KPMG

Future Analytics

Environmental Impact Assessment Report (EIAR)

Volume 2 - Main Document

In respect of a

Proposed Strategic Housing Development (SHD) on lands to the Immediate South of Ratoath, Co. Meath

On behalf of

Beo Properties Limited

May 2022

Contents

1. Introduction 1
1.1 Introduction 1
1.2 Proposed Scheme 1
1.3 Definition of EIA 4
1.4 Need for an EIAR 5
1.4.1 EIA Legislation context 5
1.4.2 EIA Screening 6
1.4.3 Scoping of EIAR 7
1.4.4 Consultation 8
1.4.5 Risk of Major Accidents and Disasters 8
1.5 Structure and Content of EIAR 9
1.6 General EIAR Methodology 11
1.6.1 Introduction 11
1.6.2 Basis for Assessment 11
1.6.3 Impact Assessment and Mitigation 11
1.6.4 Residual Impacts 11
1.6.5 Significance of Environmental Issues 11
1.7 EIAR and Design Team 12
1.8 Difficulties Encountered During the Study 18
1.9 References 18
2. Planning Policy Context 20
2.1 Introduction 20
2.2 Policy Context 20
2.3 National Planning Framework (NPF): Project Ireland 2040 20
2.4 Project Ireland 2040: National Development Plan 2021-2030 21
2.5 Housing for All, A New Housing Plan for Ireland (2021) 22
2.6 Spatial and Economic Strategy for the Eastern and Midland Region 22
2.7 Meath County Development Plan 2021 - 2027 23
2.7.1 Core Strategy 23
2.7.2 Housing 23
2.7.3 Density 24
2.7.4 Public and Private Open Space 24
2.7.5 Ratoath Written Statement – Volume 2 24
2.8 Ratoath Local Area Plan 2009 - 2015 25
3. Description of Projects & Alternatives 27
3.1 Introduction 27
3.2 Project Rationale 27
3.2.1 Project Description 28
3.3 Design Evolution 30
3.3.1 Site Layout 30

3.3.2 Courtyard Model 32
3.4 Consideration of Alternatives 33
3.5 Alternative Locations 34
3.6 'Do-Nothing' Alternative 35
3.7 Alternative Layout Strategies 35
3.7.1 Alternative 1 – Linear Layout 36
3.7.2 Alternative 2 – Back-to-Back Housing 38
3.7.3 Alternative 3 – Internal Ring Roads 39
3.8 Design Alternatives 42
3.8.1 Courtyard Models 43
3.8.2 Unit Typologies 44
3.8.3 Apartment Basements 45
3.9 Proposed Site Layout 47
3.10 Conclusion 49
4. Population and Human Health 50
4.1 Introduction 50
4.2 The Proposed Scheme 50
4.3 Assessment Methodology 52
4.3.1 The Study Area 53
4.3.2 Data Sources 56
4.4 Receiving Environment 56
4.4.1 Population Characteristics 56
4.4.2 Household Characteristics 58
4.4.3 Education 59
4.4.4 Educational Facilities in the Study Area 61
4.4.5 General Human Health 63
4.4.6 Economic Activity and Employment 65
4.4.7 Social Infrastructure and Amenities 66
4.4.8 Recent Development and Planning Applications 71
4.5 Identification of Likely Significant Impacts 73
4.5.1 Impact on Population and Human Health 75
4.5.2 Impact on Economic Activity and Employment 75
4.5.3 Impact on Childcare / Creche Facilities 76
4.5.4 Impact on Primary and Post Primary Schools 77
4.5.5 Impact on Amenities and Open Space 78
4.5.6 Impact on Water 79
4.5.7 Impact on Local Attractions and Tourism Activities 79
4.6 Do Nothing Scenario 79
4.7 Mitigation Measures 80
4.8 Residual Impacts 80
4.9 Potential Cumulative Impacts 80

4.10 Interactions Arising 81
4.11 Monitoring 81
4.12 References 81
5. Biodiversity 82
5.1 Introduction 82
5.2 Background to Altemar 82
5.3 Methodology 82
5.4 Baseline Environment 87
5.4.1 Designated Sites 87
5.4.2 Species Data 87
5.5 Characteristics of the Proposed Development 95
5.5.1 Description of the site 95
5.5.2 Characteristics of the site 95
5.5.3 Site Survey 95
5.6 Predicted Impacts 100
5.6.1 Construction Phase 100
5.6.2 Operational Phase 101
5.7 Do Nothing Scenario 102
5.8 Residual Impacts 107
5.9 Interactions 107
5.10 Monitoring 108
5.11 Difficulties Encountered 108
5.12 References 108
6. Land & Soils 110
6.1. Introduction 110
6.1.1. Author Information 110
6.1.2. Proposed Development 110
6.1.3. Aspects relevant to this Chapter 112
6.2. Methodology 113
6.2.1. Scoping 113
6.2.2. Detailed Methodology 113
6.3. Baseline Environment 115
6.3.1. Sourcing Baseline Information 115
6.3.2. Topography & Setting 115
6.3.3. Areas of Geological Interest & Historic Land-Use 116
6.3.4. Regional Soils 119
6.3.5. Regional Geology 120
6.3.6. Regional Hydrogeology 121
6.3.7. Groundwater Vulnerability 121
6.3.8. Groundwater Status 122
6.3.9. Groundwater Recharge 122

6.3.10. Groundwater Abstractions 122
6.3.11. Nearby Site Investigations 123
6.3.12. Designated Area of Conservation 124
6.3.13. Local Soils & Geology 125
6.3.14. The Impact of subsurface structures on the Local Hydrogeology 126
6.3.15. Soils Contamination Assessment 126
6.3.16. Groundwater Contamination Assessment 128
6.3.17. Chemical / Gas Assessment 128
6.3.18. Potential Pollutant Linkages 128
6.3.19. Radon 131
6.3.20. Summary & Type of Geological/Hydrogeological Environment 132
6.4 Predicted Impacts 133
6.4.1. Characteristics of the Proposed Development 133
6.4.2. Potential Impact of the Proposed Development 133
6.4.3. Construction Phase 133
6.4.4. Operational Phase 134
6.5 Potential Cumulative Impact 134
6.6 Do Nothing Scenario 135
6.6.1. Do Nothing Scenario of Predicted Impacts 135
6.6.2. 'Do Nothing' Scenario for Human Health 135
6.6.3. 'Do Nothing' Scenario of Residual Impacts 135
6.7 Risks to Human Health 135
6.7.1. Construction Phase Risks 135
6.7.2. Operation Phase Risks 135
6.8 Mitigation Measures 135
6.8.1. Construction Phase Mitigation 136
6.8.2. Control of Soil Excavation 136
6.8.3. Export of material from Site 136
6.8.4. Sources of Fill and Aggregates 136
6.8.5. Fuel and Chemical Handling 136
6.8.6. Control of Water during Construction 137
6.8.7. Construction Management Plan 137
6.8.8. Operational Phase Mitigation 137
6.9 Residual Impacts 138
6.9.1. Construction Phase 138
6.9.2. Operational Phase 142
6.10 Monitoring 142
6.10.1. Interactions 142
6.11 Difficulties Encountered 142
6.12 References 143
7. Water 144

7.1 Introduction 144
7.1.1 Author Information 144
7.1.2 Consultation 144
7.2 Methodology 144
7.2.1 Scoping 144
7.2.2 Detailed Methodology 144
7.3 Baseline Environment 145
7.3.1 Regional Hydrology 145
7.3.2 Local Hydrology 149
7.3.3 Water Infrastructure Services 150
7.4 Predicted Impacts 152
7.4.1 Characteristics of the Proposed Development 152
7.5 Potential Cumulative Impact 154
7.5.1 Interactions 154
7.5.2 Potential Cumulative Impacts 154
7.6 Do Nothing Scenario 159
7.6.1 Do Nothing Scenario of Predicted Impacts 159
7.6.2 'Do Nothing' Scenario of Residual Impacts 159
7.7 Risks to Human Health 159
7.7.1 Construction Phase 159
7.7.2 Operational Phase 159
7.8 Mitigation Measures 159
7.8.1 Construction Phase 159
7.8.2 Operational Phase 160
7.9 Residual Impacts 162
7.9.1 Construction Phase 162
7.9.2 Operational Phase 162
7.10 Monitoring 162
7.11 Difficulties Encountered 163
7.12 References 163
8. Air & Climate 165
8.1 Introduction 165
8.2 Methodology 165
8.2.1 Criteria for Rating of Impacts 165
8.2.2 Construction Phase Methodology 167
8.2.3 Operational Phase Methodology 168
8.3 Baseline Environment 173
8.3.1 Meteorological Data 173
8.3.2 Baseline Air Quality 173
8.3.3 Climate Baseline 175
8.4 Predicted Impacts 176

8.4.1 Construction Phase 176
8.4.2 Operational Phase 177
8.5 Potential Cumulative Impact 180
8.5.1 Construction Phase 180
8.5.2 Operational Phase 180
8.6 Do Nothing Scenario 181
8.7 Risks to Human Health 181
8.7.1 Construction Phase 181
8.7.2 Operational Phase 181
8.8 Mitigation Measures 181
8.8.1 Construction Phase 181
8.8.2 Operational Phase 182
8.9 Residual Impact 182
8.9.1 Construction Phase 182
8.9.2 Operational Phase 183
8.10 Monitoring 183
8.10.1 Construction Phase 183
8.10.2 Operational Phase 183
8.11 Difficulties Encountered 183
8.12 References 183
9. Noise & Vibration 186
9.1 Introduction 186
9.2 Assessment Methodology 186
9.2.1 Construction Noise 186
9.2.2 Construction Vibration 188
9.2.3 Operational Phase - Additional Traffic on Existing Public Roads 188
9.2.4 Operational Phase – Operation of the Ratoath Outer Relief Road 188
9.2.5 Operational Phase – Mechanical Plant and Services 189
9.2.6 Operational Phase – Residential Inward Noise Impact 190
9.2.7 Operational Phase – Vibration Criteria 192
9.3 Baseline Environment 192
9.3.1 Proposed Development and Surrounding Environment 192
9.3.2 Survey Methodology 192
9.3.3 Survey Locations 192
9.3.4 Procedure 193
9.3.5 Instrumentation 193
9.3.6 Measurement Parameters 193
9.3.7 Measurement Results 194
9.4 Predicted Impacts 195
9.4.1 Construction Phase - Noise 195
9.4.2 Construction Phase - Vibration 198

9.4.3 Operational Phase – Operation of Ratoath Outer Relief Road 199
9.4.4 Operational Phase – Additional Traffic on Existing Roads 201
9.4.5 Operational Phase – Inward Noise Impact – ProPG Stage 1 201
9.4.6 Operational Phase - Building Services Plant 203
9.5 Potential Cumulative Impact 204
9.6 Do Nothing Scenario 204
9.7 Risks to Human Health 204
9.8 Mitigation Measures 204
9.8.1 Construction Phase 204
9.8.2 Operational Phase 206
9.9 Residual Impacts 207
9.9.1 Construction Noise 207
9.9.2 Construction Vibration 207
9.9.3 Outward Noise Impact – Road Traffic Noise 207
9.9.4 Outward Noise Impact – Plant and Mechanical Noise 207
9.10 Monitoring 208
9.11 Difficulties Encountered 208
9.12 References 208
10. Material Assets: Built Services 209
10.1 Introduction 209
10.2 Methodology 209
10.3 Baseline Environment 209
10.3.1 Existing ESB Infrastructure 209
10.3.2 Existing Telecoms Infrastructure 209
10.3.3 Existing Gas Infrastructure 210
10.4 Predicted Impacts 211
10.4.1 Proposed ESB Infrastructure 211
10.4.2 Proposed Telecoms Infrastructure 212
10.4.3 Proposed Gas Infrastructure 213
10.4.4 Rules for road openings and site works 213
10.5 Potential Cumulative Impact 214
10.5.1 Construction Phase 214
10.5.2 Operational Phase 216
10.6 Do Nothing Scenario 217
10.7 Risks to Human Health 217
10.8 Mitigation Measures 217
10.8.1 Operational Phase – Electrical 217
10.8.2 Operational Phase – Gas 217
10.8.3 Operational Phase – Communications 217
10.9 Residual Impacts 217
10.9.1 ESB Infrastructure 217

10.9.2 Telecoms Infrastructure 217
10.10 Monitoring 218
10.11 Difficulties Encountered 218
10.12 References 218
11. Traffic & Transportation 219
11.1 Introduction 219
11.2 Assessment Methodology 220
11.3 Baseline Environment 223
11.4 Predicted Impacts 233
11.5 Potential Cumulative Impact 243
11.6 Do Nothing Scenario 248
11.7 Risks to Human Health 248
11.8 Mitigation Measures 249
11.9 Residual Impacts 252
11.10 Monitoring 252
11.11 Difficulties Encountered 252
11.12 References 252
12. Material Assets: Resource & Waste Management 254
12.1 Introduction 254
12.1.1 Author Information 254
12.1.2 Proposed Development 254
12.1.3 Waste Storage Requirements 256
12.1.4 Aspects Relevant to this Chapter 258
12.2 Methodology 259
12.2.1 Approach 259
12.3 The Existing Receiving Environment 262
12.3.1 Sourcing Baseline Information 262
12.3.2 Topography and Setting 262
12.3.3 Receiving Environment 263
12.3.4 Receiving Environment 263
12.4 Predicted Impacts 263
12.4.1 Construction Phase 263
12.4.2 Operational Phase 265
12.5 Potential Cumulative Impact 266
12.6 Do Nothing Scenario 267
12.6.1 Do Nothing Scenario of Predicted Impacts 267
12.6.2 6.6.2. 'Do Nothing' Scenario for Human Health 267
12.6.3 'Do Nothing' Scenario of Residual Impacts 267
12.7 Risks to Human Health 267
12.7.1 Construction Phase Risks 268
12.7.2 Operation Phase Risks 268

12.8 Mitigation Measures 268
12.8.1 Construction Phase 268
12.8.2 Operational Phase 268
12.9 Residual Impacts 269
12.9.1 Construction Stage 269
12.9.2 Operational Stage 269
12.10 Monitoring 269
12.10.1 Interactions 270
12.11 Difficulties Encountered 270
12.12 References 270
13. Cultural Heritage 272
13.1 Introduction 272
13.2 Assessment Methodology 272
13.3 Documentary Sources 272
13.3.1 Policies, Standards and Guidelines 278
13.4 Baseline Environment 281
13.4.1 Archaeological and Historical Background 281
13.4.2 National Monuments in State Care 283
13.4.3 Recorded Monuments 283
13.4.4 Previous Archaeological Investigations 287
13.4.5 Topographical Files 295
13.4.6 Placename Evidence 295
13.4.7 Cartographic Sources and Aerial Photography 298
13.4.8 Tangible Cultural Heritage Sites/Features 299
13.4.9 Record of Protected Structures 299
13.4.10 National Inventory of Architectural Heritage sites 300
13.4.11 Site Inspection 300
13.4.12 Characteristics of the Proposed Development 300
13.5 Predicted Impacts 301
13.5.1 Direct Impacts on Recorded Archaeological Monuments 301
13.5.2 Direct Impacts on Protected Structures and National Inventory of Architectural Heritage sites 301
13.5.3 Direct Impacts on Known and Potential Archaeological Features 301
13.5.4 Direct Impacts on Tangible Cultural Heritage. 301
13.5.5 Indirect Impacts 302
13.6 Potential Cumulative Impact 302
13.7 Do Nothing Scenario 302
13.8 Risks to Human Health 302
13.9 Mitigation Measures 302
13.10 Residual Impacts 303
13.11 Interactions 304

