deemed Substantial-moderate and of a Negative Quality.

The landscape mitigation strategy includes earthen berms along the northern, western and north-eastern boundaries of the Data Hall area, planted with native woodland species, together with enhanced hedgerow and native woodland planting throughout the site. During the initial establishment period of these measures, and prior to the maturation of the proposed planting, a discernible degree of change will occur at certain proximate local receptors.

12.5.5 MAGNITUDE OF VISUAL EFFECTS – CONSTRUCTION STAGE

During the construction phase, the main visual impacts will arise from the frequent movement of heavy goods vehicles (HGVs) and worker vehicles travelling to and from the site via the designated site entrance. In addition, construction machinery and equipment, some of which may extend above intervening vegetation and existing buildings, will be

present within the site. Stockpiles of stripped topsoil and stored construction materials will also be visible in certain areas, particularly during peak construction periods. However, beyond the immediate vicinity of the site, much of this short-term construction activity will be partially or wholly screened from view by the mature trees and established vegetation in the surrounding landscape. These natural features serve as a visual buffer, limiting the extent to which construction activities will be visible from the wider area.

The most notable construction-phase visual impact is anticipated to occur along the R446 regional road to the north of the site, where this adjacent receptor will be afforded relatively clear views towards the development site. Nonetheless, views from this location are expected to be partially screened by proposed site hoarding and perimeter fencing during construction. As the built elements of the data centre gradually rise during construction, they will begin to exert a more prominent visual presence within the local landscape and will ultimately emerge as defining built features in this part of the study area. These effects, however, will be experienced progressively and will diminish in prominence once construction activity concludes and landscape mitigation measures mature.

By contrast, the solar aspect of the development will result in comparably lower construction-stage visual impacts. This is due to the modest height of the proposed solar infrastructure (not exceeding approximately 4 metres) and the limited scale of construction activity involved in its delivery.

In conclusion, construction-stage visual effects are assessed as being no greater than High in the immediate vicinity of the data centre aspect of the development. For the solar component, visual effects are assessed as being no greater than Medium in its immediate surrounds. In all instances, these effects are short-term and transitional, reducing notably upon completion of construction and implementation of mitigation planting.

Coupled with the Medium-low visual receptor sensitivities in the immediate surrounds of the site, the construction stage visual impacts in the immediate vicinity of the site will be no greater than Substantial-moderate and will reduce considerably beyond 500m-1000m from the site, where the proposed development will be heavily screened. As a result, construction stage visual impacts are deemed Not Significant.

Under the pre-mitigation scenario, the assessed significance of effect at the representative viewpoints along the R446 ranges from Substantial–Moderate to Imperceptible, reflecting the transitional nature of effects prior to the maturation of the proposed landscape mitigation measures. Clearer visibility of the proposed panels occurs under this pre-mitigation scenario, before the existing and proposed hedgerows have established.

12.5.6 MAGNITUDE OF LANDSCAPE EFFECTS – OPERATIONAL STAGE

The proposed development will result in a notable alteration of the local landscape character, particularly through the transition of much of the site into a more intensive industrial facility. In terms of physical landscape effects, the development will involve permanent and irreversible changes to the site's existing land cover, through the excavation of large areas to accommodate building foundations and associated infrastructure.

While the solar element of the development retains much of the site's existing green characteristics, it also encompasses some positive localised landscape effects. These arise from the retention, protection, and enhancement of existing hedgerow networks, the introduction of new native hedgerows, linear woodland corridors, and extensive grassland areas actively managed to enhance biodiversity. As a result, the solar component contributes to a strengthening of the green infrastructure within the site and the surrounding landscape.

In contrast, the data centre aspect of the development will be characterised by a marked increase in the scale and extent of built form, marking a clear departure from the site's current rural and agricultural land use. This will result in a clear alteration of the local landscape character, albeit at the site scale, and will lead to a reduction its typical pastoral qualities. The sense of a pleasant, pastoral aesthetic within the site will inevitably be diminished, whilst the surrounding immediate landscape will also be influenced by the industrial nature of the development. However, the data centre component also incorporates a robust landscape strategy, featuring extensive native woodland planting, pollinator-friendly perennial and shrub plantings, and broad meadows interspersed with native parkland trees. These measures aim to soften the visual presence of the built development, re-establish biodiversity corridors, and support the ecological integration of the project within the wider rural landscape.

It is important to note that the industrial nature of the proposed development is not entirely unprecedented in the local or wider context. The site lies adjacent to the existing Flexgen Castlelost development, which has already introduced a large-scale built form into this landscape. Additionally, the nearby motorway corridor exerts a strong influence on local landscape character, reducing the perceived sensitivity and rural tranquillity of the area. Furthermore, the wider landscape includes existing renewable energy infrastructure, such as the Yellow River wind farm, visible in more distant views. This broader context indicates that the proposed development, while introducing further built form, is not wholly incongruous with the evolving land use character of the area

Overall, the proposed development will contributed to a marked change in the local landscape in terms of its scale and function and represents a considerable increase in the intensity of built development. With reference to the significance matrix (Table 12.4) above, the Medium-low landscape sensitivity judgement attributed to the study area, coupled with a High magnitude of landscape impact in the immediate vicinity (<500m) of the proposed development is considered to result in an overall significance of no greater than Substantial-moderate, with residual landscape effects reducing swiftly at increasing distances as the proposed development becomes screened and soften within the wider surrounding landscape. Indeed, it is important to note that there will be limited residual visibility of the development beyond c. 500m - 1km from the site. Thus, the most notable landscape effects will be heavily localised to the immediate surrounding landscape context.

The proposed Data Halls are set back from the regional road corridor and are located approximately 69–71 metres from the roadside hedgerow, generally at a lower ground level than the regional road. Earthen berms along the northern, western and north-eastern boundaries of the Data Hall area are planted with native woodland species to provide enhanced screening and to assist in visually integrating the development into the receiving local landscape, thereby softening the built form.

A landscaped plaza is provided at the heart of the Data Hall component, incorporating geometric raised planters and structured planting beds designed across a series of graduated levels that respond to the changes in ground level between the buildings and the adjacent road carriageway. The plaza incorporates a mix of native and pollinator-friendly tree and shrub species, selected to provide a sequential flowering period offering continuous nectar and pollen sources from early spring through late autumn, in alignment with the objectives of the All-Ireland Pollinator Plan.

12.5.7 MAGNITUDE OF VISUAL EFFECTS – OPERATIONAL STAGE

The assessment of visual impacts at each of the selected viewpoints is aided by photomontages of the proposed development. Photomontages are a 'photo-real' depiction of the scheme within the view utilising a rendered three-dimensional model of the development, which has been geo-referenced to allow accurate placement and scale. For each viewpoint, the following images have been produced:

- Existing view;
- Outline view
- Montage view
- Montage view with mitigation established.

Table 12.7 Assessment of Viewpoints

VP NO.	EXISTING VIEW	VP SENSITIVITY	MAGNITUDE OF VISUAL EFFECT (PRE & POST MITIGATION)	PRE MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT	POST MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT
VP1	**L5125 at Piercetown:** This view from the L5125 at Piercetown presents a predominantly rural landscape characterised by improved grassland fields enclosed by mature hedgerows and scattered trees. The landform is generally flat, with limited long-range visibility due to the dense vegetative structure. There is an absence of built development or vertical infrastructure, contributing to a tranquil and undeveloped rural character. The scene reflects a typical lowland pastoral landscape with a notable sense of enclosure.	**Medium-low**	A very fleeting view of the proposed data halls will be afforded in the distance through a gap in the mature skyline vegetation. At this distance of over 1 km, where the proposed development is largely screened by intervening mature vegetation, the data halls will have a very limited visual presence and are unlikely to draw the eye. The solar aspect of the proposed development will not be visible from here. Thus, the magnitude of visual effect prior to the establishment of the proposed mitigation screen planting is deemed to be low to negligible. Once fully established, the proposed mitigation screen planting—comprising native woodland along the northern boundary of the site—will further screen and soften the proposed development assimilating it into the already heavily vegetated landscape. Nonetheless, the main built form of the proposed buildings will still be visible along the distant horizon. Thus, the residual magnitude of effect remains Low-negligible	**Slight-imperceptible / Negative / Medium-term**	**Slight-imperceptible / Negative / Permanent**
VP2	**R446 at Castlelost southwest of Rochfortbridge:** This view, southwest of Rochfortbridge, depicts a semi-urban streetscape on the edge of the town. The scene includes	**Medium-low**	The proposed development will be entirely screened from here by the intervening vegetation in the direction of the site. Thus, the magnitude of effect is deemed Negligible by default.	**Imperceptible / Neutral / Medium-term**	**Imperceptible / Neutral / Permanent**

VP NO.	EXISTING VIEW	VP SENSITIVITY	MAGNITUDE OF VISUAL EFFECT (PRE & POST MITIGATION)	PRE MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT	POST MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT
	roadside buildings, stone walls, utility poles, and a defined road corridor, with a backdrop of mature trees lining the route out of the settlement. Residential and agricultural structures are evident, contributing to a transitional landscape between town and countryside. Overall, the view reflects a well-established approach to Rochfortbridge with a moderate level of built form set within a green and tree-lined setting.				
VP3	**L5125 at Oldtown:** This view encompasses two aspects. To the east, it is enclosed by dense vegetation that lines the local road corridor. To the south, the view extends across an adjacent pastoral field in the foreground before being contained by dense, mature tree-lined hedgerows.	**Medium-low**	The proposed development is partially visible in the background, set behind a mature intermittent hedgerow and mature tree line screening. The data halls appear as low-lying, grey-toned built forms that break the rural skyline but are softened by surrounding layers of vegetation. While they introduce an element of industrial character into an otherwise pastoral landscape, the visual mass and intensity of development is diminished by the layers of existing screening throughout the view. Overall, the magnitude of visual effect is deemed Medium-low. Once the proposed mitigation screen planting has fully established along the sites northern boundary, visibility of the built forms will be marginally reduced with the new areas of native woodland	**Moderate-slight / Negative / Medium-term**	**Moderate-slight / Negative / Permanent**

VP NO.	EXISTING VIEW	VP SENSITIVITY	MAGNITUDE OF VISUAL EFFECT (PRE & POST MITIGATION)	PRE MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT	POST MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT
			further softening the highly anthropogenic forms. Nonetheless, the visual presence of the proposed development will remain much the same. Thus, the magnitude of effect remains Medium-low		
VP4	**R446 at Farthingstown:** This is a view afforded from a section of the regional road in the townland of Farthingstown adjacent to a linear cluster of residential dwellings. The cluster of single-storey dwellings lines the southern side of the regional road carriageway, whilst the northern side of the road corridor is bound by roadside hedgerow vegetation with views afforded to the neighbouring pastoral fields beyond. To the south, layers of stacked vegetation to the rear of the nearby dwellings contains this aspect of the view at a short distance.	**Medium-low**	The proposed panels will be clearly visible at close range to the north of the regional road corridor, where they appear above the roadside vegetation, slightly set back from the hedgerow field boundary. The panels will be a notable built feature in this location and will generate a sense of enclosure on the northern side of the carriageway, although both near and distant mature vegetation will soften the built forms. To the south, the proposed panels in the central solar array will be partially visible beyond layers of intervening mature hedgerow vegetation. While the built tone and texture of the panel structures will contrast with the verdant tones and organic textures of the surrounding pastoral landscape, the panels to the south are set back from both the road and nearby dwellings and do not break the vegetated skyline. Overall, the proposed panels will result in a marked increase in the intensity of built development within this local landscape context, with the panels to the	**Moderate / Negative / Medium-term**	**Slight-imperceptible / Negative / Permanent**

VP NO.	EXISTING VIEW	VP SENSITIVITY	MAGNITUDE OF VISUAL EFFECT (PRE & POST MITIGATION)	PRE MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT	POST MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT
			north producing the more notable visual effects. The proposed data halls and their associated built forms will not be visible from this location. On balance, for the reasons outlined above, the magnitude of visual effect is deemed Medium. Once the proposed mitigation screen planting has become fully established, there will be little, if any, visibility of the proposed panel structures from this local landscape context. Indeed, the panels to the south and north will be heavily screened by the enhanced hedgerows, although the hedgerows to the north of the regional road will still generate a slight sense of enclosure along the regional road. Overall, the residual magnitude of visual effect is deemed Low–Negligible		
VP5	**L11272 at Farthingstown:** This view, taken from a local road in the townland of Farthingstown, is representative of local residential receptors situated along the road corridor. It is seen through a nearby agricultural field entrance and extends across a field that rises to a low ridge, which partially contains the view. The scene includes an existing farmstead, mature vegetation, and	**Medium-low**	A brief view of the backs of the panels is afforded from this gateway. The panels are slightly set back from the immediate field boundary, reducing the perceived visual presence of the proposed solar array. Nevertheless, the view of the backs of the panels will create an increased sense of enclosure in this location, screening the previously open views across the pastoral field. The built forms of the panel structures will contrast with the verdant and organic	**Slight / Negative / Medium-term**	**Slight-imperceptible / Negative / Permanent**

VP NO.	EXISTING VIEW	VP SENSITIVITY	MAGNITUDE OF VISUAL EFFECT (PRE & POST MITIGATION)	PRE MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT	POST MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT
	distant wind turbines visible along the skyline.		tones and textures of the surrounding agrarian landscape, resulting in an increased intensity of built development within this local landscape context. However, it is important to note that this is a fleeting view from a gateway, with views of the panels heavily obscured by existing intervening vegetation along other sections of the local road carriageway. The neighbouring dwelling is also heavily screened by the dense coniferous vegetation that encloses its landholding. Overall, the magnitude of effect is deemed to be medium–low. Once fully established, the new and enhanced boundary vegetation will screen the proposed panels completely from this viewpoint, resulting in the residual visual effect reducing to Low–negligible.		
VP6	**R400 overpass of M6:** This view is afforded from the R400 overpass of the M6, south of the settlement of Rochfortbridge. The view is oriented westward across the motorway corridor, which is enclosed by dense, mature vegetation on both sides.	**Low**	The proposed development will not be visible from here due to the layers of mature intervening vegetation in the direction of the proposed development. Thus, the magnitude of visual effect is deemed Negligible by default.	**Imperceptible / Neutral / Medium-term**	**Imperceptible / Neutral / Permanent**
VP7	**R446 at Oldtown:** This view is afforded from the R446 regional road at Oldtown and is representative of both major route receptors and the	**Medium-low**	A broad view of the northern solar parcel is afforded across the regional road corridor. The proposed panels will rise above the roadside hedgerow and	**Moderate / Negative / Medium-term**	**Slight-imperceptible / Negative / Permanent**

VP NO.	EXISTING VIEW	VP SENSITIVITY	MAGNITUDE OF VISUAL EFFECT (PRE & POST MITIGATION)	PRE MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT	POST MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT
	surrounding local community receptors. A view across the regional road corridor to the north is partially obstructed on the opposite side of the carriageway by a low roadside hedgerow. Brief glimpses are available into the neighbouring pastoral fields, beyond which the view is contained by dense layers of intervening vegetation. To the south, the view is similarly enclosed at the roadside by dense roadside vegetation.		present as a horizontal band along a notable extent of this section of the regional road. While the panels will be a noticeable built feature, they do not notably obstruct any sensitive viewing aspects and will be seen just below the distant vegetated skyline. Although glimpses of the central array may be afforded along adjacent sections of the R446, the panels will be entirely screened from the adjacent residential landholding. The proposed data halls will also be screened from this landscape context, although they will become visible a short distance further to the west. Overall, the magnitude of visual effect along this section of the regional road corridor is deemed to be Medium. Once the proposed mitigation screen planting has fully established, the panels will be largely screened from view, with the exception of the site entrance. Fleeting glimpses through this entrance will have a limited impact on the visual amenity experienced along this busy regional road corridor. Therefore, the magnitude of effect is expected to reduce to Low–negligible once the proposed planting has fully matured.		
VP8	**R446 at Oldtown west of its intersection with the L5125:** This view is afforded from the R446	**Medium-low**	While the solar element of the proposed development will be largely screened from this location, with only brief	**Substantial-moderate /**	**Moderate-slight / Negative / Permanent**

VP NO.	EXISTING VIEW	VP SENSITIVITY	MAGNITUDE OF VISUAL EFFECT (PRE & POST MITIGATION)	PRE MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT	POST MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT
	regional road, which extends east and west along its corridor. To the east, the view is enclosed by a roadside hedgerow, while a low rolling ridge in the road and surrounding terrain screens visibility of the wider landscape context. A similar view is afforded to the west, where visibility is largely contained within the road corridor by dense surrounding vegetation.		glimpses of the panels afforded, the proposed data halls and fuel cells will be visible to the south of the regional road corridor. The data halls will appear prominently in this view and will result in a marked degree of visual change, particularly where notable areas of mature vegetation have been cleared to accommodate the development. Nonetheless, the proposed fuel cell buildings, which are of a comparable scale to their nearer counterparts, will be partially screened by a combination of terrain and layers of intervening mature vegetation located to the rear of the property south of the viewpoint. The data halls will generate the most notable visual impact in this view, introducing a strong sense of enclosure along the southern side of the regional road corridor. These built forms represent a departure from the typical rural character of the area and will result in a noticeable increase in the intensity of built development. However, the nearest data halls will screen the more distant built elements within the site, considerably reducing the perceived overall scale and intensity of the wider development. Overall, the magnitude of visual effect prior to the establishment of the	**Negative / Medium-term**	

VP NO.	EXISTING VIEW	VP SENSITIVITY	MAGNITUDE OF VISUAL EFFECT (PRE & POST MITIGATION)	PRE MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT	POST MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT
			proposed mitigation screen planting is deemed to be High. Once the proposed screen planting along the development boundary has fully established and matured, the view of the proposed data halls will be notably softened and screened by the new corridor of native woodland planting located to their north. While the planting will result in a more enclosed road corridor, this character will be consistent with other similarly enclosed sections of the regional road within the surrounding landscape context. Thus, the magnitude of effect will reduce to Low when the proposed vegetation has fully established. It should also be noted that over time (between c. 10-20 years) the proposed data halls will be almost fully screened as the woodland matures.		
VP9	**R446 at Gneevebane:** This is a view from a section of the R446 at Gneevebane, where the regional road corridor rises to the west. The depicted view extends eastward along the road corridor, which is bounded by dense hedgerow on the near side and pasture fields to the north. To the south, a brief view is afforded through an adjacent agricultural field entrance, next to a small single-storey dwelling. The view to the south extends across a small pastoral field,	**Medium-low**	The proposed development will be visible here in two aspects of the view afforded from this section of the regional road corridor. To the south, adjacent to the single-storey residential dwelling, a view is afforded of the nearest two data halls, which appear at a notable but not overbearing scale and will result in a marked degree of visual change, altering the local pastoral landscape character. The visual presence of the development is marginally diminished at this nearby receptor by the set-back distances from	**Substantial-moderate / Negative / Medium-term**	**Moderate-slight / Negative / Permanent**

VP NO.	EXISTING VIEW	VP SENSITIVITY	MAGNITUDE OF VISUAL EFFECT (PRE & POST MITIGATION)	PRE MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT	POST MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT
	enclosed on the far side by hedgerow vegetation, where existing wind turbines are also visible, rotating along the distant skyline.		the dwelling, in addition to the proposed berms located at the western extent of the site. Nevertheless, the proposed development in this local context represents a considerable increase in the intensity of built development. Furthermore, when viewed along the regional road corridor to the east, the proposed northern solar parcels will be visible in the pasture fields located to the north of the regional road. Whilst they will have a limited visual presence here due to the viewing distances involved, they will further contribute to an increase in the intensity of built development within the surrounding local landscape context. Overall, the magnitude of visual effect is deemed High–Medium. Once the proposed mitigation screen planting has fully established—including new woodland planting along the southern boundary of the data halls and along the western site boundary on the proposed berms—the proposed development will be entirely screened from this location. Nonetheless, the newly established planting will create a notable sense of enclosure along the eastern boundary of the dwelling. To the east along the regional road corridor, views of the panels will be further reduced by the surrounding enhanced hedgerow vegetation. Overall, the		

VP NO.	EXISTING VIEW	VP SENSITIVITY	MAGNITUDE OF VISUAL EFFECT (PRE & POST MITIGATION)	PRE MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT	POST MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT
			residual magnitude of visual effect is deemed Medium–Low		
VP10	**L51251 at Kiltotan and Collinstown:** This is a view of two aspects afforded from the L51251 local road in the townlands of Kiltotan and Collinstown, located adjacent to a residential dwelling. To the east, the view is partially truncated at a close distance by the roadside grassed embankment, with only brief glimpses afforded into the neighbouring pastoral field. A more open view is afforded to the south along the local road laneway in the direction of the motorway overpass, albeit the roadside vegetation contains any open visibility across the neighbouring fields of pasture. To the west, a view across the residential landholding is afforded and is partially contained by intervening hedgerow vegetation. Several overhead electricity pylons are visible through and above the near vegetation, whilst the newly operational Flexgen Castlelost is also visible, rising above the layers of intervening vegetation.	**Medium-low**	To the east, a brief view of the panels in the central solar parcel is afforded through lower sections of the neighbouring roadside hedgerow, albeit the proposed panels are offset a distance of 200 m from the roadside boundary, which notably reduces their perceived visual presence from this local landscape context. To the west and southwest, a brief view of the proposed GIS building is afforded adjacent to the existing Flexgen Castlelost development. The proposed building will be finished in muted tones and textures, similar to existing Castlelost structures, to further assimilate the development into its surrounding context and diminish its perceived scale. Nonetheless, it will still be a notable built feature viewed to the southwest. Overall, whilst the development will contribute to an increase in the scale and intensity of development in this context, the proposed structures and panels are well offset from the local road corridor and do not result in any strong sense of enclosure here. Thus, prior to the establishment of the proposed mitigation screen planting, the magnitude of visual effect is deemed Medium–Low, much of	**Moderate-slight / Negative / Medium-term**	**Moderate-slight / Negative / Permanent**

VP NO.	EXISTING VIEW	VP SENSITIVITY	MAGNITUDE OF VISUAL EFFECT (PRE & POST MITIGATION)	PRE MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT	POST MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT
			which relates to the views of the proposed GIS building as opposed to the solar aspect of the proposed development. It should be noted that the proposed fuel cells and data halls will be entirely screened from here by a combination of the surrounding terrain and hedgerow vegetation. Once the proposed mitigation screen planting has fully established, it will entirely screen the brief views of the panels afforded here, with residual visibility of the development only relating to the structures visible to the southwest. Overall, whilst the proposed mitigation will effectively screen the solar aspect of the proposed development, the GIS building and some of its surrounding structures still have the potential to be viewed from here. Thus, the residual magnitude of effect remains Medium–Low		
VP11	**Local road laneway south of M6 at Farthingstown:** This is a view afforded from a local access laneway in the townland of Farthingstown, to the south of the local road overbridge of the M6 motorway. The depicted view represents a small cluster of residential dwellings on the southern side of the motorway corridor. The view is oriented to the west across a	**Medium-low**	The proposed panels will be briefly visible beyond the adjacent pastoral field, where the intervening vegetation heavily screens much of the southern solar parcel. Brief views of the panels are afforded through gaps in the vegetation, where they present against further layers of stacked vegetation and do not break the vegetated skyline. Indeed, whilst the panels will be visible here,	**Slight-imperceptible / Negative / Medium-term**	**Imperceptible / Neutral / Permanent**

VP NO.	EXISTING VIEW	VP SENSITIVITY	MAGNITUDE OF VISUAL EFFECT (PRE & POST MITIGATION)	PRE MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT	POST MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT
	broad pastoral field, bounded on the opposite side by dense hedgerow vegetation. The view to the north is contained at a short distance by a dense hedge that encloses the adjacent residential landholding.		they will have little impact on the visual amenity afforded from this location. Thus, the magnitude of visual effect is deemed Low–Negligible. Once the proposed mitigation screen planting has fully established, views of the panels will be fully screened from this local landscape context. Thus, the magnitude of visual effect will reduce to Negligible.		
VP12	**R446 at Garrane:** This is a view afforded from the R446 at Garrane, selected to represent Protected View 13 in the current Westmeath County Development Plan, which is described as: "Panoramic views from Garran Hill on the Regional Road R-446." Whilst locally elevated, views from this context tend to be somewhat enclosed by surrounding vegetation and existing built development. The depicted view is oriented to the east along the regional road corridor and is contained at a short distance by a low ridge and surrounding layers of stacked vegetation.	**Medium**	The proposed development will not be visible from here due to the layers of mature intervening vegetation in the direction of the proposed development. Thus, the magnitude of visual effect is deemed Negligible by default.	**Imperceptible / Neutral / Medium-term**	**Imperceptible / Neutral / Permanent**
VP13	**L51251 over bridge of the M6:** This is a view afforded from the elevated local road overbridge of the M6, which provides a view across the M6 motorway corridor—both to the east and west. The view is representative of local community receptors that	**Low**	The proposed panels will be visible from this locally elevated location, both to the north and south of the motorway corridor. Views of the panels to the north are limited due to the dense vegetation that lines the northern verge of the motorway. To the south, a more open	**Moderate / Negative / Medium-term**	**Moderate / Negative / Permanent**

VP NO.	EXISTING VIEW	VP SENSITIVITY	MAGNITUDE OF VISUAL EFFECT (PRE & POST MITIGATION)	PRE MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT	POST MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT
	traverse this local road corridor. The motorway is viewed within a cutting and is enclosed to both the north and south by dense, mature vegetation. To the south, a view is afforded across a densely vegetated landscape, where turbines are visible rotating in both the near and distant landscape. Croghan Hill is also visible to the south. The view to the northeast is notably contained by dense vegetation, whilst a similar degree of containment is noted to the northwest. However, views of the newly operational Flexgen Castlelost development are afforded beyond layers of dense, mature hedgerow vegetation.		view of the proposed solar array is afforded, where it is contained within a network of mature hedgerow vegetation. Whilst the panels will be a notable built feature from this location, they do not present in a highly dominant manner, and the scale and extent of the panel arrays are diminished and visually softened by the surrounding established hedgerow vegetation. To the northwest, the proposed GIS building and other ancillary electrical infrastructure are visible immediately adjacent to the existing Castlelost development. The materiality of the proposed GIS building—one of the larger built structures in this aspect of the development—will mimic the existing Castlelost buildings, further assimilating the development into the surrounding landscape context and diminishing the perceived scale and extent of the built form. Overall, views to the northeast, northwest, and southeast will generate a marked degree of visual change along this local road overpass, resulting in a considerable perceived increase in the intensity of built development in this local landscape context. Indeed, a marginal "island effect" is also generated here, where users of the local road may feel as though they are traversing through the development. Nevertheless,		

VP NO.	EXISTING VIEW	VP SENSITIVITY	MAGNITUDE OF VISUAL EFFECT (PRE & POST MITIGATION)	PRE MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT	POST MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT
			it should be noted that the full scale and extent of the development is notably screened to the northwest by the existing Castlelost development and proposed GIS building. On balance, and for the reasons outlined above, the magnitude of visual effect is deemed High–Medium. Once the proposed mitigation screen planting has fully established, views of the central solar parcel to the north of the M6 motorway will be entirely screened from this location. In contrast, the proposed screen planting will have a more limited effect to the south, as the local road overpass is elevated above the southern solar parcel. Similarly, mitigation planting will have a limited effect to the northwest, given the marginal elevation of the overpass relative to the site. Overall, the residual magnitude of visual effect remains High–Medium.		
VP14	**M6 Motorway Layby at Kiltotan and Collinstown:** This is a view from a layby in the western corridor of the M6, in the townlands of Kiltotan and Collinstown. The view is representative of users of the motorway corridor and is enclosed to the south by dense, mature coniferous forest. The depicted view	**Low**	The proposed development will be intermittently visible from this section of the westbound motorway corridor, where the proposed buildings and infrastructure will project at intervals above the neighbouring grassed embankment and intervening mature vegetation. It should be noted that visibility from the eastbound	**Moderate / Negative / Medium-term**	**Moderate / Negative / Permanent**

VP NO.	EXISTING VIEW	VP SENSITIVITY	MAGNITUDE OF VISUAL EFFECT (PRE & POST MITIGATION)	PRE MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT	POST MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT
	extends north across the motorway corridor, which is contained on the opposite side by a grassed embankment and intermittent mature vegetation. The existing Castlelost development is visible to the northeast, while a corridor of overhead cables and electricity pylons is visible to the northwest.		carriageway will be further limited by the adjacent grassed embankment. The upper half of the proposed fuel cell buildings, brief views of a data hall, and partial views of the proposed GIS building will be afforded from this section of the motorway. Whilst the development presents with a notable visual envelope here, in combination with the existing Castlelost development, the proposed buildings and structures benefit from considerable separation distances, which reduce the impression of a single large visual mass. Furthermore, the finish and materiality of the proposed structures have been designed to diminish the perceived scale and extent of the larger buildings, while also offering some visual interest for users of the motorway corridor. Overall, the proposed development will clearly contribute to a notable increase in the perceived intensity of built development along this section of the motorway. However, the development does not present in a highly dominant manner and does not block or obstruct any sensitive viewing aspects. Indeed, industrial developments located adjacent to motorway corridors are not uncommon, and as such, the proposed development is not considered to present as a highly incongruous element in this local landscape context. Overall,		

VP NO.	EXISTING VIEW	VP SENSITIVITY	MAGNITUDE OF VISUAL EFFECT (PRE & POST MITIGATION)	PRE MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT	POST MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT
			the magnitude of visual effect is deemed Medium. The proposed mitigation screen planting will have limited screening effect here, and thus, the residual magnitude of visual effect remains Medium.		
VP15	**R446 at Newcastle:** This is a view afforded from a section of the R446 regional road in the townland of Newcastle, representative of both the major route corridor and the surrounding local community receptors. The depicted view is oriented east along the regional road corridor, which rises to a low ridge a short distance ahead, containing this aspect of the view.	**Medium-low**	The proposed development will not be visible from here due to rolling terrain in the direction of the site. Thus, the magnitude of visual effect is deemed Negligible by default.	**Imperceptible / Neutral / Medium-term**	**Imperceptible / Neutral / Permanent**
VP16	**R446 east of Tyrrellspass:** This is a view afforded from the R446 regional road to the east of the settlement of Tyrrellspass. The view has been selected to represent both the centre of population and a major route receptor, and it extends east along the regional road corridor and the surrounding pastoral lands. Dense vegetation along the regional road to the east contains one aspect of the view, while to the southeast, a more open view is afforded across the surrounding pastoral landscape,	**Medium-low**	The proposed development will not be visible from here due to rolling terrain in the direction of the site. This view was included to represent the settlement of Tyrrellspass to the west of the site. Thus, the magnitude of visual effect is deemed Negligible by default.	**Imperceptible / Neutral / Medium-term**	**Imperceptible / Neutral / Permanent**

VP NO.	EXISTING VIEW	VP SENSITIVITY	MAGNITUDE OF VISUAL EFFECT (PRE & POST MITIGATION)	PRE MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT	POST MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT
	which is enclosed at a slightly greater distance by stacked hedgerow vegetation.				
VP17	**L51254 over bridge of the M6 at Garrane**: This is a locally elevated view afforded from a local road overbridge of the M6 at Garrane, representative of local community receptors traversing the road corridor. The view is framed by the motorway corridor to the east, which is enclosed by steep embankments to both the north and south. Distant views are afforded to the east, where a corridor of overhead electricity pylons is visible traversing the landscape, whilst a glimpse of the existing Castlelost development is also afforded to the north of the motorway corridor in the distance.	**Low**	A faint view of the proposed GIS building is afforded adjacent to the existing Castlelost development in the distance, to the north of the motorway corridor. It will be difficult to discern from this distance and does not break the skyline. Indeed, even if visible from here, the proposed development will appear as an extension of the existing development and will not present as an inappropriate form of development in this context. A brief glimpse of the data halls may also be afforded through layers of vegetation north of the motorway corridor; however, the muted grey tones will offer low contrast against the sky and are unlikely to draw the eye. Thus, the magnitude of visual effect is deemed Low–Negligible. The proposed mitigation screen planting will screen the view of the data halls, although it will have a limited screening effect in relation to the proposed GIS building. Thus, the residual magnitude of effect remains Low–Negligible	**Slight-imperceptible / Negative / Medium-term**	**Slight-imperceptible / Negative / Permanent**
VP18	**L51254 at Rahincuill:** This is a view afforded from a local road in the townland of Rahincuill that is representative of the surrounding local community receptors. The local	**Medium-low**	There is very limited potential for any clear visibility of the proposed development from this local road context. Indeed, even if visible from this location, views of the proposed	**Slight-imperceptible / Negative / Medium-term**	**Slight-imperceptible / Negative / Permanent**

VP NO.	EXISTING VIEW	VP SENSITIVITY	MAGNITUDE OF VISUAL EFFECT (PRE & POST MITIGATION)	PRE MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT	POST MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT
	road is lined with intermittent residential dwellings to both the north and south. The depicted view is oriented to the north, adjacent to a small single-storey dwelling, where filtered views are afforded of the landscape further to the north. This landscape is principally composed of pastoral fields and intervening hedgerow vegetation, with the view to the north relatively contained at a short distance.		structures would be heavily filtered by the surrounding layers of intervening vegetation and would have a very limited visual presence. Overall, it is not considered that these filtered, brief views would have any notable effect on the visual amenity of this local context. Thus, the magnitude of visual effect is deemed to be Low-negligible. The proposed mitigation screen planting will be barely discernible from here.		
VP19	Croghan Hill: This is an elevated panoramic view afforded from the summit of Croghan Hill. The depicted view extends to the north, where the landscape is characterised by a mix of pastoral farmland and extensive blocks of commercial conifer forestry. Across the distant landscape, the vegetation becomes stacked in perspective, cloaking much of the landscape throughout the background of the view. Although not depicted in this view, the newly operational turbines of the Yellow River Wind Farm will be clearly visible throughout the foreground to middle ground of views afforded to the north and northeast from this elevated view.	**High-medium**	The proposed development will be visible to the north, with the solar aspect and the data centre development separated by a broad area of conifer forestry. Nonetheless, each element of the development will occupy a notable area of land; however, neither appears as a highly prominent feature from this elevated viewpoint and will instead likely be perceived as an alternative form of land use from this location. Overall, the main visual effect here relates to the intensification of development within the 360-degree view. However, the visual break between the solar aspect and the data centre helps to diminish the overall perceived scale and extent of the development. It is not considered that the proposed development will notably draw the eye from this distance of over	**Slight / Negative / Medium-term**	**Slight / Negative / Permanent**

VP NO.	EXISTING VIEW	VP SENSITIVITY	MAGNITUDE OF VISUAL EFFECT (PRE & POST MITIGATION)	PRE MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT	POST MITIGATION SIGNIFICANCE / QUALITY / DURATION OF EFFECT
			5 km; therefore, the magnitude of effect is deemed to be Low. The proposed mitigation screen planting will further anchor the development within the wider landscape context, although it will have a limited screening effect from this elevated location. As such, the residual magnitude of effect is also deemed Low.		