13.12 Monitoring 304
13.13 Difficulties Encountered 304
13.14 References 304
13.14.1 Other Sources 306
14. Landscape 307
14.1 Introduction 307
14.2 Methodology 307
14.2.1 Study Area 307
14.2.2 Relevant Legislation, Policy and Guidelines 307
14.2.3 Key Definitions 308
14.2.4 Data Collection and Collation 308
14.2.5 Assessment of Landscape and Visual Impacts 309
14.2.6 Sensitivity of Landscape and Visual Environment 309
14.2.7 Magnitude of Change in Landscape and Visual Environment 309
14.2.8 Significance of Effects on Landscape and Visual Environment 310
14.2.9 Quality, Duration and Frequency of Landscape and Visual Effects 310
14.2.10 Photomontage Methodology 311
14.3 Baseline Environment 311
14.3.1 Site Context and Description 311
14.3.2 Landscape and Visual Planning Aspects 313
14.3.3 Overview and Landscape and Visual Significance and Sensitivity 313
14.4 Predicted Impacts 314
14.4.1 Characteristics of the Proposed Development 314
14.4.2 Predicted Impacts Construction Stage 315
14.4.3 Predicted Impacts Operation Stage 317
14.5 Potential Cumulative Impact 318
14.6 Do Nothing Scenario 319
14.7 Risks to Human Health 319
14.8 Mitigation Measures 319
14.8.1 Construction Stage 319
14.8.2 Operational Stage 320
14.9 Residual Impacts 320
14.9.1 Construction Stage 320
14.9.2 Operation Stage 320
14.10 Monitoring 321
14.10.1 Construction Stage 321
14.10.2 Operational Stage 321
14.11 Difficulties Encountered 321
14.12 References 322
15. Summary of Interactions 323
15.1 Introduction 323

15.2 Definitions 323
15.3 Interaction of Effects 324
15.3.1 Population and Human Health 325
15.3.2 Biodiversity 325
15.3.3 Land and Soils 325
15.3.4 Water 325
15.3.5 Air & Climate 326
15.3.6 Noise & Vibration 326
15.3.7 Material Assets - Built Services 326
15.3.8 Traffic and Transport 326
15.3.9 Material Assets – Resource & Waste Management 326
16.3.10 Cultural Heritage 326
16.3.11 Landscape 326
15.4 Other effects 326
15.5 References 327
16. Summary of Mitigation Measures and Residual Impacts 328
16.1 Introduction 328
16.2 Mitigation Measures 328
16.2.1 Biodiversity 328
16.2.2 Land & Soils 331
16.2.3 Water 332
16.2.4 Air & Climate 333
16.2.5 Noise & Vibration 334
16.2.6 Material Assets: Built Services 334
16.2.7 Traffic and Transportation 335
16.2.8 Material Assets: Resource and Waste Management 337
16.2.1 Cultural Heritage 338
16.2.2 Landscape 339
16.3 Residual Impacts 340
16.3.1 Biodiversity 340
16.3.2 Land and Soils 341
16.3.3 Water 341
16.3.4 Air & Climate 342
16.3.5 Noise & Vibration 342
16.3.6 Material Assets: Built Services 343
16.3.7 Traffic and Transportation 343
16.3.8 Resource and Waste Management 344
16.3.9 Cultural Heritage 344
16.3.10 Landscape 344

1. Introduction

1.1 Introduction

This Environmental Impact Assessment Report accompanies a Strategic Housing Development (SHD) planning application lodged by Beo Properties Limited for permission for development on a site of c. 14.166 ha located immediately south of the existing built-up area of Ratoath, Co. Meath.

The site is generally bound to the north by Glascarn Lane, the rear of houses at Glascarn Lane, further existing residential dwellings and a permitted strategic housing development (Reg Ref: TA17/305196); to the east and south by existing agricultural fields and by Glascarn Lane; and to the west by Fairyhouse Road (R155), the rear of houses at Fairyhouse Road, the Carraig Na Gabhna and Cairn Court developments, and existing agricultural fields.

1.2 Proposed Scheme

An overview of the key elements of the proposed SHD is set out below (please refer to Chapter 3 Description of Development for full details). However, for clarity, the statutory development description is below: -

> *"We, Beo Properties Limited, intend to apply to An Bord Pleanála for permission for a strategic housing development at this site (c.14.166 ha), on existing agricultural lands located immediately to the south of the existing built area of Ratoath in County Meath. The site is generally bound to the north by Glascarn Lane, the rear of houses at Glascarn Lane, further existing residential dwellings and a permitted strategic housing development (Reg Ref: TA17/305196); to the east and south by existing agricultural fields and by Glascarn Lane; and to the west by Fairyhouse Road (R155), the rear of houses at Fairyhouse Road, the Carraig Na Gabhna and Cairn Court developments, and existing agricultural fields. The subject site is located on lands within the following town lands (in part): Legagunia, Commons, Jamestown, Glascarn and Newtown.*
>
> *The proposed development will principally consist of the construction of 452 no. residential units and all associated ancillary accommodation, open space and site development works. The total gross floorspace (GFA) of the overall development is c.55,714.4 (c.59,177 with ancillary uses included) of which c.54,175 is residential and c.1,539.4 is non-residential uses. The proposed development will principally consist of 150 no. semi-detached and terraced dwelling houses (3-bed - with option to convert attic in 89 no. units, thereby creating 4-bed houses), 182 no. maisonettes (15 no. 1-bed & 167 no. 3-bed) and 120 no. apartments (100 no. 2-bed and 20 no. 3-bed)(with balconies/terraces across all elevations), with heights ranging from 2-3 storey terraced houses and 3-4-storey duplex buildings (1 storey ground floor units and 2 storey first and second floor units; 2 storey ground and first floor units and 2 storey second and third floor units) and 6-storey apartment blocks. The scheme provides the following house types (as detailed in the application pack materials):61 no. A1 (with the option to provide as A2 given similar appearance), 28 no. A2 (with the option to provide as A1 given similar appearance), 30 no. B1, 31 no. B2, 42 no. M1, 42 no. M2, 34 no. M3, 34 no. M4, 15 no. M5, 15 no. M6, 60 no. D1, 20 no. D2, 20 no. D3, 20 no. D4. The scheme is presented across 12 neighbourhoods (A-H & J-M), each with its own designated central communal open space, car and cycle parking (746 no. car parking spaces and 816 no. cycle parking space) as follows:*
>
> ***Neighbourhood A:** consisting of 38 no. units comprising 4 no. 2 storey three-bedroom terraced housing units, 30 no. apartments (25 no. two-bedroom units and 5 no. three-bedroom units), 4 no. 2 storey three-bedroom maisonettes, ancillary accommodation, including lobby (c.53 sq. m), post room (c.13 sq. m), ESB storage (c.11 sq. m), water storage (c.14 sq. m), refuse storage (c.29 sq. m), bike storage (c.135 sq. m), car park (c.702 sq. m) associated private balconies/terraces/rear gardens, communal open space (c.662 sq. m), 51 no. surface and undercroft car parking spaces (42 no. residential and 9 no. visitor) and 92 no. cycle parking spaces.*

Neighbourhood B: *consisting of 43 no. units comprising 23 no. terraced housing units (10 no. 2 storey three-bedroom units and 13 no. 3 storey three-bedroom units), 20 no. 2 storey three-bedroom maisonettes, ancillary accommodation including, associated private balconies/terraces/rear gardens/winter gardens, communal open space (c.1,753 sq. m), 76 no. car parking spaces (66 no. residential and 10 no. visitor) and 52 no. cycle parking spaces.*

Neighbourhood C: *consisting of 62 no. units comprising 12 no. 2 storey terraced housing units, 30 no. apartment units (25 no. two-bedroom units and 5 no. three-bedroom units), 20 no. maisonette units (18 no. 2 storey three-bedroom units and 2 no. single storey one-bedroom units), ancillary accommodation, including lobby (c.53 sq. m), post room (c.13 sq. m), ESB storage (c.11 sq. m), water storage (c.14 sq. m), refuse storage (c.29 sq. m), bike storage (c.135 sq. m),), car park (c.702 sq. m), associated private balconies/ terraces/rear gardens, communal open space (c. 1,270 sq. m), 96 no. surface and undercroft car parking spaces (74 no. residential and 22 no. visitor) and 142 no. cycle parking spaces.*

Neighbourhood D: *consisting of 38 units comprising 14 no. terraced housing units (7 no. 2 storey three-bedroom units and 7 no. 3 storey three-bedroom units), 24 no. maisonettes (20 no. 2 storey three-bedroom units and 4 no. single storey one-bedroom units), ancillary accommodation, including associated private balconies/terraces/rear gardens, communal open space (c.798 sq. m), 62 no. car parking spaces (52 no. residential and 10 no. visitor), 60 no. cycle parking spaces and an ESB substation (c.14 sq. m).*

Neighbourhood E: *consisting of 30 units comprising 18 no. 2 storey three-bedroom terraced housing units, 12 no. 2 storey three bedroom maisonettes, ancillary accommodation, including associated private balconies/terraces/rear gardens, communal open space (c.643 sq. m), 56 no. car parking spaces (48 no. residential and 8 no. visitor), 30 no. cycle parking spaces and an ESB substation (c.14 sq. m).*

Neighbourhood F*: consisting of 36 units comprising 20 no. terraced housing units (12 no. 2 storey three-bedroom units and 8 no. 3 storey three-bedroom units), 16 no. 2 storey three-bedroom maisonettes, ancillary accommodation, including associated private balconies/terraces/rear gardens, communal open space (c.664 sq. m), 64 no. car parking spaces (56 no. residential and 8 no. visitor) and 42 no. cycle parking spaces.*

Neighbourhood G: *consisting of 29 units comprising 11 no. 3 storey three-bedroom terraced housing units, 18 no. maisonettes (15 no. 2 storey three-bedroom units and 3 no. single storey one-bedroom units), ancillary accommodation, including associated private balconies/terraces/rear gardens/winter gardens, communal open space (c.430 sq.m), 48 no. car parking spaces (40 no. residential and 8 no. visitor), 48 no. cycle parking spaces and an ESB substation (c.14 sq.m).*

Neighbourhood H: *consisting of 50 units comprising 8 no. terraced housing units (4 no. 2 storey three-bedroom terraced housing units, 4 no. 3 storey three-bedroom terraced housing units), 30 no. apartments units (25 no. two-bedroom units and 5 no. three-bedroom units), 12 no. 2 storey three-bedroom maisonettes, ancillary accommodation, including associated private balconies/terraces/rear gardens/winter gardens, 4 no. commercial/local retail units (c.533.6 sq. m), 4 no. wc (c.44 sq. m), lobby (c.50 sq. m), post room (c.14 sq. m), ESB storage(c.13 sq. m), water storage (c.14 sq. m), refuse storage (c.30 sq. m), communal bins (c.11 sq. m), bike storage (107 sq. m), communal open space (c.1,153 sq. m), 76 no. surface and undercroft car parking spaces (58 no. residential and 18 no. visitor) and 118 no. cycle parking spaces and an ESB substation (c.14 sq. m).*

Neighbourhood J: *consisting of 37 units comprising 13 no. terraced housing units (5 no. 2 storey three-bedroom units and 8 no. 3 storey three-bedroom units), 24 no. maisonette units (20 no. 2 storey three-bedroom units and 4 no. single storey one-bedroom units, ancillary accommodation, including associated private balconies/terraces/rear gardens/winter gardens, communal open space (c.1,148 sq. m), 56 no. car parking spaces (50 no. residential and 6 no. visitor) and 60 no. cycle parking spaces.*

Neighbourhood K: *consisting of 30 no. apartment units (25 no. two-bedroom units and 5 no. three-bedroom units), ancillary accommodation, including associated private balconies, ancillary childcare facility (c.1,003 sq. m) with associated play areas (c.727 sq. m), lobby (c.53 sq. m), post room (c.14 sq. m), ESB storage (c.13 sq. m), water storage (c.14 sq. m), refuse storage (c.28 sq. m), bike storage (c.132 sq. m), car park (c.702 sq. m) communal open space (c.200 sq. m), 38 no. surface and undercroft car parking spaces (30 no. residential and 8 no. visitor) and 92 no. cycle parking spaces, in addition to 22 no. car parking spaces for the creche.*

Neighbourhood L: *consisting of 35 units comprising 15 no. terraced housing units (11 no. 2 storey three-bedroom units and 4 no. 3 storey three-bedroom units), 20 no. maisonettes (18 no. 2 storey three-bedroom units and 2 no. single storey one-bedroom units), ancillary accommodation, including associated private balconies/terraces/rear gardens/winter gardens, communal open space (c.845 sq. m), 57 no. car parking spaces (50 no. residential and 7 no. visitor), 50 no. cycle parking spaces and an ESB substation (c.14 sq. m).*

Neighbourhood M: *consisting of 24 units comprising 12 no. terraced housing units (6 no. 2 storey three-bedroom units and 6 no. 3 storey three-bedroom units), 12 no. 2 storey three-bedroom maisonettes, ancillary accommodation, including associated balconies/terraces/rear gardens/winter gardens, communal open space (c.1,017 sq. m), 39 no. car parking spaces (36 no. residential and 3 no. visitor), 30 no. cycle parking spaces and an ESB substation (c.14 sq. m).*

The proposed development also includes 2.247 ha of landscaped public open space which includes a civic plaza (0.513 ha), greenway spine (1.087 ha) and parklands (0.674 ha); solar PV Panels in various locations; and public lighting. All associated site development works above and below ground including hard and soft landscaping, roads/footpaths/cycle paths, play areas, boundary treatments, SuDs, pumping station, EV charging points, green roofs, ESB substations and services to facilitate the development.

Planning permission is also sought for a second phase of the Ratoath Outer Relief Road (RORR) (c. 22,825 sq. m), that will run along the southern boundary of the application site and join up to the existing constructed section of the RORR. The section of the RORR proposed as part of this development runs from a new signalised junction on the R155, east for approximately 1100m, to the end of the site boundary. The proposed roadway will provide access for the site in the form of two priority controlled junctions. A series of pedestrian and cycle connections are provided to site from the Fairyhouse Road (R155), Glascarn Lane and the new RORR as well as a pedestrian link to Carraig Na Gabhna. The site provides permeability through its internal road and shared surface networks, including pedestrian and cycle paths (implementing a segregated pedestrian and cycle path proposed along the RORR) but also within the site. A greenway will be provided across the site that will connect the R155 Fairyhouse Road with Garraig Na Gabhna road and Glascarn Lane. This greenway will provide pedestrian/cyclist connection to the newly proposed pedestrian/cyclist infrastructure along the RORR. Planning permission is also sought for all associated site development and infrastructural works, services provision, foul and surface water drainage, an extension to the foul water network, surface water and watermain along the RORR required to facilitate the development, access roads/footpaths, lighting, landscaping and boundary treatments..”

The purpose of this Environmental Impact Assessment Report (EIAR) is to assess the likely and significant direct and indirect environmental impacts of the proposed development. This, in turn, will enable the Competent Authority to carry out an EIA of the proposed development. Specifically, it will enable the Competent Authority to interpret and describe in detail these impacts, and scope how they can be minimised or ameliorated. The final output of the assessment is presented in the form of this Environmental Impact Assessment Report (EIAR) which accompanies the planning application for the

development to the Competent Authority. In turn, the Competent Authority will carry out an EIA in order to reach a reasoned conclusion on the significant effects of the project on the environment.

Figure 1.1 below is a Site Location Map of the site.