12.5.8 CUMULATIVE IMPACT ASSESSMENT

In this instance, the most notable cumulative developments — including the Flexgen Castlelost development — are operational developments and, as such, form part of the baseline landscape and visual context. These are assessed cumulatively in the sections above. Other relevant development types include the Yellow River Wind Farm, which is also operational and assessed as a cumulative development throughout the report. Overall, it is not considered that there are any further relevant cumulative development types to be assessed in respect of the proposed development.

On balance, for the reasons outlined above and detailed in the preceding sections, there will be some notable cumulative landscape and visual effects in relation to the operational Flexgen Castlelost development. Indeed, the combined developments will constitute one of the most prominent single land uses in this local context. In terms of cumulative visual effects, the most notable combined visibility is largely contained within the M6 corridor and its immediate surrounding landscape. Where visible, the Flexgen development has the greatest potential to be seen in combination with the proposed GIS building, which will share the same finish as the existing Flexgen development and is therefore likely to be perceived as an extension of this newly operational development.

Overall, while there will be some notable cumulative landscape and visual effects, these tend to be highly localised and are deemed to be Not Significant.

12.5.9 MONITORING

12.5.9.1 Construction Phase

Landscape tender drawings and specifications will be produced to ensure that the landscape work is implemented in accordance with best practice. This document will include tree work procedures, soil handling, planting and maintenance. The contract works will be supervised by a suitably qualified landscape architect.

The planting works will be undertaken in the next available planting season after completion of the main civil engineering and building work.

All tree protection requirements will be installed on commencement of the development and removed on a phased basis as stages of the development are completed.

12.5.9.2 Operational Phase

This will consist of weed control, replacement planting, pruning etc. All landscape works will be in an establishment phase for the initial three years from planting. All works will be monitored on an ongoing basis to ensure the quality of the development is maintained.

12.6 CONCLUSIONS

In terms of landscape impacts, the proposed development is of considerable scale and extent and will become one of the most prominent single land uses in this context. However, the solar aspect and the main site compound are likely to be perceived as two separate development types, which marginally diminishes the perceived overall scale and extent of the development.

While the solar element will have a limited physical impact, the data hall component of the development will involve more notable physical effects. These include the removal of some hedgerow vegetation, stripping of topsoil, and some extensive excavation works to accommodate the foundations of the proposed built structures.

Although the development will result in some higher-magnitude physical effects, the perceived impacts on the surrounding landscape character are highly localised. This is due to the strategic siting of the proposed development within a well-contained part of the landscape, as evidenced by the submitted photomontages accompanying this assessment. There will indeed be notable impacts on the landscape character of the site and its immediate surroundings; however, these operational-phase effects will be further mitigated by a comprehensive landscape mitigation strategy. Over time, the proposed landscape interventions will help to screen and soften the development and will further integrate it into this relatively robust landscape context.

In terms of landscape designations, this is not considered to be a highly sensitive landscape, as evidenced by the presence of existing development such as the Flexgen Castlelost development, the M6 motorway corridor, and the surrounding working land uses, including pastoral farmland and extensive conifer plantations. This assessment is further supported by the absence of Areas of High Amenity within the study area in County Westmeath. In County Offaly, within the southern extent of the study area, landscape sensitivity is classified as ranging from Low to Moderate.

Overall, the proposed development represents one of the largest single land uses within this local landscape context and will result in higher-magnitude effects, classified as Substantial-Moderate, at the site and its immediate surroundings. Beyond this immediate

context, residual landscape effects diminish rapidly as the development becomes further screened and softened, significantly reducing its potential to affect the wider landscape character. On balance, the operational landscape effects are deemed to be Not Significant

In terms of visual impact, this was assessed from 19 no. viewpoint locations throughout the study area, representing a range of viewing angles, distances, and visual receptor types. The majority of views are located within the near and immediate surroundings of the development, where the greatest potential for significant visual effects is likely to occur. The sensitivity of visual receptors ranged from High–Medium to Low, reflecting the generally robust character of the study area. Receptors identified with High–Medium and Medium sensitivity include the more elevated views from within the study area, such as those from Croghan Hill and views from surrounding designated scenic viewpoints, respectively. All other representative viewpoints within the study area have been classified as having a receptor sensitivity of Medium–Low or Low, further underscoring the resilient visual nature of this landscape context.

Whilst the scale and extent of the development is considerable, its perceived visual prominence is significantly diminished within this landscape context. In particular, with respect to the main site compound—comprising the proposed data halls and fuel cell buildings, which are among the largest structures within the development—the full scale and extent of this component is never fully apparent from the immediate surrounding landscape.

Although the regional road to the north of the site will afford some clear views of the nearest two data halls, these structures tend to screen the more distant built features within the site, with only brief and partial views of the proposed fuel cell buildings visible from this location. It is also important to note that, once the proposed mitigation screen planting has become fully established, views of these data halls will be heavily filtered, thereby considerably reducing their perceived visual presence. Furthermore, once the proposed native woodland planting has fully matured (in approximately 15–20 years), views of this part of the site are likely to be almost completely screened (refer to Figure 12.16 below).

Similarly, while there will be some clearer views of the proposed fuel cell buildings and the GIS building, along with surrounding ancillary features, from the M6 motorway corridor to the south, visibility of the data halls from this corridor will be limited. The intervening screening provided by roadside embankments and mature vegetation further obscures lower-lying built features within the site. In fact, visibility of the proposed development from the motorway will be largely confined to the westbound carriageway, with the

eastbound carriageway benefitting from a higher degree of screening due to these intervening landscape elements.

Overall, the residual visual effects generated by the proposed development are assessed as ranging between Moderate and Imperceptible. The most notable residual effects are associated with views from the adjacent motorway corridor and local road overpasses to the south of the proposed development. However, these receptors are not considered to be highly susceptible to change, as reflected in their Low visual receptor sensitivity classification.

Figure 12.16 Updated Photomontage Booklet: VP2 located to the immediate north of the site showing the effectiveness of the proposed mitigation screen planting once fully established



With regard to the solar aspect of the development, whilst there will be clear views of the proposed panels from some of the nearest surrounding receptors once the development becomes operational, the perceived visual presence of the panels will be considerably reduced once the proposed mitigation screen planting has fully established (approximately 3–4 years). At that stage, visibility of the panel arrays will be very limited. Indeed, residual visibility from the nearest surrounding receptors is expected to be restricted to fleeting or glimpse views of the panel structures. Overall, the residual visual effects generated by the solar aspect of the proposed development are assessed as being no greater than Slight.

On balance, for the reasons outlined above, it is considered that the proposed development represents a sizable intervention within this landscape context and will give rise to some notable residual landscape and visual effects. Nevertheless, landscape effects are primarily concentrated at the site level and its immediate surroundings. While the development will result in a marked increase in the intensity of land use locally, its potential to significantly influence the character of the wider landscape, beyond approximately 250–500 metres from the site, is limited.

In terms of residual visual effects, the full scale and extent of the development is never fully perceptible, even from the nearest local receptors. The proposed development is considered to be appropriately sited, and visual effects will be further reduced through the implementation of a comprehensive landscape mitigation strategy. Indeed, the principal visual effects are expected to be experienced by road users travelling along nearby sections of the motorway corridor and a number of local road overbridges. These receptors are not deemed highly sensitive to visual change.

Overall, it is concluded that, whilst sizable, the proposed development is located within a robust landscape setting and does not conflict with any landscape or visual policies or objectives contained within the County Development Plans for either County Westmeath or County Offaly

The proposed development has been designed to respond carefully to the character and sensitivity of its receiving environment. Generous setbacks are provided from the regional road and adjoining residential properties; the Data Halls are articulated and modelled to reduce their perceived scale and visual prominence through a geometric metal veil, a landscaped central plaza and surrounding earthen berms; and the solar layout provides enhanced residential offsets in line with established best practice. The security infrastructure has been designed to minimise visual intrusion.

12.6.1 OVERALL SIGNIFICANCE OF EFFECT

Based on the landscape and visual effect judgements provided throughout this LVIA, the proposed development is not considered to give rise to any significant residual effect. Instead, landscape effects are not considered to exceed 'Substantial-moderate' significance at the site and its immediate surrounding landscape, and even in the immediate context of the site and residual visual effects are not considered to exceed 'Moderate' significance. Thus, the residual landscape and visual effects are deemed Not Significant.

The photomontages, supported by Digital Terrain Model and Digital Surface Model visibility mapping, demonstrate that the landscape mitigation strategy, including reinforced hedgerows and native woodland planting, substantially limits visibility from the surrounding road network and nearby dwellings once established. While some localised visual change occurs, particularly during the initial establishment period, the residual significance of effect ranges from Moderate–Slight to Imperceptible and does not result in significant adverse impacts on the rural landscape or residential amenity in the post-mitigation establishment scenario. The proposed development is therefore considered to achieve an appropriate and balanced integration within its receiving environment.

12.7 REFERENCES

- Landscape Institute and the Institute of Environmental Management and Assessment (IEMA) publication entitled Guidelines for Landscape and Visual Impact Assessment, 2013 (GLVIA3).
- Environmental Protection Agency (EPA) publication "Guidelines on the Information to be contained in Environmental Impact Statements" (2022).
- "Photography and Photomontage in Landscape and Visual Impact Assessment", Landscape Institute Technical Guidance Note 06/2019.

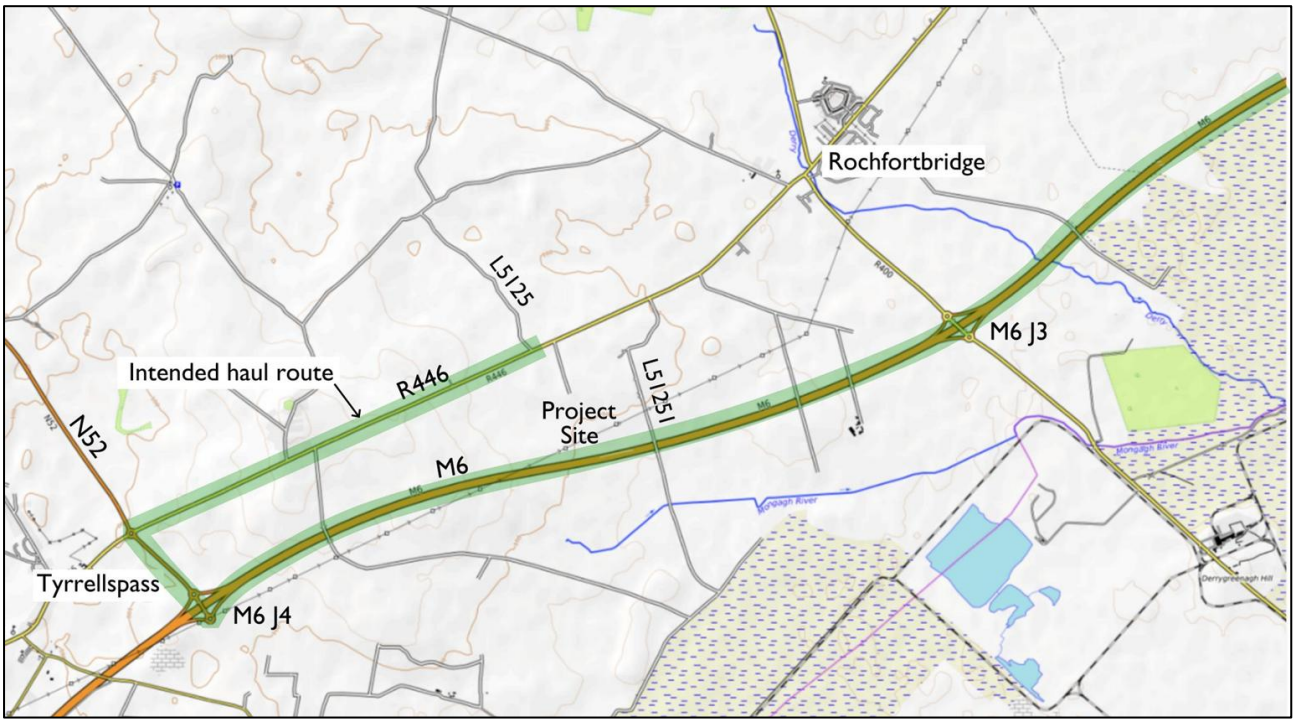
13 TRAFFIC & TRANSPORT

13.1 INTRODUCTION

This chapter of the EIAR provides an assessment of the traffic and transport related impacts of the proposed development in the townlands of Gneevebane, Oldtown, Farthingstown, Castlelost and Kiltotan and Collinstown in the south of County Westmeath.

It is proposed that the development lands (Figure 13.1) will be accessed off the R446 Regional Road approximately 3.1km to the east of the N52/R446 junction (located to the east of Tyrrellspass), and immediately to the east of the R446/L5125 junction. A secondary access point to the DC facility from the R446 for emergency use only.

Figure 13.1 Site Location



13.1.1 OVERVIEW OF DEVELOPMENT PROPOSALS

Red Admiral DC Limited propose to develop a DC facility and DER on lands in the townlands of Gneevebane, Oldtown, Farthingstown, Castlelost and Kiltotan and Collinstown in the south of County Westmeath. The project includes two main elements, namely:

- The Data Centre (DC) facility, comprising six two-storey Data Centre buildings, car parking, landscaping, drainage and other associated works. The DC facility will be

constructed and secured within a 39ha campus. Each DC building will have a footprint of 13,978 m^2 (sqm). Each DC building will contain:

- Data halls fitted with server racks and distribution units,
- Mechanical and electrical (M&E) plant rooms /spaces which will house advanced cooling equipment, pumps, piping and medium voltage (MV) and low voltage (LV) switchgear, and
- Administration and support areas including, reception, offices, meeting rooms and welfare facilities.

- Decentralised Energy Resource (DER), which will be constructed across approximately 200ha of lands adjoining the DC facility. The DER incorporates several power assets which will generate, store and manage electricity close to the DC facility. The DER comprises the following assets:
  - Fuel Cell Power System – 160MW,
  - Battery Energy Storage System (BESS) – 250MW,
  - Solar PV farm (nominal 180MWp), and
  - 220kV IPP GIS Grid connection to the 220kV Castlelost GIS substation which adjoins the proposed development site.

A full description of the proposed development is provided in Chapter 2 of this EIAR.

13.2 ASSESSMENT METHODOLOGY & SIGNIFICANCE CRITERIA

The methodology adopted for the production of this chapter is detailed below.

13.2.1 LEGISLATION AND GUIDANCE

Relevant guidance on assessing the impact of a development on roads, traffic and transport is contained within: the TTA guidelines produced by Transport Infrastructure Ireland (TII)[50] and, the Environmental Protection Agency (EPA) Guidelines on the information to be contained in Environmental Impact Assessment Reports[51].

13.2.2 APPROACH TO ASSESSMENT

The traffic and transport impacts of the proposed development have been assessed by utilising the following approach based on the aforementioned legislation and guidance. The assessment combines:

[50] Transport Infrastructure Ireland (2014) PE-PDV-02045 Traffic and Transport Assessment Guidelines
[51] Environmental Protection Agency (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports

- Undertaking desktop based study including reviewing: the construction programme; construction traffic routeing; construction and operational trip generation of developments with similar component parts; and, appropriate operational mobility management measures;
- Undertaking site based field work including: traffic count surveys; and, a Road Safety Audit site visit;
- Undertaking traffic modelling of the construction and operational traffic generated by the proposed development on the local road network;
- Reviewing the environmental impact of the construction and operational traffic generated by the proposed development against significance criteria; and,
- Considering whether mitigation measures are required to ensure that any potential roads, traffic and transport effects are kept to a minimum.

13.2.3 CONSULTATIONS

A pre-planning meeting was held involving Halston and Westmeath County Council in February 2025. Following the pre-planning meeting, an informal technical scoping request, related to the intended content of this chapter, was issued to Westmeath County Council on 16 May 2025, with additional information being issued at the request of the Council on 19 May 2025. No formal response was received from Westmeath County Council.

13.2.4 SIGNIFICANCE CRITERIA

The main significance criteria when assessing traffic and transport impacts of a proposed development is the impact of the development on the operation of the road network in the vicinity of the development. Whilst a specific threshold is not set in relation to energy related developments, a '*material increase*' is normally considered to have occurred where traffic to and from a proposed development exceeds 10% of the traffic flow on an impacted local road, and/or 5% of the traffic flow on an impacted national road. Exceeding these threshold value does not mean that the development results in a significant traffic or environmental impact, but does mean that the impact of the development requires further (more detailed) assessment. Other criteria include, for example: any increase in road traffic collisions (which may result in environmental impacts due to spillage); damage to the road structure; and measurable traffic related effects on air quality (see Chapter 10) and noise and vibration (see Chapter 11).

When assessing significance criteria, it is always important to remain cognisant of sensitive receptors such as facilities catering for the young or elderly, where the occupants can be more susceptible to the adverse effects of exposure to environmental impacts.

13.3 DESCRIPTION OF RECEIVING ENVIRONMENT

13.3.1 SITE LOCATION

The proposed development is located between the villages of Rochfortbridge and Tyrrellspass as described in Section 2.2 of the EIAR.

13.3.2 EXISTING SITE TRAFFIC CHARACTERISTICS

The proposed development lands are located adjacent to the Castlelost Flexgen Plant, which is currently under construction, with construction traffic utilising the main access for the proposed development off the R446 regional road. Construction of this plant is due to be completed in Q4 of 2025 /Q1 of 2026.

13.3.3 CURRENT TRAFFIC VOLUMES

To inform the analysis contained within this chapter of the EIAR, manual classified traffic count surveys (MCC) were undertaken during the AM and PM peak periods (between 07:45-09:14 and 16:30-17:59 hours) at the following junctions (listed west to east) on Thursday 22 May 2025:

- The existing R446/N52 roundabout junction to the east of Tyrrellspass;
- The existing R446/L5125 t-junction to the west of the main access for the proposed development;
- The existing R446/Castlelost development site access t-junction junction (Plate 13.1);
- The existing R446/L51251 local road t-junction;
- The existing R446/L11272 local road t-junction to the west of Rochfortbridge;
- The existing R446/L1127 local road t-junction in Rochfortbridge; and,
- The existing R446/R400 mini-roundabout junction in Rochfortbridge.

Plate 13.1 The R446 Regional Road at the existing R446/Castlelost development site access t-junction



For the purpose of the traffic assessment contained in this chapter, the traffic count survey data has been converted into Passenger Car Units (PCUs). This PCU data assigns factors of: 0.2 for pedal cycles; 0.4 for motorcycles; 1.0 for cars and light goods vehicles (LGV) including those towing trailers; and, 2.3 for all Heavy Goods Vehicles (HGVs), buses and coaches. This conversion is necessary to provide a standard unit of measurement within traffic modelling. The MCC data, including PCU data, is provided in Appendix 13.1.

Traffic data collected by the permanent TII traffic counter located on the N52 immediately to the north of the aforementioned R446/N52 roundabout junction (TII traffic counter reference: TMU N52 110.0E) indicates that traffic volumes on Thursday 22 May 2025 were 8% above average workday traffic levels for the 12-month period July 2024 to June 2025 inclusive. For the purpose of the traffic capacity analysis, including traffic modelling contained within this chapter of the EIAR, the MCC data has not been adjusted for seasonality and is therefore considered by TTRSA to be robust.

TTRSA have been informed by Halston that construction of the proposed development is forecast to start in 2028 or 2029. The peak construction year is forecast to be 2029 and the opening (completion year) is forecast to be 2033. Future assessment years, five and 15 years after opening are therefore 2038 and 2048. Existing traffic on the local road network has been growthed to these years using the TII Project Appraisal Guidelines link based central growth factors for County Westmeath[4], taking into account of 6% HGV, the average recorded at the existing R446/N52 roundabout junction and R446/R400 mini-roundabout junction. The following growth factors have been applied:

- From 2025 to 2029 a factor of 1.070;
- From 2025 to 2033 a factor of 1.099;
- From 2025 to 2038 a factor of 1.137; and,
- From 2025 to 2048 a factor of 1.210.

The impact of this traffic growth is detailed within traffic calculations (input data for the traffic modelling) included within Appendix 13.3. Any minor variation in the opening and future assessment years will not impact on the validity of the results of the traffic modelling.

13.3.4 PROPOSED TRAFFIC SCHEMES

As part of preparing this chapter, a review has been undertaken of proposed transport schemes in the vicinity of the proposed development. No transport schemes have been identified that would either impact on, or be impact by, the proposed development.

13.3.5 COMMITTED DEVELOPMENT

As part of the preparation of this chapter, the '*National Planning Application Map Viewer*'[3] was reviewed on 06 July 2025. No specific committed development has been identified that would generate traffic over and above the growth factors detailed in paragraph 13.3.3.

13.4 ASSESSMENT OF POTENTIAL ENVIRONMENTAL EFFECTS

13.4.1 TRAFFIC CAPACITY EFFECTS

Traffic capacity effects are typically assessed in terms of the impact of the traffic generated by a development on the operation of the local road network, the significance criteria for which are stated in Section 13.2.4. Traffic modelling software is used to facilitate this assessment.

13.4.2 TRIP GENERATION

The trip generation related to the construction and operational phases of the proposed development has been predicted taking account of the proposed workforce associated with the proposed development and typical volumes of construction related HGV traffic associated with the elements of the proposed development taking account of, for example: the gross floor areas (GFAs) of the DC; and, the area of Solar PV Farm and MW output of the other elements of the DER. Employee related (car/LGV) travel has been calculated with a vehicle occupancy of 2.

Detailed calculations in relation to construction related trip generation are included in Appendix 13-2. In summary, the peak hour construction related trip generation is predicted to be:

- A maximum of peak of three two-way HGV trips in each of the AM and PM peak hours;

- 85 employee related arrivals and 13 employee related departures in the AM peak hour; and,
- 213 employee related departures in the PM peak hour.

The main trip generation associated with the operational phase of the proposed development related to the DC facility. A DC facility of the size proposed, when all six data halls are fully constructed, the operation of the proposed DC including DER is expected to have approximately 360-400 staff. The staff would be expected to work over a number of different shifts, for example: two 12-hour shifts for security; one 8-hour shift for management and office staff; three 8-hour shifts for M&E staff; and one 8-hour shift for facilities and DER related staff. Predicted operational phase trips, based on car/LGV access with an occupancy of one (representing a worst-case), have been included within the traffic calculations in Appendix 13.3

The operation of the elements of the DER are typically remotely monitored and operational phase trips related to the DER are predicted to be:

- Fuel Cell Power System – Less than on two-way Car/LGV trip per week;
- Battery Energy Storage System (BESS) – Less than on two-way Car/LGV trip per week; and,
- Solar PV Farm – Less than on two-way Car/LGV trip per week.

No abnormal and/or oversized loads are anticipated.

13.4.3 TRIP DISTRIBUTION AND ASSIGNMENT

For the purpose of the assessment contained within this chapter, HGV trips associated with the proposed development have been routed: via the M6; exiting at junction 4 of the M6 motorway onto the N52; via the N52 to the R446/N52 roundabout; and, via the R446 accessing the proposed development site from the west, (and reverse). The intended route for construction related HGV trips does not pass through either Rochfortbridge or Tyrrellspass. Employee related trips have been distributed taking account of existing proportional traffic movements at the junctions covered by the assessment.

13.4.4 TRAFFIC MODELLING APPROACH

The operation of the existing junctions listed in Section 13.3.3 have been assessed using the industry standard traffic modelling software packages ARCADY (for roundabout junction) and PICADY (for priority 't' junctions), for the weekday AM and PM peak hours in the peak construction, opening, and future assessment years listed in Section 13.3.1.4. The assessment has been undertaken using PCU values. The criteria used to assess the

performance of a junction for a given traffic demand within the aforementioned traffic modelling software are:

- Ratio of Flow to Capacity (RFC) is a measure of junction performance in terms of saturation. A value of 1.00 in ARCADY or PICADY represents an arm of the junction operating at maximum capacity and that any increase in the rate of vehicles arriving on the link will result in significant additional queue lengths. Traditionally a figure of 0.85 or 85% is the maximum acceptable degree of saturation for priority and roundabout junctions, with anything above these figures being considered to be congested.
- Queue lengths (measured in PCUs), primarily used to check for blocking back through adjacent junctions.

The results of the assessment are summarised in Table 13.1, with the modelling output files being provided within Appendix 13.4. In summary, the traffic (capacity) impact of the proposed development, is short term and not significant.

Table 13.1 Maximum RFC values at junctions without and with the proposed development

Existing Junction	Without Proposed Development				With Proposed Development			
	2029	2033	2038	2048	2029	2033	2038	2048
R446/N52	0.37	0.39	0.40	0.43	0.39	0.40	0.41	0.44
R446/L5125	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
R446/Site Access	0.04	0.04	0.04	0.04	0.41	0.15	0.15	0.16
R446/L51251	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
R446/L11272	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06
R446/L1127	0.37	0.38	0.40	0.43	0.37	0.39	0.40	0.43
R446/R400	0.35	0.36	0.37	0.40	0.37	0.37	0.39	0.41

13.4.5 ROAD STRUCTURE EFFECTS

The effect of the proposed development on road structure impact is initially assessed by a simple visual inspection for cracking, deformation and disintegration in the vicinity of the site (DTTAS 2013[5], 2014[6]). If following this visual assessment, (taking account of the types and volumes of traffic likely to be generated from a proposed development) the structural ability of the road to carry the traffic is in question, tests can be undertaken to determine the structural strength of the carriageway. Current guidance for such testing is detailed in the TII publication '*Pavement Assessment, Repair and Renewal Principles*' Reference AM-PAV-060509 published in March 2020[7].

Prior to the opening of the M6 motorway, the section of the R446 impacted by the proposed development was part of the N6 national road linking Dublin to Galway. The R446 has a sealed width of approximately 11.85m comprising eastbound and westbound running lanes and hard shoulders on both sides of the carriageway. During a site visit on Friday 26 June 2025, ravelling was observed on the R446 in the immediate vicinity of the R446/Site Access junction, particularly coincident with worn road markings; ravelling and bleeding was observed on the L11272 local road; and, a section of the L51251 had recently been resurfaced with tar and chip. Because the proposed development results in trip generation on the R446 and local roads over and above existing levels, there is potential for the development related traffic to impact on the structure of these roads in the short term. If the mitigation measures included within Sections 13.5 are implemented, the impact of the proposed development on the road structure is predicted to be not significant.

13.4.6 ROAD SAFETY EFFECTS

Road safety effects of a proposed development are typically assessed in terms of the collision record on the local road network in the vicinity of a development. Safety related geometrical measurements are also assessed, for example, visibility to and from access points and junctions. Collision data is not currently publicly available due to ongoing issues in relation to GDPR and associated data-sharing agreements between An Garda Síochána and the Road Safety Authority.

The posted speed limit on the R446 is 100km/h. Egress visibility splays indicated the project engineers are consistent with the posted speed limit.

A Stage 1 Road Safety Audit has been conducted of the highway related design associated with the proposed access junctions onto the R446, L51251 and L11272 local roads. This Road Safety Audit has been conducted in accordance with the TII '*Road Safety Audit Standard*'[8]. This Road Safety Audit is included as Appendix 13.5. If the mitigation measures included within paragraph 13.5.2 (recommendations contained within the Road Safety Audit) are implemented, the impact of the proposed development on road safety is predicted to be not significant.

13.5 MITIGATION MEASURES

The following mitigation measures are recommended in relation to the proposed development.

13.5.1 ROAD STRUCTURE MITIGATION

To reduce the impact of the proposed development on the road structure of the R446 in the immediate vicinity of the proposed development, and the impacted local road network, the baseline condition of the impacted roads should be agreed with Westmeath County Council prior to the commencement of the development, and the condition subsequently reviewed: annually during construction; and, on the completion of construction. Any defects deemed to be resulting from the construction of the proposed development should be 'made good' within an agreed timescale. If defects to the structure of local road which have the potential to impact on road safety are observed outside of the aforementioned reviews, the defects should be made good within an agreed timescale.

13.5.2 ROAD SAFETY MITIGATION

As noted in Section 13.4.1.5, the Road Safety Audit contains a number of recommendations in relation to the highway related design associated with the proposed site access junctions onto the R446, L51251 and L11272 local roads. The recommendations contained within the Road Safety Audit should be actioned to mitigate the road safety effects associated with these site accesses.

13.6 RESIDUALTRAFFIC EFFECTS

Taking into account the analysis contained within this chapter and implementation of the mitigation and monitoring contained within Sections 13.5.1 and 13.5.2, the residual traffic and transport related impact of the development is considered to be not significant.

13.7 DO NOTHING' SCENARIO

If the proposed development does not proceed, whilst there would be no impact immediate to the proposed development site, it is anticipated that the demand for such as development would remain and be satisfied at an alternative location. The effects of the development on the wider environment would therefore be similar to those detailed within this chapter

13.8 CUUMULATIVE EFFECTS

The assessment contained in this chapter takes full account of the proposed development, combined with traffic related impact of factors such as population and economic growth, changes to development patterns and employment locations, and other specific planned developments.

13.9 TRANS-BORDER /INTERNATIONAL EFFECTS

Due to both the distance of the proposed development to an international border, whilst road vehicles currently generate emissions in terms of exhaust gases and particulate matter, the trans-border/international traffic related environmental impact associated with the proposed development is not measurable.

13.10 DIFFICULTIES ENCOUNTERED IN COMPILING INFORMATION

No difficulties (technical deficiencies or lack of know-how) were encountered in compiling this chapter. The traffic assessment contained within this chapter uses a fixed demand matrix which reflects current travel behaviour. Changes in the nature of existing trips such as re-timing, re-routeing, and/or changes in the mode of transport used, may result in a lesser impact than stated within this chapter.

13.11 REFERENCES

- [1] TII (2014) 'PE-PDV-02045 Traffic and Transport Assessment Guidelines', https://www.tiipublications.ie/library/PE-PDV-02045-01.pdf
- [2] EPA (2022) 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf
- [3] 'National Planning Application Map Viewer' https://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=9cf2a09799d74d8e9316a3d3a4d3a8de
- [4] Transport Infrastructure Ireland (2019) PE-PAG-02017 Traffic Demand Projections
- [5] DTTAS (2013) 'Urban Flexible Roads Manual : Pavement Surface Condition Index Volume 2 of 3' https://www.rmo.ie/uploads/8/2/1/0/821068/psci_manual_urban_flexibleroads_04112013_lowres.pdf
- [6] DTTAS (2014) 'Pavement Asset Management Guidance Section 5.0: Condition Surveying and Rating – Overview' https://www.rmo.ie/uploads/8/2/1/0/821068/ipag_-_pamg_-_section_5.0_-_condition_surveying_and_rating_-_overview.pdf
- [7] TII (2020) ' AM-PAV-060501 Pavement Assessment, Repair and Renewal Principles' https://www.tiipublications.ie/library/AM-PAV-06050-02.pdf
- [8] Transport Infrastructure Ireland (2025) GE-STY-01024 Road Safety Audit' (standard).

14 ARCHAEOLOGICAL AND CULTURAL HERITAGE

14.1 INTRODUCTION

This chapter presents the findings of an Archaeological and Cultural Heritage Impact Assessment on the site of a proposed development located within the townlands of Oldtown, Farthingstown, Gneevebane, Kiltotan and Collinstown, Co. Westmeath (645800, 739000 see Appendix 14-A; Figure 1). The site is located between Rochfortbridge and Tyrrellspass, adjacent to the M6 Galway to Dublin Motorway and the R446 regional road between Rochfortbridge and Tyrrellspass.

The site covers an area of c. 243 hectares and primarily consists of greenfield agricultural land alongside the M6 motorway and the regional R446 (see Appendix 14-A; Figure 5). Several wet ditches are present across the site, marking field boundaries, including the Mongagh River at the southern extent of the site. A GNI gas pipeline is currently under construction, and the granted 220kV GIS substation the Castlelost Flexgen reserve Gas Fired Generator are located adjacent to the development lands

The proposed development consists of (1) Data Centre facility and includes six two-storey data halls; and a (2) Decentralised Energy Resource within 192ha to include power assets and associated infrastructure. These are subject to the following permissions:

- Section 34 application to Westmeath County Council (DCC and DER)
- Section 182A SID application to An Bord Pleanála (HV Electrical Transmission Lines)

The proposed development has been designed to preserve in situ six monuments (ringforts; WM033-046; WM033-061; WM033-066 – 69); these are within the archaeological constraints' areas (Appendix 14-A; Figure 1); and excluded from any groundworks. Furthermore, a Protected Structure listed in the *Westmeath County Development Plan 2021-2027*; a forge/smithy (RPS 033-001; NIAH Reg. No. 15320002) is located along the proposed access route.