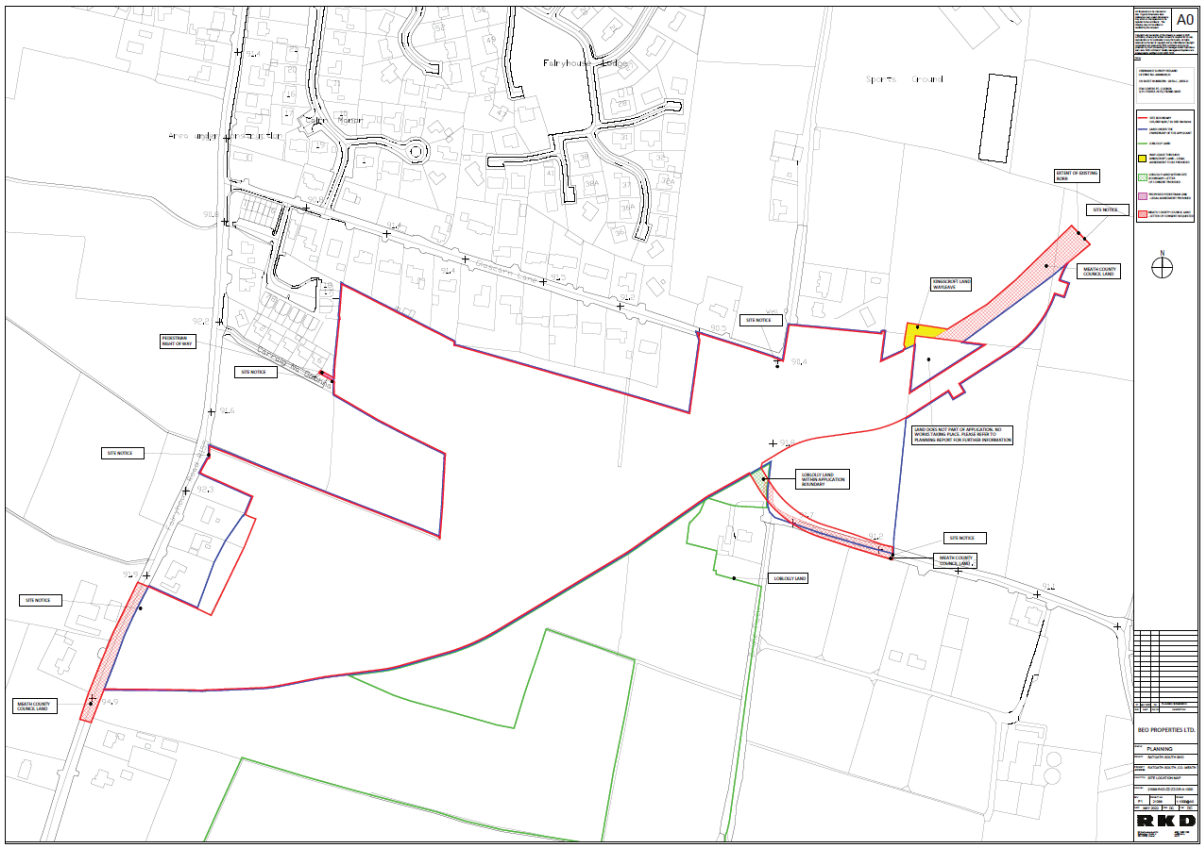


Figure 1-1: Map showing site location

1.3 Definition of EIA

The 2014 EIA Directive (2014/52/EU) defines 'Environmental Impact Assessment' as a process consisting of the preparation of an environmental impact assessment report by the developer, for the examination of the competent authority to reach a reasoned conclusion on the significant effects of the project on the environment. EIA Directives have been transposed into the Irish law by way of the *Planning and Development Acts 2000* (*As amended*) and *Planning and Development Regulations* 2001-2018.

As defined by Directive 2014/52/EU and restated within the *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* by the Department of Housing, Planning and Local Government, 2018, it is a process consisting of:

(a) the preparation of an Environmental Impact Assessment Report (EIAR) by the developer

(b) the carrying out of consultations

(c) the examination by the competent authority of the EIAR, any supplementary information provided, where necessary, by the developer and relevant information received through consultations with the public, prescribed bodies and any affected Member States

(d) the reasoned conclusion of the competent authority on the significant effects of the project on the environment, and

(e) the integration of the competent authority's reasoned conclusion into any development consent decision.

The 2017 Draft *Guidelines on the information to be contained in an EIA* by the EPA refers to the EIAR as '*a statement of the effect if any, which proposed development if carried out would have on the environment.'*

> *The EIAR is prepared by the developer and is submitted to a CA[1] as part of a consent process. The CA uses the information provided to assess the environmental effects of the project and, in the context of other considerations, to help determine if consent should be granted. The information in the EIAR is also used by other parties to evaluate the acceptability of the project and its effects and to inform their submissions to the CA.*

This report prepared by or behalf of the developer on the environmental impact assessment is referred to as an Environmental Impact Assessment Report since the amended directive 2014/52/EU. It was previously referred to as Environmental Impact Statement (EIS).

The *Guidelines on the information to be contained in an EIA* by the EPA were since updated in May 2022. However, its reference to EIAR as above has not changed. Moreover, the updated Guidelines also deflect to the definition of EIAR in the Planning and Development Act 2000 (as amended), which is as follows:

> *"a report of the effects, if any, which proposed development, if carried out, would have on the environment and shall include the information specified in Annex IV of the Environmental Impact Assessment Directive"*

1.4 Need for an EIAR

1.4.1 EIA Legislation context

This EIAR document has been prepared in accordance with the European Union EIA Directive 85/337/EC as amended by 97/11/EC, 2003/4/EC, 2011/92/EU and Directive 2014/52/EU. The EIAR has also been prepared in accordance with the *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environment Impact Assessments* (2018) and the *Guidelines on the information to be contained in an EIA* published by the EPA (2022). The following key guidelines and guidance produced by EU and other government agencies were consulted in the preparation of this EIAR:

- EU Guidance on EIA Screening (European Commission 2001).
- EU Guidance on EIA Scoping (European Commission 2001).
- EIA Review Checklist (European Commission 2001).
- Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002).
- Study on the Assessment of Indirect & Cumulative Impacts as well as Impact Interaction (DG Environment 2002)
- Environmental Impact Assessment (EIA), Guidance for Consent Authorities Regarding Sub-Threshold Development (DoEHLG 2003).
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003).
- Development Management Guidelines (DoEHLG, 2007).
- Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA 2017)

[1] Competent Authority (CA): The term 'competent authority' means the Minister or Public Authority to which an EIAR is required to be submitted, i.e. the authority charged with examining an EIAR with a view to issuing a consent to develop or operate

- Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licencing Systems - Key Issues Consultation Paper (Department of Environment, Community and Local Government, 2017).
- Circular letter PL 1/2017 - Advice on Administrative Provisions in Advance of Transposition (Department of Housing, Planning and Local Government, 2017).
- Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report (European Commission 2017)
- Environmental Impact Assessment of Projects – Guidance on Screening (European Commission 2017)
- Environmental Impact Assessment of Projects – Guidance on Scoping (European Commission 2017)
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government, 2018)]
- Environmental Impact Assessment Screening Practice Note 02 (Office of Planning Regulator, 2021)
- Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA 2022)

1.4.2 EIA Screening

The 2017 *Environmental Impact Assessment of Projects: Guidance on Screening* published by the European Commission defines the screening as the stage that '*ascertains whether a projects effects on the environment are expected to be significant'*. Projects are required to undertake screening to determine whether an EIA is necessary. The Screening is carried out as per a case-by-case examination or by the thresholds set by the relevant Member State's Competent Authority. Mandatory legislative threshold requirements take into account the type and scale of the proposed development, and the sensitivity of the receiving environment.

Certain public and private projects that are likely to have significant effects on the environment are subject to EIA requirements derived from EIA Directive 85/337/EC (as amended by Council Directive 97/11/EC, Directive 2003/4/EC, Directive 2009/31/EC, Directive 2011/92/EU and recently Directive 2014/52/EU which amends EIA law in a number of respects by amending Directive 2011/92/EU) which are designed to ensure that projects likely to have significant effects on the environment are subject to a comprehensive assessment of environmental effects prior to development consent being given.

Article 2 of Directive 2014/52/EU provides that Member States shall bring into force the laws, regulations, and administrative provisions necessary to comply with the Directive by 16 May 2017.

The Department of Housing, Planning, Community and Local Government has brought forward amendments to the Planning and Development Act 2000, as amended, and the Planning and Development Regulations 2001- 2018 to provide for the transposition of the Directive into the Irish planning code. To this effect, the *European Union (Planning and Development) (Environmental Impact Assessment) Regulations* 2018 have now transposed the 2014 Directive into Irish law. The Department has also provided an update to the 2013 *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* to provide practical guidance on legal and procedural issues arising from the requirement to undertake EIA in accordance with Directive 2014/52/EU.

Annex I of the EIA Directive 85/337/EC requires as mandatory the preparation of an EIA for all development projects listed therein. Schedule 5 (Part 1) of the *Planning & Development Regulations* 2001 (as amended) transposes Annex 1 of the EIA Directive directly into Irish land use planning legislation. The Directive prescribes mandatory thresholds in respect to Annex 1 projects. Annex II of the EIA Directive provides EU Member States discretion in determining the need for an EIA on a case-by-case basis for certain classes of project having regard to the overriding consideration that projects

likely to have significant effects on the environment should be subject to EIA. Schedule 5 (Part 2) of the *Planning & Development Regulations* 2001 (as amended) set mandatory thresholds for each project class.

Class 10(b) (i) and (iv) addresses 'Infrastructure Projects' and requires that the following class of project be subject to EIA:
(b) (i) Construction of more than 500 dwelling units.

Furthermore, Category 10(b)(iv) refers to:
'*Urban development which would involve an area greater than 2 hectares in the case of business district, 10hectares in the case of other parts of a built-up area and 20 hectares elsewhere.'*

Although the proposed development does not exceed the above threshold of 500 dwelling units, the inclusion of an Environmental Impact Assessment Report with this application was considered a prudent measure given the scale of development (c. 452no. dwelling units). This approach was supported by Meath County Council and An Bord Pleanála at Pre-Application stage, where the EIA was subject to informal screening.

1.4.3 Scoping of EIAR

The proposed development has been subject to several pre-planning consultations, including formal pre-planning meetings held on 19th August 2021 and 26th January 2022 (Tripartite Meeting with Meath County Council and An Bord Pleanála). An informal scoping process was carried out to identify the issues that are likely to be most important during the Environmental Impact Assessment process. This approach is consistent with the Environmental Protection Agency's *Guidelines on the information to be contained in Environmental Impact Assessment Reports* which provides that formal scoping, as per section 173(2)(a) of the Act, is not mandatory.

The EIAR prepared for the scheme has endeavoured to be as thorough as possible and therefore the provisions included in the revised EIA Directive and all of the issues listed in Schedule 6, Sections 1, 2 and 3 of the Planning and Development Regulations 2001-2018 and in recent guidance documents have been addressed in the EIAR. In this context, the following topics/issues have been reviewed and addressed in the context of the proposed development:

- Planning Policy Context;
- Population and Human Health;
- Biodiversity;
- Land and Soils;
- Water;
- Air & Climate;
- Noise & Vibration;
- Material Assets: Built Services;
- Traffic & Transport;
- Material Assets: Resource & Waste Management;
- Cultural Heritage; and
- Landscape

In addition to the above, a series of independent assessments and reports that accompany the application and inform the above chapters of the EIAR where relevant. These include:

- A Flood Risk Assessment for the site prepared by O'Connor Sutton Cronin Engineering Consultants;

- A Traffic and Transport Report prepared by O'Connor Sutton Cronin Engineering Consultants;
- A Mobility Management Plan (including parking strategy) prepared by O'Connor Sutton Cronin Engineering Consultants;
- A Construction Demolition Waste Management Plan prepared by O'Connor Sutton Cronin Engineering Consultants;
- A Construction Environment Management Plan prepared by O'Connor Sutton Cronin Engineering Consultants;
- An Appropriate Assessment (AA) Screening Report prepared by Altemar;
- An Ecological Impact Assessment (EcIA) Report prepared by Altemar; and
- A Photomontages Booklet prepared by Digital Dimensions (attached as Volume 3 of this EIAR)

1.4.4 Consultation

The preparation of this EIAR has been informed by several pre-planning meetings with various departments of Meath County Council and An Bord Pleanála. The approach adopted in undertaking this EIAR was discussed and largely agreed in principle during these consultations. Issues raised in consultations have been taken on board and addressed in the compilation of this document. Where relevant, statutory bodies were consulted by the experts assigned to each topic assessed under this EIAR, details of which are provided in the relevant Chapters.

1. Irish Water
2. National Transport Authority
3. Transport Infrastructure Ireland

1.4.5 Risk of Major Accidents and Disasters

In accordance with Article 3(2) and Annex IV of the 2014 EIA Directive, the vulnerability of the project to risks of major accidents and/or disasters, as well as likely significant effects on the environment if it did occur, are considered.

Article 3(2) of the 2014 EIA Directive states that an EIAR should consider the following: -

'The effects referred to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned'.

In addition, an EIAR should also contain the following information prescribed in 5(d) of Annex IV of the 2014 EIA Directive:

- "A description of the likely significant effects of the project on the environment resulting from, inter alia: (d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);"

The 2018 Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment sets out two key considerations to address this: -

• "The potential of the project to cause accidents and/or disasters, including implications for human health, cultural heritage, and the environment;

• The vulnerability of the project to potential disasters/accidents, including the risk to the project of both natural disasters (e.g., flooding) and man-made disasters (e.g., technological disasters)."

During the construction phase, the risk of accidents and/ or disasters caused by the project, arising from the potential for construction accidents, are addressed under Health and Safety Regulations and other codes. When directly relevant to the planning and EIA process, certain mitigation measures are identified in order to prevent and/ or mitigate any significant effects.

During the operational phase, the risk of fire related accidents is addressed through the Building Regulations (Fire Safety) and is also addressed through mitigation measures, where applicable. Specifically, residual risks of fire and road traffic accidents will be managed by emergency services.

The risk of flooding and vulnerability of the project is addressed in the Flood Risk Assessment (SSFRA) prepared by O'Connor Sutton Cronin Consultant Engineers and submitted as part of this SHD application. Otherwise, in terms of the project, no other major accidents or disasters are considered to give rise to effects that are 'likely' and 'significant'.

1.5 Structure and Content of EIAR

The content of this EIAR has been prepared as per the guidance provided in Article 5(1) and Annex IV of the amended Directive (2014/52/EU). Environmental Protection Agency's *Guidelines on the information to be contained in Environmental Impact Assessment Reports* describes what an EIAR is to contain in accordance with Article 5(1), as follows:

a) *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.

The EPA '*Guidelines on the information to be contained in Environmental Impact Assessment Reports*' describe inclusion of the following as good practice in the preparation of an EIAR:

- Key alternatives considered;
- Proposed project;
- Receiving environment;
- Likely significant effects; and
- Mitigation and monitoring measures and residual effects.

A non-technical summary is also required to be provided. This is provided as a separate volume to this report. This section will provide core information of the assessments in a simpler language and condensed format to ensure that the public and local community are aware of the likely environmental impacts of the proposed development.

As per article 3(1) of Directive 2014/52/EU *the environmental impact assessment shall identify, describe, and assess in an appropriate manner, in the light of individual case, the direct and indirect significant effects of a project on the following factors:*

(a) population and human health;
(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;
(c) land, soil, water, air and climate;
(d) material assets, cultural heritage and the landscape;
(e) the interaction between the factors referred to in points (a) to (d)

This EIAR includes all necessary technical studies to address the likely environmental impacts of the construction and operation of the proposed development. The disciplines identified for inclusion in this EIAR, along with the technical content, were determined based on a various site walkover surveys, completion of an environmental scoping exercise (to inform the content and extent of matters covered in the environmental information) and consultation with statutory bodies.

Within the main body of the EIAR, Chapter 1 sets out the Introduction and Methodology, Chapter 2 sets out the relevant Planning Policy and Context and Chapter 4 sets out the Population and Human Health characteristics of the receiving environment.