Portions of the site were subject to archaeological assessments prior, including geophysical surveys, test trenching, excavation and monitoring this was in relation to a gas fired generator (Planning Ref. no. 21/515), the Energy storage system (ESS) (Planning Ref. No. 21/532) new GIS substation (ABP-311276-21), the GNI (Kiltotan) Pipeline (CRU 202473) with the geophysical survey of the western portion of the site at pre-planning. The latter confirmed the presence of subsurface remains of ringfort WM0033-061 and identified a previously unknown enclosure with associated field systems

14.2 ASSESSMENT METHODOLOGY & SIGNIFICANCE CRITERIA

14.2.1 DESKTOP STUDY

For the purposes of this report, archaeology, architectural and cultural heritage is considered to include the following elements:

- Sites and Monuments Record (SMR)
- Record of Monuments and Places (RMP)
- National Monuments
- Sites reported in the Database of Irish Excavation Reports
- Any previously unrecorded sites
- A list of architectural heritage structures (NIAH)
- A list of Protected Structures (*Westmeath County Development Plan 2021–2027*)
- Archaeological Reports (on Geophysical Surveys, Test Trenching, Excavations, Monitoring of the site)

14.2.2 RMP AND SMR

A primary cartographic source and base-line data for the assessment was consultation of the *Sites and Monuments Record* (SMR) and *Record of Monuments and Places* (RMP) for County Westmeath. All known recorded archaeological monuments are indicated on the 6-inch Ordnance Survey (OS) maps and are listed in these records. The SMR and RMP paper archives are not a complete record of all monuments, however, as newly discovered sites may not appear in the lists or accompanying maps. Accordingly, in conjunction with the consultation of the SMR and RMP, the digital database of recorded monuments (Historic Environment Viewer), which may be accessed through the National Monuments Service (NMS) website, was also consulted. This database of SMR records is updated daily.

The county SMR forms the basis for the statutory RMP (established under Section 12 of the National Monuments (Amendment) Act 1994). Accordingly, all sites included in the RMP are protected under the National Monuments Acts (1930–2004).

14.2.3 NATIONAL MONUMENTS

The National Monuments Service website lists Monuments covered by Preservation Orders and in the ownership/guardianship of the Minister for Housing, Local Government and Heritage by county (https://www.archaeology.ie/national-monuments/).

The term 'National Monument' is defined by the National Monuments Act (1930) as being 'a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic, or archaeological interest attaching thereto'. The aforementioned Act states that the consent of the Minister is required for archaeological works at or near a National Monument in the ownership or guardianship of the Minister or a local authority, or to which a preservation order applies. The Minister is required to consult with the Director of the National Museum of Ireland in relation to such an application for consent.

14.2.4 PROTECTED STRUCTURES & NIAH SITES

Protected Structures are buildings and other structures that the planning authority considers to be of special interest from an architectural, historical, archaeological, artistic, cultural, scientific, social, or technical point of view. These are protected under Part IV of the Planning and Development Acts 2000 and listed in Volume 8: Record of Protected Structures in the *Westmeath County Development Plan 2021–2027*.

Heritage Structures are also recorded by the National Inventory of Architectural Heritage (NIAH), a state initiative established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999. The list forms the basis for the recommendations for inclusion in the Record of Protected Structures (RPS).

14.2.5 THE TOPOGRAPHICAL FILES OF THE NATIONAL MUSEUM OF IRELAND

The topographical files of the National Museum of Ireland contain information pertaining to archaeological finds (mainly artefactual) and excavations in numerous townlands throughout the country, which were reported to the museum since the 1920s. While many of these find spots are not recorded monuments, they can provide an indication of past activity in a townland and consequently add to our understanding of the archaeological potential of an area.

14.2.6 CARTOGRAPHIC SOURCES AND AERIAL IMAGERY

Potential archaeological or cultural heritage features can be marked on historic maps or be visible on aerial photography as cropmarks, soil marks and low earthworks. Both provide a useful resource in identifying sites, particularly if they no longer have any above-ground remains.

Several cartographic sources were consulted as part of this assessment, namely *The Down Survey of Ireland* (1656–1658), and the first (surveyed 1837 – published 1840) and third

edition (surveyed 1911 – published 1913) Ordnance Survey (OS) maps (see Appendix 14-A; Figures 2–4). Aerial photographs dating between 1995 and 2013 from the Ordnance Survey of Ireland (OSi) were also examined, as was Google Earth imagery dating between 2005 and 2024.

14.2.7 EXCAVATIONS DATABASE

The Database of Irish Excavation Reports, also known as the Excavations Database, is an annual account of all investigations carried out under an excavation licence and includes excavations undertaken from 1970 to the present (www.excavations.ie). This database was consulted as part of the desktop research for this assessment to establish if any previous archaeological investigations under an excavation licence had been carried out on or near the proposed development area.

14.1.1 ARCHAEOLOGICAL REPORTS

The following reports were also consulted in order to inform the assessment of all aspects of the archaeological resource within the proposed development site and to ensure that the assessment is cognisant of all relevant policies and objectives:

14.2.7.1 Geophysical Survey

Geophysical Survey, in the form of magnetic gradiometry, is a non-intrusive method that is used in Irish Archaeology. It is a method for rapidly mapping archaeological objects, structures, deposits and other features, including geological anomalies, that survive beneath the ground surface. The results are presented as a grey-scale map of anomalies detected that are interpreted by an experienced archaeologist. A licence to carry out work is required and is granted by the Department of Housing Local Government and Heritage following submission of the licence application for the site in question. Upon completion of the work, a report detailing the results of the work carried out is submitted to the Department and the National Museum of Ireland Geophysical surveys.

Below are relevant reports on geophysical surveys carried out to date within or adjacent to the site:

- Kiltotan and Collinstown, Oldtown, Co. Westmeath Geophysical Survey Report (Licence Number 21R0317) by ACSU (Murphy, Breen 2022)
- Report on Geophysical Survey at Kiltotan and Collinstown, Gneevebane, and Oldtown, Co. Westmeath (Licence Number 24R0163) by ACSU (Murphy, Rochford 2024a)

- Geophysical Survey Report CRU Gas to Lumcloon Project, Co. Westmeath (Licence Number 24R0194) by ACSU (Murphy, Rochford, 2024b)

14.2.7.2 Archaeological Test Trenching

Archaeological test trenching is carried out in advance of construction and is undertaken across the footprint of a proposed development. Test trenches are excavated to facilitate the early identification of archaeological deposits and features. If test trenching is carried out following a geophysical survey, the trenches are placed to target anomalies detected in order to assess their significance, extent and depth. The results allow for an informed decision on how best to deal with any discovered archaeological finds or features prior to works on site commencing. A licence to carry out the work is required and is granted by the Department of Housing Local Government and Heritage following submission of the licence application for the site in question. Upon completion of the work, a report detailing the results of the work carried out is submitted to the Department and the National Museum of Ireland

Below are relevant reports on test trenching carried out to date within or adjacent to the site:

- Report on Archaeological Test Trenching at Kiltotan and Collinstown, and Oldtown, Rochfortbridge, Co. Westmeath (Licence Number 22E0211) by ACSU (Murphy, Lyne 2022)
- Archaeological Impact Assessment Report Gas to Lumcloon Project Walterstown, Calverstown, Kilbrennan, Piercetown, Castlelost West, Oldtown, Kiltotan and Collinstown (24E0734, 24R0351) by ACSU (Gibney, Murphy 2024).

14.2.7.3 Archaeological Excavation

Archaeological excavation can be carried out in advance of construction (if features were identified as a result of prior assessments, such as test trenching), but also during the construction phase (if features were exposed during monitoring). Archaeological features exposed as a result of test trenching or monitoring that can not be preserved in situ require preservation by record (excavation by hand). This requires topsoil stripping of the archaeological areas under the direct supervision of an archaeologist to expose the top of the archaeological features and the natural subsoil. Following topsoil removal, the features are cleaned by hand and planned/surveyed, then sectioned, fully excavated by hand and recorded in detail.Below are relevant reports on excavation carried out to date within or adjacent to the site:

- Report on Archaeological Monitoring & Excavation at Kiltotan, Collinstown & Oldtown, Rochfortbridge, Co. Westmeath (Licence Number 22E0211 ext) by ACSU (Murphy, Murphy 2023)
- Archaeological Excavation Report Oldtown 1, Co. Westmeath (Licence Number 24E1071) by ACSU (Gibney, Sines 2025)

14.2.7.4 Archaeological Monitoring

Archaeological monitoring is carried out during the construction phase of all ground disturbances associated with the works. It can be undertaken following prior assessment or as a sole archaeological mitigation measure. The aim of monitoring is to confirm the presence/absence of archaeological features within the site to be developed. Any features of archaeological significance found during monitoring require preservation in situ or preservation by record as appropriate in consultation with the Statutory Authorities. A licence to carry out the work is required and is granted by the Department of Housing, Local Government and Heritage following submission of the licence application for the site in question. Upon completion of the work, a report detailing the results of the work carried out is submitted to the Department and the National Museum of Ireland.

Below are relevant reports on monitoring carried out to date within or adjacent to the site:

- Report on Archaeological Monitoring & Excavation at Kiltotan, Collinstown & Oldtown, Rochfortbridge, Co. Westmeath (Licence Number 22E0211 ext) by ACSU (Murphy, Murphy 2023)
- Archaeological Monitoring Report. Gas to Lumcloon Project. Walterstown, Calverstown, Kilbrennan, Piercetown, Castlelost West, Oldtown, Kiltotan and Collinstown (24E0734) by ACSU (Gibney, Sines in prep)

14.2.8 DOCUMENTARY RESEARCH

Additional desktop research included the following resources:

- The Irish Townlands Database (https://www.townlands.ie/), the Irish Placename Database (https://www.logainm.ie/en/) and the Database of Placenames in Westmeath County - Townland Names of Westmeath Project (https://aengusfinnegan.ie/townland-names-of-westmeath-project/) were consulted for the associated administrative divisions (baronies, civil parishes and townlands) and the meaning of the placenames and fields within and surrounding the proposed development site. The Irish Placename Database was created by Gaois, Fiontar & Scoil na Gaeilge in collaboration with The Placenames Branch of

the Department of Housing, Local Government and Heritage. It contains archival records and placenames research conducted by the State. Many of Ireland's geographical names are of Irish origin, while others derive from English, with a small number from Old Norse. The anglicisation process included name standardisation, which was largely carried out in the 19th century and recorded in the Ordnance Survey's work. Toponyms can provide useful historical and cultural heritage data, such as information on administrative divisions, natural and archaeological features that may have disappeared, and the ownership or character and origins of a settlement. The Database of Placenames in Westmeath County includes details from the Ordnance Survey Name Books, which are notebooks compiled in the 1840s as part of the first Ordnance Survey of Ireland.

- Griffith's Valuation (1847–1864) is a property tax survey with accompanying mapping that lists and details every taxable piece of agricultural land or built property in Ireland, published county by county.
- The School's Collection, which is a collection of folklore compiled by school children in Ireland in the 1930s. It includes references to intangible cultural heritage, such as folk traditions and oral histories, and was recorded between 1937 and 1939.

14.2.9 STANDARDS AND GUIDELINES

This chapter's methodology is guided by a legislative framework that governs how aspects of archaeological, cultural and architectural heritage are protected. It has been prepared in compliance with all relevant EIAR legislation and guidance, including *Guidelines on the information to be contained in Environmental Impact Assessment Reports*, published by the Environmental Protection Agency (2022).

14.2.10 SIGNIFICANCE CRITERIA

The main purpose of this chapter is to identify, describe and present an assessment of the likely significant effects of the proposed development on archaeological and cultural heritage remains (known and unknown if present). An effect can be positive, negative, or neutral/none, direct or indirect. The effect may result from the construction phase and/or the operation phase of the project.

The potential effects will be assessed for each component of the development as described above, as well as cumulatively.

This chapter aims to present a precise, concise, accurate, and credible description of the likely and significant effects of archaeological and cultural heritage and offer mitigation measures where a likely significant effect is predicted. The description of effects follows

the EPA Guidelines (2022, Table 3.4, Figure. 3.4), whereby comparing the character of the predicted effect to the sensitivity of the receiving environment can determine the significance.

14.3 DESCRIPTION OF RECEIVING ENVIRONMENT

14.3.1 INTRODUCTION

The development site is principally located within four townlands: Oldtown, Farthingstown, Gneevebane, Kiltotan and Collinstown, Co. Westmeath. The eastern portion of the site, adjacent to and on the north and south sides of the M6, is in the townland of Farthingstown, with a minor portion at the south in Kiltotan and Collinstown townland; the northern portion is adjacent to and north of R446 in the townlands of Oldtown and Farthingstown, while the western portion is in the townland of Kiltotan and Collinstown with minor portions in Oldtown and Gneevebane townlands.

An area at the centre of the site adjacent to and north of M6 Motorway, is within the ownership boundary but largely not a part of the planning boundary, however, it was subject to geophysical survey, test trenching, excavation and monitoring; while the western portion of the site was subject to geophysical survey (see Section 13.3.6; Appendix 14-A, Figure 5)

The site has an elevation of c. 83–124m Ordnance Datum (O.D.). The underlying geology consists of massive unbedded limestone-mudstone, a part of the Waulsortian Formation at the north and dark limestone and shale, a part of the Lucan Formation with volcaniclastic agglomerate at the south. It is covered by deep, well-drained mineral (mainly basic) soils with some patches of mineral poorly drained soils and cut away peat at the very south (Geological Survey of Ireland). The Monagagh River traverses the southern portion of the site; its tributary, forming the southern boundary of the site, is referred to Castlejordan_20 (Environmental Protection Agency). The Monagagh River flows through three counties Westmeath, Offaly and Meath, and is connected to Milltown River and Yellow River. Its head is to the east of Smithstown and its mouth is to the south of Castlejordan. The site crosses townland boundaries and consists of low rolling terrain that is typical of the midlands. To the northwest of the site, at Garrane there is a low hill with a subtle ridge east of the Castlelost FlexGen /GIS site. To the south of the site the landscape is flat with the exception of a prominent hill known assCroghan Hill. The site is accessed via R466 (Regional), the old Tyrrellspass to Rochfortbridge road, and two local roads, L51251 and Farthingstown L11272.

the terrain is undulating as it includes several drumlins. The site is accessed via a cul-de-sac off the L8763 (local road) that terminates at the farmyard.

Cultural Heritage is considered here to include all recorded monuments listed in the Record of Monuments and Places (RMP) and in the Sites and Monuments Record (SMR), National Monuments (i.e. those in the ownership/guardianship of the state), Protected Structures, National Inventory of Architectural Heritage (NIAH) sites, previously unrecorded sites, sites reported in the Excavations Database if not included in the RMP/SMR, find spots or sites listed in the Topographical Files of the National Museum of Ireland, and finally sites identified during a site visit, through examination of cartographic sources and aerial imagery, and through non-invasive geophysical survey.

14.3.2 HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

The relevant townlands are all within the Barony of Fartullagh in the Civil Parish of Castlelost. The Down Survey map of 1654-56 depicts the Barony as Turtullagh, and the Parish of Castlelost with Oldtõ, Gnevbane Kiltotan, Fardinstõ, Collinstõ. The Barony map depicts a towner house in Collinstown, Gnewbane, Old towne, and Branockstown noted together as well as Killtotan and Fardingstown, the latter bordered by a great red bog. Not much detail is given in relation to the townlands in the Irish Placename Database. However, the Westmeath Field Names Recording Project and the Griffiths Valuation were examined and give an insight into the heritage of the site.

The Westmeath Field Names Recording Project (https://meitheal.logainm.ie/westmeath-field-names/) holds relevant details in relation to the western and southern portions of the site. These include names of fields. Some of these refer to geological features (e.g Rock Field, Furry Hill, Red Hills), filed type (e.g Bush Field, Planting Field), some refer to the former tenants names (e.g Kerrigan's Field, Matt's Garden, Kerrigan's Garden, Caddell's Field), archaeological monuments (e.g Fort Field, or Matt's Fort that appear to refer to WM033-066 and WM033-061 respectively) while other names may hint to the presence of features and structures of potential historical and heritage interest (e.g Well Field, Back of Buildings, Old Street, Hut Field).

The Griffith's Valuation database (https://www.askaboutireland.ie/griffith-valuation/index.xml?action=placeSearch) archives and relevant maps were examined and suggest a presence of a linear settlement depicted since 1837 in Kiltotan and Collinstown townlands, with some of the buildings no longer shown on the 1903 map and the majority gone or replaced by or reused as farmyard buildings. Similarly, Farthingstown House is a farmyard, and small settlements/farmyards shown in Farthingstown, if still shown on the 1903 mapping, are gone by the 1995 or subsequent aerials. The main immediate lesser

listed for the lands are Charles B. Marley (western lands at Kiltotan and Collinstown and eastern lands at Farthingstown), James Belton Earl of Longford (northwest lands at Gneevebane) with the lands at the west listed as being managed by representatives of William Bagnall (who was deceased at the time of survey).

There are six Recorded Monuments listed in the Record of Monuments and Places for County Westmeath (1997). These are all classified as ringforts (WM033-046; WM033-061; WM033-066–69) and will be preserved in situ and placed within exclusion zones, with no groundworks or storage allowed. All are depicted on the examined map, but only two (WM033-067 and WM033-066) maintain surface expression by the 1995 aerial.

14.3.2.1 Ringforts

Ringforts, as the name suggests, were generally circular enclosures with a minimum of one ditch, with accompanying banks sometimes also surviving. They vary in size, ranging between 15.5m and 75m in diameter internally, but largely falling between 28 and 35 metres (Stout 1997, 15; O'Sullivan et al. 2013, 50). Early Irish laws stated that circularity was a feature of the model ringfort (Stout 1997, 15, 112–4). With an increase in development-led excavations, however, more non-circular enclosures have also come to light and these are generally between 50 and 70 metres in diameter. For this discussion, therefore, all ringforts and enclosures will be discussed under the category 'ditched enclosures'.

The majority of early medieval ditched enclosures date to the sixth to ninth centuries AD, and we see a significant decline in their use in the tenth century (O'Sullivan and Nicholl 2010, 65). Though a site in Laytown, Co. Meath could have a fourth-century date (McConway 2002), other sites such as Ballynacarriga, Co. Cork (Noonan et al. 2004) and Raystown, Co. Meath (Seaver 2005a; 2016), were probably occupied from the fifth century well into the eleventh century.

Most ditched enclosures were univallate, with one bank and one fosse or ditch. In many cases, the banks do not survive. There are also bivallate enclosures, for example, Cloonaboy, Co. Mayo (Gillespie 2010), and multivallate enclosures, such as Garranes, Co. Cork (Ó Ríordáin 1942). Ditched enclosures tend to be situated on sloping or well-drained hilly ground with good views (Stout 1997) and they are usually found in clusters within a townland (Edwards 1990). Evidence from excavations shows that enclosing ditches were, in some cases, allowed to naturally silt up over time, while others were filled with dumped refuse (Monk 1995). Layers of metallurgical wate (iron slag) for example, were dumped into the ditch at Lisleagh, Co. Cork (ibid.).

Ditched enclosures are generally regarded as enclosed farmsteads, and at some sites at least the defences are thought to have been built to protect against cattle raids (Stout 1997, 32–4). Some sites have provided little evidence for internal structures, suggesting the enclosure was used for storing cattle, known as a 'bodun', though the majority provide evidence to suggest they were inhabited settlements, with houses, farmyards, outbuildings and animals (O'Sullivan and Nicholl 2010, 65). Excavated items retrieved from ringforts are largely of a domestic, craft or agricultural nature. Some larger sites, such as Raystown, Co. Meath, fulfilled many functions, such as providing evidence for animal husbandry, cereal and grain processing, milling, burial and metal-working (Seaver 2016).

Settlement enclosures usually have a southeast-facing entrance or causeway, to avoid the prevailing cold westerly and northerly winds that the enclosure would be exposed to (Stout 1997, 18–19). Sometimes the entranceways were also further elaborated with stone or wattle walls or banks. The entrance widths vary from site to site, with that at Rath II at Ballypalady, Co. Antrim, ranging from 0.76m at the outer end to 1.5m at the inner end, suggesting it was not intended for keeping large livestock (O'Sullivan and Nicholl 2010, 68). Many sites, like at Lissachiggel, Co. Louth, also had either cobbles or paving stones, providing a dry passage into the enclosure (ibid.). These entrances were known in early Irish literature and legal sources as the 'airdrochat' and were to be kept clean and dry, with often observed ditches and gullies aiding such drainage (ibid., 70). It was also not unusual to see pathways within the interior of an enclosure, to steer movement in a particular direction and 'upon entering the site, a person was often persuaded by laid pathways to move directly and immediately to the house doorway' (ibid., 69–70).

Early medieval houses within ditched enclosures tended to be circular or round, and these would have been constructed of stone, sods or post-and-wattle walls. The roofs were likely thatched with reeds, turf or straw. According to the eighth-century law text Críth Gablach, a typical farmer's house was 6–8 metres in diameter. Archaeological evidence shows that the majority were 4–5 metres in diameter, and some were significantly larger at 6–10 metres (O'Sullivan and Nicholl 2010, 72). As pointed out by McCormick et al. (2011), because of the basket-like construction, any recuts or changes to these early medieval houses are rarely seen in the archaeological record. It was likely that the lifespan of a medieval house would have lasted for just a short period (20 to 30 years), however, with good maintenance a house could have stood for 50 to 60 years (O'Sullivan and Nicholl 2010, 73).

Also associated with enclosures, and often found in their environs, are other features such as fire pits, storage pits, refuse pits, cooking pits and cereal-drying kilns. O'Sullivan and Nicholls (2010, 85) wrote of pits that they are 'one of the more enigmatic elements to be

found within the enclosure and their function can, at times, be difficult to discern. They would have been used for a variety of purposes; probably reused and cleaned-out many times and countless, no doubt, had multiple functions over their lifetime'. According to McCormick et al. (2011), cereal-drying kilns are generally not associated with ditched enclosures as they are a fire hazard, but they are often found in close proximity, just outside the enclosure, as at Johnstown, Co. Meath, and Camlin, Co. Tipperary, or sometimes within their own small enclosure, as at Baronstown, Co. Meath (O'Sullivan et al. 2013, 203).

14.3.2.2 Field systems

Often associated with early medieval settlement enclosures are field systems. Some are represented by outer circular or D-shaped enclosures with bounded pathways, while others are a complex of non-concentric ditches representing a sequence of enclosure ranging from small paddocks and kitchen gardens to large fields (O'Sullivan et al. 2013, 183–94). Some of these field systems suggest long-term occupation and complexity, where the chronology of the external enclosures and ditches can be interpreted as possible evidence for kinship and partible inheritance, with the creation of new forms of enclosure to accommodate the redistribution of land (Bolger 2011). An early suggestion of a ditched settlement with associated field system was Cush, Co. Limerick (Ó Ríordáin 1940), however, the temporal relationships between the ringfort and the rectangular field ditches were not confirmed through scientific dating and remain speculative (O'Sullivan et al. 2013, 189). With an increase in development-led excavations and scientific dating in more recent years, however, more definite examples of complex field systems have emerged.

On the townland boundary between Glebe and Laughanstown, Co. Dublin, two small ditches radiating from the south side of a ditched enclosure likely represented part of an associated early medieval field system, which was radiocarbon dated to between the seventh and ninth centuries AD (Seaver 2005b; 2011). These curvilinear ditches probably had low banks topped by hawthorn or blackthorn, with both species represented in the associated charcoal samples. The curving hedgerow of the townland boundary also complemented one of these field boundaries, suggesting a large elongated field enclosure attached to the south side of the ringfort.

Excavations at Boyerstown, Co. Meath, revealed an extensive series of rectilinear field systems radiocarbon dated to the early medieval period, and laid out adjacent a likely contemporary ringfort (O'Sullivan et al. 2013, 187). Five circular enclosures and an array of sub-rectangular and curvilinear enclosures were excavated, with the site returning radiocarbon dates between AD 460 and AD 900 (Kinsella 2008; Clarke 2009). What

appeared to be a ringfort, based on geophysical survey results, is located to the northwest of these field systems, and probably related to them. The earliest enclosure (Enclosure 1, 60m x 30m) contained three internal divisions, but no other internal features or finds, with the exception of small amounts of animal bone. One of the internal divisions cut an earlier ditch which was dated to AD 460–650. Enclosure 2 (45m x 25m) was also sub-rectangular and it cut through the south-southeastern extent of Enclosure 1 and was dated to AD 700–900. An annexe to the north was dated to AD 630–780. Two additional radiocarbon dates were recovered from ditch features. One of which either connected to or was cut by Enclosure 1 and was dated to AD 580–680. The other, a small curvilinear ditch, was cut by Enclosure 2 and dated to AD 620–700; it was probably associated with Enclosure 1. While it is likely that these represent successive phases of enclosure they also appeared to be broadly contemporary in use, mainly concentrated within a 200-year period between the seventh and eighth centuries AD. It was suggested by the excavators that all of the ditches functioned as animal enclosures because there was an almost total absence of finds, with only a small amount of animal bone recovered, as well as no evidence for cultivation such as ridge or furrow or plough marks.

Outside of enclosures, people also appear to have lived in houses situated within fields, such as those excavated by Ó Ríordáin (1949) at Lough Gur, Co. Limerick. Here, two roundhouses and one rectangular house were situated within four small rectangular fields, only half an acre in size, overlooking the lake. The small size of these fields suggest they were probably used for tillage or as vegetable gardens. The field boundaries comprised double-stoned walls with rubble fills, ranging in width between 1m and 3m, except for one which was made from earth. Another field bank was situated up the hillside and was probably part of a wider field system used for pasture.

At Ballyutoag, Co. Antrim, two large, conjoined enclosures, with a series of adjacent fields formed by low earthen banks, and a third smaller enclosure, were associated with a number of external hut sites, over an area of approximately 24 acres (Williams 1984). This was probably an upland transhumance settlement where cattle grazed for the summer months and small levels of crop husbandry were undertaken, as evidenced by some cultivation ridges. Excavation of some of the hut sites produced a meagre collection of artefacts, which tied in with the evidence from the historical sources stating that booleying was the work of the impoverished classes and mainly women and children (Patterson 1994). Radiocarbon dates for one of the enclosures indicated use in the seventh to eighth century AD, while the huts were largely dated to the eighth century.

14.3.2.3 Souterrains

Souterrains also date from early medieval period, being mostly in use between the ninth and twelfth centuries AD, although there are also some potentially earlier examples (O'Sullivan et al. 2013, 107). They are found in association with open settlements, enclosed settlements (especially ringforts and cashels), promontory forts and church sites. There are over 3,500 souterrains recorded in Ireland, with the highest concentrations in West Cork, Kerry, North Antrim, south Galway and north Louth (O'Sullivan and Downey 2004).

The term 'souterrain' derives from the French 'sous terrain', meaning underground. In archaeological terms, souterrains are artificial subterranean structures, either cut into bedrock or, more commonly, built into earth-cut trenches. Such trenches are often lined with drystone walling and capped with large stone lintels or roof slabs. Souterrains largely comprise of one or more chambers linked by tunnels called creepways, with access via the ground level, often concealed and provided by ramped or stepped entrances. They can be simple linear or curvilinear structures, or more complex, with multiple chambers and different levels. The primary function of souterrains seems to have been food storage, particularly for dairy products, as they maintain constant temperatures (c. 10°c), but they may also have been used as places for short-term refuge for people and objects if a site was under attack, or for a variety of roles that included a farrowing pen where sows could safely give birth (O'Sullivan et al. 2013, 109–111).

14.3.3 RECORDED ARCHAEOLOGICAL MONUMENTS (RMP/SMR SITES)

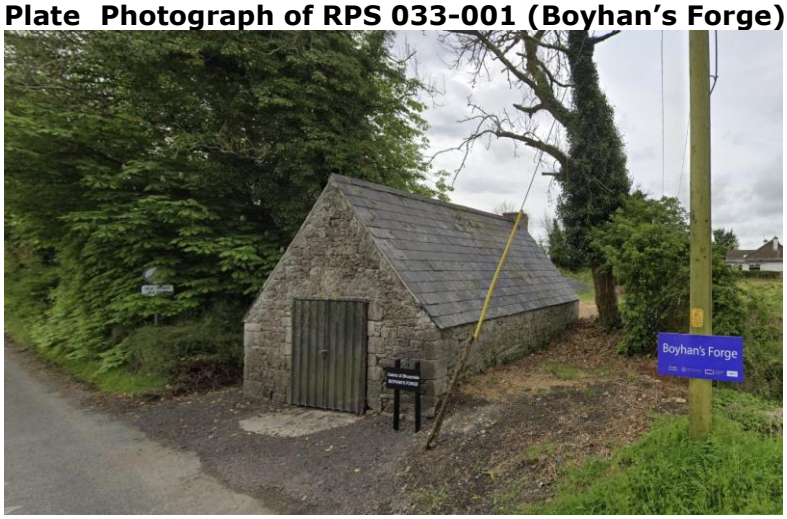
There are six monuments listed in the *Record of Monuments and Places* or the *Sites and Monuments Record* located within the site boundary (see Appendix 14-A; Figure 1). These include ringforts (WM033-046; WM033-061; WM033-066 – 69); these are within the archaeological constraints areas (Appendix 14-A; Figure 8) and are excluded from any groundworks. Furthermore, there are 14 monuments located within 1km of the site, these are dominated by ringforts (eleven such monuments) with an earthwork, enclosure and a mound also listed.

14.3.4 RECORDED ARCHAEOLOGICAL MONUMENTS (RMP/SMR SITES)

Boyhan's Forge at Farthingstown is located immediately adjacent to the Local Road L-11272 just south of the former Dublin to Galway Road and southwest of Rochfortbridge. The forge was built c 1830 and is indicated on the 1st edition Ordnance Survey map. It is built of local limestone and is in good structural condition, with a pitched natural slate roof,

clay ridge tiles, and a square-headed carriage arch to the main east gabled elevation, with double timber-sheeted doors.

Plate Photograph of RPS 033-001 (Boyhan's Forge)



The forge is located outside the red line boundary for the proposed development and therefore there will be no direct impact on the structure. A proposed underground cable will be laid beneath the local road (L-11272) which runs along the edge of the structure. Prior to construction works commencing, temporary barriers will be placed along the road edge in front of the forge in order to prevent any access to the structure for construction machinery. Appropriate signage will be provided to alert the construction crew to the sensitivity of the site and all crew will be briefed by way of a Toolbox Talk in advance of works commencing. Machinery operators will exercise extreme caution when turning machinery not to impact on either the structure itself or the area in front of the forge. All works in the road will be done through open excavation and any vibration will be kept to a minimum to avoid any potential damage to the structure. All excavations along this section of road will be monitored by a licensed archaeologist in order to ensure that these mitigation measures are adhered to.

14.3.5 NATIONAL MONUMENTS

No National Monuments are located on or within close proximity to the site.

14.3.6 PREVIOUSLY UNRECORDED SITES

The site contains a previously unknown monument, a sub-circular enclosure with an annexe, and a possible early field system with associated anomalies, as identified through a geophysical survey (24R0163; Murphy Rochford 2024a). The Report Monument Form has been submitted, and the application to include the monument in the Site and Monuments Record is being processed (for details in section 13.3.6). No other previously

unrecorded sites were noted within the proposed development area during the site walkover survey. Nor were any new sites identified from an examination of aerial imagery.

A number of potential cultural heritage sites were identified on cartographic sources, however. Within the proposed development clusters of buildings, with associated wells or kilns, as well as a linear settlement, were depicted on the examined mapping. Some of the structures are no longer shown by the 1903 map, while others were levelled by the 1995 and 2001 aerial images, and some were reused or replaced by farm buildings. Wells and springs are also frequently marked on historic maps, often as a small circle but sometimes also labelled and named (although these simple circles can also denote the location of limekilns). There are eight such symbols within the site shown on the examined mapping. Some are labelled as 'spring', 'well' 'w' by the time of the 1903 map. Four of these were depicted since the 1837 map. These are all associated with buildings, some are within yards, while others are at a short distance from buildings and could represent a kiln. On the 1903 map, a pump within the northwest portion of the site is shown close to a mile stone (M.S.).

Townland boundaries also extend through the proposed development lands. The townland boundary between Kiltotan and Collinstown with Oldtown and Farthingstown is roughly north to south aligned, while the boundary between Kiltotan and Collinstown with Oldtown and Gneevebane is more irregular, undulating with the field divisions (Appendix 14-A; Figure 5). The line of these townland divisions is still preserved in the layout of the fields today. Townlands represent one of the smallest divisions of land across Ireland, and they have ancient origins, with the first written accounts found in pre-twelfth-century church records (Bryonie 2005). They were subsequently mapped and defined by the English administration and used as the basis for plantation grants in the sixteenth and seventeenth centuries and for the leasing of land within large estates from the early seventeenth century. Accordingly, they were used as units of measurement for taxation purposes and defined in terms of how much arable land they held (Hall 1999). They became standardised from the seventeenth century onwards and were further clarified by the completion of the first Ordnance Survey of Ireland in the 1840s. Townland names frequently referred to an easily identifiable feature of the landscape, such as Carraig or Carrick (meaning Rock), Tulach or Tully (meaning a hill), or a botanical feature such as Eanach or Annagh (meaning marsh), other times they include family names, usually reflecting those that lived there in pre-famine times, or early ecclesiastical and secular habitations, including Rath (meaning fortification), Dun (meaning fort) or Cill/Kill (meaning church) (Donaghmore Historical Society).