The environmental topics where there is potential for significant impacts to arise are addressed in Chapters 5 to 14 as follows:

Chapter 5	Biodiversity
Chapter 6	Land and Soils
Chapter 7	Water
Chapter 8	Air & Climate
Chapter 9	Noise & Vibration
Chapter 10	Material Assets: Built Services
Chapter 11	Traffic & Transportation
Chapter 12	Material Assets: Resource & Waste Management
Chapter 13	Cultural Heritage
Chapter 14	Landscape
Chapter 15	Summary of Effects & Mitigation / Monitoring Measures

Chapter 15 provides a Summary of Effects & Mitigation and Monitoring Measures with a summary of all interactions in each chapter also. In addition, cumulative impacts for all relevant disciplines are addressed in each chapter.

Where appropriate, each of the main sections of this report are structured in the same general format, as follows:

- An introduction describing the purpose of the section and setting out the qualifications and experience of the author;
- A description of the methodology used in the section;
- A description of the aspects of the existing environment relevant to the environmental topic under consideration;
- Characteristics of the proposed development under consideration;
- An assessment of the impact of the proposed development on the environmental topic;
- Recommendations for mitigation measures to reduce or eliminate any significant negative impacts identified; and,
- An assessment of the residual impact that will remain, assuming that recommended mitigation measures are fully and successfully implemented.
- Summary of interactions, where identified;
- Monitoring measures, where relevant;
- References.

Further details of the methodology and discipline specific best practice and guidance are presented in the relevant Chapters included within this report.

Details of the project will be available online through the EIA Portal[2] and on the website of the Competent Authority. A copy of the application, including this EIAR, will also be available on the project specific website for this SHD development - www.ratoathsouthshd.ie

1.6 General EIAR Methodology

1.6.1 Introduction

The methodology adopted for the preparation of this EIAR comprised a systematic analysis of the impact of the Proposed Project in relation to the existing environment. The overall methodology for preparation of the EIAR is discussed under the following headings;

- Basis for assessment;
- Impact assessment and mitigation; and
- Significance of environmental issues.

1.6.2 Basis for Assessment

The impact assessment examines the existing environmental conditions within the study area for each element of assessment and then determines the potential impacts associated with the Proposed Project during its construction and operational phases.

The study area considered within this EIAR differed for each environmental aspect and extended to incorporate all areas where there was potential for significant impact (i.e. any sensitive areas which could be affected by this development were included in the study area). Further information on the extent of the study area considered for each topic is addressed in the relevant corresponding EIAR chapter.

1.6.3 Impact Assessment and Mitigation

The preparation of the EIAR was an iterative process, linking into the design development process. The approach adopted in the impact assessment and preparation of the EIAR was based on the recommendations in the *Guidelines on information to be contained in Environmental Impact Assessment Reports (EPA, 2022)*.

The proposed design was developed and the potential impacts of the proposal on the receiving environment were identified. Mitigation measures, once identified and assessed, have been incorporated into the design, where possible.

1.6.4 Residual Impacts

Residual impacts relate to environmental change(s) which will occur after the proposed mitigation measures have been put in place and taken effect. Although there may be some residual impacts which arise from any development, these impacts are usually considered to be minimal in nature.

1.6.5 Significance of Environmental Issues

The glossaries contained in the Guidelines on the information to be contained in EIAR describes an impact as '*change resulting from the implementation of project*.'

The following factors were considered when determining the significance of the impact (both positive and negative) of the Proposed Project on the receiving environment:

- The quality and sensitivity of the existing/baseline receiving environment;

[2]https://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=d7d5a3d48f104ecbb206e7e5f84b71f1

- The relative importance of the environment in terms of national, regional, county, or local importance;
- The degree to which the quality of the environment is enhanced or impaired;
- The scale of change in terms of land area, number of people impacted, number and population of species affected, including the scale of change resulting from cumulative impacts;
- The consequence of that impact/change occurring;
- The certainty/risk of the impact/change occurring;
- Whether the impact is temporary or permanent; and
- The degree of mitigation that can be achieved.

The criteria outlined in the EPA guidelines have also been followed when quantifying the duration and magnitude of impacts. The quality of the impact is described as 'negative', 'neutral' or 'positive'. Particular consideration is also given to whether significant impacts are 'Direct' or 'Indirect'. Further information on the specific methodologies utilised for the assessment of each environmental aspect are included in the relevant EIAR chapters.

Where no impact or a positive impact was predicted to occur, the design of the Proposed Project remained unchanged. Where significant adverse impacts are predicted, mitigation measures are proposed to avoid or minimise impacts. Where feasible, these measures were then incorporated into the design of the Proposed Project.

Following on from a grant of planning permission, the proposed project will progress to construction stage. All mitigation measures set out within this EIAR and which are applicable to construction of the project and operation of the development, will be adhered to. This includes any mitigation measures contained in such planning permission, as may be granted.

The construction of the development will be undertaken in accordance with the conditions of any forthcoming planning approval received for the scheme.

Any further modification to the Proposed Project to improve/reduce environmental impacts will only occur where such modifications are minor/points of detail. The final Proposed Project design and construction will comply with all relevant statutory approvals.

1.7 EIAR and Design Team

This EIAR has been prepared by KPMG Future Analytics (KPMG FA) and various competent specialist sub-consultants on behalf of Beo Properties Limited. The list below presents the subject matter experts[3] who contributed to the preparation of the report and their qualifications. Further details on the experience of the experts are set out in each chapter of this EIAR.

Table 1-1 Table of Competent Experts

	Chapter	Company	Chapter Author	Role & Relevant Experience
1.	Introduction	KPMG FA	Daniel Nestor	Stephen M Purcell BSc (Hons), MRUP, PGDip., MSc, MIPI, FSCSI, FRICS. Stephen is an award-winning and published Chartered Surveyor and Town Planner. With 15 years' experience in securing planning consent for major projects, the delivery of high-quality strategic planning outcomes and in policy

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

				formulation, Stephen is a dynamic, results focussed consultant. Working across local, national and pan-European projects, he has coordinated multi-disciplinary property development teams to secure consent for thousands of residential units, significant commercial, retail and mixed-development schemes and led Environment Impact Assessment processes. Stephen is passionate about applying an evidence-based approach to all projects, from due diligence and feasibility studies, through to masterplans and securing consent. He is experienced in the application of socio-economic analysis to underpin strategy and project development and has presented widely on planning matters (tv and print media' conference; oral hearings and legal expert witness). Daniel Nestor BA (Hons.) M.Plan MIPI. Daniel is a Senior Consultant with KPMG Future Analytics, having spent the last four years gaining invaluable experience working as a planning consultant in the private sector. Daniel is a Corporate Member of the Irish Planning Institute (IPI). Daniel has been involved in multiple, large-scale residential schemes, such as the O'Devaney Gardens SHD application and EIAR for 1,047 units. He is a diligent and attention-orientated planning consultant with particular interest and expertise in Environmental Impact Assessment. He has authored multiple EIA Screening reports, as well as having contributed to a number of EIA Reports also.
2.	Planning Policy Context	KPMG FA	Daniel Nestor	Stephen M Purcell BSc (Hons), MRUP, PGDip., MSc, MIPI, FSCSI, FRICS. Daniel Nestor BA (Hons.) M.Plan MIPI
3.	Description of Project Alternatives	RKD	Donal Crowe	Dónal Crowe Project Architect at RKD, BSc, MArch, MRIAI An RIAI-accredited architect, Dónal's experience ranges from large commercial, education & residential sector projects in Ireland to single family residences in the USA.

				In the past year Dónal has worked as project architect on the concept design and planning applications of three residential developments located in Dublin City and Meath County and containing 85, 183 & 452 units. He has also been involved in two large-scale mixed-used masterplans of approximately 92 and 139 hectares which have involved a thorough exploration of different housing models used in Ireland and abroad
4.	Population & Human Health	KPMG FA	Daniel Nestor / Stephen Purcell	Stephen M Purcell BSc (Hons), MRUP, PGDip., MSc, MIPI, FSCSI, FRICS. Daniel Nestor BA (Hons.) M.Plan MIPI
5.	Biodiversity	Altemar	Bryan Deegan	Bryan Deegan MCIEEM is the Managing Director of Altemar Ltd. and holds a M.Sc. Environmental Science, BSc (Hons.) in Applied Marine Biology and a National Diploma in Applied Aquatic Science. He has over 27 years' experience as an environmental consultant in Ireland and was the lead ecologist for this project. Previous projects where Altemar were the lead project ecologists include the Lidl Ireland GmbH regional distribution centres in Newbridge and Mullingar, 18 airside projects for daa at Dublin Airport and 7 fibre optic cable landfalls in Ireland including the New York to Killala cable project in 2015.
6.	Land & Soils	OCSC	Eleanor Burke	Eleanor Burke BSc Env. Sci. (Hons), MSc Env Sci (Hons), DAS, MIEnvSc, CSci Eleanor is a Chartered Scientist and is a Member of The Institution of Environmental Sciences with over 20 years environmental consultancy experience. She is a highly skilled environmental consultant with an excellent knowledge of environmental regulations and best practice. She has extensive experience in undertaking Environmental Impact Assessment particularly contributing to Land and Soils and Hydrology Chapters as well as Environmental Impact

				Assessment Screening reports for a variety of mixed use, commercial and residential projects.
7.	Water	OCSC	Eleanor Burke	Eleanor Burke BSc Env. Sci. (Hons), MSc Env Sci (Hons), DAS, MIEnvSc, CSci
8.	Air & Climate	AWN	Ciara Nolan	Ciara Nolan BSc Eng (Hons), MSc (Hons), AMIAQM, AMIEnvSc. Ciara is a Senior Environmental Consultant in the air quality section of AWN Consulting Ltd. She holds an MSc. (First Class) in Environmental Science from University College Dublin and has also completed a BSc. in Energy Systems Engineering. She is an Associate Member of both the Institute of Air Quality Management (AMIAQM) and the Institution of Environmental Science (AMIEnvSc). She has been active in the field of air quality for 5 years, with a primary focus on consultancy. She has prepared air quality and climate impact assessments for numerous EIARs for a range of projects including commercial, residential, industrial, pharmaceutical and data centre developments.
9.	Noise & Vibration	AWN	Alistair Maclaurin	Alistair Maclaurin BSc, PgDip, MIOA Alistair Maclaurin is a Senior Acoustic Consultant at AWN Consulting who has experience preparing multiple EIS and EIAR documents throughout his 8 years' experience as an environmental consultant. Additionally, he has worked as a noise specialist on major infrastructure projects such as Crossrail and Thames Tideway.
10.	Material Assets: Built Services	BBSC	Barry O'Neill	Barry O'Neill Tech, Dip Tech, BEng(Hons), CEng, MIEI, CIBSE. Barry is a Chartered Engineer with over 20 years of experience in Building Services Engineering. Barry has delivered on housing, healthcare, education, infrastructural projects in Ireland and abroad.

11.	Traffic & Transport	OCSC	Lizmary Alfirs & Joshua Tai	Lizmary Alfirs, B.Eng Civil Engineering, B.EngHons Transportation Engineering, with distinction., Member, Engineering Council of South Africa (ECSA), Professional Engineer. Lizmary Alfirs is a Professional Engineer with 9 years of experience. Her core expertise is geometric road design, additionally, she also has a background in traffic and transport engineering. She has worked in various areas of traffic engineering from TIA's, CPTR's, NMT, PLTF and IPTS guidelines. Her experience has since migrated over to geometric design, designing various intersections and interchanges, including for the University of Mbombela, interchanges on the R75 and N4, and designing roadway corridors, including the N1 and N4, national roadways in South Africa. Joshua Tai, B Eng, Civil Engineering ,Member of Engineers Ireland. Joshua Tai involved with a number of Large Mixed-Use Development, Strategic Housing Development and Urban Road Improvement Scheme. Joshua is committed to working as part of an overall design team while also taking into account the specific need and requirements of each project. Joshua has experienced to work on road junction design, detailed traffic analysis and modelling, clash detection, vehicle swept path analysis and BIM level 1 design. His experience primarily deals with transportation infrastructure design and the operation of junctions. Joshua is responsible on the preparation of technical output from transportation engineering perspective for a variety of project such as Traffic and Transportation Assessment, Mobility Management Planning, Roads Infrastructure and Traffic Signalling Design, Junction Modelling Analysis and Roads Drawing Tender & Construction Packages.
12.	Material Assets: Resource & Waste Management	OCSC	Anthony Horan	Anthony Horan is a Graduate of UCD with a degree in Civil Engineering. Anthony Has a P. Dip. In Project Management from TCD and a P. Cert in Road Safety from UCD. Anthony is a Chartered Engineer and FCONSEI and a previous holder of the title PMP. Anthony is the Ex. Chairperson and Secretary of the Institute of Civil Engineers (RoI Branch). He currently

				sits on the panel of interviewers for the title of Chartered Engineer for Engineers Ireland. Anthony is a Director of OCSC. Anthony has 19 years post graduate experience in civil engineering in a career spanning all aspects of the project lifecycle. Anthony has been a discipline lead on Civil and multidisciplinary projects for OCSC in private development and public works. Some of Anthony's recent EIAR experience would include Belgard Gardens SHD (1900 units), Dublin Landings (60,00m2 of Mixed Commercial Development with 300 apartments) and Corballis East SHD (1300 units).
13.	Cultural Heritage	ACSU	Donald Murphy & Magda	Donald Murphy holds a Master's Degree in Archaeology from University College Dublin (NFQ Level 9). He is a Member of the Institute of Archaeologists of Ireland. Donald is the founder and Managing Director of Archaeological Consultancy Services Unit Ltd. He has over 30 years post-graduation experience carrying out Environmental Impact Assessments, archaeological assessments and excavations. He has also completed excavations on behalf of the National Monuments Service at Knowth, the Hill of Tara, Clonmacnoise, Mellifont Abbey and Newgrange. As Project Manager/Senior Archaeologist, Donald has managed the archaeological aspect of some of the largest infrastructural schemes undertaken in Ireland, including road projects such as the N52 Nenagh Bypass Link Road (2000); M1 Northern Motorway Project (2001–2002); N22 Ballincollig Bypass (2001); M4 Kinnegad–Enfield–Kilcock Motorway (2001–2004); N25 Waterford Bypass (2003–2007); M3 Clonee to North of Kells Motorway (2005–2010); M7/M8 Motorway (2005–2008) and the N5 Westport to Turlough Road Scheme (2015–2020). Magda holds a Master's Degree in Archaeology from the University of Adam Mickiewicz in Poznan, Poland (NFQ Level 9). She is a member of the Institute of Archaeologists of Ireland and is excavation licence eligible since 2019. She has over 12 years of post-graduation experience working in Poland, Ireland, Denmark and Norway. She excavated sites on a variety of large scale infrastructure projects (e.g. M3, N9/10, N18 and N22 road projects in Ireland, Copenhagen Metro Project, Kriegers

				Flak Project in Denmark). She has worked with ACSU since 2019 and specialises in archaeological desktop assessments and Environmental Impact Assessment Reports.
14.	Landscape	BSM	Thomas Burns / Aleksandra Chodziutko	The landscape and visual assessment has been prepared by Thomas Burns, a Partner and Landscape & Environmental Planner with Brady Shipman Martin environmental, landscape and planning consultants. Thomas joined Brady Shipman Martin as a Landscape Architect after graduating from University College Dublin, in 1989. He completed a post-graduate Diploma in Environmental Impact Assessment Management also in University College Dublin in 1994 and an Advanced Diploma in Planning and Environmental Law in 2018 from King's Inn. Thomas became a Partner in the Practice in 2002. Thomas has over 30 years of experience in landscape and environmental planning issues including in the preparation of landscape and visual impact assessments for environmental impact statements (EIS) and environmental impact assessment reports (EIAR). These assessments have been prepared for a wide range of projects from major infrastructure projects to industrial / commercial projects and for major residential / SHD projects. Thomas has regularly given expert evidence at planning hearings and other public inquiries.

1.8 Difficulties Encountered During the Study

Difficulties encountered in the preparation of the EIAR are outlined in each chapter as they relate to the various environmental topics.

1.9 References

- EPA (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports
- European Union (2018) The European Union (Planning and Development) (Environmental Impact Assessment) Regulations
- European Union (1999) European Communities (Environmental Impact Assessment) (Amendment) Regulations (S.I. No. 93 of 1999)
- Irish Statute (2000) The Planning and Development Act (No. 30 of 2000), as amended
- Irish Statute (2001) Planning and Development Regulations (S.I. No. 600 of 2001) as amended
- European Commission, (2001) Guidance on EIA – Scoping
- EPA (2017) Draft Guidelines on preparation of Environmental Impact Assessment Reports
- Department of the Environment, Community and Local Government (DoECLG), (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment

- EPA (2002) Guidelines on the Information to be contained in Environmental Impact Statements
- EPA (2003) Advice Notes on Current Practice in the Preparation of Environmental Impact Statements
- EPA (2015) Draft Revised Guidelines on the Information to be contained in Environmental Impact Statements
- EPA (2015) Draft Revised Advice Notes on Current Practice in the Preparation of Environmental Impact Statements
- EPA (2015) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;
- Department of Housing Planning and Local Government (2018) EIA Portal. Available from: https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal.

2. Planning Policy Context

2.1 Introduction

The proposed development has been prepared in the context of relevant local, regional, and national policies and objectives. The accompanying planning report included as part of this planning application provides a detailed review of these policies and objectives. However, for the purposes of the EIAR, a summary of the relevant policies and objectives is provided within this section.

2.2 Policy Context

Given that the subject site is located to the south of Ratoath town centre, the *Meath County Development Plan 2021 – 2027* is the current statutory development plan for the area.

In addition, the Ratoath Local Area Plan 2009 - 2015 is also applicable to the development site, as well various regional and national guidelines and frameworks. This chapter is a summary of the relevant policies and objectives pertaining to both development sites.

2.3 National Planning Framework (NPF): Project Ireland 2040

The National Planning Framework (NPF) is the Government's high-level strategic plan for shaping the future growth and development of the country out to the year 2040. It is a national document that will guide at a high-level, the strategic planning and development of the country over the next 20+ years, so that as the population expands, growth is sustainable (in economic, social and environmental terms). The NPF is structured around ten core principles which it names as its 'National Strategic Outcomes'. In relation to future development proposals in Ratoath, the following key outcomes are considered relevant: -

- **Compact Growth** – The focus on the promotion of compact growth throughout the NPF seeks a more *''streamlined and coordinated approach''* to the development of lands within and around the country's urban settlements.
- **Enhanced Regional Accessibility** – The NPF also aims to enhance accessibility between key urban centres.
- **Sustainable Mobility -** The NPF places an emphasis on utilising less carbon-intensive modes where possible, but also promoting the use of active modes such as cycling and walking.

Specifically, the NPF strives to prioritise urban areas in settlements other than the five Cities and their suburbs as ideal locations in which to accommodate the State's future population. National Policy Objective (NPO) 3a defines this approach (below):

> "*Deliver at least 40% of all new homes nationally, within the built-up footprint of existing settlements.''*

Such areas allow for the creation of critical mass that allows services and infrastructure to be more effectively, efficiently and easily provided. Targeting development in built up areas also reduces negative impacts on the natural environment and the loss of valuable, finite land resources and the emission of greenhouse gases.

However, in order to achieve Compact Growth, there must be a pragmatic and progressive approach to planning and development in terms of residential densities achieved through increase heights. The general approach of building up, not out, must be followed.

Clearly, the NPF will drive increasing levels of forthcoming population growth and residential development into built up areas as the most sustainable and resilient locations in which to secure Ireland's future. This proposal in Ratoath aligns with the NPOs, NSOs and the broader principles of the Plan, developing a site that is immediately adjacent to existing built-up areas to secure additional sustainable housing supply as a high-quality scheme.

Figure 2.1: National Strategic Outcomes: The National Planning Framework

2.4 Project Ireland 2040: National Development Plan 2021-2030

The National Development Plan 2021 – 2030 (or "NDP") was published in 2021 as an updated version of the previous National Development Plan 2018 – 2027. As part of Project Ireland 2040, the NDP sets out the Government's over-arching investment strategy and budget for the period 2021-2030.

It is an ambitious plan which places a major focus on improving the delivery of infrastructure projects to ensure both speed of delivery and value for money across all projects. The Document sets out funding to underpin key Government priorities, including allocations which will support the realization of critical goals laid out in *Housing for All* – a New Housing Plan for Ireland (September 2021). The NDP underpins the overarching message of the National Planning Framework ("NPF").

Given the location of the subject site and its close proximity to existing services such as public transport and amenities, it is considered that the proposals align with the principles outlined in the National Development Plan. Moreover, the development also aligns with the principles and objectives of the Housing for All – a New Housing Plan for Ireland (see below).

2.5 Housing for All, A New Housing Plan for Ireland (2021)

A new National Plan addressing housing supply has been launched for the period 2021-2030. According to '*Housing for All – A New Housing Plan for Ireland'* (2021), Ireland needs an average of 33,000 homes constructed per annum until 2030 to meet targets set out for additional households as outlined in the National Planning Framework up from approximately 20,000 homes a year. "Increasing New Housing Supply" is one of four pathways identified by the Plan to achieve the objectives.

Under this pathway, new arrangements will be introduced for Large-Scale Residential Developments (LRD) that will replace the current Strategic Housing Development (SHD) arrangements. The proposed development will contribute to the increased supply required to meet the demand for housing in Dublin, whilst also providing a range of different housing typologies and a creche facility also.

It is considered that the development, if granted planning permission, would positively contribute towards the housing targets as illustrated above. Moreover, the construction of an additional 452 no. residential units would greatly benefit the area by providing much needed housing.

2.6 Spatial and Economic Strategy for the Eastern and Midland Region

The Regional Spatial and Economic Strategy for the Eastern and Midland Region (RSES) is a high-level strategic plan and investment framework that seeks to shape the development of the Eastern and Midland region up to 2031 and beyond, supporting the implementation of the NPF by providing a long-term strategic planning and economic framework for the development of the region.

The RSES translates the NPOs of the NPF to key Regional Policy Objectives (RPOs) to inform and guide the relevant local authorities with respect to the preparation of the City and County Development Plans, Local Area Plan and other plans and in their assessment of planning applications. The vision for the RSES is "To create a sustainable and competitive Region that supports the health and wellbeing of our people and places, from urban to rural, with access to quality housing, travel and employment opportunities for all".

Key RPOs are detailed below and it is firmly considered that the proposed development is consistent with them and their principles. The proposed development will achieve compact development immediately adjacent to the existing settlement of Ratoath and will provide a range of housing types including rowhouses, duplexes and apartments which will cater for a wide demographic profile. The high-quality design and layout provides public, communal and private open space areas and encourages walking and cycling with the use of shared surfaces and permeable routes.

> **RPO 3.2:** "Local authorities, in their core strategies shall set out measures to achieve compact urban development targets of at least 50% of all new homes within or contiguous to the built up area of Dublin city and suburbs and a target of at least 30% for other urban areas."
>
> **RPO 5.5:** "Future residential development supporting the right housing and tenure mix within the Dublin Metropolitan Area shall follow a clear sequential approach, with a primary focus on the consolidation of Dublin and suburbs, and the development of Key Metropolitan Towns, as set out in the Metropolitan Area Strategic Plan (MASP) and in line with the overall Settlement Strategy for the RSES. Identification of suitable residential development sites shall be supported by a quality site selection process that addresses environmental concerns."
>
> **RPO 9.4:** "Design standards for new apartment developments should encourage a wider demographic profile which actively includes families and an ageing population."

RPO 9.10: "In planning for the creation of healthy and attractive places, there is a need to provide alternatives to the car and to prioritise and promote cycling and walking in the design of streets and public spaces. Local authorities shall have regard to the Guiding Principles for 'Healthy Placemaking' and 'Integration of Land Use and Transport' as set out in the RSES and to national policy as set out in 'Sustainable Residential Development in Urban Areas' and the 'Design Manual for Urban Roads and Streets (DMURS)'."

2.7 Meath County Development Plan 2021 - 2027

The Meath County Development Plan was adopted at a Special Planning Meeting on 22nd September 2021 and came into force on 3rd November 2021. The Plan identifies Ratoath as a 'Self-Sustaining Town' with a high level of population growth and a weak employment base which requires targeted 'catch-up' investment to become more self-sustaining.

2.7.1 Core Strategy

CS POL 1 aims *"To promote and facilitate the development of sustainable communities in the County by managing the level of growth in each settlement to ensure future growth is in accordance with the Core Strategy and County Settlement Hierarchy in order to deliver compact urban areas and sustainable rural communities"*
The proposed development is on land zoned for residential development inside the Ratoath Outer Relief Road (RORR) and the settlement boundary of Ratoath. The scheme proposed is compact in form, attractive and well-designed at an appropriate density with a range of housing unit types in close proximity to schools, childcare facilities, shops are a range of other community services

CS OBJ 4 aims *"To achieve more compact growth by promoting the development of infill and brownfield/ regeneration sites and the redevelopment of underutilised land within and close to the existing built up footprint of existing settlements in preference to edge of centre locations."*

The proposed development lies on underutilised land and is within the existing settlement of Ratoath and thus achieves sustainable compact growth.

CS OBJ 5 aims *"To deliver at least 30% of all new homes in urban areas within the existing built up footprint of settlements."*

The proposed development provides for 452 units and lies within the existing settlement of Ratoath and will deliver sustainable compact growth.

2.7.2 Housing

SH POL 5 aims "To secure a mix of housing types and sizes, including single storey properties, particularly in larger developments to meet the needs of different categories of households."

SH OBJ 14 aims "To support the delivery of social housing in Meath in accordance with the Council's Social Housing Delivery Programme and Government Policy as set out in Rebuilding Ireland: Action Plan for Housing and Homelessness."

SH OBJ 15 aims "To apply a 10% social housing requirement, pursuant to Part V of the Planning and Development Act 2000, as amended, to land zoned for residential use, or for a mixture of residential and other uses, except where the development would be exempted from this requirement."

SH OBJ 16 aims "To address the identified need to increase the supply of social housing in Trim, Ashbourne, Ratoath, Dunboyne, Dunshaughlin by seeking the provision of social housing additional to that required by way of Part V of the Planning and Development Act 2000 as amended, subject to funding."

The proposed development consists of 452 no. residential units. With the agreement of the Planning Authority the proposed development will provide 45 no. social housing units to MCC. A letter from MCC Housing Department confirming agreement in principle is included with this application.

2.7.3 Density

DM POL 5 aims *"To promote sustainable development, a range of densities appropriate to the scale of settlement, site location, availability of public transport and community facilities including open space will be encouraged."*

The subject proposal provides a creche and 4 no. commercial/retail units which will serve future residents. In terms of access to the public transport, the site is located proximate to an existing bus stop on Fairyhouse Rad which is served by serval bus routes, including a link to Dunboyne Rail Station (with Park & Ride). The Dunboyne Parkway Railway station is only a 10-minute drive away, providing direct access to Dublin' Connolly Station. With the above considered, the density as proposed is considered to be appropriate for the site.

2.7.4 Public and Private Open Space

DM OBJ 26 requires that "*Public open space shall be provided for residential development at a minimum rate of 15% of total site area. In all cases lands zoned F1 Open Space, G1 Community Infrastructure and H1 High Amenity cannot be included as part of the 15%. Each residential development proposal shall be accompanied by a statement setting out how the scheme complies with this requirement."*

The central area of public open space provided creates a large inviting area of open green space and paved areas to provide a multi-functional space. The central open space and communal open areas all have strong levels of surveillance. This area includes a stepped down lawn amphitheatre, play area, plaza area with raised planter with seating edges, wildflower meadow and open lawn area. This area has the potential to support pop up markets and food trucks for community events. In addition, a public square / linear plaza will front onto the central open space area, activating the area outside the retail space.

2.7.5 Ratoath Written Statement – Volume 2

Volume 2 of the Development Plan provides a Written Statement and Maps for all Settlements in the County. The statement provides specific opportunities and objectives for Ratoath and has a vision to,

> *"promote the sustainable consolidation of Ratoath, accommodating, significant expansion of employment opportunities, whilst consolidating growth of the town and reinforcing the town centre. In this context, the plan will promote and support employment growth and expansion of the international equestrian hub in support of the town centre; and will promote sustainable movement through the completion of the Ratoath Outer Relief Road".*

In addition, the following policies are relevant insofar as the proposals are concerned: -

> **RATH POL 1:** *To ensure Ratoath develops in a consolidated and sustainable manner which facilitates and supports employment opportunities, accommodates local services and reinforces the existing town centre.*
>
> **RATH OBJ 7:** *To facilitate the development of the Ratoath Outer Relief route in tandem with development.*
>
> **RATH OBJ 8:** *To further advance public footpath and cycle path upgrades in the town in accordance with the Ratoath Pedestrian and Cycle Scheme.*
>
> **RATH OBJ 10:** *To reserve lands off the Fairyhouse Road for the provision of a swimming pool.*
>
> **RATH OBJ 12:** *To require that development proposals are prepared in accordance with a Masterplan which includes an, urban design and landscape design statement.*

The written statement notes that a detailed Local Area Plan for the town will be prepared during the life of this Plan, which will supersede the 2009-2015 LAP.

2.8 Ratoath Local Area Plan 2009 - 2015

The Ratoath LAP 2009–2015 was amended following the adoption of the MCDP. The amendments introduced land-use zoning objectives and an order of priority for the release of lands in a number of settlements including Ratoath. The land use zoning objectives contained within the MCDP were applied to the land use zoning objectives map for Ratoath which incorporated the subject lands, designated as 'A2 New Residential' with an objective:

> *"To provide for new residential communities with ancillary community facilities, neighbourhood facilities and employment uses as considered appropriate for the status of the centre in the Settlement Hierarchy.'*

Table 4.2 Permitted and open for consideration uses on A2-zoned lands.

Permitted Uses	Open for Consideration Uses
B & B / Guest House, Bring Banks, Community Facility / Centre, Childcare Facility, Convenience Outlet, Childcare Facility, Children Play / Adventure Centre, Education (Primary or Second Level), Halting Site / Group Housing, Home Based Economic Activities, Leisure / Recreation / Sports Facilities, Residential / Sheltered Housing, Retirement Home / Residential Institution / Retirement Village, Water Services / Public Services.	Betting Office, Caravan Park, Cultural Facility, Education (Third Level), Enterprise Centre, Health Centre, Healthcare Practitioner, Hotel / Motel / Hostel, Offices <100m, Place of Public Worship, Bar/ Restaurant / Café, Take-Away / Fast Food Outlet, Veterinary Surgery

On residential development, the LAP establishes the need to deliver the following as a key principle:

"…high quality living environments in neighbourhoods with a range of housing types and sufficient community facilities to serve the needs of residents. Generally the objective will be to provide a range of residential units, which vary in both size and type, and an overall scheme design which can accommodate a broad population profile including single person households, couples, households with children, older people and people with a disability."

The planning and design approach pursued for this scheme will bring a suitable variety and choice of unit to the local market that responds to both existing and projected population demand and demographic trends accommodating single persons, couples, families, older people and persons with disability. The neighbourhood character areas proposed are designed around a mix of units, house types and layouts with well-defined streetscapes and open spaces that offer natural supervision.