14.3.7 PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS

Portions of the site and adjacent areas have been subject to archaeological assessments in the past. These included geophysical surveys, test trenching, excavations and monitoring. However, the northern and eastern portions of the site have not been assessed. Below is a list of archaeological investigations carried out today within the site and adjacent areas.

14.3.7.1 The Castlelost Flexgen Project – Flexgen, ESS and GIS (central portion of the current site)

An archaeological assessment was carried out in relation to a gas-fired generator (Planning Ref. No. 21/515), the Energy storage system (ESS) (Planning Ref. No. 21/532), and a new GIS substation (ABP-311276-21). This included geophysical survey, test trenching, excavation and monitoring.

A geophysical survey under licence 21R0317 issued by the Department of Housing, Local Government and Heritage was undertaken (Murphy, Breen 2022). A full, detailed gradiometer survey was undertaken throughout the application area using a Bartington GRAD 601-2 dual-sensor fluxgate gradiometer cart system. The surveyed area extended across 21 hectares and consists of 9 arable and pasture fields. No definite features were identified. However, anomalies of potential archaeological significance were recorded.

Subsequently, test trenching (Murphy, Lyne 2022) of the site was carried out under licence 22E0211 issued by the Department of Housing, Local Government and Heritage. A total of 67 test trenches were excavated, with an additional 11 offsets to assess features exposed. Each trench measured 1.8m in width, and in total, 5146m of linear trenches were excavated. The test trenches were excavated down to the natural subsoil. A mid-brown sandy clay topsoil and sod, with a combined thickness of 0.1m to 0.65m, was taken down onto a natural orange boulder clay with areas of marl. Outcrops of gravel were recorded in the southern portion of the site. Test trenching identified four areas of archaeological activity, including a fulacht fia/burnt mound (C3) located in Field 6 (corresponding with Anomaly 6D), and three areas of archaeological activity in Field 1, including a keyhole-shaped kiln (C4), a pit (C5) and a large, circular-shaped charcoal-rich pit (C6). These features were clearly of an archaeological nature, were covered with a protective barrier/terram and the trenches were carefully backfilled. Linears, some representing furrows and others corresponding with a townland boundary (C9) and filed boundaries (C7 and C8), were recorded and found to be modern in nature. Preservation by record was recommended.

Excavation of four areas of archaeological significance (Areas A – D) was carried out.

An area 10m by 10m was stripped of topsoil under archaeological supervision around C5, Area A. The oxidised orange clay spread with tiny fragments of charcoal C5 measured 0.54m in length, 0.49m in width and had a maximum depth of 0.08m. It was isolated within the cutting and may have been agricultural in origin, possibly the result of gorse burning. No other features were identified or exposed within Area A.

An area 10m by 10m was stripped of topsoil under archaeological supervision around C6, Area B. This feature was roughly circular in plan with a diameter of 1.7m, a depth of 0.18m and contained two fills (C13 & C14) with evidence of oxidisation along the edges. It was interpreted as an isolated charcoal pit, and no other features were identified in Area B.

An area 10m by 10m was stripped of topsoil under archaeological supervision around C4, Area C. This feature comprised a sub-oval pit 2.26m in length by 1.12m in width and 0.27m in depth. It contained four fills (C15, C16, C17 & C18) and was truncated by agricultural furrows. It had evidence for two phases of use with two thick charcoal layers separated by an oxidised layer, and the base was oxidised, providing evidence of in-situ burning. It was interpreted as an isolated charcoal production pit, and no other features were identified in Area C.

An area 25m by 25m was stripped of topsoil under archaeological supervision around the burnt mound spread C3 in Area D. This feature comprised a spread of heat-shattered stone and charcoal-rich peaty clay measuring 13.1m east-west by 15.3m north-south and varied in depth from 0.08m to 0.3m. It was interpreted as the ploughed out remains of a fulacht fia, and an associated trough and pit were recovered. The trough (C11) was sub-rectangular in plan and measured 2.06m by 1.24m with a maximum depth of 0.18m. It contained a single fill (C12) that was similar to the burnt mound spread (C3). There was no evidence of timber lining within this feature. The pit (C8) was located approximately 10m east of the burnt mound spread C3 and was sub-oval in plan, measuring 1.34m by 1.12m and 0.38m in depth. It contained two fills (C9 & C10), and charcoal was recovered from the primary fill.

14.3.7.2 Pre-planning (the western portion of the current site)

The western portion of the site was subject to a geophysical survey under licence 24R0163 (Murphy, Rochfort 2024a). A full, detailed gradiometer survey was undertaken throughout the application area using a Bartington GRAD 601-2 dual-sensor fluxgate gradiometer cart system. The surveyed area extended over c. 50 hectares and consisted of 11 arable and pasture fields bounded by mature hedges and wet ditches. The geophysical survey

successfully identified the location of buried archaeological remains. Definite archaeological features were detected within Fields 2, 4, 5, 9 and 10 (M3 – M6, M8 and M9), with features of potential archaeological significance recorded in Fields 1, 2, 4 and Field 9, with more tentative responses recorded across Fields 1-9 and Field 11, that may have a natural origin. In Field 2, 4 and 5, the Recorded Monument Ringfort – rath (WM033-061----) was identified (M9), with some possible contemporary linears or field systems (M10-M11). This Recorded Monument had previously been levelled and was only visible as a cropmark. In Field 9, a large settlement complex was identified in the south section of the field, which includes a sub-oval enclosure, a possible annexe (extending eastwards into Field 10), a possible internal structure in the annexe and several linears (M3-M6). Test trenching was recommended.

14.3.7.3 Kiltotan Pipeline

An archaeological assessment was carried out in relation to Kiltotan Pipeline (CRU No. G Pre00144/2024). This included geophysical survey, test trenching, excavation and monitoring.

A ***geophysical survey*** under licence 24R0194 was undertaken of the central portion of the current site (Murphy, Rochford 2024b). A full, detailed gradiometer survey was undertaken throughout the application area using a Bartington GRAD 601-2 dual-sensor fluxgate gradiometer cart system. The site consists of a 5.3km long corridor traversing agricultural land, comprising 36 fields. Fields 1-33 were surveyed under licence 24R0194. The remaining fields were surveyed previously under licence nos. 23R0163 (Field 34) and 21R0317 (Fields 35 and 36). Definite archaeological features were detected within Fields 10 (Anomalies M2 – M6) and 34 (M11 – 14); these indicate the presence of two large settlement complexes, with sub-oval enclosures, possible annexes, possible internal structures within the annexes, a causeway and several linears and curvilinears that might suggest field systems or other enclosing elements in the form of ditches. Scatters of anomalies are also labelled as possible archaeology (?Archaeology). These include a concentration of anomalies; curvilinear and linear responses, large and small responses, which could represent archaeological features in the northern portion of Field 34 (Anomalies M10). These could represent ditches, pits, postholes, spreads and kilns, but could also be natural in origin. In Field 20 (Anomaly M8) and in Field 14 (Anomalies M7), curvilinear and linear anomalies were recorded that could represent possible enclosure ditches with associated field systems; these are more ephemeral, hence could represent changes in the topsoil or the natural subsoil. Former boundaries depicted on the examined Ordnance Survey mapping were recorded in Fields 4, 19, 24, 29, 30 and 31. Test trenching and a buffer zone around the ringfort (WM033-024) were recommended.

The route of the Kiltotan Gas Pipeline was subject to test trenching under licences 24E0734, 24R0351 (Gibney, Murphy 2024). The southern portion of the pipeline lies within the current site. In total, 76 test trenches were excavated; 53 test trenches were excavated first, and a further 23 trenches were excavated once the crop was harvested and access granted. Test trenching identified archaeological features in five separate areas – Kilbrennan 1 (Field system), Kilbrennan 2 (Kiln), Castlelost West 1 (Pits), Castlelost West 2 (Pits) and Oldtown 1 (Ditches/Field Systems, pits). The surface and spoil from all test excavations, as well as all identified archaeological features, were swept with a Garrett ATX metal detector under licence number 24R0351. No artefacts were recovered or hits detected. The topsoil in all the trenches in proximity to; Enclosure WM033-064---- (Field 10) and the newly identified sites at Kilbrennan 1 & 2 and Castlelost West 1 & 2; and an Enclosure identified during the previous geophysical survey (Field 34) and the newly identified site Oldtown 1 were also scanned but no hits were detected or finds recovered, suggesting that the topsoil at both locations has low potential for the presence of metal residues or artefacts. Preservation by record of features identified was recommended and carried out. One of the sites excavated was located within the current site, Oldtown.

Oldtown 1 archaeological excavation was carried out under licence 24E1071 (Gibney; Sines 2025) site comprises modern furrows observed running across the site and extending beyond the eastern and western site limits (C5 and C6/C18). Both ran roughly northeast to southwest across the site and were all similar in size and depth and contained the same loose, mid-brown silty clay with low quantities of small angular to sub-angular spheroidal stone inclusions (C10 and C11, respectively).

Four features (C4, C8, C9, C17) were initially identified as archaeological, while the site was hand-cleaned after the topsoil was stripped. A light red coloured patch was initially thought to be in-situ burning, represented by oxidised clay (C4). However, this was found to be a natural deposit when excavated. C8 and C9 were interpreted as a possible posthole and an associated linear feature, respectively, but were also found to be natural. Finally, C17 was marked as an east-west oriented linear feature but was found to be a deposit of topsoil within a slight depression into the natural (C2).

The archaeological features on-site comprised four linear features orientated roughly north to south (C3, C7, C14 and C15), an additional linear feature orientated roughly east to west (C25), and two pits (C19 and C20).

A 20m x 20m square was also stripped c.30m northwest of the site to identify two possible features identified during the testing phase (C100 and C108). However, no archaeological features were identified in this area.

The features identified at Oldtown 1 appear to be a small part of a larger archaeological landscape. Two known ringforts are located to the northeast and southwest, and the geophysical survey carried out ahead of these excavations identified a large enclosure directly east of Oldtown 1. The excavated features, therefore, likely represent an associated field system dating to the Early Medieval period (400 – 1100 AD). However, the site of Oldtown 1 is a relatively small part of a broader archaeological landscape. Any future excavations to the east would be invaluable in discerning the true nature of the features identified at Oldtown 1.

The pipeline corridor was also subject to monitoring (Gibney, Sines in prep). No features of archaeological significance were exposed.

14.3.7.4 M6 Motorway Investigations

The footprint of the M6 Motorway was subject to test trenching (04E0908), and identified sites that were later excavated (E2768, E2769 and E2770). Features excavated under licence E2768 were interpreted as a burnt mound, pits, furrows and ditches. Two areas were opened. In Area A, a mound of heat-shattered stones, measuring c. 5m by 4m and c. 0.35m in thickness, was excavated. Following the removal of the mound, several pits were found and interpreted as storage pits and water-holding troughs. One of the pits was radiocarbon dated to the Chalcolithic/Early Bronze Age period (2458–2150 cal. BC). The linears exposed were interpreted as post-medieval and were represented by furrows, drains and modern ditches, some associated with modern agricultural activity. In Area B, a large oval pit was excavated. It measured 1.35m by 1.04m with a depth of 0.58m. It returned an Early Bronze Age date (2135–1928 cal. BC).

Excavations under licence E2769 exposed a large Bronze Age pit and post-medieval ditches. In Area A, a series of diagonal ditches and pits were identified during test trenching. Subsequent excavation interpreted these as being natural in origin. However, a large enigmatic area of burning and a series of field boundaries were uncovered. The burning area measured 5.2m by 3.86m and was 0.85m thick. It was radiocarbon dated to the Late Bronze Age (1116–919 cal. BC) and was interpreted as an area of repeated large fires. A disturbed pit was excavated in Area B and later interpreted as a tree throw.

Early medieval furnaces and post-medieval ditches were excavated under licence E2770 across three areas. In Area A, a furnace pit was excavated; it measured 0.47m in diameter and was 0.15m deep. Small amounts of slag were retrieved, and the feature was interpreted as a smithing furnace. A radiocarbon date of cal. AD 899–1032 was obtained. In Area B, a 2m wide and 0.58m deep ditch was excavated. It was interpreted as relatively recent in date; however, it was not depicted on the first edition Ordnance Survey map.

Area C consisted of a modern ditch and an oval-shaped pit. The pit was 0.7m by 0.6m and 0.24m deep and was interpreted as a furnace. Smithing residues included a tuyere fragment, vitrified clay lining fragments, amorphous slag and fluid slag. The feature was dated to the late medieval/post-medieval period (cal. AD 1420–1611).

14.3.7.5 Test Trenching (07E0867

In 2007, test trenching in advance of quarrying under licence 07E0867 (Dehaene 2007). The investigations identified a hearth and a relict field boundary. No report has been uploaded, so the precise location remains unknown. Below is the entry/summary from the Database of Irish Excavation Reports:

> *Quarrying works are planned for this site which comprises two arable fields totalling 16.9ha. Testing took place in September 2007 of geophysical anomalies identified by Earthsound Ltd. Eleven trenches were excavated, totalling 456m. A hearth was identified in the west of the site. This was a rectangular feature with charred fills. A relict field boundary, illustrated on the first-edition 6-inch OS map but not visible on the surface, was identified. (https://excavations.ie/report/2007/Westmeath/0018904/; accessed June 2025)*

14.3.8 RPS AND NIAH

The site contains no architectural heritage sites or Protected Structures as listed in the *Westmeath County Development Plan 2021–2027*. However, a forge/smithy (RPS 033-001; NIAH Reg. No. 15320002) is located along the proposed access route; along L11272 Farthingstown just off R446 Tyrrellspass to Rochfortbridge.

14.3.9 CARTOGRAPHIC SOURCES AND AERIAL IMAGERY

A review of available historic mapping for the area was carried out to include *The Down Survey of Ireland* Barony of Turtullagh (1656), the first (surveyed 1836 – published 1839) and third edition (surveyed 1911/12 – published 1913) Ordnance Survey (OS) maps

The Down Survey map of 1654-56 depicts the Barony as Turtullagh, and the Parish of Castlelost with the townlands noted as *Oldtõ, Gnevbane Kiltotan, Fardinstõ, Collinstõ*. The Barony map depicts a towner house in Collinstown, and labels *Gnewbane, Old towne and Branockstown* are noted together as well as *Killtotan and Fardingstown*, the latter bordered by a *Great Red Bog*.

The 6-inch OS map of 1836 and the 25-inch OS map of 1911/12 show a rural landscape of farmland, divided by field boundaries and traversed by unfenced roads or tracks, which

changed over time (Appendix 14-A; Figures 3-4). All six of the Recorded Monuments located within the site are depicted, suggesting these had surface expression. A series of clusters of small cottages or vernacular houses, small farmyards both with outbuildings, are also illustrated within the proposed development site. Some of those buildings are associated with farm yards, garden allotments, wells and limekilns. While most of these features no longer have any above-ground expression, sub-surface remains and associated artefacts may still be present. Of particular interest is the linear settlement along a road spanning the townlands of Kiltotan and Collinstown, extending into Oldtown. While some of these buildings are largely no longer extant, some appear to be in use as or were replaced by farm buildings at present. By the time of the 25-inch map of 1911/12, some of the small farmyards/clusters also include buildings marked as abandoned, while others are no longer shown. The field systems were also changed, and additional boundaries were added. This is particularly apparent in relation to the very southern portion of the site, where wet ditches are illustrated forming field boundaries. This suggests efforts to improve the land, with parts of the southern area of the site depicted as comprising rough pasture overgrown with furze, and a small portion as marsh.

A review of available aerial photographs was also conducted, including those dating to between 1995 and 2013 from the Ordnance Survey of Ireland and Google Earth imagery dating between 2005 and 2020. By the time of the 1995 aerial image, a number of the field boundaries depicted on the historical mapping had been removed. The only monument with a clear surface expression that appears to have been left untouched is WM033-066. Some tree clearance took place within WM033-067. However, its bank appears to be present on subsequent aerials. There is no surface expression on the 1995 aerial of WM033-068, WM033-046, and WM033-061; these were completely levelled. However, cropmarks indicating a subsurface presence can be observed. By the 2001-2005 aerial test trenches excavated and excavation areas carried out in relation to the M6 motorway can be seen. In late 2005, aerial photos show that the construction of the motorway was underway. At that time, the very southeastern portion of the site, measuring c. 27 hectares on the south side of the motorway, was used for soil storage but returned to grass by 2008, with large spoil heaps still present by the 2020 aerial. It is unclear if the soil was used and spread out across fields or transported elsewhere. However, this portion of the site is low lying and in proximity to bog. It appears that the Mongagh River traversing the southern portion of the site was re-routed by 2006-2012 aerial and subject to dredging on a number of occasions. This is apparent, particularly on the 2011-2013 aerial. There is a number of linear cropmark anomalies visible indicating former field boundaries, as well as cromparks corresponding with plots depicted on the

examined mapping. Some faint cropmarks of parallel linears are visible and might indicate drainage.

14.3.10 TOPOGRAPHICAL FILES

The Topographical Files of the National Museum of Ireland were consulted but finds were recorded for the townlands.

14.3.11 FIELD INSPECTION

A site inspection was conducted in May 2025 (see Appendix 14-B; Plates 1-5). This confirmed that the site consists of agricultural land of mixed-use pasture and tillage cultivation. The field system boundaries are predominantly maintained hedgerows with occasional mature trees, wet ditches and farmers' tracks. The land directly south of the site consists of a bog. The site contains six recorded monuments, all are ringforts, two have surface expression. Furthermore, a forge/smithy (RPS 033-001; NIAH Reg. No. 15320002) is located along the proposed access route.

14.4 ASSESSMENT OF POTENTIAL ENVIRONMENTAL EFFECTS

14.4.1 ARCHAEOLOGICAL HERITAGE

There will be no effects, direct or indirect, on recorded archaeological monuments. While there are six such monuments within the site, the development was designed not to impact these monuments. The monuments will be placed within exclusion zones with no groundworks or soil storage permitted.

A potential direct effect on the archaeological resource lies in the uncovering of sub-surface archaeological features during groundworks associated with the proposed development and related infrastructure within all undisturbed areas of the site. Only the western portion of the site was subject to the geophysical survey (24R0163; Murphy, Rochford 2024a). Definite archaeological features were detected within Fields 2, 4, 5, 9 and 10 (M3 – M6, M8 and M9), with features of potential archaeological significance recorded in Fields 1, 2, 4 and Field 9, with more tentative responses recorded across Fields 1-9 and Field 11, that may have a natural origin. In Field 2, 4 and 5, the Recorded Monument Ringfort – rath (WM033-061----) was identified (M9), with some possible contemporary linears or field systems (M10-M11). While no groundworks are proposed within the area of a sub-circular enclosure with an annexe and a possible early field system with associated anomalies (Anomalies M3-M6); the remaining anomalies identified will require further assessment (see Section 14.5.1; Appendix 14-A; Figure 5). Furthermore, the northern and the eastern portions of the site were not subject to assessments prior.

The Mongagh River traverses the southern portion of the site and is fed by wet ditches, indicating an area that was formerly at the boundary between wetland and dryland. Such locations, where there is a readily available water source but also an adjacent area of dry ground, frequently contain the remains of *fulacht fia*, also known as burnt mounds. They are usually identified as charcoal-rich mounds or spreads of heat-shattered stones; however, in many cases the sites have been disturbed by later agricultural activity and are no longer visible on the field surface. Disturbed spreads will nonetheless often preserve underlying associated features, such as troughs, pits, post/stake-holes and gullies. They represent the remains of prehistoric water heating sites, where people mainly gathered to cook food, although they could also have been used for bathing/sauna, brewing, textile working, etc. Burnt mounds are most commonly dated to the Bronze Age (c. 2200–800 BC), largely to the Middle–Late Bronze Age (Brindley et al. 1990; Corlett 1997), however, many examples are now also known to date from the Neolithic, Chalcolithic and Iron Age (Hawkes 2018, chapter 5).

Should previously unknown archaeological features be present, the proposed development will have a direct, negative, permanent and profound or very significant effect on such remains.

14.4.2 ARCHITECTURAL AND CULTURAL HERITAGE

There will be no effects, direct or indirect, on recorded architectural heritage as no Protected Structures or sites listed within the National Inventory of Architectural Heritage (NIAH) are located within the proposed development site.

However, a Protected Structure listed in the *Westmeath County Development Plan 2021-2027*, a forge/smithy (RPS 033-001; NIAH Reg. No. 15320002) is located along the proposed access route. Any groundworks associated with the road upgrade, if required, have the potential to impact on the structure. Furthermore, buildings associated with the linear settlement are depicted on the 6-inch map of 1837 and the 25-inch map of 1903 within the site (see Appendix 14-A; Figures 3–4). Where the buildings are still upstanding, some aspects of the original vernacular structures may remain upstanding and will require further assessment (see Section 14.5.2).

Additional cultural heritage features depicted on the examined Ordnance Survey mapping of 1837 and 1903 were also detected within the proposed development site, but have no above-ground remains surviving (see Appendix 14-A; Figures 3–5). A potential direct effect on these features lies in the uncovering of sub-surface remains during groundworks associated with the proposed development and related infrastructure.

Townland boundaries also extend through the proposed development lands. The townland boundary between Kiltotan and Collinstown with Oldtown and Farthingstown is roughly north to south aligned, while the boundary between Kiltotan and Collinstown with Oldtown and Gneevebane is more irregular, undulating with the field division. These land divisions represent the smallest administrative divisions in Ireland, and many have a deep history that goes beyond their subsequent standardisation in the seventeenth century. Accordingly, where any of the townland boundaries are to be impacted by the development, they will require further assessment. The proposals for the site include the removal of a significant section of the townland boundary between Kiltotan and Collinstown, with Oldtown and Gneevebane. Two roads are proposed over

The proposed development will have a direct, negative, permanent and profound effect on townland boundaries. Furthermore, should previously unknown cultural heritage features be present, the proposed development will have a direct, negative, permanent and profound or very significant effect on such remains.

14.4.3 INDIRECT EFFECTS

Indirect effects are those whereby the proposed development may have a negative (or positive) effect on the wider archaeological landscape or surrounding architectural and cultural heritage. Indirect effects may include a visual impact on the surrounding archaeological and/or architectural landscape.

The introduction of the proposed development to the area will result in a change to the general setting of all of the recorded monuments and the protected structure.

The proposed development will have an indirect negative effect on the setting on setting of two recorded monuments - WM033-066---- and WM033-067---- as these have surface expression.

14.5 MITIGATION MEASURES

14.5.1 ARCHAEOLOGICAL HERITAGE

The predicted effects on the known archaeological heritage are regarded as being none. No effects on the recorded archaeological resource (SMRs/RMPs). There will be indirect and visual effects on the monuments present within the site.

A potential direct effect on previously unknown archaeological heritage lies in the uncovering of sub-surface remains. Accordingly, the following mitigation measures will be carried out subject to the approval of the National Monuments Service (NMS) of the

Department of Housing, Local Government and Heritage (DHLGH), and further mitigation may be sought by the NMS.

- Six recorded monuments (ringforts; WM033-046; WM033-061; WM033-066 – 69); and a previously unknown monument, a sub-circular enclosure with an annexe and a possible early field system with associated anomalies identified as a geophysical survey (Anomalies M3-M5; 24R0163; Murphy, Rochford 2024a) will be entirely excluded, fenced off from all development traffic or other potential impacts from the development for the duration of the construction phase. The buffer zones will be established prior to any groundworks commencing.
- A geophysical survey shall be carried out in the northern and eastern portion of the site, which has not been subject to a survey previously. This will be carried out prior to any groundworks commencing and will be undertaken by an experienced, licence-eligible archaeologist working under licence from the Department of Housing, Local Government and Heritage.
- Archaeological test trenching will be carried out on the western portion of the site prior to any groundworks commencing and will be undertaken by an experienced, licence-eligible archaeologist working under licence from the Department of Housing, Local Government and Heritage. The trenches will be positioned to target anomalies identified during the geophysical survey and more general testing within the footprint of the proposed development. (see Section 13.5.2 also). If archaeological features or deposits are exposed, these shall be sufficiently sectioned in order to assess their extent, nature and significance. Once test trenching is complete, further mitigation might include preservation in situ (avoidance), excavation (preservation by record) and/or monitoring of topsoil stripping.
- Archaeological test trenching will be carried out on the northern and eastern portion of the site prior to any groundworks commencing and will be undertaken by an experienced, licence-eligible archaeologist working under licence from the Department of Housing, Local Government and Heritage. The trenches will be positioned to target anomalies identified during the geophysical survey and more general testing within the footprint of the proposed development/infrastructure/road). If archaeological features or deposits are exposed, these shall be sufficiently sectioned in order to assess their extent, nature and significance. Once test trenching is complete, further mitigation might include preservation in situ (avoidance), excavation (preservation by record) and/or monitoring of topsoil stripping.

- Mitigation measures for preservation (by record or in situ) of archaeological, architectural and cultural heritage shall be included in the Construction Management Plan (including the buffer/exclusion zones). The plan will be updated following the completion of the archaeological assessments, and should the proposed development be altered.
- Adequate time and resources will be provided by the developer for the resolution of any archaeology identified within the development site, which will be directly impacted by groundworks. Time and resources will also be allowed for any post-excavation work and specialist analysis necessary following any archaeological excavation that takes place.
- A report is required to be compiled on completion of any archaeological excavation and will be submitted to the relevant authorities.

Regarding Boyhan's Forge (RPS 033-001) a proposed underground cable will be laid beneath the local road (L-11272) which runs along the edge of the structure. Prior to construction works commencing, temporary barriers will be placed along the road edge in front of the forge in order to prevent any access to the structure for construction machinery.

Appropriate signage will be provided to alert the construction crew to the sensitivity of the site and all crew will be briefed by way of a Toolbox Talk in advance of works commencing. Machinery operators will exercise extreme caution when turning machinery not to impact on either the structure itself or the area in front of the forge. All works in the road will be done through open excavation and any vibration will be kept to a minimum to avoid any potential damage to the structure. All excavations along this section of road will be monitored by a licensed archaeologist in order to ensure that these mitigation measures are adhered to.

14.5.2 ARCHITECTURAL AND CULTURAL HERITAGE

The predicted effects on the known architectural heritage are regarded as being none. No effects on Protected Structures (RPS) or sites in the National Inventory of Architectural Heritage (NIAH) were identified, and no indirect or visual effects on the nearest such site outside the proposed development site boundary were noted.

A number of potential direct effects previously unknown architectural and cultural heritage were identified, however, and the following mitigation measures will be carried out:

Townland boundaries within the development will be directly affected. Accordingly, a townland boundary survey should be completed by an experienced archaeologist prior to

any groundworks in any areas to be impacted. This will comprise a comprehensive written and illustrated record of those boundaries. Where deemed appropriate, the archaeological test trenching may also target these features. Any machine-dug section through a townland boundary will be cleaned by hand and recorded as a measured survey.

- Any upstanding structures associated with the linear settlement scheduled for demolition may incorporate earlier vernacular buildings or fabric. Accordingly, a visual assessment of the buildings, including a photographic survey, should be completed by an archaeologist with built-heritage experience prior to their demolition. Following demolition, this area may also be subject to test trenching.
- The sub-surface remains of other vernacular buildings and associated features, such as limekilns and wells, may also be present across the site. Accordingly, the archaeological test trenching shall also target such features, where identified on historical mapping.
- Caution when working in the vicinity of a forge/smithy (RPS 033-001; NIAH Reg. No. 15320002) located along the proposed access route (north end of L11272) to ensure no damage occurs

14.6 RESIDUAL IMPACTS OF THE DEVELOPMENT

The residual impacts are likely to be neutral and none to imperceptible if the mitigation measures are implemented. The table below summarises the residual effects of the proposed development on the archaeological and cultural heritage landscape. Residual impacts are defined as the overall effect of the development on archaeology and cultural heritage, on the basis of implementing the mitigation measures outlined in this report.

Table 14.1 Residual Impacts

Potential Effects	Mitigation strategy	Residual impacts
Construction Effects		
Effects on Recorded Monuments	Exclusion/buffer zones to be established prior to groundworks commencing, and mitigation measures to be included in the CMP and updated upon completion of archaeological assessments or any alteration to the proposed development.	None
Effects on previously unknown archaeological and cultural heritage sites – Demolition of buildings. Topsoil removal associated with development. Groundworks and service trenches, etc.	Assessment and photographic survey prior to building demolition/townland boundary removal Geophysical Survey of the northern and eastern portion of the site and the archaeological test trenching of the footprint of the proposed development, including targeting geophysical survey anomalies, features identified on	None

Potential Effects	Mitigation strategy	Residual impacts
Construction Effects		
	historical mapping and photographic and measured survey of townland boundaries. Consultation with the Licensing Section of the National Monuments Service should be undertaken if archaeological sites or features are uncovered. Excavation and recording of any archaeological features identified, thus preserving them by record.	
Effects on Protected Structures - none	Caution when working in the vicinity of a forge/smithy (RPS 033-001; NIAH Reg. No. 15320002) located along the proposed access route (north end of L11272) to ensure no damage occurs	None
Operational Effects		
Effects on Recorded Monuments	Buffer zones to be established and maintained.	None

14.7 CUMULATIVE EFFECTS

Cumulative effect includes the combined effects of multiple developments or activities on a range of receptors, in this case, archaeological monuments and architectural/cultural heritage sites.

There are no significant cumulative effects on the archaeological and cultural heritage resource of the area as a result of the proposed development. There are no predicted effects on the known archaeological and architectural features of the site and the surrounding landscape. The proposed development was designed to avoid any known archaeological and architectural heritage constraints.

Archaeological assessments and excavation took place in relation to a gas fired generator (Planning Ref. no. 21/515), the Energy storage system (ESS) (Planning Ref. No. 21/532) new GIS substation (ABP-311276-21) and the Kiltotan Pipeline (CRU 202473) and resulted in preservation by record or in situ of archaeology identified.

All related due diligence will be undertaken by the client, who will ensure the completion of the required archaeological and cultural heritage assessment.

Subject to the implementation of the appropriate mitigation measures during the construction phase, it is predicted that there will be no residual cumulative effects on archaeological, architectural and cultural heritage.

14.8 MONITORING AND FURTHER WORKS

Monitoring is required during the construction phase and will include archaeological test trenching carried out prior to any groundworks commencing, as well as assessments/surveys of any upstanding vernacular architecture and townland boundaries to be impacted. Following this, further mitigation may be required in the form of preservation in situ (avoidance), excavation (preservation by record) and/or monitoring of topsoil stripping. Such mitigation measures (as outlined in Section 14.5) should be conditioned within any planning permission for the site.

No monitoring is required during the operation phase.

14.9 SUMMARY OF SIGNIFICANT EFFECTS

Should previously unknown archaeological, architectural, and cultural heritage features be present within the footprint of the proposed development, it will likely result in the permanent loss of these remains, and, as such, the magnitude of the effect is profound or very significant.

14.10 REFERENCES

- Bolger, T. (2011) 'Status, inheritance and land tenure: some thoughts on early medieval settlement in the light of recent archaeological excavations', in C. Corlett and M. Potterton (eds), Settlement in Early Medieval Ireland in the light of recent archaeological excavations, 1–10. Research Papers in Irish Archaeology 3. Wordwell, Dublin.
- Brindley, A. L., Lanting, J. N. and Mook, W. G. (1990) Radiocarbon dates from Irish fulachta fiadh and other burnt mounds. The Journal of Irish Archaeology 5 (1989–90), 25–33.
- Bryonie, R. (2005). Identity, locality and the townland in Northern Ireland. In B. Graham and G.J. Ashworth (eds), Senses of Place: Senses of Time, 47–60. Routledge, London.
- Clarke, L. (2009) M3 Clonee-North of Kells Contract 3 Navan Bypass: Report on the Archaeological Excavation of Boyerstown 3, Co. Meath, Ministerial Directions No. A023/015, E3107. Report prepared by Archaeological Consultancy Services Ltd for National Roads Authority. Digital Repository of Ireland (https://doi.org/10.7486/DRI.d2184427p, accessed May 2025).
- Corlett, C. (1997) A fulacht fiadh site at Moynagh Lough, County Meath. Ríocht na Mídhe 9(3), 46–49.
- Database of Irish Excavation Reports (www.excavations.ie, accessed June 2025).

- Edwards, N 1990, The Archaeology of Early Medieval Ireland, Batsford.
- Environmental Protection Agency (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports (https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf, accessed May 2024).
- Fowler, P. J. 1966 'Ridge and furrow cultivation at Cush, Co. Limerick', in North Munster Antiquarian Journal, Vol. 10, 69-71
- Geological Survey Ireland Spatial Resources, Department of the Environment, Climate and Communications(https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228, accessed May 2025).
- Gibney, G., Murphy, D., 2024 Archaeological Impact Assessment Report. Gas to Lumcloon Project: Walterstown, Calverstown, Kilbrennan, Piercetown, Castlelost West, Oldtown, Kiltotan and Collinstown, Co. Westmeath (24E0734, 24R0351). by Unpublished report prepared by Archaeological Consultancy Services Ltd for Bord Gáis Eireann
- Gibney, G., Sines B. 2025 Archaeological Excavation Report Oldtown 1, Co. Westmeath (24E1071); Preliminary, unpublished report prepared by Archaeological Consultancy Services Ltd for Bord Gáis Eireann
- Gibney, G. Sines B., (in prep) Archaeological Monitoring Report Gas to Lumcloon Project Walterstown, Calverstown, Kilbrennan, Piercetown, Castlelost West, Oldtown, Kiltotan and Collinstown, Co. Westmeath (24E0734); by Unpublished report prepared by Archaeological Consultancy Services Ltd for Bord Gáis Eireann.
- Griffiths Valuation by the National Library of Ireland (https://www.askaboutireland.ie/griffith-valuation/, accessed May 2025).
- Gillespie, R. F. (2010) 'A bivallate ringfort at Cloonaghboy', in R F Gillespie & A Kerrigan, Of Troughs and Tuyères: The archaeology of the N5 Charlestown Bypass, 319–40. NRA Scheme Monographs 6, The National Roads Authority, Dublin.
- Hall, M. (1999) The obliteration of townland boundaries. Tipperary Historical Journal 1999, 43.
- Hawkes, A. (2018) The Archaeology of Prehistoric Burnt Mounds in Ireland. Archaeopress, Oxford.
- Historic Environment Viewer (https://heritagedata.maps.arcgis.com/apps/webappviewer, accessed May 2025).
- Irish Townland and Historical Map Viewer (https://osi.maps.arcgis.com/apps/webappviewer/, accessed May 2025).
- Kinsella, J. (2008) 'New discoveries and fresh insights: researching the early medieval archaeology of the M3 in County Meath', in J. O'Sullivan and M. Stanley

(eds) Roads, Rediscovery and Research: Proceedings of a public seminar on archaeological discoveries on National Road Schemes, August 2007, 95–107. Monograph Series No. 5. National Roads Authority, Dublin.

- McConway, C. (2002) 'Excavations at Laytown reveal coastal settlement in Meath', Archaeology Ireland, Vol. 16, No. 1, 16–19.
- McCormick, Kerr, McClatchie & O'Sullivan 2011, 'The archaeology of livestock and cereal production in early medieval Ireland AD 400 – 1100', UCD School of Archaeology, University College Dublin, Dublin.
- Monk, M 1995 'A tale of two ringforts: Lisleagh I and II', Journal of the Cork Historical and Archaeological Society Vol. 100, 105 – 116.
- Murphy D., Breen R., 2022 Kiltotan and Collinstown, Oldtown, Co. Westmeath Geophysical Survey Report (Licence Number 21R0317) by Unpublished report prepared by Archaeological Consultancy Services Ltd
- Murphy D., Lyne M., 2022 Report on Archaeological Test Trenching at Kiltotan and Collinstown, and Oldtown, Rochfortbridge, Co. Westmeath (Licence Number 22E0211) Unpublished report prepared by Archaeological Consultancy Services Ltd
- Murphy D., Murphy D., 2023 Report on Archaeological Monitoring & Excavation at Kiltotan, Collinstown & Oldtown, Rochfortbridge, Co. Westmeath (Licence Number 22E0211 ext) Unpublished report prepared by Archaeological Consultancy Services Ltd
- Murphy D., Rochford J., 2024a Report on Geophysical Survey at Kiltotan and Collinstown, Gneevebane, and Oldtown, Co. Westmeath (Licence Number 24R0163) Unpublished report prepared by Archaeological Consultancy Services Ltd
- Murphy D., Rochford J., 2024b Geophysical Survey Report CRU Gas to Lumcloon Project, Co. Westmeath (Licence Number 24R0194) Unpublished report prepared by Archaeological Consultancy Services Ltd for Bord Gáis Eireann
- Mytum, H 1992 The Origins of Early Christian Ireland London.
- National Inventory of Architectural Heritage Database (https://www.buildingsofireland.ie/, accessed May 2025).
- National Monuments in State Care: Ownership and Guardianship, Westmeath (2009) (https://www.archaeology.ie/app/uploads/2025/03/monuments-in-state-care-westmeath.pdf , accessed May 2025).
- National Monuments Service (www.archaeology.ie, accessed May 2025).
- Noonan, D., Conway, C., O'Hara, R. & O'Meadhra, J. (2004) Report on the Archaeological Excavation at Ballynacarriga Early Christian Settlement, Youghal By-Pass, Co. Cork. (01E0567). Report prepared by Archaeological Consultancy Services Ltd for National Roads Authority. Digital Repository of Ireland (https://doi.org/10.7486/DRI.3485c268v, accessed May 2025)

- Ó Ríordáin, S. P. 1940 'Excavations at Cush, Co. Limerick', in Proceedings of the Royal Irish Academy, Vol. 45C, 83-181.
- Ó Ríordáin, S.P. 1942 The excavation of a large earthen ring-fort at Garranes, Co. Cork. Proceedings of the Royal Irish Academy 47C, 77–150.
- Ó'Ríordáin, S. P. 1949 'Lough Gur excavations: Carrig Aille and 'The Spectacles'', in PRIA, Vol 52 C, 39-111.
- O'Sullivan, A & Nicholl, T 2010 'Early medieval settlement enclosures in Ireland: dwellings, daily life and social identity', UCD School of Archaeology, University College Dublin, Dublin.
- O'Sullivan, A., McCormick, F., Kerr, T.R. and Harney, L. (2013) Early Medieval Ireland, AD 400–1100. The Evidence from Archaeological Excavations. Royal Irish Academy, Dublin.
- O'Sullivan, M. and Downey, L. (2004) 'Souterrains', Archaeology Ireland, Vol. 18, No. 4, 34–36.
- Patterson, N 1994 Cattle Lords and Clansmen: The Social Structure of Early Ireland London. Seaver, M 2005 'From mountain to sea: excavations in the townlands of Glebe and Laughanstown, Co. Dublin', in J. O'Sullivan & M. Stanley (eds) Recent Archaeological
- Placenames Database of Ireland (https://www.logainm.ie/en/, accessed May 2024).
- Record of Monuments and Places for County Westmeath (1997) (Archaeology-RMP-Westmeath-Manual-1997-0052.pdf, accessed May 2025).
- Seaver, M. (2005a) 'Run of the mill-excavation of an early medieval settlement at Raystown, Co. Meath', Archaeology Ireland, Vol. 19, No. 4, 9–12.
- Seaver, M. (2005b) 'From mountain to sea: excavations in the townlands of Glebe and Laughanstown, Co. Dublin', in J. O'Sullivan and M. Stanley (eds) Recent Archaeological Discoveries on National Road Schemes 2004, 51–64. Monograph Series No. 2. National Roads Authority, Dublin.
- Seaver, M. (2011) 'Interchange: excavations in the early medieval landscape of Glebe and Laughanstown, Co. Dublin', in C. Corlett and M. Potterton (eds), Settlement in Early Medieval Ireland in the light of recent archaeological excavations, 261–87. Research Papers in Irish Archaeology 3. Wordwell, Dublin.
- Seaver, M. (2016) Meitheal, The Archaeology of lives, Labours and Beliefs at Raystown, Co. Meath. TII Heritage 4, Transport Infrastructure Ireland, Dublin.
- Stout, M. (1997) The Irish Ringfort. Four Courts Press, Dublin.
- The Down Survey of Ireland by Trinity College Dublin (https://downsurvey.tchpc.tcd.ie/index.html, accessed May 2025).

- Williams, B. B. (1984). Excavations at Ballyutoag, County Antrim. *Ulster Journal of Archaeology*, 47, 37–49.
- Westmeath County Development Plan 2021–2027 https://www.westmeathcoco.ie/en/ourservices/planning/developmentplans/countydevelopmentplan2021-2027/, accessed May 2025).

15 CLIMATE

15.1 INTRODUCTION

This chapter of the EIAR considers the likely significant effects from the proposed development on climate as well as the likely significant effects of climate change on the proposed development.

Climate change is a major challenge for all of society to address. The Sixth Assessment Report from the Intergovernmental Panel on Climate Change (IPCC) confirmed that human activities resulting in the emission of greenhouse gases (GHG), are mainly responsible for global warming since the mid-20th century. The impacts of climate change are already observed at global and national levels and these impacts will continue. Even if the world rapidly decarbonises, GHGs already in the atmosphere and current emissions trends make future climate impacts unavoidable. Planned responses to the threats and opportunities posed by climate change are now required.

The Chapter is supported by a Project Carbon Management Plan (PCMP) and the Bitpower Energy Reports entitled *"Carbon Impact Statement & Alignment with National Large Energy User Policies" and "Energy Statement and Approach to Sustainable Data Centre Development"*. The PCMP provides a comprehensive breakdown of the embodied carbon emissions for the entire Project and presents assumptions and associated calculations to support the embodied carbon emission estimates arrived at. The GHG assessment presented in this report considers the data provided in the PCMP and assesses the data centre campus and all elements of the Decentralised Energy Resource (DER).

15.2 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

A full description of the proposed development is provided in Chapter 2 of this EIAR.

This chapter evaluates the impacts which the project may have on Climate as defined in the Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022).

15.3 ASSESSMENT METHODOLOGY

15.3.1 STUDY AREA

The Proposed Development covers an area of approximately 48 hectares. However, due to the broad nature of climate as an environmental factor the consideration of potential

climate impacts is not determined by a pre-defined geographical area but more so on a regional and national scale. The GHG assessment involves the transport of construction materials from the supplier within Ireland and the transport of waste materials off-site for within Ireland and consequently the study area for the proposed project is regarded as the island of Ireland.

15.3.2 INTERNATIONAL GUIDANCE

The assessment methodology has been derived with reference to the most appropriate international guidance documents:

- IEMA Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (2022)
- Institute of Environmental Management and Assessment (IEMA) guide to climate change resilience and adaptation (2020)
- Royal Institution of Chartered Surveyors (RICS). Whole Life Carbon Assessment for the Built Environment, Version 3. (2024);
- Institution of Civil Engineers (ICE). PAS 2080:2023 Carbon Management in Buildings and Infrastructure (2023);
- The Institution of Structural Engineers (IStructE). How to Calculate Embodied Carbon. 3rd Edition, Version 1.1 (2025);
- Sustainable Energy Authority of Ireland (SEAI, 2025) provides methodology for life-cycle global warming potential (GWP) calculations.
- Sustainable Energy Authority of Ireland (SEAI, 2022) provide energy conversion and emissions factors for Irish-based calculations. These factors have been used in the calculation of GHG emissions associated with the electricity and natural gas demand of the Proposed Development

15.3.3 GREENHOUSE GAS ASSESSMENT

15.3.3.1 Construction Phase

The main sources of GHG emissions during the construction phase will consist of the carbon embodied within the materials used for the construction works, the transport of the materials from the supplier to the construction site, the construction activities themselves, the excavated materials and the transportation and disposal of excavated materials as required.

Embodied carbon is carbon dioxide emitted during the manufacture, transport and construction of building materials, together with site activities. Total carbon emissions are calculated, in units of tonnes of carbon dioxide equivalent (tCO2e), which is a metric for

expressing the impact of all greenhouse gases on a carbon dioxide basis, by multiplying the emission factor by the quantity of the material that will be used over the entire construction phase.

The PCMP included as part of this planning application presents detailed calculations for the embodied carbon emissions associated with the construction phase of the entire project including the data centre campus and all elements of the DER and these have been considered in this assessment.

The PCMP follows the methodology of the Institute of Structural Engineers guidance document How to Calculate Embodied Carbon (2025) and also the Sustainable Energy Authority of Ireland (SEAI) methodology for life-cycle global warming potential (GWP) calculations (2025).

The PCMP was prepared in accordance with PAS 2080:2023 Carbon Management in Buildings and Infrastructure which is a global standard for the whole-life carbon management of buildings and infrastructure and is focussed on reducing carbon emissions across all lifecycle stages. Life cycle stages and information modules are defined in EN 15978:2011 (sustainability of construction works – assessment of environmental performance of buildings – calculation method) and EN 17472:2022 (sustainability of construction works sustainability assessment of civil engineering works – calculation method).

Best practice is to report whole-life embodied carbon in accordance with the life cycle stages and modules as defined in the above Standards and the PCMP follows this methodology. The life cycles stages and associated modules applied in the PCMP are as follows:

- Pre-Construction Stage (Module A0): These carbon impacts arise from studies, surveys, design activities, stakeholder engagement, land acquisition (where material) and can generally be screened out of larger projects as they can be considered insignificant in the overall project context.
- Product (cradle-to-gate) Stage (Module A1 to A3): The carbon emissions generated at this stage arise from extracting the raw materials from the ground, their transport to a point of manufacture and then the primary energy used (and the associated carbon impacts that arise) from transforming the raw materials into construction products.
- Construction Stage (Module A4 to A5): These carbon impacts arise from transporting the construction products to site, and their subsequent processing

and assembly into the building including on-site energy use, welfare facilities and site waste.

- In-Use (embodied) Stage (Module B1 to B5): This covers a wide range of sources from the embodied carbon emissions associated with the operation of the building, including the materials used during maintenance, replacement and refurbishment. These are considered separately in the Bitpower reports.
- In-Use (operational) Stage (Module B6 to B7): These carbon impacts arise from operational emissions associated with energy and water use. These are considered separately in the Bitpower reports.
- End of Life Stage (Module C1 to C4): The embodied carbon emissions associated with the deconstruction and/or demolition, transport, waste processing and disposal of the existing building at the end of its life is considered at this stage.
- Beyond System Boundary Stage Module (D): Considers the potential carbon benefit from the reuse, recovery and recycling potential of a building or a building product.

The PCMP follows a module-based whole life carbon approach to quantify the emissions where embodied carbon for each asset element is calculated as the sum of the relevant modules (A0 to A5, B1 to B5, C1 to C4), with Module D reported separately. The carbon benefits of the module D results are reported in the Tables in the PCMP but they have not been used to offset any of the other module results. Embodied carbon emissions for each module are calculated by multiplying the material or product weight by the module-specific carbon factor to give a total embodied carbon emission as kg or tonne/CO_2e for each individual module.

Embodied carbon emissions for the construction phase of the project are calculated by summing all the modules A1 to A5 to include: (A1 to A3) embodied carbon in construction materials and equipment, (A4) transport of materials to site, and (A5) on-site construction activities, temporary power, site waste and off-site disposal of excavated material where applicable.

The whole-life carbon assessment for the entire project including the data centre campus and all elements of the DER have been categorised into asset elements in order to facilitate a progressive assurance approach where assumptions are documented, data quality is tracked and calculations can be updated at defined project gateways (concept, developed design, technical design, construction, as-built, and operational review). The asset elements of the Project are categorised as follows:

- Data centre campus

- Solar PV farm
- Battery Energy Storage System (BESS)
- Solid Oxide Fuel Cell (SOFC) Power System
- Grid connection (including 220kV GIS) and ancillary DER connection works

The carbon emissions associated with the transport of the materials from the supplier to the site have been calculated separately by applying 2025 GHG emission factors published by the UK Government (Greenhouse Gas Reporting: Conversion Factors 2025) to the HGV movements and personnel vehicle movements during the construction of the Project based on the traffic and transport data as is provided in Appendix 13.2 of the EIAR.

15.3.3.2 Operational Phase

This section of the EIAR details the operational phase greenhouse gas assessment and is based on the Energy Reports prepared by Bitpower Energy Solutions for the proposed development.

Total GHG emissions associated with the energy consumption for the project is based on the maximum demand of 250MW required to run the six data centre buildings at full capacity which represents an extreme and untypical setup. Typical annualised data centre loads would range from 50 to 60% of total capacity, with higher power demand levels only experienced on the warmest days when more cooling is required for the buildings. The Bitpower reports provides a conservative emissions estimate by assuming the data centres would run at 66% of maximum capacity for 24 hours a day, 365 days a year, resulting in the total Project power consumption of 1,445,400 MWh per year. This is considered an absolute worst-case scenario in terms of annual power consumption.

The annual contribution of the SOFC, solar PV farm and the grid energy resources were modelled to show the annual energy requirements for the Project operating at a constant 66% energy demand throughout the entire year. The updated models assume a 15-year lifespan for the Data Centre. On review of other consented data centres in Ireland, the typical operational lifetime of such operations is between 15 and 20 years. As such, the total lifetime emissions of the project have been assessed on the basis of a 15-year lifespan.

The Bitpower reports also uses the modelling results to predict the likely future GHG emissions associated with the operation of the DER system. Total annual emissions resultant from the energy demand of the data centre campus for the worst case of maximum energy demand for 365 days per year were estimated and have been used to inform the updated operational phase impact assessment.

15.3.3.3 Construction and Operational Phase Significance Criteria

The impact assessment methodology is based on the Institute for Environmental Assessment and Management (IEMA) Guidance. The relevant guidance considered is the IEMA Environmental Impact Assessment Guide to: Assessing GHG Emissions and Evaluating their Significance (2022).

The EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports were published in May 2022 and are also considered in this assessment. It is noted that the assessment of climate effects uses different terminology and definitions and in particular cumulative impacts which are routinely assessed in other sections of the EIAR are not addressed in this assessment. The assessment methodology follows evolving guidance on assessment and is consistent with best international practice for assessments of this type.

This assessment report provides a GHG impact assessment which considers impacts on the climate from GHGs arising from the Proposed Development, including how the Proposed Development would affect the ability of the Irish government to meet its carbon reduction plan targets. IEMA Guidance describes the criteria to determine the significance of a project which considers the extent of GHG emissions associated with the project as follows and is presented in Table 15.1.

Table 15.1 Significance Criteria for GHG Emissions

Effects	Significance Level	Description
Significant Adverse	Major Adverse	The project's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to Ireland's trajectory towards net zero.
	Moderate Adverse	The project's GHG impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals. A project with moderate adverse effects falls short of fully contributing to Ireland's trajectory towards net zero.
Not Significant	Minor Adverse	The project's GHG impacts are fully consistent with applicable existing and emerging policy requirements and good practice design standards

Effects	Significance Level	Description
		for projects of this type. A project with minor adverse effects is fully in line with measures necessary to achieve Ireland's trajectory towards net zero.
	Negligible	The project's GHG impacts are reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050. A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions.
Beneficial	Beneficial	The project's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.

Professional judgement has been used to provide a qualitative description of the nature of the impacts and determine the significance of the effect on climate. The predicted GHG emissions are assessed against the relevant carbon budgets.

15.3.4 VULNERABILITY TO CLIMATE CHANGE

The impact assessment methodology is based on the Institute for Environmental Assessment and Management (IEMA) Guidance - Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (2020). This guidance represents best practice for undertaking climate change risk assessments.

Climate change risk assessment is a risk assessment-based methodology for identifying potential climate impacts and assessing their severity. The risk assessment involves identifying potential climate change risks to a project, assessing the risks identified and then formulating mitigation actions to reduce the impact of the identified risks.

The significance of the climate event or impact is assessed based on the likelihood of occurrence and the consequence of impact. The IEMA Guidance defines the likelihood and consequence criteria as shown in Table 15.2 and Table 15.3 below.

Table 15.2 Likelihood Categories

Likelihood	Probability and Frequency of Occurrence

Category	
Very High	The event occurs multiple times during the lifetime of the project (e.g. approximately annually)
High	The event occurs several times during the lifetime of the project (e.g. approximately once every five years)
Medium	The event occurs limited times during the lifetime of the project (e.g. approximately once every 15 years)
Low	The event occurs once during the lifetime of the project
Very Low	The event may occur during the lifetime of the project

Table 15.3 Consequence Categories (adapted for the proposed project)

Consequence of Impact	Description
Very Large Adverse	Continuous disruption to the development lasting more than 1 week
Large Adverse	Intermittent disruption to the development lasting more than 1 week
Moderate Adverse	Intermittent disruption to the development lasting more than 1 day but less than 1 week
Minor Adverse	Minor disruption to the development lasting less than 1 day
Negligible	Minor disruption to an isolated section of the development lasting less than 1 day

The significance of the event is then derived using the significant matrix which is based on the likelihood and severity ratings according to IEMA (2020) best practice guidance and shown in Table 15.4.

Table 15.4 IEMA Significance Matrix

		Measure of Likelihood				
		Very Low	Low	Medium	High	Very High
Measure of Consequence	Negligible	NS	NS	NS	NS	NS
	Minor	NS	NS	NS	S	S
	Moderate	NS	NS	S	S	S
	Large	NS	S	S	S	S
	Very Large	NS	S	S	S	S

NS – Not Significant; S - Significant

15.4 LEGISLATION AND POLICY

Irelands approach to Climate Change has been shaped by a number of key European Union policy documents which focus on meeting EU targets and aiming for a low-carbon, climate-resilient, and environmentally sustainable economy by 2050. The main documents driving Irish climate policy are:

The Paris Agreement entered into force in 2016 and sets a target of limiting the global average temperature increase to 1.5^0C above pre-industrial levels. It is a legally binding global climate agreement and each country is required to communicate its climate contribution and planned climate actions. These actions, collectively, determine whether the long-term goals of the Paris Agreement are met.

The European Green Deal published in 2019, provides an action plan which aims for the EU to be climate neutral by 2050. The key energy and climate initiatives include aims to reduce net greenhouse gas emissions by 55% by 2030, compared to 1990 levels and 90% reduction by 2040; to accelerate the transition to renewable energy, reduce dependency on fossil fuels, and strengthen energy security; and to provide a legal framework to reduce emissions and energy consumption in homes, workplaces, schools, hospitals, and other public buildings, ensuring improved energy efficiency.

The Recast Renewable Energy Directive entered into force in 2023, significantly revises the previous Directive by setting more ambitious targets for 2030 and requiring Member States to implement additional measures to promote renewable energy. The Recast Directive aims for an EU-wide renewable energy target of 42.5% of total energy consumption by 2030, and focuses on streamlining the permitting process for renewable energy projects and accelerating the transition to renewable energy in sectors like transport, industry, and buildings.

The Emissions Trading System (ETS) is an EU-wide scheme which regulates GHG emissions of larger industrial emitters including electricity generation and facilities which have greater than 20MW thermal input capacity so the proposed project falls within the scope of the ETS. There are no country-specific targets under the ETS but it does place a cap on GHG emissions that can be emitted by facilities that fall within its scope. Within the cap, companies receive or buy emission allowances, which may be traded as needed. The cap decreases every year, ensuring that total emissions fall on an annual basis over the target timeframes. The ETS ensures that all these companies will collectively reduce their emissions by 62% by 2030 compared to 2005.

15.4.1 NATIONAL LEGISLATION AND POLICY

The Climate Action and Low Carbon Development (Amendment) Act 2021, supports Ireland's transition to Net Zero and to achieve a climate neutral economy by no later than 2050. It sets out a legally binding framework with clear targets and commitments to ensure we achieve our national, EU and international climate goals and obligations in the near and long term. The Act set a target for a 51% reduction in GHG emissions by 2030 compared to 2018.

The Act passes the process of carbon budgeting into law and requires the Government to adopt a series of economy-wide five-year carbon budgets, including sectoral targets for each relevant sector. A carbon budget represents the total amount of GHG emissions that may be released during an agreed five-year period and, to date, two five-year budgets have been published, namely 2021 to 2025 and 2026 to 2030 and one provisional carbon budget has been proposed for 2031 to 2035. The total emissions allowed under each budget is set out below in Table 15.5, as well as the average annual reduction for each five-year period.

Table 15.5 Ireland Carbon Budgets 2021 - 2035

Period	Mt CO_2eq	Emission Reduction Target
2021 – 2025	295	Reduction in emissions of 4.8% per annum for the first budget period.
2026 – 2030	200	Reduction in emissions of 8.3% per annum for the second budget period.
2031 - 2035	151	Reduction in emissions of 3.5% per annum for the third provisional budget.

The proposed actions for each sector are detailed in a national Climate Action Plan, which is updated annually, and a National Long Term Climate Action Strategy will be prepared every five years.

Climate Action Plan 2025 (CAP25) is the third Climate Action Plan to be prepared under the Climate Action and Low Carbon Development (Amendment) Act 2021 and like the preceding Climate Action Plans commits Ireland to achieving a 51% reduction in overall greenhouse gas emissions by 2030 and sets Ireland on a path to reach net-zero by no later than 2050. The sectoral emissions ceilings for each sector are shown in Table 15.6, as reported in CAP25.

Table 15.6 Sectoral Emissions Ceilings

Sector	2018 Baseline ($MtCO_2eq$)	Sectoral Emissions Ceilings for each 5-year carbon budget period ($MtCO_2eq$)	
	2018	2021 - 2025	2026 – 2030 (2030)
Electricity	10	40	20 (3)
Transport	12	54	37 (6)
Built Environment – Residential	7	29	23 (4)
Built Environment – Commercial	2	7	5 (1)
Industry	7	30	24 (4)
Agriculture	23	106	96 (17.25)
Other (F-gases, waste & petroleum refining	2	9	8 (1)
LULUCF	5	Reflecting the continued volatility for LULUCF baseline emissions to 2030 and beyond, a new approach aligned with the EU LULUCF Regulation has been adopted.	
TOTAL	**68**		
Annual unallocated emissions savings in 2030			5.25
Unallocated savings 2026 - 2030			26

The CAP25 states with regard to electricity that it accounted for 12.5% of Ireland's GHG emissions in 2023. Between 2018 and 2023, electricity emissions decreased by 26.2%, to a provisional 7.6 $MtCO_2eq$. and this reduction is due to an increase in the share of renewable electricity generation. The main electricity action in the CAP25 is to accelerate renewable energy generation. It is noted that the sectoral emissions ceilings for the Electricity sector requires a 75% abatement to emissions from the 2018 baseline which is 3 $MtCO_2eq$ per annum by 2030.

The CAP25 states with regard to industry that it accounted for 10.4% of Ireland's GHG emissions in 2023. Between 2018 and 2023, electricity emissions decreased by 9.6%, to a provisional 6.3 $MtCO_2eq$. and this reduction is primarily due to switching away from

carbon intensive fuels to lower carbon ones. The main industry action in the CAP25 is to seek solutions to the challenging problems in construction materials and the introduction of further measures to encourage and support a reduction in fossil fuel demand

The CAP25 states with regard to the built environment that it accounted for 11.1% of Ireland's GHG emissions in 2023. Between 2018 and 2023, built environment emissions decreased by 21%, to a provisional 6.8 $MtCO_2eq$.

Ireland's Long-Term Strategy on Greenhouse Gas Reductions 2024 is a Government of Ireland Strategy which sets out indicative pathways, beyond 2030, towards achieving carbon neutrality for Ireland by 2050. The Strategy provides a pathway to a whole-of-society transformation and links shorter-term Climate Action Plans and Carbon Budgets, and the longer-term objective of the European Climate Law and Ireland's National Climate Objective. Core measures identified as necessary to deliver a net zero emissions electricity sector include significantly higher renewable power capacity (largely through onshore and offshore wind, and solar PV), and increased deployment of flexible technologies and practices that could enable the grid to function with high levels of intermittent power sources (i.e. battery storage, and storage of renewable power as gas). With regards to the built environment, the Strategy highlights the importance of promoting the use of lower carbon alternatives in construction.

The National Adaptation Framework - Planning for a Climate Resilient Ireland was published by the Department of the Environment, Climate and Communications in 2024 and specifies the national strategy for the application of adaptation measures in different sectors and by local authorities to reduce the vulnerability of the State to the negative effects of climate change and to avail of any positive effects that may occur.

Ireland's National Adaptation Framework (NAF) defines adaptation as an "*approach for addressing the current and future risks posed by a changing climate. The aim of adaptation is to reduce the vulnerability of our environment, society and economy and increase resilience*".

The NAF sets out an extended suite of guiding principles that underscore the need for smarter, faster and transformative adaptation actions, which demand a pathway planning approach to account for a range of future warming and impact scenarios. This updated NAF also promotes an outcomes-based approach, which will assist in monitoring and measuring progress towards improving the resilience of infrastructure, ecosystems and broader society to climate change.

Project Ireland 2040 which is part of the National Planning Framework (NPF) sets out key policy principles via National Strategic Outcomes (NSOs), which include supporting and strengthening the economy and a transition to a low carbon, climate resilient society and achieving sustainable growth and better environmental resource management It states that Ireland's National Energy Policy is centred on the three pillars of sustainability, security of supply and competitiveness.

National Energy and Climate Plan (NECP) 2021-2030 is a 10-year plan mandated by the EU to each of its Member States, in order for the EU to meet its overall GHG emissions targets. The plan sets out in detail Ireland's objectives regarding the five EU energy dimensions (Decarbonisation (GHG emissions and removals, renewable energy), energy efficiency, energy security, internal energy market and research, innovation and competitiveness) together with planned policies and measures to ensure that these objectives are achieved. This strategy acknowledges the increasing role of natural gas in the energy mix for heat, transport and power generation including as a back up to intermittent power generation.

15.4.2 LOCAL POLICY

The Westmeath County Development Plan 2021-2027 (WCDP) sets out the policies and objectives and the overall strategy for the development of the county over the plan period 2021-2027. Chapter 11 of the WCDP outlines the approach to climate change adaptation and greenhouse gas mitigation and includes the following measures:

- To support the implementation of the Climate Action Plan 2019 and to facilitate measures which seek to reduce emissions of greenhouse gases in the Electricity, Enterprise, Built Environment, Transport, Agriculture and Waste sector.
- To support the implementation of the Climate Action Plan 2019 and the National Climate Change Adaption Framework Building Resilience to Climate Change 2012 through the County Development Plan and through the preparation of a Climate Change Adaptation Plan in conjunction with all relevant stakeholders.

The WCDP specifically states the following with respect to clean energy developments *"The Plan recognises the contribution that wind and solar energy make to meeting national renewable energy targets. In this regard, the plan strongly supports the development of renewable energy resources. It is acknowledged in the plan that the Council is open to new and innovative renewable energy sources and technological solutions to addressing climate change."*

The Westmeath County Council Climate Action Plan 2024 – 2029 was published in 2024 and sets out to create a low carbon and climate resilient County, by delivering and promoting best practice in climate action, at the local level. The Climate Action Plan (CAP) is aligned to the Government's overall National Climate Objective, which seeks to pursue and achieve, by no later than the end of 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy.

The Westmeath CAP focuses on thematic areas with a view to assessing the actions which can be carried out in order to tackle climate breakdown at a local level by carrying out measures to decrease emissions and enhance biodiversity locally with a view to slowing down and ultimately reversing climate change while closely focusing on quality of life for Westmeath citizens

Westmeath County Council Climate Change Adaptation Strategy 2019-2024 forms part of the National Adaptation Framework (NAF) which was published in response to the provisions of the Climate Action and Low Carbon Development Act 2015. The strategy details actions for the Council to:

- ensure a proper comprehension of the key risks and vulnerabilities of climate change
- bring forward the implementation of climate resilient actions in a planned and proactive manner
- ensure that climate adaptation considerations are mainstreamed into all relevant plans and policies and integrated into all operations and functions of the local authority

Westmeath County Council adopted the **Local Authority Climate Action Charter** in 2019 which commits local authorities to lead climate action efforts at the local and National levels. It involves reducing emissions from Council operations and collaborating with various stakeholders on climate initiatives.

Delivering Effective Climate Action 2030 is a local government strategy, published in April 2021, ensuring a coordinated approach to climate action across all 31 local authorities, emphasising a strong leadership role in climate action. This overarching sectoral commitment and coherent approach is set out across the 6 goals outlined below:

1. Develop appropriate structures and processes for directing and managing effective climate action.
2. Achieve local government carbon emission and energy efficiency targets for 2030.

3. Protect and enhance Westmeath's natural environment by supporting biodiversity and increasing climate resilience.
4. Mobilise Climate Action in Local Communities, whilst achieving a just transition.
5. Create a culture of sustainability, promoting a circular economy throughout the County.
6. Achieve a 'just transition' particularly for communities that may be economically disadvantaged by decarbonising projects.

The Joint Committee on Climate, Environment and Energy published their report on the proposed Carbon Budgets for Ireland in October 2025. In accordance with the Climate Action and Low Carbon Development (Amendment) Act 2021, the Climate Change Advisory Council proposed a carbon budget for the period 2031-2035 (CB3) and a provisional budget for the period 2036-2040 (CB4). The carbon budget figures for Ireland are provided for under four time periods as follows:

- CB1 (2021 to 2025) with a carbon budget of 295 Mt CO_2e
- CB2 (2026 to 2030) with a carbon budget of 200 Mt CO_2e
- CB3 (2031 to 2035) with a carbon budget of 160 Mt CO_2e
- CB4 (2036 to 2040) with a provisional carbon budget of 120 Mt CO_2e

15.5 RECEIVING ENVIRONMENT

15.5.1 CLIMATE BASELINE

As part of the EPA Research Programme 2021–2030, the EPA in conjunction with the Marine Institute, Met Eireann and University College Cork published The Status of Irelands Climate 2020 in 2021. This report sets out the latest status of essential climate variables (ECVs) which are reliable climate observations for the total climate system across the atmospheric, oceanic and terrestrial domains. It is through the monitoring of these ECVs that the status of Ireland's climate with that of the rest of the world can be measured. The key findings of the Report in relation to the status of Ireland's climate are as follows:

- Background carbon dioxide concentrations are now at 413ppm, which is estimated to be 50% higher than those of the pre-industrial era, while those of methane are at 1940ppb, representing an approximately 170% increase compared with pre-industrial levels. Nitrous oxide concentrations are now above 330ppb, which is a 20% increase compared with pre-industrial levels.
- Concentrations of chlorofluorocarbons (CFCs) have been dropping since 2004, following the implementation of the Montreal Protocol in 1989, banning the production and use of CFCs.