In total, the LAP establishes 13 Residential Policies which have been carefully considered in the planning and design of the proposed scheme, a selection of the most pertinent of these to housing schemes are set out below:

RES POL 1: *To provide for the integration of new housing into the natural and built environment in a manner that makes a positive contribution to the overall environment in the locality.*

RES POL 2: *To encourage the development of mixed and balanced communities to avoid areas of social exclusion.*

RES POL 3: *To achieve a mix of housing types and sizes in the consideration of individual planning applications for residential development and in development of the Councils own housing stock.*

RES POL 4: *To ensure that the needs of pedestrians and cyclists are provided for in the design of layouts in residential areas.*

RES POL 5: *To promote energy efficiency both during the construction phase and during the lifetime of residential development by sensitive design and layout taking into account topography, orientation and surrounding features.*

3. Description of Projects & Alternatives

3.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) has been prepared by RKD Architects and contains a description of the reasonable alternatives examined during the evolution of the scheme design.

3.2 Project Rationale

The goal of the project is to provide an innovative development of 452 new homes arranged in a block neighbourhood model that is designed to create and inclusive and sustainable community, promote active transport, and offer an alternative way of living to the traditional cul-de-sac housing estate.

The layout allows for connections back to the existing built area of Ratoath, to adjacent sites, and to any future development in the lands to the south. The mix of unit typologies provided will address the needs of a diverse range of inhabitants and household structures. The development will also include a significant portion of the Ratoath Outer Relief Road, a key infrastructure project in the area which will form the southern boundary of the site.

The site and primarily residential brief were confirmed from outset of the project so the main alternatives studied through the design process comprised of varying design solutions and layouts.

Figure 3.2.a – Birds-Eye Sketch

3.2.1 Project Description

The proposed development features a total of 452 new homes which are located in 12 neighbourhoods (A-M), each with its own central communal court space that can play host to a variety of community and recreational functions. The boundaries of these blocks are deliberately porous to encourage activation and movement between neighbourhoods and throughout the site.

A main access road loops from two points on the new Outer Relief Road and enables an easy approach to the heart of the scheme where a park and civic plaza provide a focal point and a location for necessary recreational and commercial facilities.

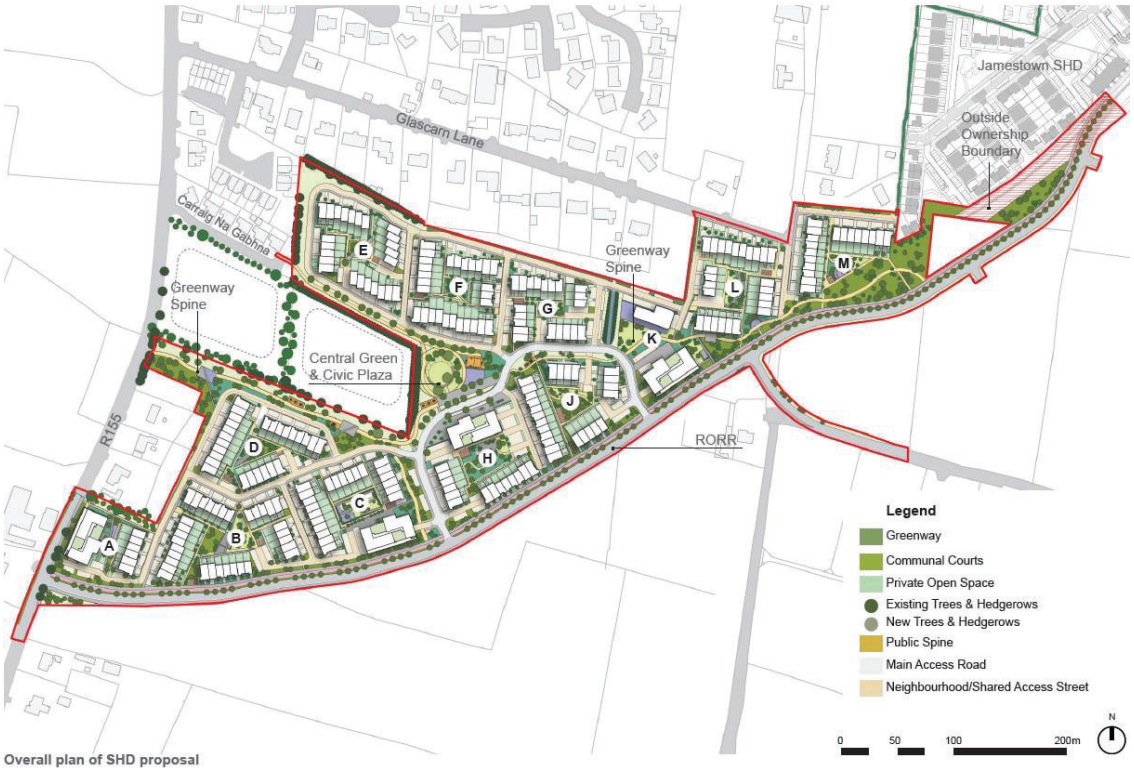


Figure 3.2.b – Overall Plan of Residential Proposal

The neighbourhoods and the park are linked together by a network of public open space which integrate pedestrian, cycle and drainage routes within buffer spaces along existing hedgerows. The wider spaces form a greenway spine that connects the development to the R155, the potential future development to the south of the RORR and to Glascarn Lane in the northeast, where a route could be created to Ratoath College and the town.

The design of buildings and landscape have been carefully considered to provide a proposal focused on sustainability and adaptability to protect the health and wellbeing of the future community.

Key tenets of the design are connectivity and permeability. The site is enclosed and divided by a distinct field pattern lined with hedgerows which currently make the site impermeable. The neighbouring properties consist of traditional housing estates with impermeable cul-de-sacs, making access to town and the available public open spaces difficult despite the close proximity.

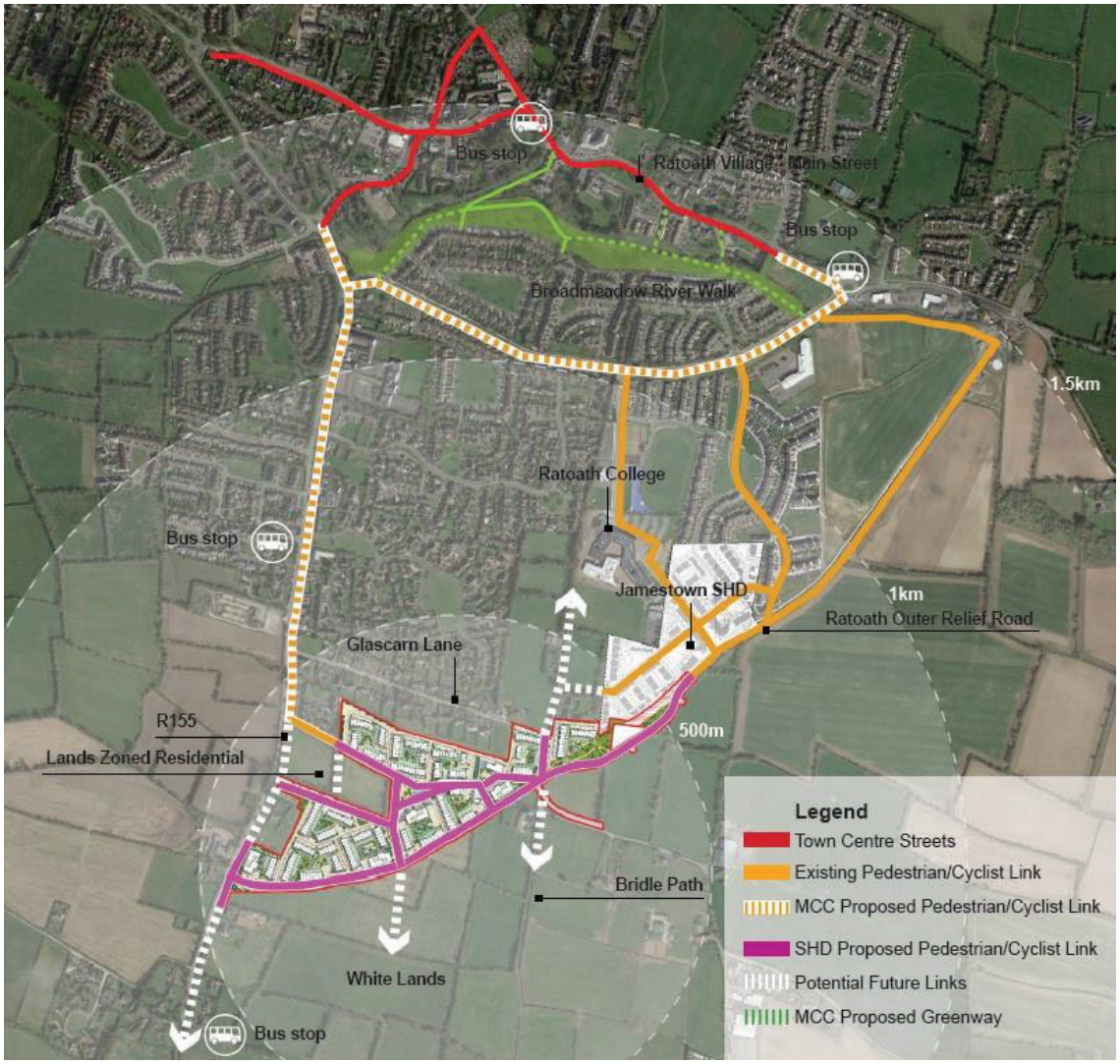


Figure 3.2.c – Site Connectivity & Permeability

The proposed development offers an alternative to this layout, increasing the permeability of the site and allowing for connections with the existing neighbourhoods to the West and North. The greenway spine through the site will deliver pedestrians and cyclists to the R155, where the Local Authority is currently investigating a cycle network connection.

The internal pedestrian and cyclist network also allows for future connections to the existing bridle path towards Fairyhouse Racecourse, to lands currently zoned White Lands in the south, to the west (currently zoned New Residential) and to the north to Glascarn Lane and Ratoath College.

3.3 Design Evolution

3.3.1 Site Layout

The defining natural features of the existing site are hedgerows and streams which function as the habitats and routes for local wildlife as well as the drainage system for the site. The initial concept for the layout of the site was to retain the perimeter hedgerows as much as is practical. This existing field pattern has informed the shape of the neighbourhood blocks with a nod to the architectural aesthetics of traditional homesteads.

Figure 3.3.a – Existing Ecology

Retained hedgerows are provided with buffer from development that begins a minimum of 10metres from the centreline of the vegetation. These zones are complemented by the introduction of a greenway spine across the site into which pedestrian / cycle paths, drainage streams / swales which can be integrated to create a network of connectivity that ties the development together.

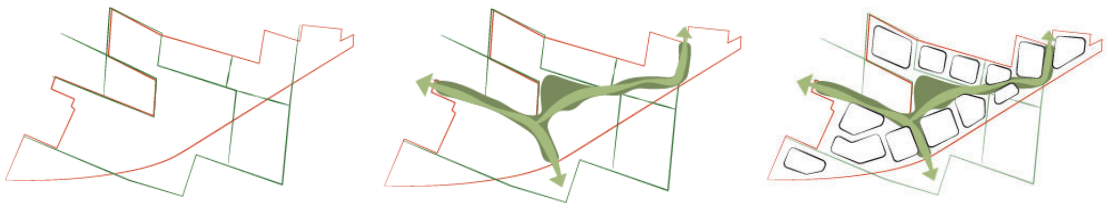


Figure 3.3.b – Initial Site Concept Sketches

The scheme occupies a key site as regards the connection between Ratoath Town centre and the lands zoned for future employment, visitor and tourist facilities to the south. It is critical to maintain the connection to Ratoath so that the site can become an extension of the town, complementing its existing amenities and qualities while opening up the lands to the south.

To achieve this, the concept of a greenway for cyclists and pedestrians was devised and overlaid onto the existing field pattern. The result is a spine of public open space that connects the R155 in the west to Glascarn Lane in the northeast and provides a branch south that can link with future development across the Outer Relief Road.

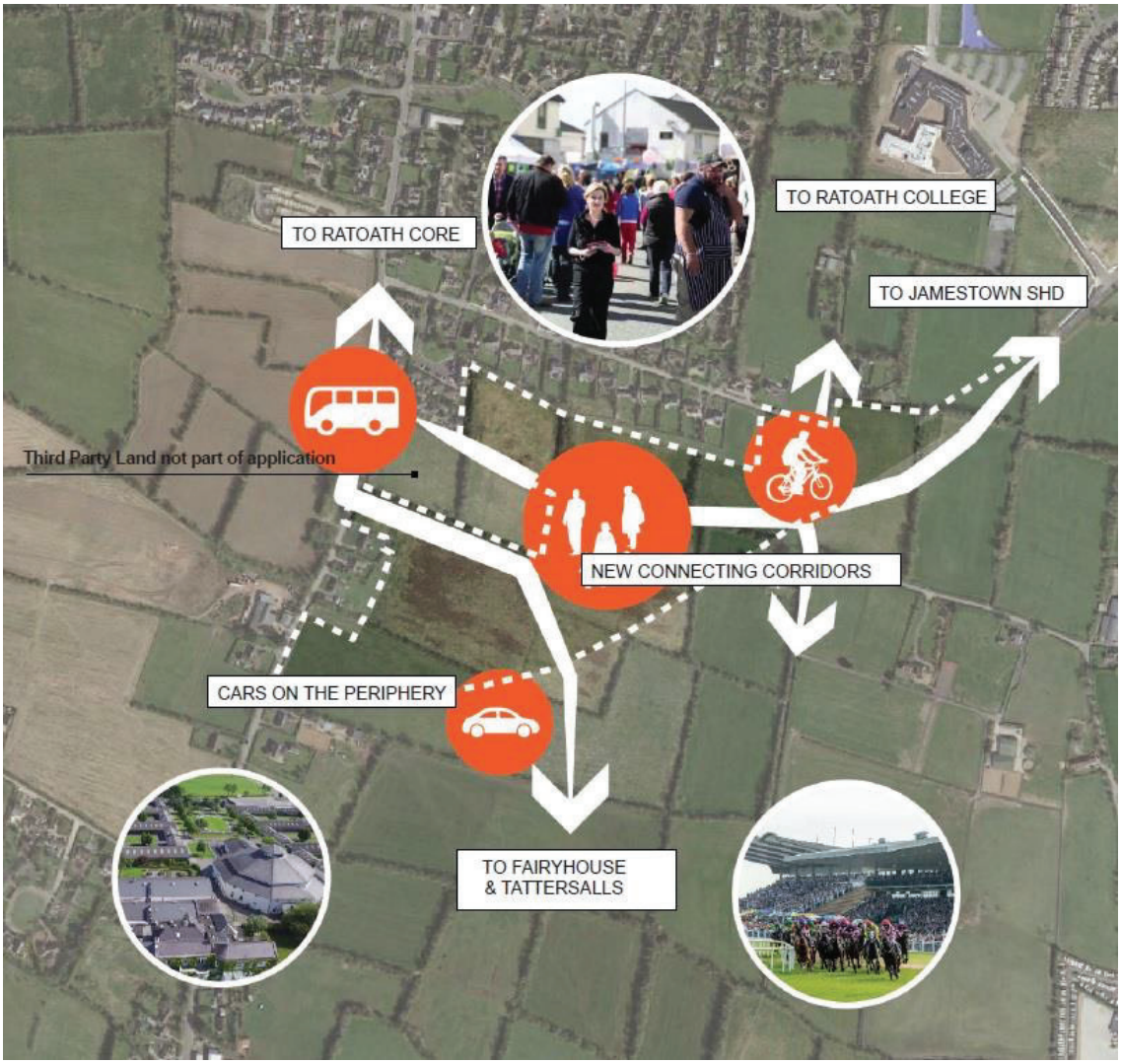


Figure 3.3.c – Connecting & Places

This will provide an attractive route for inhabitants across the site to use in travelling to Ratoath Town centre, Ratoath College, or the Jamestown Sports Campus. In the future it could form part of an extended greenway to Fairyhouse Racecourse and Tattersalls.