- The annual average surface air temperature in Ireland has increased by approximately 0.9°C over the last 120 years, with a rise in temperatures being observed in all seasons. This compares with a global average temperature estimated to be 1.1°C above pre-industrial levels.
- The number of warm spell days has increased slightly over the last 60 years, with very little change in cold spell duration. This is in line with what has been observed in many regions of the world.
- Annual precipitation was 6% higher in the period 1989–2018, compared with the 30-year period 1961–1990, and the decade 2006–2015 has been the wettest on record. An overall increase in precipitation has been observed across northern hemisphere mid-latitude land areas during the last 70 years.
- Analysis of wet and dry spells demonstrates an increase in the length of wet spell days across the country. No trend is apparent in dry spell days.
- Satellite observations indicate that the sea level around Ireland has risen by approximately 2–3mm per year since the early 1990s, and analysis of sea level data from Dublin Bay show a rise of approximately 1.7mm per year since 1938, consistent with global average rates.
- The average sea surface temperature measured at Malin Head was 0.47°C higher over the last 10 years compared with the period 1981–2010.
- River flows are generally increasing, although, when more recent data for a shorter period have been analysed, there are indications that flows may be decreasing in the south and east of the country.
- Land cover observations since 1990 show increases in the areas covered by artificial surfaces and forest, while there is a decrease in wetland areas. The volume of growing stock in forests increased by 38% over the period 2006–2017, thereby increasing the amount of carbon sequestered in forests. Long-term carbon storage in forests will be determined by the dynamic balance between growth and harvesting rates.
- In 2018, carbon dioxide emissions were almost 18% higher than in 1990, primarily due to increased fossil fuel combustion in transport and energy industries; emissions of methane were just over 5% lower, although emissions from agriculture increased by 1.6% over the same period. Nitrous oxide emissions decreased by 10% over the period, mainly because of reductions in the use of synthetic fertiliser and animal manure in agriculture.

These changes observed in the EPA Report will cause extensive direct and indirect harm to Ireland and its population, with predicted impacts including increased likelihood of

groundwater, river, and coastal flooding; increased coastal erosion; increased pressure on water supply and water quality; and changes in wind speeds and storm tracks.

The Climate Change Advisory Council is an independent advisory body tasked with assessing and advising on how Ireland can achieve the transition to a climate-resilient, biodiversity-rich, environmentally sustainable and climate-neutral economy. They produce an annual review of the Irish Climate which summarises the most recent developments in the understanding of Ireland's changing climate in the context of broader global climate changes. The annual review is based on recent developments and information sources, including international and national *'State of the Climate'* reports and other relevant research. The annual review published in March 2025 is titled *'Our Changing Climate in 2024'* and presents the following key climate observations for Ireland:

- The average air temperature in Ireland in 2024 was 10.72°C. This makes 2024 the fourth-warmest year on record in Ireland, with 7 of top 10 warmest years on record now having occurred since 2005.
- The spring of 2024 was the sixth-wettest and second-warmest meteorological spring on record. The high volume of spring rainfall had profound effects on farm operations in Ireland during 2024. A World Weather Attribution study, which analysed the storm events and accumulated seasonal rainfall from October 2023 to March 2024 in the UK and Ireland, estimates that wet periods such as this are four times more likely to occur in today's climate, and that average precipitation was observed to have become approximately 30% more intense during stormy days.
- Storm Darragh was the strongest storm experienced in Ireland in 2024. Violent storm force winds resulted in 395,000 households, farms and businesses losing power with impacts cascading to other sectors. Damage to Holyhead Port in Wales exposed the vulnerability of Ireland to impacts on trade from extreme climatic events beyond its borders.
- Although rainfall was below average overall, 2024 was marked by several heavy rainfall events. Three stations recorded their wettest November day on record during Storm Bert, with severe flood events being experienced in towns and villages in Counties Donegal, Kerry, Cork, Limerick and Galway.

Future climate predictions undertaken by the EPA have been published in 2024 in 'Research Report No. 471: Updated High-resolution Climate Projections for Ireland'. The main objective of the study was to evaluate the effects of climate change on the future climate of Ireland using the method of high-resolution regional climate modelling. Differences between the 30-year reference period (1981–2010) and three future 30-year periods

(2021-2050, 2041–2070 and 2071–2100) were analysed to assess projected changes in the Irish climate. The updated projections offer a clearer picture of the climate changes Ireland can expect and the key findings of the study are presented below:

- Temperature: Near-surface temperatures are projected to rise by 0.5–0.7°C (2021–2050) under a low-emission scenario (SSP1-2.6), and by 2.4–3.0°C (2071–2100) under a high-emission scenario (SSP5-8.5), with the largest increases observed in eastern Ireland.
- Extreme Weather: Heatwaves are expected to become more frequent, while frost and ice days will decrease. Both dry spells and extreme rainfall events will intensify.
- Precipitation: Winter and autumn months are projected to become wetter, while summer rainfall is expected to decrease by up to 8% by the end of the century.
- Snowfall: Snowfall is expected to decline sharply, with reductions of up to 84% by 2100 under the highest emissions scenario.
- Energy: Wind energy potential is projected to decrease, particularly in summer, while photovoltaic power is expected to decline across all seasons.
- Heating Demand: With warmer winters, heating demand in Ireland is expected to decrease over the coming decades.

The most up-to-date research into and information on climate change as outlined above shows that there is likely to be future increases in weather variability including increased frequency and intensity of storms and high winds, increased temperatures in summer, the potential for heat waves and flooding from heavy precipitation events.

15.5.2 GREENHOUSE GAS EMISSIONS BASELINE

The EPA has provided Ireland's latest GHG emissions figures for the period 1990-2023. These figures are provisional figures based on the SEAI's energy balance provided in June 2024. In 2023, Ireland's GHG emissions are estimated to be 55.01 million tonnes carbon dioxide equivalent (Mt CO_2e), which is 6.8% lower (or 4.00 Mt CO_2e) than emissions in 2022 (59.00 Mt CO_2e) and follows a 2.0% decrease in emissions reported for 2022. Emissions are 1.2% below the historical 1990 baseline for the first time in 33 years.

Decreased emissions in 2023 compared to 2022 were observed in the largest sectors except for transport which showed an increase of 0.3%. Emissions per capita decreased from 11.4 tonnes CO_2e/person in 2022 to 10.4 tonnes CO_2e/person in 2023. Ireland's average tonnes of GHG/capita over the last ten years were 12.1 tonnes. Table 15.7 details the GHG emissions share per sector for 2022 and 2023.

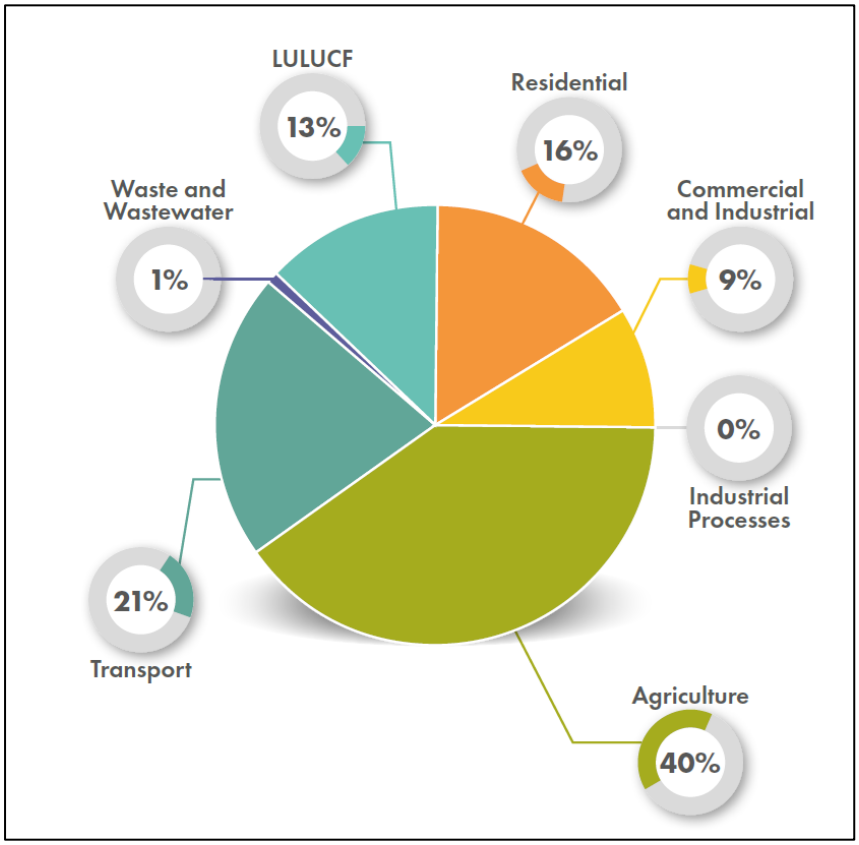
Table 15.7 National Greenhouse Gas Emissions 2023

Sector	2022 (Mt CO_2e)	2023 (Mt CO_2e)	% Change from 2022 to 2023
Agriculture	21.795	20.782	-4.6
Transport	11.760	11.791	0.3
Energy Industries	10.003	7.845	-21.6
Residential	5.753	5.346	-7.1
Manufacturing Combustion	4.334	4.133	-4.6
Industrial Processes	2.288	2.155	-5.8
F-Gases	0.741	0.699	-5.7
Commercial Services	0.751	0.699	-5.7
Public Services	0.696	0.677	-2.5
Waste	0.881	0.846	-4.0
Land Use, Land-use Change and Forestry (LULUFC)	3.983	5.614	40.0
National total excluding LULUFC	59.003	55.007	-6.8
National total including LULUFC	62.986	60.620	-3.8

The Westmeath County CAP (2024 – 2029) presents the Baseline Emissions Inventory which is an overview of the baseline GHG emissions for various sectors in 2018 in Co. Westmeath. In 2018, the baseline year, GHG emissions for Co. Westmeath was 1,639 kt CO_2e. This means an overall emissions reduction of 836 kt CO_2e is required for Co. Westmeath across all sectors to achieve the target to reduce GHGs by 51% by 2030.

The top three sectors in the county in terms of GHG emission levels were Agriculture, Transport and Residential producing 40%, 21% and 16% of tCO_2e respectively, of the total emissions in the county. Figure 15.1 shows the percentage breakdown of sectoral GHG emissions in Co Westmeath.

Figure 15.1 Percentage Breakdown of Sectoral GHG Emissions (Westmeath Co Co 2024)



15.6 IDENTIFICATION OF LIKELY SIGNIFICANT IMPACTS

15.6.1 CONSTRUCTION PHASE

15.6.1.1 Do Nothing Scenario

Under the *'do nothing scenario'* it is assumed the Project does not go ahead. The land would remain in its current agricultural use and there would be negligible emissions arising associated with the existing land use. The climate at the site would remain as per the baseline and will change in accordance with trends and patterns within the wider area. This scenario can be considered to be neutral in terms of climate.

15.6.1.2 Impacts as a Result of Climate Change (Climate Vulnerability)

The construction programme is considered to be short when considered in terms of changes to climate and any variations in climatic parameters over the construction period would be expected to be minimal when compared to the present-day baseline. Any potential changes in climatic parameters are likely to occur gradually and it is considered

that construction workers and contractors will be able to adapt working methods over time to effectively manage such changes.

Flood risk and extreme weather events have been considered as part of the construction planning and it is considered that the construction phase of the proposed project has a low vulnerability to the relevant climate factors and it is assessed that the likelihood of a climate change event impacting on the project varies from Low to Very Low. As per the IEMA methodology presented in Table 15.2, Table 15.3 and Table 15.4 the potential impact of climate change on the proposed project will vary from Negligible to Minor Adverse and therefore is assessed as **Not Significant** in an overall context.

15.6.1.3 Impacts on Climate Change (Greenhouse Gases)

The construction phase impact assessment considers the embodied carbon emissions associated with all asset elements of the Project including the data centre campus, the Solar PV farm, the BESS, the SOFC, the grid connection including the 220kV GIS and ancillary DER connection works. The construction stage transport carbon emissions have also been considered and are included in the assessment.

The PCMP contains the detailed calculations and associated methodology for each asset element as discussed in Section 15.3.3.1 of this report to arrive at the embodied carbon emission estimates for each element of the construction phase. The PCMP presents the updated construction phase embodied carbon estimates for each of the project elements and this table is reproduced below as Table 15.8.

Table 15.8 Updated Construction Phase Embodied Carbon Emissions

Project Element	Lifecycle Stage	Module(s)	Embodied Carbon Estimate (tCO_2e)
Data centre campus (baseline)	Construction	A1–A5	47,628
Data centre campus (low-carbon option)	Construction	A1–A5	37,380
Solar PV farm (180 MWp)	Construction	A1–A5	83,603
BESS (250 MW x 2hr)	Construction	A1–A5	84,189
SOFC (160MW)	Construction	A1–A5	20,413
Grid connection (including 220kV	Construction	A1–A5	6,856

Project Element	Lifecycle Stage	Module(s)	Embodied Carbon Estimate (tCO_2e)
GIS) and ancillary DER connection works			
Construction transport	Construction	A4–A5	5,425
Total Project	**Construction**	**A1-A5**	**237,866**

Note – Table 15.8 is reproduced from the PCMP Report

The modelled baseline embodied carbon intensity figure for the construction of the data centre campus was estimated to result in 47,628 tCO_2e of GHG emissions. When the modelling was updated to account for a low-carbon upgrade to the building materials, the baseline embodied carbon intensity figure for the construction of one data centre and all associated infrastructure was revised down which would result in overall GHG emissions of 37,380 tCO_2e for the construction phase of the entire data centre campus. The low-carbon upgrading resulted in a 21.5% saving in GHG emissions for the data centre campus The updated construction phase embodied carbon emissions have been estimated at 237,866 tCO_2e for the entire construction project.

The carbon emissions associated with the construction of the entire project has been assessed in the context of Ireland's Carbon Budgets for assessment purposes. The construction of the project is anticipated to be completed over a 62-month period with 65% of the total works completed prior to 2031 and the remainder completed in 2031 and 2032. The GHG impacts presented in Table 15.9 represent an estimate of the carbon budget expenditures that will occur as a result of the Project's construction. The construction phase embodied carbon emissions have been proportionally divided across the relevant carbon budget periods, namely 65% to CB2 and 35% to CB3 which corresponds to the likely indicative timeline for the construction works programme.

Table 15.9 Updated GHG Impact Assessment (assessed against Irelands Carbon Budgets)

Time Period	2026 – 2030 (CB2)	2031 – 2035 (CB3)	Total
Irelands Carbon Budget (tCO_2e)	200,000,000	160,000,000	360,000,000
GHG Emissions (tCO_2e)	154,613	83,253	237,866
Project GHG	0.077	0.052	0.066

Time Period	2026 – 2030 (CB2)	2031 – 2035 (CB3)	Total
emissions as a % of Carbon Budget			

The nature and significance of effect can be characterised by assessing the Project's construction stage GHG impacts within Ireland's carbon budget, and with its compliance with Ireland's net zero trajectory, local and national climate-related policy, legislation and guidance.

The carbon budget periods relevant during the construction phase of the Project are the 2026 to 2030 CB2 period which has a carbon budget of 200 $MtCO_2e$ and the 2031 to 2035 CB3 period which has a carbon budget of 160 $MtCO_2e$. The updated GHG emissions for the construction phase of the entire project following mitigation are estimated to be 237,866 tCO_2e which accounts for 0.066% of the total carbon budget. The construction phase estimates show that the proposed project would potentially account for 0.077% of the overall CB2 budget and 0.052% of the overall CB3 budget. It is therefore considered that carbon emissions associated with the construction of the Project comprise a negligible proportion of Ireland's Carbon Budgets CB2 and CB3.

The Applicant's approach to low carbon material and product procurement, and efficient construction methods are in keeping with good practice emissions reduction measures, and current and emerging national policy regarding the transition towards net zero. In particular this approach will contribute to demand for low carbon materials and support the key target to decrease embodied carbon in construction materials, as detailed within the CAP25 and Ireland's Long-term Strategy on Greenhouse Gas Emissions Reduction.

It should be noted that the potential impacts associated with the construction phase of the proposed Project are short-term in nature. When the mitigation measures detailed in the mitigation section of the EIAR chapter are implemented, direct GHG emissions from the site will not be significant.

As such, the proposed development aligns with Ireland's national legislation and policy, and net zero trajectory. In accordance with the significance criteria (as detailed in Section 15.3.3.3 of the EIAR) the impact of the construction phase GHG emissions is considered to result in a **minor adverse** effect on climate which is considered a **not significant** impact.

15.6.2 OPERATION PHASE

15.6.2.1 Do Nothing Scenario

Under the *'do nothing scenario'* it is assumed the Project does not go ahead. The land would remain in its current agricultural use and there would be negligible emissions arising associated with the existing land use. The climate at the site would remain as per the baseline and will change in accordance with trends and patterns within the wider area. This scenario can be considered to be neutral in terms of climate.

15.6.2.2 Impacts as a Result of Climate Change (Climate Vulnerability)

The proposed development's vulnerability to the various climate factors for the operational phase is assessed by considering the main factors that have potential to impact on the project over its lifetime. The climatic factors with potential to impact the project are assessed as follows:

- Increased rainfall which may lead to flooding;
- High temperatures which may lead to over-heating of buildings and over-loading of cooling equipment;
- Extreme storms (wind and snow) which may lead to damage to buildings and infrastructure;
- Drought which may lead to reduced access to water for cooling or to fires.

A Flood Risk Assessment (FRA) was prepared by Envirologic Hydrological Consulting for the proposed project and found that on-site fluvial flooding is predicted in the southern portion of the site and following recommended mitigation measures the report concluded that the proposed development will not have a negative impact, in terms of flood risk, on the local drainage network, on local private property, or to the surrounding environment and on human health. The proposed development buildings and infrastructure will not be subject to flooding due to the localised ground conditions and built-in mitigation measures.

Extreme temperatures, both hot and cold, have the potential to impact the building materials and some related infrastructure. However, high quality, durable building materials will be selected for the proposed development. Building design measures will minimise excessive solar gain and reduce unwanted solar gains.

With regard to significant storm events, the buildings are designed to be very robust and strong and to withstand significant wind and snow episodes. All attached façade and roof elements will be fixed to the super-structure to withstand extreme wind events.

The SOFC offers a highly efficient and environmentally friendly solution for cooling needs with the absorption chilling technology that is used. It is an air-cooled system operated in a closed-loop and will not require large quantities of water.

The site will be fitted with appropriate fire-fighting equipment. Due to its location the subject site is not considered to be at risk of contributing to or falling prey of a climate induced fire.

It is considered that the operational phase of the proposed project has a low vulnerability to the relevant climate factors and it is assessed that the likelihood of a climate change event impacting on the project is Low. The potential consequence of climate change on the proposed project is assessed as **Minor Adverse** and therefore is **Not Significant**.

15.6.3 IMPACTS ON CLIMATE CHANGE (GREENHOUSE GASES)

The operation of the Project post-construction will result in GHG emissions due to the use of electricity to operate the facilities and services within the buildings. The operational energy demand for the Project will be provided by the DER system.

Total GHG emissions associated with the energy consumption for the project is based on the maximum demand of 250MW required to run the six data centre buildings at full capacity which represents an extreme and untypical setup. Typical annualised data centre loads would range from 50 to 60% of total capacity, with higher power demand levels only experienced on the warmest days when more cooling is required for the buildings. The updated Bitpower report provides a conservative emissions estimate by assuming the data centres would run at 66% of maximum capacity for 24 hours a day, 365 days a year, resulting in the total Project power consumption of 1,445,400 MWh per year. This is considered an absolute worst-case scenario in terms of annual power consumption.

The energy and carbon performance of the proposed DER system versus the performance of the national grid has been modelled and assessed and the findings are presented in the original Bitpower Energy Statement and Approach to Sustainable Data Centre Development report and summarised in the updated Bitpower report. The energy and carbon modelling was completed in order to demonstrate the positive benefits of using the DER as the power source for the data centre.

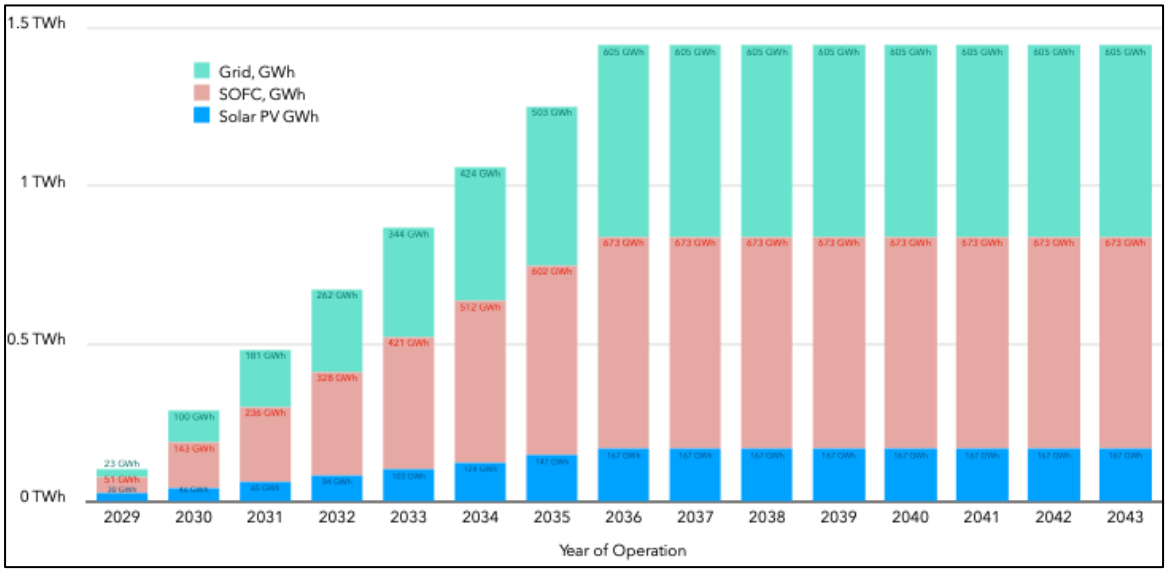
The annual contribution of the SOFC, solar PV and grid energy resources were modelled to show the annual energy requirements for the Project operating at a constant 66% energy demand throughout the entire year. The updated models assume a 15-year lifespan for the data centre. On review of other consented data centres in Ireland, the typical operational lifetime of such operations is between 15 and 20 years. As such, the

total lifetime emissions of the project have been assessed on the basis of a 15-year lifespan.

The carbon intensity models assume a start year of 2029 for the project and the data centre energy requirements will ramp up from Year 1 to Year 8 at which point the data centres will be operating at the maximum capacity of a continuous 66% for the entire year until the end year for the Project which is set at 2043.

Figure 15.2 is reproduced from the updated Bitpower report and shows the annual energy contribution figures for the three DER energy resources modelled. The model assumes continuous operation for 24 hours per day, 365 days at 66% capacity.

Figure 15.2 Project power demand and energy sources for Project lifetime



Note – Figure is reproduced from the updated Bitpower report

The updated Bitpower report also uses the modelling results to predict the likely future GHG emissions associated with the operation of the DER system. Total annual emissions resultant from the energy demand of the data centre campus for the worst case of maximum energy demand for 365 days per year were estimated and are presented in Table 15.10 below.

Table 15.10 Updated Summary of Operational Phase GHG Emissions – Worst-Case Scenario

Year	GHG Emissions / tCO_2e			
	Solar PV	SOFC	Grid	DER Total
2029	0	5,552	4,420	9,972

Year	GHG Emissions / tCO_2e			
	Solar PV	SOFC	Grid	DER Total
2030	0	31,630	19,290	50,920
2031	0	57,740	34,810	92,550
2032	0	83,840	50,410	135,250
2033	0	110,110	66,120	176,230
2034	0	135,740	81,480	217,220
2035	0	161,210	96,770	257,980
2036	0	185,920	117,830	303,750
2037	0	185,920	117,830	303,750
2038	0	185,920	117,830	303,750
2039	0	185,920	117,830	303,750
2040	0	185,920	117,830	303,750
2041	0	185,920	117,830	303,750
2042	0	185,920	117,830	303,750
2043	0	185,920	117,830	303,750
Total	**0**	**2,073,182**	**1,295,940**	**3,369,122**

Annual operational phase emissions resultant from the energy demand of the Project were estimated to ramp up from 9,972 tCO_2e per annum for the opening year of the Project (2029) to a maximum of 303,750 tCO_2e per annum for Year 8 of the Project (2036) when the entire facility is operating at maximum capacity. This figure represents the maximum annual operational carbon intensity for the Project. Total operational phase emissions resultant from the energy demand of the entire Project were estimated to be 3,369,122 tCO_2e over the Project's 15-year lifetime.

The figures presented in Table 15.10 above are considered very conservative and present an absolute worst-case in terms of potential carbon emissions associated with the operational phase of the Project. The updated Bitpower report looks at quantifying the additional carbon reductions that will be achieved over the lifetime of the Project. In order to present a more robust and realistic assessment of the emissions associated with the

Project, some of the available paths to decarbonisation for the Project have been assessed and these are discussed below. The potential carbon savings that will be derived from the decarbonisation modes presented in the report are still considered conservative when compared to the possible savings that are predicted with current government policy but are considered to be more realistic figures in terms of the actual likely outcomes of the proposed Project.

The carbon savings that will be provided by the Battery Energy Storage System (BESS) have not been factored into the modelling predictions as it is difficult to precisely quantity the savings that will be made. The BESS will work in tandem with the solar array to ensure that the power demand for the data centre will be reliably met with 100% renewable power throughout daylight hours. While at night-time the BESS can be recharged using renewable electricity procured via virtual or physical power purchase agreements (PPAs). In effect the carbon savings will mostly be accrued by the grid in enabling the penetration of more renewable electricity. The updated Bitpower report conservatively estimates that the BESS will enable a 10% improvement in overall emissions.

The operational GHG figure per annum is based on the 2023 Irish Grid carbon intensity figures, and the figures presented in Table 15.3 above do not account for planned decarbonisation of the grid in line with policy and legislation as Ireland moves towards its net zero 2050 target. The updated Bitpower report modelled future scenarios of continuous improvement in grid carbon intensity of 20% and 40% to predict a conservative future scenario for the carbon intensity of the national grid. Reductions in carbon intensity of this magnitude are well within the ambitions of the Climate Action Plan and will readily be enabled by the deployment of offshore and onshore wind and solar.

It is considered likely that absorption chilling using waste heat from the SOFC will be implemented at the site in the near future as more concentrated cooling will be required and consequently absorption chilling will be more widely adopted. This has been conservatively modelled as a carbon saving of 12.5%.

When the likely carbon savings offered by the BESS, the grid decarbonisation and the adoption of absorption chilling are considered in the modelling the annual greenhouse gas emissions for the Project will reduce from an absolute worst-case figure of 303,750 tCO_2e per annum to a more likely conservative figure of 192,071 tCO_2e per annum. This is a reduction of 37% in annual carbon emissions for the operational phase of the Project.

The carbon emissions associated with the operation of the data centre campus have been assessed in the context of Ireland's Carbon Budgets. The updated GHG impact assessment

presented in Table 15.11 represent carbon budget expenditures that will occur as a result of the Project's operation.

Table 15.11 Updated GHG Impact Assessment (assessed against Ireland's Carbon Budgets)

Time Period	2026 – 2030 (CB2)	2031 – 2035 (CB3)	2036 – 2040 (CB4)	Total
Irelands Carbon Budget	200,000,000	160,000,000	120,000,000	480,000,000
Worst-case Operational GHG Emissions (tCO2e)	60,892	879,230	1,518,750	2,458,872
Project GHG emissions as a % of Carbon Budget	0.03	0.55	1.26	0.51
Conservative-case Operational GHG Emissions (tCO2e)	60,892	879,230	960,350	1,900,472
Project GHG emissions as a % of Carbon Budget	0.03	0.55	0.80	0.39

The carbon budget figures for Ireland are provided for the 2026-2030, 2031-2035 and 2036-2040 time periods. The 2036-2040 carbon budget is a provisional figure but is included here for comparison purposes.

The worst-case operational-stage Project emissions for the 2026 to 2030 (CB2) time period comprise 0.03% of the equivalent carbon budget for Ireland while this figure is increased to 0.55% for the 2031 to 2035 (CB3) time period and to 1.26% for the provisional 2036-2040 (CB4) time period. The worst-case operational-stage carbon emissions for the project lifetime of 15-years comprises 0.51% of the total carbon budget over this time interval.

The conservative-case operational-stage Project emissions for the 2026 to 2030 (CB2) time period comprise 0.03% of the equivalent carbon budget for Ireland while this figure

is increased to 0.55% for the 2031 to 2035 (CB3) time period and to 0.8% for the provisional 2036-2040 (CB4) time period. The conservative-case operational-stage carbon emissions for the project lifetime of 15-years comprises 0.39% of the total carbon budget over this time interval.

The figures provided in Table 15.4 above are based on the modelled scenarios provided in the updated Bitpower report. It is important to note that the modelling did not account for a significant number of other decarbonisation pathways that will apply to the proposed project such as the gas network decarbonisation, carbon capture and sequestration and Corporate Power Purchase Agreements (CPPAs).

The operational GHG figure per annum is based on the 2023 natural gas conversion factors, and the figures presented in Table 15.3 above do not account for planned decarbonisation of the gas network in line with policy and legislation as Ireland moves towards its net zero 2050 target. The national gas network is evolving to include biomethane and hydrogen and opportunities for using increased levels of carbon neutral gases will become available over the lifetime of the project.

The SOFC emissions are comprised of concentrated carbon and present a viable option for carbon capture and storge. It is considered likely that a small-scale carbon capture plant will be developed at the site to provide commercially viable carbon dioxide for downstream use resulting in further reducing the carbon intensity of the operation of the Project. Imported electricity related emissions (Scope 2) will be mitigated through CPPA agreements.

While accounting for the extent of the embedded design measures in the project that act to significantly reduce operational emissions, in addition to considering the decarbonisation of the gas network leading to further operational emissions reductions and future net zero emissions in the operation of the DER, the impact of GHG emissions associated with the operation of the project is consistent with Ireland's national legislation and policy, and net zero targets. In accordance with the significance criteria the impact of the operational phase GHG emissions are considered to result in Minor Adverse effects and are considered Not Significant in an overall context.

15.7 MITIGATION MEASURES

15.7.1 CONSTRUCTION PHASE

Embodied carbon of materials and construction activities will be the primary source of climate impacts during the Construction Phase. The mitigation measures outlined below

will ensure that GHG emissions are minimized wherever possible during the construction phase of the Project. The following mitigation measures should be considered:

- The Low Carbon optimisation proposals as provided in the LCA study should be implemented in full.
- Embodied carbon will be investigated at detailed design stage and proactive steps shall be taken at each key process stage including (1) product stage, (2) transportation to site stage, (3) site operations stage and (4) Material replacement & refurbishment stage to ensure that embodied carbon emissions are minimised at all stages.
- Environmental Product Declarations should be sought for all fit out items during procurement, with the aim to procure lower carbon products where available.
- Implementation of the site-specific Resource and Construction Waste Management Plan which defines how the reuse and recycling of construction materials shall be maximised and the generation of unsegregated construction waste streams shall be minimised.
- Where practicable, materials will be sourced locally to reduce the embodied emissions associated with transport.
- Prevention of site plant and machinery engines idling to avoid using unnecessary fuels.
- Ensure all plant and machinery are well maintained and operating efficiently.

15.7.2 OPERATION PHASE

The proposed development includes extensive built-in carbon mitigation within its design which are key to enabling the data centre to maintain net-zero operations on a continuous basis aligned with corporate sustainability targets and the EU Taxonomy for sustainable activities.

The project is specifically designed to enable full commitment to a future of carbon neutrality for the entire data centre campus. The developer is committed to investment in new generation renewable energy capacity and the DER system has been specifically configured to easily facilitate installation of new beneficial technologies as they develop and advance. As an example, the data centre will initially be configured for air cooling, but the facility is flexibly configured to specifically allow for installation of liquid cooling (e.g. immersive) at rack (or chip) as technology advances and densities of rack increases.

Further mitigation measures which will reduce GHG emissions include:

- All buildings will be designed and constructed to ensure LEED (Leadership in Energy and Environmental Design) certification is achieved.
- Passive solar design will be incorporated to minimise solar gain to reduce cooling energy requirements.
- The building fabric of the new development will be designed and constructed to limit heat loss and where appropriate, limit heat gains through the fabric of the building.
- Mechanical heating, ventilation and air conditioning will be designed to minimise energy use associated with space conditioning through the use of high efficiency systems.
- The incorporated electrical systems will be highly energy efficient and shall include low energy lighting solutions and power factor correction.

15.8 WHOLE LIFE CARBON IMPACT ASSESSMENT

Embodied carbon emissions for the construction phase of the project are calculated by summing all the lifecycle stage modules A1 to A5 however the other lifecycle stages and associated modules need to be considered as part of a whole-life carbon assessment for the project. The In-Use (embodied) Stage (Module B1 to B5) and the In-Use (operational) Stage (Module B6 to B7) have been assessed separately in the updated Bitpower report and are included above. The End-of-Life Stage (Module C1 to C4) and the Beyond System Boundary Stage (Module D) should also be included as part of the whole life assessment.

Table 15.12 presents the combined data from the PCMP report and the updated Bitpower report to provide an estimate of the whole-life carbon emissions for the entire project over an assumed 62-month construction period and a 15-year operational period.

Table 15.12 Whole Lifetime Carbon Emissions Summary

Project Element	Lifecycle Stage	Module(s)	Embodied Carbon Estimate (tCO_2e)
Total Project	Construction	A1 to A5	237,866
Total Project	Operation (worst-case)	B1 to B7	2,458,872
Total Project	Operation (conservative-case)	B1 to B7	1,900,472
Total Project	End-of-Life	C1 to C4	Not estimated

Total Project	Reuse / Recovery	D	-34,699
Total Project Conservative Case	**All Stages**	**A1-A5, B1-B7, C1-C4 and D**	**2,138,338**

The conservative-case whole-life carbon assessment for the project estimates that 2,138,338 tCO_2e of carbon emissions will be generated over the lifetime of the entire project. The estimate presented in Table 15.12 has conservatively assumed that the module D emission gains will exceed the end-of-life C1 to C4 emissions and therefore these two lifecycle stages have cancelled each other out in terms of carbon emissions. Similarly, the conservative figure for the operational stage embodied carbon emissions has been used in the overall calculation.

The carbon emissions associated with the entire project over its lifetime has been assessed in the context of Ireland's Carbon Budgets for assessment purposes and is presented in Table 15.13.

Table 15.13 Whole Lifetime GHG Impact Assessment (assessed against Irelands Carbon Budgets)

Time Period	2026 – 2030 (CB2)	2031 – 2035 (CB3)	2036 – 2040 (CB4)	Total
Irelands Carbon Budget	200,000,000	160,000,000	120,000,000	480,000,000
Project Lifetime GHG Emissions (tCO2e)	215,505	962,483	960,350	2,138,338
Project Lifetime GHG emissions as a % of Carbon Budget	0.11	0.60	0.80	0.45

The whole lifetime GHG emissions for the entire project following mitigation are estimated to be 2,138,338 tCO_2e which accounts for 0.45% of the total carbon budget. The whole lifetime carbon estimates show that the proposed project would potentially account for 0.11% of the overall CB2 budget, 0.6% of the overall CB3 budget and 0.8% of the provisional CB4 budget. It is clear therefore that the carbon emissions associated with the whole lifetime of the Project comprise a negligible proportion of Ireland's Carbon Budgets.

As detailed throughout the EIAR and the Bitpower reports, the Applicant is committed to reducing the lifetime emissions associated with the Project, incorporating mitigation measures within the design of the Project that enable the emissions reductions detailed.

When account is taken of the magnitude of the lifetime carbon emissions within the context of Irelands Carbon Budgets and the extent of mitigation measures designed to reduce the lifetime emissions arising from the project, the Project aligns with Ireland's national legislation and policy and net zero targets.

In accordance with the significance criteria the whole life effects of GHG emissions resultant from the Project are considered to result in **Minor Adverse** effects and are considered **Not Significant** in an overall context.

15.9 RESIDUAL IMPACTS

15.9.1 CONSTRUCTION PHASE

The proposed development will result in some impacts to climate through the release of GHGs. The proposed development will be constructed using best practice climate mitigation measures to reduce the construction phase impacts on climate. The predicted impact with mitigation relating to GHG emissions will result in a **short-term, minor adverse, not significant** effect.

15.9.2 OPERATIONAL PHASE

The proposed development will be designed to include best practice climate mitigation measures to reduce the operational phase impacts on Climate. The DER system is a new and innovation solution and it will allow the Datacentre Campus to operate on a fully optimised, net-zero carbon energy mix. This will be achieved well in advance of the national grid and Gas Networks Ireland decarbonising their respective networks to Net Zero because of the advanced technologies built into the operational set-up of the DER which allows the system to maximise its use of net-zero carbon energy sources by prioritising renewable energy sources where-ever available ahead of other energy sources.

Gas Networks Ireland has recently published an ambitious transformation plan entitled Pathway to a Net Zero Carbon Network, highlighting the essential role the national gas network will play in transitioning Ireland to a carbon-neutral economy by 2050. The Pathway details the journey towards a repurposed, resized, and fully decarbonised gas network by 2045 by replacing natural gas with renewable gases like biomethane and green hydrogen.

Similarly, EirGrid have a plan in place to deliver 80% of Ireland's electricity from renewable sources by 2030 as set out in the CAP25 and to reduce GHG emissions by 51% from 2018 to 2030 and to achieve net zero carbon emissions by 2050.

Emissions associated with the Project's operational energy demand are anticipated to decrease alongside the decarbonisation of the national grid and the gas network, however the rate of decrease of emissions will be faster for the DER system and it will achieve net zero well before the Gas Network in 2045 if decarbonising occurs at the rate that it is proposed.

Given the ability of the DER system to optimise its energy mix to minimise carbon and effectively provide carbon free system services the proposed development will be able to maintain net-zero operations on a continuous basis (24 hours a day / 365 days a year). The predicted impact to climate from the power demand of the development is deemed to be **long-term, negative** and **minor adverse.** Thus, in terms of climate the operational phase of the Proposed Development will be **not significant**.

15.10 CUMULATIVE IMPACT ASSESSMENT

The IEMA Guidance states with regard to Cumulative Assessment that *"Effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed, as there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other"* and consequently the impact assessment is considered to have covered any cumulative impacts.

15.11 INTERACTIONS ARISING

Climate has the potential to interact with hydrological features such as surface water bodies during both construction and operational phases. The impact of flood risk has been assessed and the surface water drainage network has been designed to cater for significant rain events. The impact of this interaction is a long-term, minor adverse and not significant.

During the construction and operational phase, there is the potential for interactions between climate and traffic. Vehicles associated with the proposed development will result in emissions of CO_2 and NO_2. The impact of this interaction is considered to be long-term, minor adverse and not significant.

15.12 MONITORING

Monitoring is not proposed for the proposed project.

15.13 COMPLIANCE WITH PRINCIPLES FOR SUSTAINABLE DATA CENTRE DEVELOPMENT

The Irish Government published a Statement on the Role of Data Centres in Ireland's Enterprise Strategy in 2022 which sets out a pathway to enable both digitisation and decarbonisation for the development of data centres in Ireland. The Statement is centred on six principles which sets government policy for data centre development that ensures the delivery of sustainable energy plans and Ireland's national decarbonisation objectives. The Statement sets the commitments for data centres to be in compliance with The Climate Action and Low Carbon Development (Amendment) Act 2021 and the Climate Action Plan(s) which supports Ireland's transition to Net Zero and to achieve a climate neutral economy by no later than 2050. The Principles for Sustainable Data Centre Development are as follows:

- Economic Impact - The Government has a preference for data centre developments associated with strong economic activity and employment.
- Grid Capacity and Efficiency - The Government has a preference for data centre developments that make efficient use of our electricity grid, using available capacity and alleviating constraints.
- Renewables Additionality - The Government has a preference for data centre developments that can demonstrate the additionality of their renewable energy use in Ireland.
- Co-Location or Proximity with Future Proof Energy Supply - The Government has a preference for data centre developments in locations where there is the potential to co-locate a renewable generation facility or advanced storage with the data centre, supported by a CPPA, private wire or other arrangement.
- Decarbonised Data Centres by Design - The Government has a preference for data centre developments that can demonstrate a clear pathway to decarbonise and ultimately provide net zero data services.
- SME Access and Community Benefits - The Government has a preference for data centre developments that provide opportunities for community engagement and assist SMEs, both at the construction phase and throughout the data centre lifecycle.

The proposed development is fully in line with all six principles as discussed below.

- Economic Impact. The potential economic impact for the region is very significant and it is estimated by Year 5 that there will be 405 direct operational jobs at the data centre campus across a variety of professional, technical, management and skilled occupations with an additional €62.9m annual wage circulation in the

economy. The Statement favours developments in regional locations, aligned with the National Planning Framework and Regional Spatial and Economic Strategies and again the proposed development is in keeping with this strategy.

- Grid Capacity and Efficiency. The proposed development relies on an innovative hybrid energy system that will facilitate the optimisation of electricity supply to allow for maximum energy efficiency while minimising carbon intensity. The DER system is configured to constantly monitor the data centre demand and the national grid supply and can then then select the preferential mode of energy supply based on hourly data. This functionality in conjunction with the Battery Energy Storage System facilitates curtailment avoidance because excess on-site solar PV output or fuel-cell output or curtailed grid renewables can be battery stored for subsequent use at the optimum time. This allows highly efficient energy use, maximising renewable energy consumption while at the same time prioritising avoidance of any grid curtailment.
- Renewables Additionality. The proposed development will contain the largest solar PV installation for any existing or proposed data centre in the country. The renewable energy asset will have a nominal capacity of 180MWp and it is estimated that the solar farm will generate in the order of 167,000 MWh of energy output per year. During the daytime, the battery storage system will work in tandem with the solar farm to ensure that the data centre load remains reliably met with 100% renewable power throughout daylight hours. At night, when solar production ceases, the battery system can be recharged using renewable electricity procured via power purchase agreements. The DER system will prioritise excess wind energy, particularly during periods of high grid curtailment, which helps mitigate the curtailment of zero-carbon wind generation on the Irish grid, unlocking additional climate benefits at a national level.
- Co-Location or Proximity with Future Proof Energy Supply. The proposed development will adjoin the Castlelost Flexgen Power Plant which has a 220kV GIS substation. This facility is designed to support further development and integration of renewables to the electricity system in Ireland. There will be both a gas transmission node and electricity node located on-site.
- Decarbonised Data Centres by Design. The entire project has been designed and developed with decarbonisation as the central goal. The proposed flexibility of the Solar PV, Fuel Cell and BESS in combination with the versatile use of the electricity grid shows a clear pathway to decarbonise and ultimately provide net zero data services.

  The proposed development systems will facilitate accurate hourly emissions reporting, grid carbon-intensity transparency, and allow the data centre to

optimise computing loads to maximise use of renewables and minimise carbon emissions and in effect will enable the data centre campus to operate on a fully optimised, net-zero carbon energy mix.

- SME Access and Community Benefits. It is anticipated that the development will provide opportunities and benefits for the surrounding regional locations through place-making, community engagement and collaboration with local and regional stakeholders to ensure that the data centre will offer value to the communities in which it is located in.

In summary, the proposed development will positively contribute in a meaningful and material manner to achieving the 2050 target as outlined under the EU Climate Laws, the Climate Action and Low Carbon Development (Amendment) Act 2021 and the Climate Action Plan 2025 of achieving climate neutrality by 2050.

16 INTERACTIONS AND CUMULATIVE EFFECTS

16.1 INTRODUCTION

This chapter addresses Interactions between environmental factors as wells as Cumulative Effects. The purpose of this chapter is to (i) identify how one environmental factor may interact with another during construction, operation and decommissioning /reinstatement; and (ii) to identify where the proposed development may give rise to cumulative effects when considered alongside other existing, permitted, under-construction or reasonably identifiable projects in the receiving environment.

The interaction of environmental factors was identified and carefully considered from the outset of the project. Interactions during construction, operational and decommissioning stages of the project are considered.

Table 16.1 presents a matrix of interactions likely to occur from the proposed development (highlighted in green). The level of interaction between the various media will vary greatly but the table allows the interactions to be identified and detailed where necessary. If the development does not have the potential to impact or affect the interaction, then that interaction is not highlighted in green. The interaction matrix is based on the potential interrelationships of the environmental media both during the construction, operation and decommissioning phases of the proposed development.

The assessment addresses the potential for cumulative effects to occur where there is temporal overlap between construction activities, additional demands on shared infrastructure (in particular the local and national road networks), and combined nuisance effects at sensitive receptors, and also considers the interaction of environmental factors in line with the EPA EIAR Guidelines (2022).

16.2 APPROACH

Interactions are considered where a change in one environmental factor has the potential to influence another environmental factor, either directly or indirectly. Cumulative effects are considered where the effects of the proposed development may combine with those of other plans or projects so as to create a greater overall effect than would arise from the project in isolation.

The most material cumulative relationship is with the adjoining Castlelost energy projects, and in particular the Castlelost FlexGen 275MWe development, because of adjacency, the shared receiving landscape, and the potential for overlapping effects in relation to traffic,

noise, air and climate, visual character and material assets. However, it should be noted that Project Admiral, Castlelost FlexGen and the permitted Castlelost ESS are independent technically and commercially and are not electrically connected. Accordingly, cumulative assessment is required because of shared environmental context rather than because the developments form a single undisclosed project.

Table 16.1 Interactions between Environmental Factors

	Population & Human Health	Air & Climate	Noise & Vibration	Landscape & Visual	Biodiversity	Waters	Soils and Geology	Material Assets	Traffic & Transport	Archaeology & Cultural Heritage
Population & Human Health		C/D, O	C/D, O	C/D, O			C/D		C/D,	
Air & Climate	C/D, O				C/D, O		C/D	C/D, O	C/D	
Noise & Vibration	C/D, O				C/D				C/D	
Landscape & Visual	C/D, O				C/D, O					C/D, O
Biodiversity		C/D, O	C/D	C/D, O		C/D, O	C/D	C/D, O	C/D	
Waters					C/D, O		C/D, O			
Soils and Geology	C/D	C/D			C/D	C/D				
Material Assets		C/D, O				C/D, O			C/D	
Traffic & Transport	C/D	C/D	C/D		C/D			C/D		C/D
Archaeology & Cultural Heritage				C/D, O					C/D	

C/D= Construction /Decommissioning
O = Operation

Table 16.2 Summary of Interactions

Interaction of Environmental Factors	Description
Air quality, climate, population and human health, biodiversity and traffic & transport	Construction traffic, earthworks and material handling interact through dust, combustion emissions, nuisance and road-safety effects. During operation, the DER configuration, solar PV, SOFC, BESS and carbon-management framework reduce higher-carbon reliance and strengthen the interaction between climate mitigation, infrastructure design and operational resource use. Similar controls remain relevant during decommissioning.
Noise and vibration, population and human health, biodiversity, traffic / transport and archaeology /cultural heritage	Noise and vibration interactions arise principally during construction and decommissioning from plant, HGV movement and certain earthworks. The proposed mitigation measures will reduce these impacts and the potential for indirect effects on ecological receptors and assist protection of sensitive heritage features during excavation and other ground disturbance.
Landscape and visual, biodiversity, population and human health, material assets and archaeology /cultural heritage	The landscape and visual impacts have potential interactions with impacts resulting from other environmental statement topics. The interactions of these impacts are usually highly complex in practice and this section serves to act as a brief overview to these issues. In addition, the proposed development will create varying impacts during the construction phase and the operation phase. No designated scenic views will be affected by the proposed development. Landscape mitigation also performs ecological, amenity and heritage functions. Increased setbacks, planted buffers, earthen berms, reinforced hedgerows, native woodland planting, visually permeable fencing and slender security infrastructure reduce visual prominence while supporting biodiversity connectivity, screening residential receptors and softening the relationship between the scheme and nearby heritage features.
Biodiversity, waters, soils and geology, landscape and lighting	Habitat protection, soil handling, drainage management and the lighting strategy are strongly interdependent. Retention of hedgerows and treelines, 5m stand-offs to ditches and boundaries, compensatory woodland, ponds, wild bird cover and dark / low-lux lighting zones all operate together to avoid or reduce effects on bats, birds and wider habitats. Construction timing controls, pre-clearance surveys, micro-exclusion zones and ecological supervision depend on how vegetation,

Interaction of Environmental Factors	Description
	drainage edges, compounds and temporary lighting are managed on the ground.
Waters, soils and geology, biodiversity, material assets and population / human health	The most pronounced construction interaction remains between soil disturbance, runoff generation, drainage infrastructure, aquatic receptors and downstream water quality. The disturbance of soil during construction has the potential to impact on water quality. Construction activities which disturb or expose the soil, including realignment of the stream, have the potential to elevate suspended solids in runoff from the site which could impact on local drains. Mitigation measures during the construction process will prevent sediment run-off and construction discharges. A preliminary CEMP has been prepared and shall be further development and implemented for the construction phase. This provides a framework under which construction activities which have potential for environmental impact (e.g. generation of dust, ecological impacts, surface water discharge, etc) will be managed. Mitigation measures as outlined in the EIAR are included within this plan. There will be no direct process emissions to soils or surface water bodies during the operational phase of the developments (in isolation or in combination). Stormwater generated on the site will be managed in accordance with sustainable best practice proposals as presented in the application documentation.
Traffic and transport, population and human health, air quality, climate, noise and vibration, and material assets	Traffic is a cross-cutting interaction factor. Construction-routing, road-condition surveys, logistics management, emergency access protection, pedestrian and cyclist measures, communication protocols, complaint logging and speed restrictions are relevant to population and human health, dust, emissions, vibration and road-asset protection.
Climate, material assets, waters and operational resource use	The project adopts a whole-life carbon approach with PAS 2080-aligned governance, carbon gateways, embodied-carbon accounting, procurement controls and a carbon data room. This interacts with material choice, waste reduction, logistics, energy infrastructure design and operational water use.
Archaeology and cultural heritage, landscape,	Archaeological and built-heritage effects remain closely linked to layout, screening, road works and construction methods. Measures such as exclusion zones, fencing, geophysical survey, test trenching, townland-

Interaction of Environmental Factors	Description
construction traffic and ground disturbance	boundary recording, etc. shall be carried out and these are designed to mitigate impact. Developments can sometimes infringe upon the amenity use and visual setting of a cultural heritage feature and as a result lead to unacceptable impacts. The proposed development will introduce a new type of development within the local area. The introduction of the proposed development will not however impact upon any inter-relationships between monuments located within the local landscape.

The proposed development of the individual and collective development has the potential to impact on various environmental aspects, and there are interactions and inter-relationships between these aspects, as presented in Table 16.1 and Table 16.2.

16.3 CUMULATIVE EFFECTS

In environmental terms, cumulative assessment is concerned with the possibility that effects from Project Admiral may combine with the effects of other existing, permitted or reasonably foreseeable projects in the same receiving environment.

The adjoining Castlelost energy projects are the most relevant cumulative context because they share the same broad landscape setting and surrounding road environment. The most significant of these is Castlelost FlexGen (Westmeath Ref. 21/515), including its later alterations, with the permitted Castlelost ESS (Ref. 21/532) also relevant. These projects are independent technically and commercially and are not electrically connected to Project Admiral; nevertheless, their proximity means they remain relevant to cumulative assessment. In addition, the EIAR and AA Screening Report identify local permissions in the vicinity, together with the gas pigging station, the underground gas transmission connection and Yellow River Wind Farm, as projects considered in the wider cumulative receiving environment. These are presented in Table 16.3.

Table 16.3 Cumulative Effects

Other project / plan	Status	Principal pathways for cumulative interaction	Cumulative effects summary
Adjoining Castlelost FlexGen 275MWe project (Ref. 21/515) and related alterations	Construction nearing completion /operation end of Q1 2026	Landscape and visual, air and climate, noise, traffic, material assets, industrial character	This is the most material cumulative relationship because of adjacency and shared receptors. Although the projects are independent and not electrically connected, cumulative effects may arise from the combined presence of major energy and data infrastructure in the same landscape and from overlapping traffic, noise and emissions pathways. With the embedded design, setbacks, planting, traffic controls and carbon-management commitments, cumulative effects are not likely to exceed those already identified in the topic chapters.
Permitted Castlelost ESS (Ref. 21/532)	Permitted /not yet constructed	Landscape and visual, material assets, cumulative land take, traffic during any overlapping works	Potential cumulative effects relate mainly to the combined presence of energy infrastructure and any overlap in construction or maintenance activity. There is no operational dependence between the projects.
Gas pigging station and underground gas transmission connection	Operational / part of wider infrastructure context	Material assets, traffic, temporary construction disturbance, industrial infrastructure character	These projects contribute to the existing utility and energy-infrastructure context. Cumulative effects are principally contextual and infrastructural rather than indicative of a single combined project.
Yellow River Wind Farm	Operational	Landscape and visual, climate and energy context	Cumulative interaction is mainly in the wider energy-landscape context. Thera are no significant cumulative ecological or water-quality effects arising with Project Admiral.
Other local permissions identified in the EIAR / AA Screening Report within c.1000 m and the wider vicinity	Existing /permitted	Local traffic, temporary amenity effects, background land-use change	These projects are generally smaller in scale. Their principal cumulative relevance is to local traffic movement and incremental change in the receiving environment; they do not materially alter the overall cumulative conclusion.

In cumulative terms, the principal pathways remain traffic and transport; noise and vibration; air quality and climate; landscape and visual effects; and the shared demand placed on material assets and utility infrastructure. During construction, the greatest potential for cumulative effects would arise if construction or abnormal-load activities associated with nearby projects were to overlap on the same road network or within the same broad receptor area. The CTMP, routing strategy, road-condition surveys,

emergency-access arrangements, communication measures and monitoring provisions materially reduce that risk.

During operation, the most notable cumulative issue is the combined presence of Project Admiral and adjoining energy infrastructure within the Castlelost area. That combined presence has potential to influence visual character, perceptions of industrialisation, local traffic activity associated with operation and maintenance, and the cumulative climate profile of the area. The development proposal includes substantial embedded mitigation and design responses, including strengthened landscape proposals, reduced visual clutter, on-site renewables and storage, SOFC-based lower-carbon generation, and PAS 2080-aligned carbon governance across the project life cycle.

In relation to biodiversity, waters and European sites, the AA Screening Report concludes that the proposed development is not likely, either alone or in combination with other plans or projects, to have significant effects on any European site. The in-combination review considered local permissions and other identified projects, and no significant in-combination effects were predicted having regard to the lack of meaningful source-pathway-receptor connectivity, the nature of the receiving environment and the project design and mitigation measures.

For decommissioning /reinstatement, cumulative effects could in principle arise where future decommissioning activities for Project Admiral coincide with works at adjoining energy infrastructure or other road-generating development. However, the decommissioning framework provides for a separate traffic management approach, phased dismantling, waste segregation, drainage inspection, contamination controls and reinstatement, such that any future cumulative effects would be temporary, managed and not expected to give rise to significant adverse residual effects.

When cumulative effects are considered, the most important relationship is with the adjoining Castlelost energy projects because they share the same receiving environment. The cumulative effects that could arise are principally related to traffic, noise, air and climate, landscape /visual character and material assets.

Having regard to the mitigation, monitoring and management measures incorporated into the proposed development and set out in this EIAR, it is concluded that, following implementation of those measures, the proposed development will not give rise to any likely significant adverse residual interactive or cumulative effects, other than those identified and assessed in the relevant topic chapters.

17 MAJOR ACCIDENTS AND DISASTERS

17.1 INTRODUCTION

This chapter has been prepared to provide a dedicated assessment of the vulnerability of the Proposed Development (Project Admiral) to the risks of major accidents and/or disasters relevant to it and, where appropriate, the expected significant adverse effects on the environment arising from such events. The assessment has been prepared having regard to the EIA Directive (as amended) and the EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EIAR) (2022).

A full description of Project Admiral can be found in Chapter 2 of the EIAR (Proposed Development).

17.2 BACKGROUND AND PURPOSE

The EIA Directive requires that EIARs consider the likely significant effects of the project on the environment, including effects deriving from the vulnerability of the project to risks of major accidents and /or disasters that are relevant to it. In this context, the term *"major accident"* includes low-likelihood, high-consequence events such as fires, explosions, loss of containment and associated secondary effects (for example, contaminated firewater/runoff), whilst *"disasters"* may include natural hazards (for example, extreme rainfall events) and other external events.

This chapter focuses on those accident /disaster scenarios that are credible for Project Admiral and that could give rise to environmental effects beyond normal operational emissions and discharges.

17.3 GUIDANCE AND LEGISLATION

The methodology has been prepared having regard to the following principal sources:

- Directive 2011/92/EU as amended by Directive 2014/52/EU, particularly the requirement to assess the vulnerability of projects to major accidents and / or disasters relevant to the project concerned;
- EPA Guidelines on the Information to be Contained in EIARs (2022);
- Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017);
- EPA Guidance on Assessing and Costing Environmental Liabilities (2014);

- A Framework for Major Emergency Management Guidance Document 1 - A Guide to Risk Assessment in Major Emergency Management (Government of Ireland, 2010);
- Land Use Planning Assessment for a Proposed Flexgen Peaker Generation Plant at Castlelost, Co. Westmeath, Report Ref 237501.0404RR0124, 24 July 2023;
- Available information for Project Admiral.

17.4 SCOPE AND METHODOLOGY

Major accidents and /or disasters are hazards that have the potential to affect and be affected by the proposed development. These include accidents during construction, operation and decommissioning caused by operational failure and /or natural hazards.

The scope of this assessment is centred on the understanding that the proposed development will be designed, built and maintained in line with best current practice and in compliance with the relevant health and safety standards. As such, major accidents resulting from the proposed development are considered very unlikely.

Notwithstanding that baseline assumption, a risk analysis-based methodology covering identification, likelihood, consequence and risk evaluation has been used for this assessment.

The EPA EIAR Guidelines (2022) recognise that EIARs may draw upon established risk assessment work undertaken for other regulatory regimes, where relevant, while ensuring that the EIAR clearly identifies the potential environmental effects and the mitigation that avoids or reduces significant adverse effects. The assessment in this chapter therefore:

- identifies major accident and disaster hazards relevant to the proposed development;
- considers credible source-pathway-receptor linkages for environmental effects;
- summarises likelihood /risk context in a proportionate manner, drawing on available quantitative and semi-quantitative assessments;
- identifies mitigation (embedded design measures and additional measures where required) and provides a conclusion on residual effects.

17.5 CATEGORISATION OF THE BASELINE ENVIRONMENT

A desk-based review of the baseline receiving environment has been undertaken because the local and regional context influences both the likelihood and the potential

consequences of a major accident or disaster. For Project Admiral, the most relevant baseline characteristics are the site drainage network and downstream connectivity to the River Monagh catchment, the groundwater and soils context, the low baseline flood risk identified in the EIAR, and the presence of the adjoining Castlelost Flexgen facility.

The Castlelost FlexGen is classified as a Lower Tier Seveso site and is subject to the provisions of the Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations, 2015 (COMAH Regulations 2015).

17.6 IMPACT ASSESSMENT METHODOLOGY

The site-specific risk assessment focuses on unplanned but plausible incidents during construction, operation and decommissioning. The process adopted for this assessment comprises: (i) identification of potential risks, (ii) risk classification through likelihood and consequence assessment, and (iii) risk evaluation by reference to a risk matrix.

17.6.1 IDENTIFICATION OF POTENTIAL RISKS

Potential risks were identified in respect of both the vulnerability of the Project Admiral to major accidents /disasters and the potential for the Project Admiral to cause such events. The screening focused on non-standard but plausible incidents capable of giving rise to non-trivial environmental effects. Off-site events were also considered where they could have consequential effects on Project Admiral.

17.6.2 RISK CLASSIFICATION - LIKELIHOOD

Likelihood has been classified using a five-point scale aligned to the approach reflected in the comparator EIAR chapter and the Government of Ireland major emergency management guidance. The approach assumes the likelihood category is met where one or more aspects of the description are satisfied.

Table 17.1 Risk Classification - Likelihood

Ranking	Likelihood	Description
1	Extremely unlikely	May occur only in exceptional circumstances; of the order of once in 500 years or more.
2	Very unlikely	Not expected to occur; little recorded evidence or opportunity to occur; of the order of once in 100-500 years.
3	Unlikely	May occur at some time; limited evidence and some opportunity for occurrence; of the order of once in 10-100 years.
4	Likely	May occur with some regularity; supported by recorded incidents or strong anecdotal evidence; of the order of once in 1-10 years.
5	Very likely	Expected to occur frequently or repeatedly; may occur more than once per year.

17.6.3 RISK CLASSIFICATION - CONSEQUENCE

The consequence rating assumes, on a conservative EIAR basis, that the relevant mitigation measures and safety procedures have failed to prevent an environmental effect. The classification used in this document is set out below.

Table 17.2 Risk Classification - Consequence

Ranking	Consequence	Description
1	Minor	No contamination or only very localised effects; minor local disruption; no fatalities.
2	Limited	Simple contamination with localised, short-duration effects that could be remediated; limited disruption.
3	Serious	Potential for wider or more persistent environmental contamination, multiple serious injuries and partial community disruption.
4	Very serious	Heavy contamination, localised severe effects or extended duration; major injuries / evacuation and poor community functioning.
5	Catastrophic	Very heavy and widespread contamination of extended duration; large-scale impact, prolonged service loss and severe community disruption.

17.6.4 RISK EVALUATION

Once classified, likelihood and consequence have been multiplied to establish a risk score and to place each scenario within a colour-coded risk matrix. For the purposes of this assessment, green denotes low risk, amber denotes medium risk and red denotes high risk. Events falling within the amber or red zones would require further consideration as potentially significant EIAR risks.

Table 17.3 Risk Evaluation

Likelihood /Consequence	1 Minor	2 Limited	3 Serious	4 Very Serious	5 Catastrophic
5 Very likely	5	10	15	20	25
4 Likely	4	8	12	16	20
3 Unlikely	3	6	9	12	15
2 Very unlikely	2	4	6	8	10
1 Extremely unlikely	1	2	3	4	5

17.7 RECEIVING ENVIRONMENT AND ENVIRONMENTAL RECEPTORS

The principal surface water receptor is the River Monagh catchment. Existing drainage ditches within and around the site connect, directly or indirectly, to the wider catchment. As a result, any uncontrolled spill, firewater release or sediment-laden runoff could affect surface water if containment and drainage controls failed.

Groundwater, soils and subsoils also represent relevant receptors. The EIAR records that the site is at low flood risk, but climate-related extreme rainfall remains relevant because it could affect the performance of containment and drainage systems if not appropriately designed and maintained.

The presence of the adjoining Castlelost Flexgen lower-tier COMAH facility is a further relevant feature of the receiving environment because it creates a credible external accident source requiring consideration of cross-boundary effects and coordinated emergency response.

17.8 IDENTIFICATION OF RELEVANT MAJOR ACCIDENT AND DISASTER SCENARIOS

Table 17.4 identifies the principal scenarios carried forward for the Admiral assessment. The screening focuses on scenarios with a credible environmental source-pathway-receptor linkage rather than matters confined solely to occupational safety.

Table 17.4 Principal Scenarios

Scenario group	Representative event	Primary environmental pathway	Key receptors	Screening outcome
Construction	Fuel, chemical, concrete washout or sediment release	Runoff to drains / ditches or infiltration to soil / groundwater	Soils, groundwater, surface water	Credible; assessed qualitatively with standard construction controls.
Construction	Construction fire with contaminated runoff	Firewater / runoff to drainage or overland flow	Soils, drainage, surface water, local air	Credible but low-likelihood; assessed qualitatively.
Fuel / oil systems	Loss of containment from oil-containing equipment or tanker unloading	Overland flow, infiltration, drainage entry	Soils, groundwater, River Monagh catchment	Credible; consequence depends on containment performance.
Fire and firefighting	Fire within the DC, fuel-cell or transformer areas	Contaminated firewater routed through drainage / retention systems	Surface water, soils, groundwater, local air	Credible; controlled primarily by retention and isolation infrastructure.
Natural gas systems	Gas leak / rupture with ignition or explosion	Smoke, debris and contaminated runoff	Local environment, soils, surface water	Credible but environmental effects are mainly secondary.
BESS	Thermal runaway / enclosure fire / propagation	Smoke and evolved gases; contaminated runoff	Local air quality, soils, surface water	Credible but unlikely; mitigation integral to design.
Electrical infrastructure	Transformer or switchgear fire (incl. insulating fluids)	Local spill and runoff to drainage if not contained	Soils; surface waters	Localised; managed via containment and drainage controls
External accident source	Major accident at adjoining Castlelost Flexgen	Heat, smoke, debris, emergency access or coordinated response effects	Adjoining lands, local environment, emergency management interface	Relevant external hazard; considered using available LUP information.
External / natural hazards	Extreme rainfall /flooding, lightning, external fire /wildfire	Containment overtopping, bypass or fire initiation	Surface water, soils, local air	Relevant to resilience of containment and drainage systems.

17.9 RISK ASSESSMENT

The following tables apply the likelihood-consequence matrix to the Admiral scenarios. Likelihood ratings reflect the design and management measures described in the EIAR and supporting information. Consequence ratings conservatively assume that an event occurs and leads to an environmental effect.

Table 17.5 Construction Phase

Risk ID	Potential risk	Principal environmental effect	Likelihood (1-5)	Consequence (1-5)	Risk score / category	Basis of rating
C1	Construction spill, sediment release or concrete washout	Localised contamination of soils, groundwater, drains or nearby waters	2	2	4 Low	Very unlikely in view of CEMP controls, bunded storage, designated refuelling /washout areas and spill response procedures. If it occurred, the likely effect would be simple, localised contamination of short duration.
C2	Construction fire or fuel incident with contaminated runoff	Local smoke, contaminated runoff and possible soil /drainage pollution	1	3	3 Low	Extremely unlikely because flammable inventories during construction are limited and subject to hot-works, storage and emergency controls. Consequence is serious on a conservative basis because contaminated runoff and smoke could require active incident management.

Table 17.6 Operational Phase

Risk ID	Potential risk	Principal environmental effect	Likelihood (1-5)	Consequence (1-5)	Risk score /category	Basis of rating
O1	Loss of containment from secondary containment	Pollution of soils, groundwater or drainage with potential downstream pathway	2	3	6 Low	Very unlikely given bunding, separators, containment and operational procedures. Consequence is serious because, if controls failed, an uncontrolled release could affect the River Monagh catchment.
O2	Fire within the DC, fuel-cell or associated plant areas with contaminated firewater	Contaminated firewater, local smoke and deposition	2	3	6 Low	Very unlikely because of passive / active fire protection and dedicated firewater infrastructure. Consequence is serious because an uncontrolled firewater release could affect multiple environmental media.