3.3.2 Courtyard Model

The use of existing field patterns and hedgerows to inform the site layout lends itself to creating blocks of dwellings ranging from 0.5-1.5ha in size. Walkability, permeability and connectivity were key concerns from the outset and this naturally led to a series of studies that would further fragment these blocks according to desire lines and sunlight paths. The result is a series of clustered neighbourhoods across the site that are linked by the greenway spine.

Figure 3.3.d – Early Concept Diagrams

These neighbourhoods are built around central shared courtyards that encourage social interaction between the inhabitants. The units will vary in size and type to suit a range of inhabitants while the central spaces will be porous enough to promote visitation between adjacent neighbourhoods.

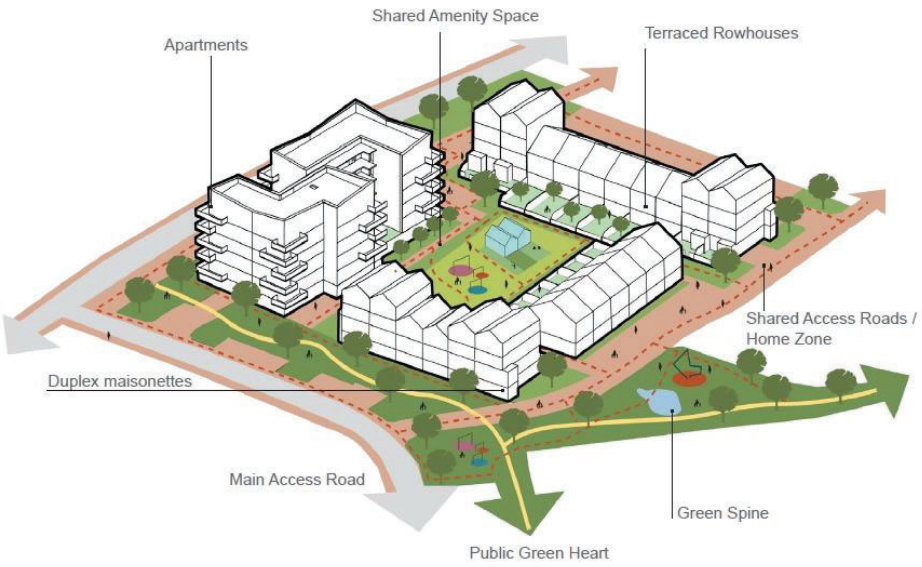


Figure 3.3.e – Block Neighbourhood Concept Diagram

The neighbourhoods will be dense enough to provide enclosure and continuous frontages to streets and public open spaces, but also diverse enough in typology to stand in contrast to the long homogenous streets and cul-de-sacs of traditional housing estates

Figure 3.3.f – Courtyard Concept Sketch

3.4 Consideration of Alternatives

The EIA process requires the consideration of project alternatives as a means of reducing or minimising environmental impacts to ensure that an optimal solution is reached.

The EIA Directive (2014/52/EU) requires that Environmental Impact Assessment Reports include:

'A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.'

The main relevant alternatives studied during the design of this scheme consist of alternative layouts and design solutions for a largely residential development at the subject site. The question of Alternative Locations and the 'Do-Nothing' Scenario will also be addressed.

3.5 Alternative Locations

Pursuant to Section 3.4.1 of the draft 2017 EPA Guidelines, the consideration of alternatives also needs to be cognisant of the fact that:

'...in some instances, some of the alternatives described below will not be applicable – e.g. there may be no relevant 'alternative location...'

The subject proposal is for the construction of 452 residential units, a childcare facility, 4 no. retail units and associated open space and road and service infrastructure on greenfield land available to the developer that is zoned 'New Residential' under the Meath County Development Plan 2021-2027. The site forms a significant portion of an identified Masterplan area (MP37) that forms a natural extension of the existing built area of Ratoath Town and is the largest tract of residential-zoned land in the vicinity.

The development of this site for residential purposes is key to meeting the Core Strategy Housing allocation of 803 units over the course of the current Development Plan. It will also enable the delivery of the adjoining section of the Ratoath Outer Relief Road which forms the southern boundary of the site and is a key driver influencing the approach to residential development in the town. As such, it was not deemed appropriate or necessary to consider alternative locations for the proposed development.

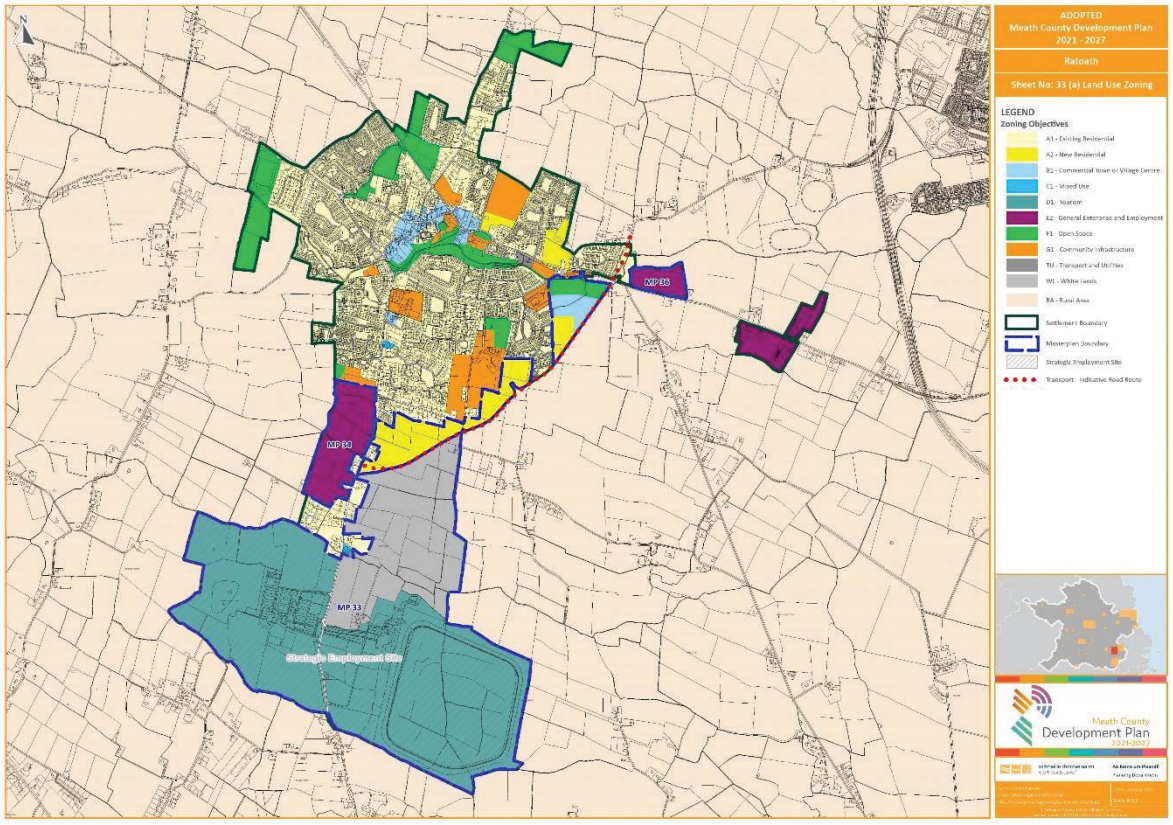


Figure 3.5.a – Ratoath Land Use Zoning Map, Meath County Council Development Plan 2021-2027

3.6 'Do-Nothing' Alternative

The "Do-Nothing" scenario is not to develop the proposed project and to leave the existing environment as it is, with no changes made to the current land-use practices.

The draft 2017 Guidelines state that:

'Analysis of high-level or sectoral strategic alternatives cannot reasonably be expected within a project level EIAR… It should be borne in mind that the amended Directive refers to 'reasonable alternatives… which are relevant to the proposed project and its specific characteristics'

As the lands have been zoned predominantly for New Residential development by the Local Authority with the aim of facilitating the delivery of the Ratoath Outer Relief Road a 'do-nothing' scenario was considered an inefficient and inappropriate use of these strategically located lands. The opportunity to provide a significant amount of high-quality housing and a public landscaped park as part of the overall development proposal were also key considerations.

3.7 Alternative Layout Strategies

Throughout the design process, a number of alternatives were considered by the Design Team for different parts of the site. This produced a continually evolving site layout which drew on input from the Design Team consultants, the Local Authority and An Bórd Pleanála which all informed the proposal submitted.

Figure 3.7.a – Neighbourhoods, Birds-Eye Render

3.7.1 Alternative 1 – Linear Layout

A previous design for these lands was commissioned by the client under a separate Design Team which was produced a more linear housing estate layout consisting of units with back-to-back rear gardens fronting onto long straight roads. The scheme would provide 486 units through a combination of houses and apartments. This model was ultimately discounted for reasons relating to layout, permeability, connectivity, ecology and site history.

Figure 3.7.a – Alternative Scheme, Linear Layout

The site history is one of a patchwork of fields typical of the Irish countryside. The above layout, while efficient, appears to first clear the site, removing all sense of that distinctive rural grain before imposing a system of long linear streets and terraces that stand in contrast with the permeable block neighbourhoods of the proposed scheme.

Figure 3.7.b – Site Historical Map – Field Pattern

In clearing the site, this layout would also remove the existing the natural features of the site, including the hedgerows which define the field patterns and act as habitats and highways for the resident wildlife. The proposed layout, in contrast, seeks to retain habitats and provide them with a buffer to development by incorporating them into the public open space network.

Figure 3.7.c – Hedgerow Buffer

The referenced Linear Layout also offers poor permeability with an orthogonal street pattern that does not appear to provide much scope for cross-movement of pedestrians or cyclists along desire lines. For example, a journey from 'A', the southwestern terrace nearest the R155, to 'B' the north-eastern terrace adjoining Glascarn Lane, would be a distance of approximately 850m and be travelled almost exclusively by roadside footpath.

Figure 3.7.d – Linear Layout, Traversing the Site

The result is longer walking and cycling distances in vehicle dominated environments which would encourage a greater dependence on cars at the expense of more sustainable and active modes of transport. The distances and inconvenience involved in traversing the site would offer little to encourage connectivity between the residents of different streets.

3.7.2 Alternative 2 – Back-to-Back Housing

Several iterations of the proposal explored the introduction of back-to-back houses as a means of boosting density. The below is one such example which studied two variations on the back-to-back model in Neighbourhoods A & B in the southwest of the site.

The result had a negligible impact on the density achieved but resulted in an increase in the road surfaces needed to serve these areas and a subsequent reduction in public and communal open space.

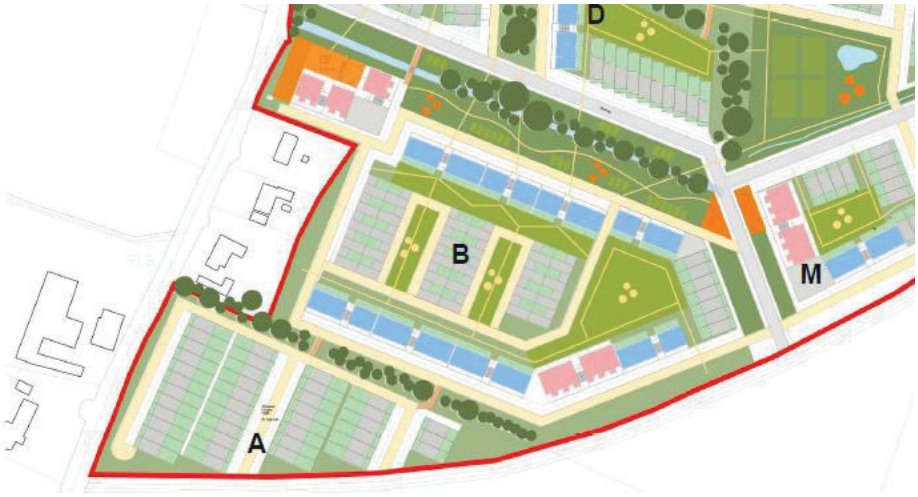


Figure 3.7.e – Alternative Scheme, Back-to-Back Neighbourhoods

The conclusion of these studies was to revert to the courtyard model of housing in place on the rest of the site to give priority to people-orientated public and communal spaces over vehicle-dominated roadways.

Figure 3.7.f – Communal Courtyard Render

A key feature of the proposed development is neighbourhood blocks that offer an alternative model of living in comparison to a traditional housing estate. All blocks have a shared communal amenity space provided by central courtyards. These shared courtyards form an extension of the private open space

and invite neighbours to get to know each other and build a vibrant community. They are also vehicle-free zones with no routes for through-traffic.

Compared to a more traditional back-to-back housing estate, a wide range of typologies is offered within each block which allows for changing needs amongst residents over time. The mix of typologies and flexibility of units also gives residents the opportunity to 'grow old in place'. The loose-fit design of the courtyard blocks ensures flexibility as each row and block can be built independently.

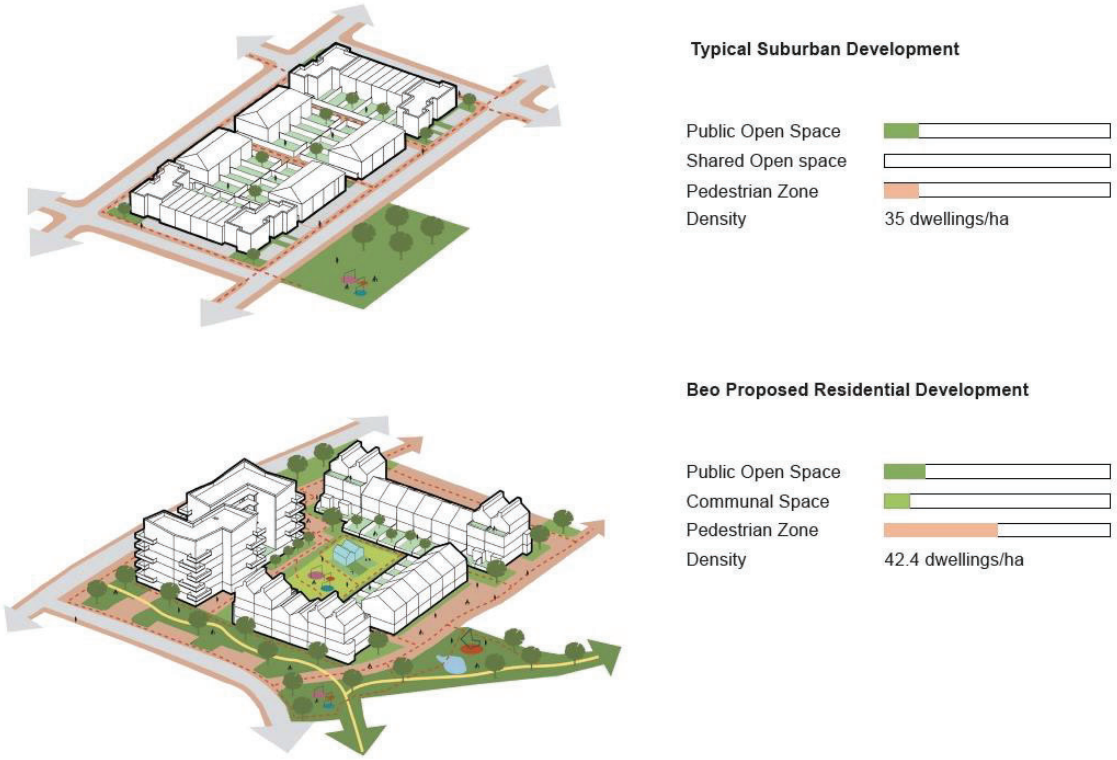


Figure 3.7.g – Housing Model Land-Use Comparison

In a traditional estate the public open space is sometimes a dedicated park surrounded by car dominated streets. However, in the proposed development the public open space offered by the greenway spine links different neighbourhood blocks and guides people through the site in an environment that is free from cars.