Risk ID	Potential risk	Principal environmental effect	Likelihood (1-5)	Consequence (1-5)	Risk score /category	Basis of rating
O3	Natural gas leak /rupture with ignition or explosion at AGI or associated infrastructure	Smoke, debris, emergency runoff and localised pollution	2	3	6 Low	Very unlikely due to gas detection, isolation and shutdown systems and the absence of bulk gas storage onsite. Environmental effects would be mainly secondary but potentially serious in the immediate vicinity.
O4	BESS thermal runaway /enclosure fire /propagation	Smoke, evolved gases and contaminated runoff	2	3	6 Low	Very unlikely in light of UL9540A-tested enclosures, NFPA 855 spacing, fire-water provision and firewater retention. Consequence is conservatively taken as serious because a large enclosure fire would require intensive management.
O5	Transformer or switchgear fire / insulating oil release	Local spill and runoff to drainage if containment failed	2	2	4 Low	Very unlikely because transformers are bunded and drainage controls are provided. Consequences would normally be localised and remediable.
O6	Major accident at adjoining Castlelost Flexgen lower-tier Seveso facility	Cross-boundary heat, smoke, debris or coordinated emergency response effects	2	3	6 Low	Very unlikely in light of the Seveso control regime and the available LUP findings, which do not indicate extensive off-site impact zones affecting occupied off-site buildings. Consequence is serious on a precautionary basis because cross-boundary effects remain possible at the shared interface.
O7	Extreme rainfall /flooding affecting containment and drainage performance	Overtopping /bypass of containment and mobilisation of contaminants	2	2	4 Low	Very unlikely because the site is identified as low flood risk and the drainage design includes attenuation, retention and penstock isolation. If it occurred, the likely environmental effect would be localised and remediable.
O8	Lightning strike or external fire / wildfire affecting site compounds	Fire initiation, local smoke and contaminated runoff	1	3	3 Low	Extremely unlikely but relevant as an external hazard. Consequence is serious on a conservative basis because a fire

Risk ID	Potential risk	Principal environmental effect	Likelihood (1-5)	Consequence (1-5)	Risk score /category	Basis of rating
						event could affect local air quality and require retention of contaminated runoff.

For ease of reference, Table 17.7 places the identified Admiral risk IDs within the applied risk matrix. All identified events fall in the green classification.

Table 17.7 Risk Summary

Risk ID	1 Minor	2 Limited	3 Serious	4 Very serious	5 Catastrophic
5 Very likely					
4 Likely					
3 Unlikely					
2 Very unlikely		C1, O5, O7, D1	O1, O2, O3, O4, O6		
1 Extremely unlikely			C2, O8, D2		

No amber or red events have been identified for Admiral on the basis of the EIAR design assumptions and the embedded containment, firewater and emergency-response measures described for the project.

17.10 RESIDUAL EFFECTS AND CONCLUSION

Project Admiral includes infrastructure and activities that are relevant to major accidents and /or disasters, notably oil-containing equipment, natural gas systems, BESS plant, transformers, firewater /drainage systems, and construction and decommissioning activities.

The most sensitive environmental receptors are the site drainage network, the River Monagh catchment, soils and groundwater. In the absence of design controls, some accidental scenarios, particularly uncontrolled spill or contaminated firewater release, could have the potential to cause significant adverse environmental effects.

However, the project as described incorporates a substantial suite of embedded measures intended specifically to interrupt source-pathway-receptor linkages. The updated risk matrix assessment confirms that the identified Admiral scenarios all fall within the low-risk zone.

Accordingly, subject to detailed design confirmation and implementation of the identified mitigation measures and management procedures, significant adverse effects on the environment arising from the vulnerability of Project Admiral to risks of major accidents and /or disasters are not likely to be significant.

18 SCHEDULE OF MITIGATION

18.1 INTRODUCTION

This consolidated schedule has been prepared to provide a clear description of (i) the features (if any) of the proposed development and (ii) the measures (if any) envisaged to avoid, prevent or reduce and, where feasible, offset likely significant adverse effects on the environment.

For the purposes of this schedule, *"mitigation"* includes: (i) measures embedded in the project design and layout (mitigation by avoidance and reduction) and (ii) management, procedural and monitoring measures to be implemented during construction, operation, decommissioning and reinstatement (as applicable).

All mitigation and management measures shall be incorporated into the Contractor's final Construction Environmental Management Plan (CEMP), together with any planning conditions and any additional method statements required to implement the controls described herein. The CEMP is a live document and will be reviewed and updated as required.

18.2 STRATEGY AND IMPLEMENTATION

Mitigation measures are incorporated at various stages of the proposed development. The preferred hierarchy of mitigation applied is:

- Prevention: at design stage – avoid, relocate or modify the design and/or do not proceed with the development.
- Reduction: introduce design modification or additional structures (e.g. screens), reduce size and scale of development, etc.
- Compensation or remediation: provide like-for-like replacement for any lost environmental elements, where feasible.

During construction, environmental protection measures will be implemented through the CEMP and associated plans and method statements (including, as relevant, a Construction Traffic Management Plan and Dust Management Plan). Operational controls will be implemented through applicable standards and management systems, including licensing requirements where relevant. Decommissioning and reinstatement will be implemented through a site closure /decommissioning plan and, in the case of the temporary construction access road, a decommissioning and reinstatement method statement.

18.3 SCHEDULE OF MEASURES BY ENVIRONMENTAL FACTOR

The measures below are grouped by environmental factor and include mitigation by design, construction management measures, monitoring provisions and reinstatement commitments, as relevant to the proposed development (as amended). Measures apply to construction, operation and decommissioning/reinstatement phases as applicable.

18.3.1 POPULATION AND HUMAN HEALTH

Phase	Measures / features
Design / Embedded features	The project is to be implemented with the site access strategy, construction compounds, welfare facilities and internal arrangements set out in the Preliminary CEMP so that construction activities can be managed in an orderly and safe manner. During decommissioning, access is to be via the established main access route from the R446, with separate decommissioning compounds for the DC facility and DER.
Construction management measures	The CEMP is to be developed by the appointed contractor before works commence, submitted for written approval, communicated to all personnel and reviewed monthly and after any accident or emergency. Environmental awareness training is to be provided through induction, toolbox talks and briefing sessions and is to address the CEMP, emergency response, spill control, waste management, water pollution prevention, dust, noise and vibration, wildlife protection, material storage and refuelling, complaints handling and environmental incident reporting. The Project Manager / SHEQ Adviser is to receive, document and respond to third-party communications. Complaints from the public are to be logged and recorded on the complaint register. Site compounds are to provide statutory welfare facilities, potable water, toilets, washing/changing facilities, first aid, rest areas, lighting and ventilation, with wastewater collected and removed from site.
Operational measures	The EIAR identifies operational effects on population and human health as neutral, subject to implementation of the project mitigation framework.
Monitoring provisions	Training records, communication logs, complaint records, inspections, audits and management reviews are to be maintained in accordance with the contractor's management system. Monthly contract review meetings are to address legal compliance, incidents / non-conformances and close-out of audit corrective actions.
Decommissioning /reinstatement commitments	Within 12 months of any proposed cessation of activities, the site owner is to engage with the local authority regarding closure and decommissioning options.

	A project Health and Safety Plan is to be implemented for decommissioning, and a Traffic Management Plan is to be developed at least 6 months in advance of decommissioning and agreed with the local authority. Decommissioning is to proceed in a planned, phased and well-resourced manner, with heavy activities avoided outside agreed working hours.

18.3.2 BIODIVERSITY

Phase	Measures / features
Design / Embedded features	Compensatory woodland is to be planted as per the plans and particulars of the application, including a 4.34 ha plot adjacent to the ring fort and a woodland strip along the southern motorway boundary to facilitate woodcock and snipe. All hedgerows and treelines in the Solar Farm Development area are to be retained; as much tree line and hedgerow as possible is to be retained elsewhere, with mature hedgerow replanted in proportion to that removed. Where possible certain trees are to be retained as monolith features through veteranisation. Some ash in the northern area of the site is to be retained if possible with the crown removed and additional potential roost features cut into it. New woodland is to be provided to compensate for loss of bat feeding habitat, and the attic in Building 1 is to be adapted for bats with three bat slates, internal baffles and three 1FF Schwegler (or equivalent) bat boxes. The lighting strategy is to provide dark, low-lux and standard lighting zones. The western boundary by DC Building 1, the emergency road, the new woodland and ponds are to remain unlit. Any unavoidable lighting is to be directional / cowled, directed downward and inward, shielded against upward and horizontal spill, and operated only when required. Low-light zones are to use 6m high 4000k fittings with motion sensors. Solar panels are to incorporate non-polarising white grid partitioning to reduce polarised light effects. Ponds are to be created / enhanced within the DC facility, screened from view and maintained as dark features at night for duck and wader species. A minimum 5m buffer is to be maintained to drain ditches, hedgerows and tree lines. A total of 11.16 ha is to be designated for wild bird cover planting to mitigate Yellowhammer habitat loss

Construction management measures	Tree felling should ideally be undertaken from September to late October /early November or from late January /end February. Outside those periods, an Ecological Clerk of Works is to verify that impacts will not arise before works proceed. All trees with potential roost features are to be subject to additional at-height survey before felling. Vegetation clearance is to take place outside the nesting bird season (1 March to 31 August). Where this is not possible, a nesting bird survey is to be completed and vegetation removed within 48 hours only where no nests or nesting birds are recorded. An Ornithologist / Ecological Clerk of Works is to be present during construction to micromanage working areas, maintain micro-exclusion zones where required and avoid disturbance to key bird species. Construction may be limited in particular areas at times when they are of value to birds, with buffer zones and timings determined through co-operation between the overseeing ornithologist, site manager and NPWS /Local Authority representatives. A 100m construction exclusion zone is to be maintained where breeding barn owl nesting has been identified, with no construction in the breeding season at that location. Where construction lighting is unavoidable, it is to be low-intensity, sensor-based and directed away from mature trees, treelines and woodland. All staff are to be briefed on biodiversity controls; unexpected wildlife discoveries are to be referred immediately to the SHEQ Adviser; tree protection zones are to be set up where trees are close to works; and any invasive plants encountered are to be managed by specialist contractors
Operational measures	Wild bird cover planting is to comprise primarily oats / barley (65%), together with linseed (10%), cornflower annuals (10%) and native provenance annual wildflower / heritage grain elements (15% / 2 ha). These areas are to be planted annually by 31 May, are not to be harvested, and are not to receive pesticides. Livestock may clear areas only between 15 and 30 March. Perennial wildflower margins are to be provided at 25–50 cm width using the specified WF03-type mix.
Monitoring provisions	Yellowhammer monitoring is to be undertaken for Years 1 to 3 post-construction. If significant decline is recorded, additional measures are to be implemented to prevent decline, which may include securing adjacent lands and planting tillage. Post-construction bat monitoring is to be undertaken at Years 1, 3 and 5 following commencement of development, focusing on activity levels, habitat usage and the effectiveness of mitigation measures.

Decommissioning /reinstatement commitments	Prior to and during decommissioning, environmental surveys are to assess soil, water and biodiversity conditions, including the presence of protected or invasive species. Final ground grading, contouring, seeding and revegetation are to restore the site to a condition consistent with pre-construction land use, typically grassland, unless otherwise agreed with the local authority.

18.3.3 SOILS AND GEOLOGY

Phase	Measures / features
Design / Embedded features	Construction layouts are to minimise impermeable area and limit heavy machinery access through sensitive soils using designated routes and low-compaction equipment. Operational infiltration, containment and protection measures are to include grading to infiltration areas, shallow basins / trenches, permeable pavements, bioswales, detention /retention areas, native deep-rooted planting, double-walled tanks, bunded containment, leak detection, shut-off valves and spill containment walls. Where waste heat or vibration could affect soils or bedrock, design responses are to include heat capture / reuse, insulation, vegetation buffers, vibration isolation pads, dampers and flexible connections.
Construction management measures	Topsoil is to be stripped carefully, stored in designated protected areas and retained for reuse during restoration. Silt fences, sediment traps, vegetation buffers, erosion control blankets and drainage controls are to be used where required to protect soil and prevent contamination. Fuel, oils and chemicals are to be stored on impervious bases within secure bunded areas with 110% capacity, at least 10m from watercourses. Mobile refuelling is to occur on impermeable surfaces away from drains, with spill kits and drip trays available. Personnel are to be trained in chemical handling, storage and emergency spill response, and all incidents are to be reported, recorded and investigated.
Operational measures	Inspection and emergency response arrangements are to be maintained for chemical storage and transfer areas, including routing any spills away from groundwater recharge zones. Continuous soil temperature and moisture monitoring is to be used where waste heat may affect soils.
Monitoring provisions	At decommissioning, the independent closure audit / assessment is to consider whether any soil or groundwater contamination remains that could affect human or environmental receptors.

Decommissioning /reinstatement commitments	Foundations are to be removed (or reduced) to approximately 1m below grade, with roads / culverts and surplus material removed as appropriate, followed by regrading and revegetation. Soils stored on site are to be reused for restoration where suitable; if insufficient, imported topsoil /subsoil is to be from a source acceptable to the local authority. Any spill-impacted soils identified during decommissioning are to be removed from site and disposed of at an appropriate facility.

18.3.4 WATER ENVIRONMENT

Phase	Measures / features
Design / Embedded features	Operational water management measures are to include slow-flow grading, shallow basins /trenches, permeable paving, bioswales, detention /retention ponds, native planting, rainwater storage and engineered infiltration / treatment features. Spill protection is to include double-walled tanks, secondary containment, chemically resistant liners, leak detection, automatic shut-off valves, early warning alarms and spill containment walls with safe drainage. The drainage design is to maintain separation and isolation of contaminated surface water from uncontaminated surface water, with risk areas discharged to separate systems and dirty waters treated before infiltration /discharge. Surface water generated on hardstanding will pass through multiple ponds, and dirty-water drainage areas are to include hydrocarbon interceptors. Flood-resilient design measures are to include maintaining open drains, watercourses and culvert /bridge inlets, watertight underground cabling and ducting, SuDS for roof and hardstanding runoff, and allowing areas that currently flood to continue to flood. Solar panels are to be mounted above existing ground level without significantly altering the existing topographical profile, with the lowest part of the panel approximately 800mm above ground.
Construction management measures	Silt fences, temporary basins, sediment traps, check dams and erosion controls are to be used where required to prevent sediment-laden runoff. Buffer zones, silt traps and settlement ponds are to be used to avoid sediment reaching drains and watercourses. Construction materials are to be stored in covered areas with secondary containment. Construction compounds are to be located at least 30m from on-site drains, with hardstanding

	delivery areas set a minimum of 10m from drainage ditches. All refuelling areas are to be on hardstanding, in agreed designated locations, with supervised deliveries, level checks before delivery, bunded storage and spill kits at refuelling points and within working areas. Fuel, oil and chemicals are to be stored on impervious bases within secure bunded areas with 110% capacity and kept at least 10m from watercourses. A spill response /incident response procedure is to be maintained. In the event of a spill, the source is to be stopped, vulnerable areas such as drains or watercourses protected, absorbent and spill control materials used, and relevant stakeholders notified where required. Wet concrete controls are to include use of ready-mix /pre-cast elements where possible, no batching of wet cement on site, no wash-out of plant on site, minimum-water chute cleaning only, and no discharge of cement-contaminated waters to the drainage system or to any drain /watercourse. For bridge and in-stream works, the method statement is to be made available to Westmeath County Council, NPWS and IFI before works commence. Works involving the Kil1 channel are to commence from the downstream end, with a cofferdam placed 100m downstream of each construction area and straw bales used at intervals to trap sediment.
Operational measures	The operational drainage, containment and treatment measures identified in EIAR and the WFD assessment are to be maintained for the lifetime of the development. Settlement ponds are to be operated to clarify surface waters from hardstanding prior to entry to surface watercourses; particulate matter captured in settlement ponds is to be transferred to landscaped perimeter bunds. Hydrocarbon interceptors are to be maintained and oils removed regularly by an appropriately licensed contractor. Water-efficient techniques are to be used at source where possible to maximise reuse, and water is to be recycled within the process from which it issues.
Monitoring provisions	Water quality monitoring is to include periodic inspection of the downstream watercourse to the south during construction for visible signs of deterioration. Frequent inspection and maintenance of erosion, sediment and runoff controls are required during construction, including inspection of silt fences as part of the daily inspection regime and removal of trapped silt at regular intervals and before predicted flood events. Regular visual monitoring of settlement ponds is required to confirm that no visible oil or fuel contamination is present;

	groundwater and surface water monitoring is to continue as per the proposed regime. During decommissioning, drainage systems are to be inspected and cleaned, and any sludges /oils are to be contained and removed off site.
Decommissioning /reinstatement commitments	Where feasible, dismantling is to be undertaken indoors away from clean surface water collection points. Loading /unloading is to occur in designated tanker delivery areas isolated from clean surface water inlets. Waste oils and greases removed during decommissioning are to be stored in suitable containers on hardstanding within bunded or otherwise contained areas; additional spill kits are to be provided; and established accident prevention and emergency response procedures are to be followed. The independent closure audit /assessment is to verify that no residual impacts to surface water or groundwater remain. Following completion of bridge /channel works, sediment captured by downstream controls is to be removed periodically over the first number of weeks following completion of the construction phase.

18.3.5 MATERIAL ASSETS

Phase	Measures / features
Design / Embedded features	Soils arising from earthworks are to be retained on site and used to form boundary berms where suitable. Construction compounds are to be laid out with geotextile base, silt fencing, secure storage, welfare facilities, waste storage areas and parking to support phased delivery of the works. The development will be a grid-connected campus with on-site solar PV, SOFC generation and BESS configured to optimise use of energy sources for cost, carbon intensity, reliability and matching of demand. The BESS is to function as a behind-the-meter energy buffer /peak-shaving asset to support local consumption, load balancing and power quality on site rather than as an export-led grid trading asset.
Construction management measures	A site-specific Construction and Demolition Resource / Waste Management Plan is to be implemented as a live document through the construction phase. Materials are to be stored so they are protected from damage by traffic, personnel movement and weather. Plant, equipment and materials are to be stored at least 10m from drains.

	Waste is to be segregated and managed in accordance with the waste hierarchy and relevant permits / duty of care requirements.
Operational measures	Proper management of the site's infrastructure and services. DER to be connected and operated in accordance with grid statutory bodies.
Monitoring provisions	Records of inspections, waste transfers and material management are to be maintained in accordance with the contractor's management system.
Decommissioning /reinstatement commitments	Residual materials at decommissioning are to be managed through reuse, return to supplier, recycling / recovery or disposal, as appropriate. Plant, equipment, battery modules, fuel cell components, inverters, cabling, pipework and associated infrastructure are to be dismantled, removed and recycled /disposed of appropriately. Internal roads and hardstanding may be broken up and recycled as infill material where not retained for future use. All transfers of products, materials and waste off site are to be recorded and retained to support closure certification.

18.3.6 AIR QUALITY

Phase	Measures / features
Design / Embedded features	The site layout and construction programme are to be planned with dust management in mind, and activities with potential for significant emissions are to be located as far as possible from residential and commercial receptors. Vehicle routes are to be hard surfaced or formed in compressed ground, the construction compound is to include hardstanding, and material storage bays are to be oriented away from the dominant wind direction.
Construction management measures	A Dust Management Plan is to be developed and implemented as part of the CEMP, with a designated Site Agent responsible for dust management. An effective training programme for site personnel is to operate throughout the works and a communication strategy is to be maintained with the local community. Dust minimisation and control measures are to be implemented and regularly reviewed, including fixed and mobile water sprays for stockpiles and road / yard surfaces during dry or windy weather. Additional controls are to include on-site speed limits and signage, engines switched off when not in use, servicing of smoking plant, no burning on site, avoidance of vehicle queuing at the entrance

	and provision of wheel wash facilities with appropriate containment. The National Guidelines for effective management of Aspergillus risks are to be followed.
Operational measures	No separate operational air quality mitigation measure is identified beyond implementation of the design and construction controls identified in the EIAR.
Monitoring provisions	A daily inspection programme is to verify the effective operation of dust controls. Dust deposition monitoring is to be undertaken at site boundary locations during construction using Bergerhoff gauges, with laboratory analysis and comparison against the TA Luft limit of 350 mg/m^2/day average over 30 days. Where monitoring indicates exceedance, the source is to be identified and corrective measures implemented. During decommissioning, a noise and dust management plan is to be integrated into the overall decommissioning plan, and dust monitoring is to be undertaken at four boundary locations, with emissions complying with recognised limit /guide values.
Decommissioning /reinstatement commitments	At the conclusion of decommissioning, all equipment and machinery used for decommissioning are to be removed from the site.

18.3.7 NOISE AND VIBRATION

Phase	Measures / features
Design / Embedded features	Acoustic louvres are to be installed along the long sides of the data centre buildings to reduce breakout noise from internal plant rooms. Operational equipment is to be selected, serviced and maintained so as to avoid increases in noise and to avoid clearly audible tonal or impulsive noise at sensitive receptors.
Construction management measures	A Site Representative is to be appointed for noise and vibration matters and complaints are to be investigated, recorded and closed out. Temporary acoustic screening / hoarding is to be installed where works take place near sensitive receptors and where there is no existing screening, with the aim of breaking line of sight to lower windows. Certain equipment operations are to be controlled through monitoring and timing of use. Low-noise plant and enclosures are to be used, and all outdoor equipment is to comply with Directive 2000/14/EC as amended.

	As a precautionary measure, vibration monitoring is to be undertaken where rollers or similar equipment operate close to NSRs 1 and 2.
Operational measures	Operational plant and equipment are to be maintained so that noise emissions do not increase over time.
Monitoring provisions	Real-time construction noise monitoring, capable of on-site and remote review, is to be undertaken at boundary positions representative of the nearest noise sensitive receptors. If threshold values are met or exceeded, the relevant works are to cease immediately and additional mitigation measures implemented. During decommissioning, a noise and dust management plan is to apply and noise monitoring is to be undertaken at four boundary locations, with emissions complying with recognised limit / guide values.
Decommissioning /reinstatement commitments	Decommissioning working hours are to be agreed with the planning authority, with heavy activities avoided outside the normal working hours set out in the Decommissioning Plan.

18.3.8 LANDSCAPE AND VISUAL

Phase	Measures / features
Design / Embedded features	Landscape tender drawings and specifications are to be prepared so landscape works are implemented in accordance with best practice, including soil handling, tree works, planting and maintenance. The four data centre buildings closest to the R446 are reconfigured so their setback from the road corridor increases from approximately 49m to approximately 75m, while maintaining compliant internal circulation, fire access and emergency response arrangements. The landscape buffer along the R446 and adjoining residential boundaries is increased with approximately 25m of additional landscaped separation and a total setback of approximately 75m from the R446. The expanded buffer is to be planted predominantly with native tree and shrub species and shaped with soft, undulating earth mounds so that it develops into a woodland-like screening landscape over time. The parapet height of the data centre buildings fronting the R446 has been reduced from 18m to 16m, with the parapet profile stepped back toward the roof centre to conceal roof plant and reduce the perceived building edge.

	A steel mesh architectural veil with natural steel finish will be applied to prominent facades to soften visual solidity, introduce depth and shadow variation, and provide cohesion across the campus. The office elements are to provide contrasting architectural treatment and a campus-style focal point, with centralised office arrangement and hard / soft landscaping used to break linear repetition and humanise the development. Earthen berms are to be provided along the northern, western and north-eastern boundaries of the data hall area and planted with native woodland species to enhance screening and assist visual integration. New and enhanced native hedgerows and native woodland planting are to be established and maintained at approximately 3-4 m height to screen and soften views from nearby dwellings and the R446. The solar layout is to provide a minimum setback of 40m from the nearest residential boundaries. Solar array fencing is to comprise visually permeable post-and-wire stockproof fencing with a maximum height of approximately 2.45 m, screened by boundary vegetation and new hedgerow /woodland on the public-facing side. CCTV poles within the solar development are to be slender structures of approximately 4.5m maximum height.
Construction management measures	All tree protection measures are to be installed at the commencement of the works (following arborist assessment) and removed on a phased basis as development stages are completed. Planting is to be carried out in the next available planting season following completion of the main civil engineering and building works, and the contract works are to be supervised by a suitably qualified landscape architect. The contractor is to keep the site clean, tidy and safe, prevent materials / waste / dust from blowing around and phase works to reduce unnecessary visual clutter. Construction compounds and site boundaries are to include fencing / hoarding and lighting positioned to avoid nuisance to neighbouring properties.
Operational measures	Operational landscape maintenance is to include weed control, replacement planting, pruning and related establishment works for the first three years from planting. Boundary planting, berm planting and plaza planting are to be maintained so that screening effectiveness is secured as the landscape mitigation matures.

Monitoring provisions	Landscape works are to be monitored on an ongoing basis to ensure quality is maintained. Cross-sections and photomontages prepared as part of the further information response are to be used as reference documents for the implementation and maturation of screening proposals.
Decommissioning /reinstatement commitments	Following decommissioning of the built development, land is to be regraded and revegetated and returned, in consultation with the local authority, to previous or otherwise agreed condition.

18.3.9 TRAFFIC AND TRANSPORT

Phase	Measures / features
Design / Embedded features	The Road Safety Audit recommendations for the site access junctions onto the R446, L51251 and L11272 are to be implemented. Site access junctions are to be designed to accommodate the largest expected vehicle types, with gates set back from the public road so vehicles can pull fully off the carriageway if the gate is closed. Mobile wheel-wash facilities are to be provided in the vicinity of site accesses to maintain public road cleanliness.
Construction management measures	The baseline condition of impacted roads is to be agreed with Westmeath County Council before construction, reviewed annually during construction and again on completion, with any defects caused by the works made good within an agreed timeframe. The final Construction Stage Traffic Management Plan is to be agreed with Westmeath County Council before implementation and is to address, at a minimum, site access and egress, traffic routing, staff parking and deliveries, pedestrian and cyclist safety, public transport considerations, temporary traffic control, emergency access, traffic-related noise /dust /vibration controls, monitoring and review, communication /public notification, speed limits, working hours and enforcement. Construction traffic is to be directed as far as practicable along the planned HGV haul route via M6 Junction 4, the N52 and the R446 so that heavy vehicles do not travel through Rochfortbridge or Tyrrellspass. Clear signage is to be installed and a Construction Vehicle Routing Plan prepared before works commence. Construction deliveries are to be coordinated through a designated logistics manager, with loading and unloading within the site boundary to avoid obstruction of public roads. Measures to protect pedestrians and cyclists near site accesses are to include warning signage, reduced speed zones and clear lane markings. Drivers are to be briefed on cyclist safety, and mirrors or sensors may be used on larger vehicles.

	Construction drivers are to afford priority to public transport where bus routes share parts of the haul route. Temporary traffic management measures affecting public roads are to be submitted to Westmeath County Council for approval in advance and may include flagmen, traffic lights, barriers and suitably managed signage by a qualified traffic management contractor. Uninterrupted access for emergency services is to be maintained throughout construction. Prior to commencement, the contractor is to consult with An Garda Síochána, the Fire Service and the National Ambulance Service on access arrangements and communication protocols. A site-specific Emergency Response Plan is to be developed before works commence and is to cover incidents including fire, chemical spill, serious injury, structural collapse and traffic collision involving construction vehicles. Traffic-related nuisance controls are to include restricting heavy vehicle movements to designated hours where required, covering loads, turning off engines when stationary for extended periods, and considering acoustic barriers, dust suppression or vibration monitoring where sensitive receptors or road conditions warrant it.
Operational measures	No specific operational mitigation is separately identified beyond implementation of the Road Safety Audit recommendations and operation via the approved access arrangements.
Monitoring provisions	Road condition review is required before commencement, annually during construction and upon completion of construction. The Principal Contractor is to appoint a Traffic Coordinator or Site Manager to oversee compliance, maintain traffic logs and report incidents or deviations. Records are to include delivery schedules, inspection reports and public complaints. The Construction Stage Traffic Management Plan is to be reviewed and updated as necessary, particularly if the construction programme changes or if issues are raised by the public or local authority. A site notice board is to be erected at the entrance showing contact details, working hours and emergency numbers; letters or leaflets may be issued in advance of high-impact works.
Decommissioning /reinstatement commitments	A Traffic Management Plan for decommissioning is to be developed 6 months in advance, agreed with the local authority and designed to minimise nuisance and avoid impacts on the road network. Decommissioning access is to use the established main access route from the R446 and existing site roads suitable for HGVs and other decommissioning vehicles.

18.3.10 ARCHAEOLOGICAL AND CULTURAL HERITAGE

Phase	Measures / features
Design / Embedded features	Recorded monuments, the previously unknown monument and associated anomalies are to be excluded from development and fenced off for the duration of construction, with buffer zones established before groundworks. Mitigation for preservation by record and /or preservation in situ, together with exclusion and buffer arrangements, is to be incorporated into the Construction Management Plan and updated following archaeological assessment and any change to the development footprint. Boyhan's Forge (RPS 033-001) is to be protected in situ during nearby cable works along the L-11272, with no direct impact to the structure permitted.
Construction management measures	A geophysical survey is to be undertaken in the northern and eastern portions of the site not previously surveyed, under licence and by an experienced archaeologist, before any ground disturbance. Archaeological test trenching is to be undertaken in the western, northern and eastern parts of the site before groundworks, targeting geophysical anomalies and providing general testing within the footprint of the development and associated infrastructure. Where archaeological features or deposits are exposed, they are to be sectioned and assessed and may require further mitigation including preservation in situ, excavation /preservation by record and / or archaeological monitoring of topsoil stripping. A townland boundary survey is to be completed before groundworks in affected areas, with a full written and illustrated record and hand-cleaned /measured survey of machine-cut sections where required. Any upstanding structures associated with the linear settlement proposed for demolition are to be subject to visual and photographic survey by an archaeologist with built-heritage experience before demolition. Adequate time and resources are to be provided for archaeological resolution, post-excavation work and specialist analysis, and reports of archaeological work are to be submitted to the relevant authorities. Prior to works near Boyhan's Forge, temporary barriers are to be installed along the road edge in front of the structure, warning signage erected and the construction crew briefed by toolbox talk on the sensitivity of the site. Works in the road beside Boyhan's Forge are to proceed by open excavation, machinery operators are to exercise extreme caution,

	vibration is to be kept to a minimum and all excavations along that road section are to be monitored by a licensed archaeologist.
Operational measures	No monitoring is required during the operation phase
Monitoring provisions	Archaeological monitoring during construction is to be implemented where required following test trenching and in accordance with National Monuments Service advice. The requirement for further monitoring is to be reviewed as part of the Contract CEMP works. Archaeological monitoring is also required for the excavations along the L-11272 adjoining Boyhan's Forge.
Decommissioning /reinstatement commitments	No separate decommissioning or reinstatement commitment is identified in the attached supporting documents for this factor.

18.3.11 CLIMATE

Phase	Measures / features
Design / Embedded features	The low carbon optimisation measures identified in the Life Cycle Assessment are to be implemented, including embodied carbon review at detailed design stage, lower-carbon procurement where available, passive solar design, efficient building fabric, high-efficiency HVAC and electrical systems, low-energy lighting and design flexibility for future beneficial technologies including liquid cooling. Buildings are to be designed and constructed to achieve LEED certification, with the LEED Campus Approach and LEED Gold identified at planning stage as the intended pathway subject to detailed analysis. The Project Carbon Management Plan (PCMP) is to apply a whole-life carbon approach across the project, using the module-based assessment of A0 to A5, B1 to B5 and C1 to C4 with Module D reported separately. Carbon management is to be progressed through defined project gateways, including concept, developed design, technical design, construction, as-built and operational review. Carbon reduction is to follow the PAS 2080 hierarchy of avoid, reduce, replace and offset / neutralise only as a last resort for residual emissions. Incorporation of the DER supports the project's decarbonisation-by-design strategy, with energy supply optimised on an hourly basis using demand data, DER availability and grid carbon intensity.
Construction management measures	A site-specific Resource and Construction Waste Management Plan is to be implemented to maximise reuse and recycling and minimise unsegregated waste.

	Where practicable, materials are to be sourced locally, idling of plant is to be prevented and plant /machinery are to be maintained and operated efficiently. Construction embodied carbon calculations are to include materials, transport to site, on-site construction activities, temporary power, welfare facilities, site waste and disposal of excavated material where applicable, in accordance with the PCMP. Carbon requirements are to be embedded in procurement and decision-making, with designers, contractors and suppliers contributing low-carbon options, product data and as-built carbon information in accordance with the PAS 2080 governance structure.
Operational measures	Operational carbon mitigation is embedded in the project design and energy strategy. In-use embodied carbon associated with maintenance, replacement and refurbishment is to be managed through the whole-life carbon approach adopted for the project. Operational performance is to be reviewed using metered energy and water data post-occupancy so operational carbon performance can be updated against project targets and assumptions.
Monitoring provisions	Whole-life carbon calculations are to be capable of progressive update at defined project gateways so that assumptions are documented, data quality is tracked and calculations can be updated through design, construction and operation. Project-specific carbon targets and KPIs are to be established once the baseline is benchmarked, including upfront carbon (A0–A5), whole-life embodied carbon (A–C), operational carbon (B6/B7) and relevant intensity metrics for the data centre. Reporting outputs are to include a carbon baseline and option comparison, a carbon register of reduction opportunities and decisions, embodied carbon reports by element and module, monthly construction emissions and logistics reporting, an as-built whole-life carbon assessment and a post-occupancy operational performance review. A project carbon data room is to be maintained for quantities, emission factors, EPDs, transport assumptions, site fuel and electricity data and calculation models, with version control to preserve a clear audit trail.
Decommissioning /reinstatement commitments	During decommissioning, materials and equipment are to be reused, returned to supplier, recycled / recovered or disposed of as appropriate. All reasonable efforts are to be made to minimise waste generation, and useful materials may be sold with value offset against decommissioning costs.