This is complemented by communal courtyard spaces adding to the network of public amenity. Many of the roads are also designated as shared surface 'pedestrian zones' with low speeds and landscaping encouraging drivers to slow down. They are considered an integral part of the public realm with a clear priority on people over vehicles.

3.7.3 Alternative 3 – Internal Ring Roads

As stated above, traffic has been kept to the outside of neighbourhood blocks to keep the communal courtyards free from vehicles. However vehicle access to dwellings remains a priority due to practical concerns regarding accessibility and inclusivity, deliveries, waste management, and emergency access.

Previous iterations of the site layout featured an internal ring road adjacent to the Ratoath Outer Relief Road and Glascarn lane that would provide vehicular access to all dwellings along the southern and

north-eastern boundaries of the site. This effectively created a 'double road' scenario as can be seen in the below diagram.

Figure 3.7.h – Internal Ring Roads

The majority of this road was envisaged as a slow-speed shared surface that gave priority to pedestrians. The area between the 'double roads' was to be reserved for planting to provide a buffer between the estate and the busy RORR.

Pre-planning discussions with Meath County Council made it clear that the Local Authority vision for the RORR is to a DMURs compliant road. Any development along it should engage with the road, providing frontage and therefore encouraging a low speed, more people friendly environment.

To achieve this, a series of options were explored. The need for frontage along the RORR stands in opposition to the concerns over access listed above. Further questions of privacy, security and defensible space also arise when dwellings are located fronting a busy distributor road.

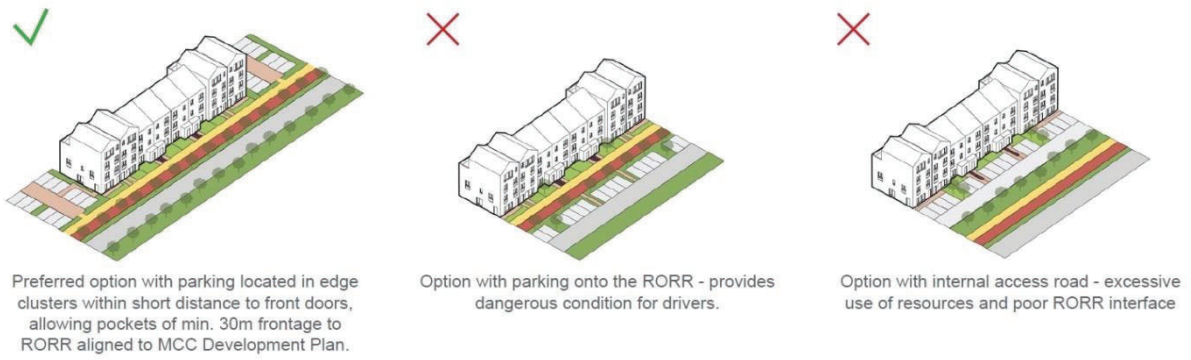


Figure 3.7.i – RORR Interface Studies

Parking became a key issue, as without the internal road, spaces must then be placed elsewhere. Suggestions of parallel spaces or pockets of parking off the RORR were negatively received by the Local Authority, while the red line for the Design Team was that the space in the communal courtyards behind these dwellings were off-limits to vehicles.

The ultimate solution proposed sees the dwellings in neighbourhoods right along the southern site boundary pulled forward to provide frontage onto the RORR. This provides an urban edge along the road however, rather than a continuous impermeable barrier, this edge is softened and broken at the corners of the neighbourhood blocks to allow for pedestrian, cyclist and visual access to the site.

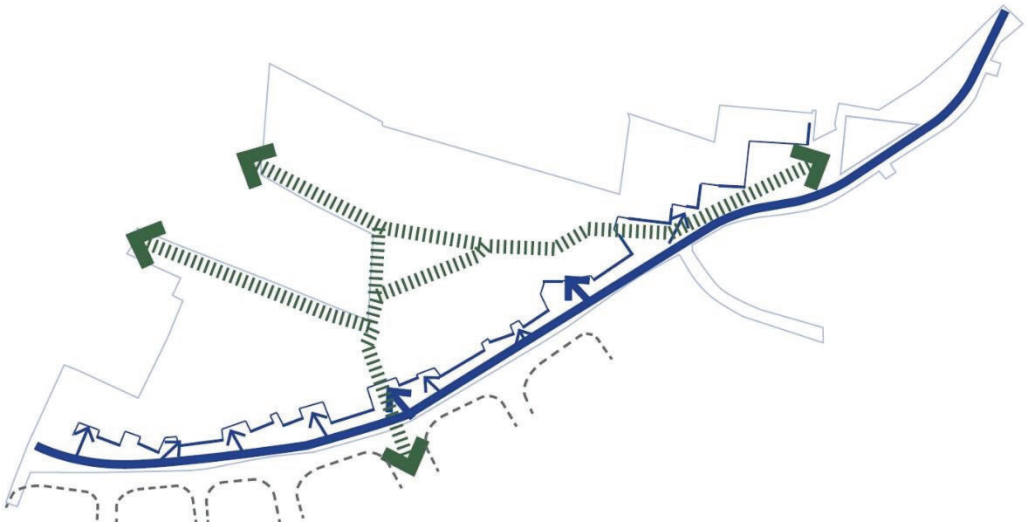


Figure 3.7.j – RORR Open Frontage

Parking is also provided in concentrated lots at these corners. Terraces without on-curtilage parking are kept short enough that the inhabitants will not have to walk significant distance from their cars to their front doors.

The dwellings themselves are provided with a buffer between the front doors and the RORR consisting of defensible front garden space in addition to the footpath, cycle path and grass verge associated with the road.

Ultimately, the proposed solution provides an urban edge that is strong and visually consistent from a drivers' perspective, yet permeable and sufficiently buffered from a resident's perspective.

Figure 3.7.l – RORR Urban Edge Diagram

Figure 3.7.m – RORR Urban Edge Renders

3.8 Design Alternatives

Throughout the design process, the Design Team also explored many alternatives that were independent of the site layout.

3.8.1 Courtyard Models

Alternative courtyard models were studied in the process of defining the vision for the model of living that this development will provide. One such model was an inversion of the proposal with car parking supplied within the interior of neighbourhood blocks and rear gardens backing externally onto public open spaces. This was ultimately discounted for reasons of privacy and security.

Figure 3.8.a – Courtyard Block Model Study Diagrams

Another model explored the routing of public open spaces through neighbourhood blocks with roads kept to the exterior. This was discounted due to the increase in road surfaces required and the impact that would be had on the existing hedgerows were they to have dwellings built in such close proximity to them.

3.8.2 Unit Typologies

Multiple housing typologies that differ from the typical 3-bedroom semi-detached house were examined to provide a variety that would suit a diversity of people and households.

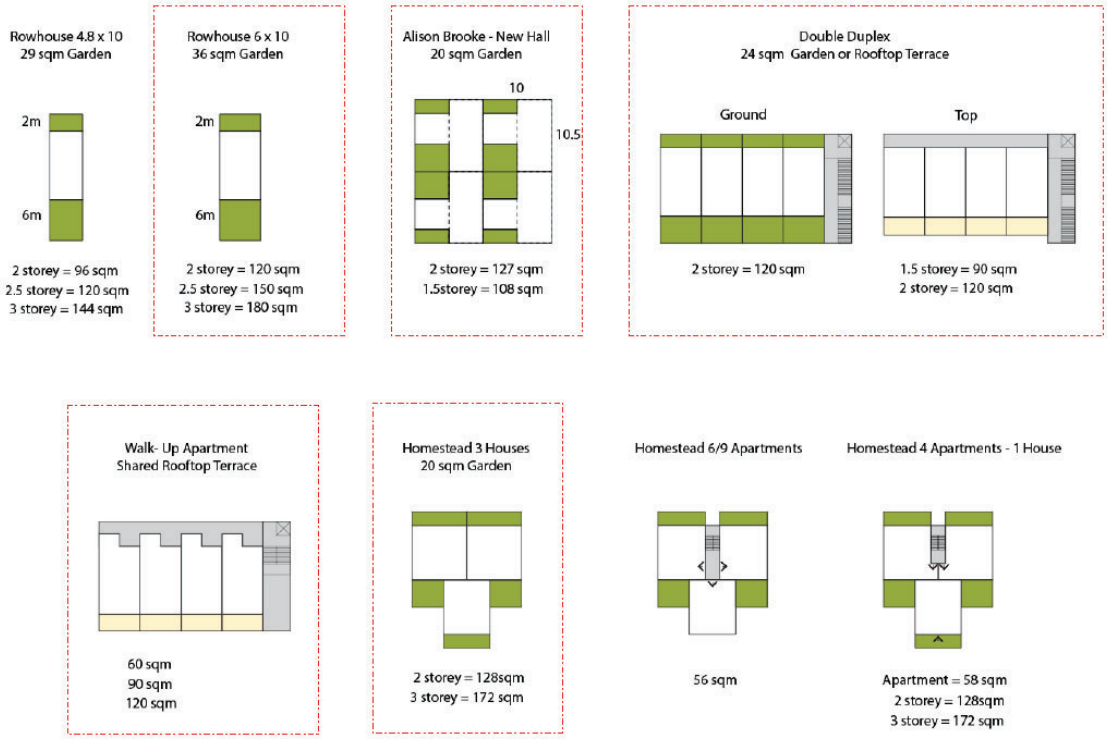


Figure 3.8.b – Housing Typology Study Diagrams

Two house types that have reduced rear gardens, but with compensatory upper floor terraces, were also designed to minimise the footprint of private spaces and therefore allow for more communal and public open spaces.

Figure 3.8.c – House Types B1 & B2, Axonometric Models

3.8.3 Apartment Basements

The option of semi-basements underneath the apartment blocks was considered to minimise the visual impact of car parking on site. One design featured a building up of landscaping to partially hide an on-grade carpark. Another investigated the effect of car parking set at a level of 1.8m below ground, with an option of a achieving an extra storey of apartments.

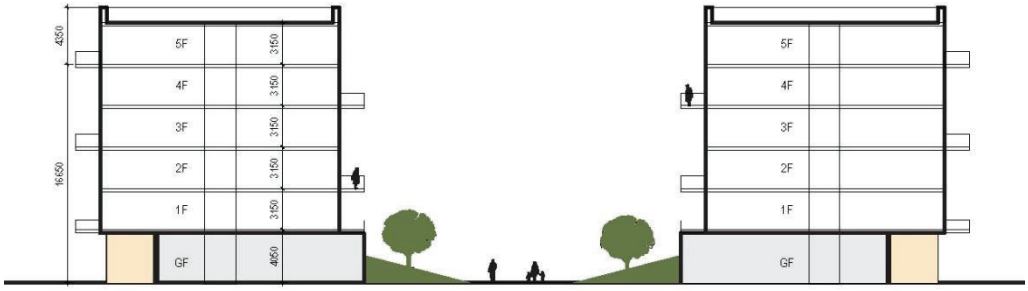


Figure 3.8.d – Apartment Block Section, Built-Up Landscape

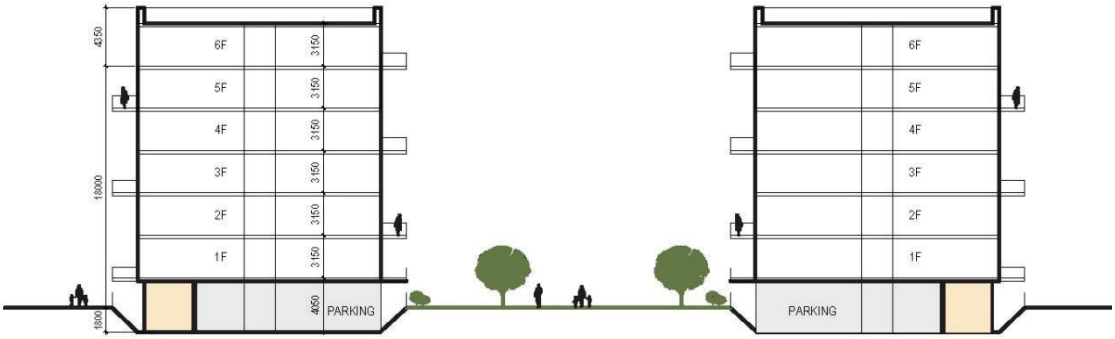


Figure 3.8.e – Apartment Block Section, Sunken Car Parking

Both versions were ultimately discounted due to the level of excavation and intervention onto the existing landscape that would be required. It was felt that extra height is not suitable as the apartment blocks in their proposed form sit comfortably beside the other house typologies within neighbourhood blocks.

Figure 3.8.f – Apartment Block Section, On-Grade

Apartment blocks instead feature either car parking or retail at street level with 5 storeys of dwellings above.

Figure 3.8.g – Apartment Block H Render

3.9 Proposed Site Layout

The proposed layout was chosen to provide a vibrant new neighbourhood based on the principles of sustainability, permeability, walkability, and shared public spaces.

It has been considered in the context of the national and international equine centres of Fairyhouse Racecourse and Tattersalls. And allows for future connections between the existing built extents of Ratoath Town, and the lands and towards the equine centres beyond. It also allows for connections to neighbouring sites, including the Jamestown SHD currently under construction to the east.

A key concept in ensuring the delivery of a sustainable development on this site is the integration of the existing ecology and field pattern. The model of living proposed takes the form of clustered courtyards that are inspired by the site's history as farmland. Residential clusters are shaped by the existing field patterns, retaining existing hedgerows where possible to preserve wildlife habitats rather than removing the existing rural grain of the site.

The clusters will be linked together by a network of shared public open spaces and routes that give precedence to pedestrians and cyclists. This network will allow for easy movement across the site by walking or cycling and will tie back to Ratoath Town with potential for future extension to nearby amenities such as Ratoath College and the aforementioned Fairyhouse Racecourse and Tattersalls. The goal is to encourage convenient movement by means other than driving and meetings between inhabitants.

Figure 3.9.a – Greenway Bird-Eye Render

The cluster neighbourhood model will also provide each block with a communal court space to be shared by the residents and encourage social interaction. These communal courts will have distinct characters and functions to encourage the inhabitants to move between them.

The range of amenity spaces, home sizes and typologies proposed is designed meet the needs of a wide range of residents. These include a mixture of house, duplex maisonette, and apartment units.

The variety of units will accommodate a diverse mix of inhabitants varying in age, life stage, mobility, and family unit size.

The development proposes an alternative model of living to the dendritic street patterns of more traditional housing estate layouts. It aims to set a sustainable precedent for the future of Ratoath.

Figure 3.9.b – Communal Courtyard Render

3.10 Conclusion

Having examined various reasonable alternative layouts and designs it is considered that the proposed scheme is the preferable option in terms of the sustainable development of the site in line with the approved residential zoning objective.

It will provide 452 new homes at a density of approximately 42 dwellings per hectare while enhancing the connectivity and permeability of the site to open up the new neighbourhood to the adjacent lands and subsequently the existing Ratoath community. The layout will promote active and sustainable modes of transport and a varied mix of unit types, sizes and designs will provide a place for a diversity of inhabitants to form a vibrant new and sustainable community.

Figure 3.9.c – Linear Plaza Render

4. Population and Human Health

4.1 Introduction

This chapter has been prepared by KPMG Future Analytics.

This chapter examines the potential population and human health effects and mitigation measures of the proposed residential development on lands to the immediate south of the established town of Ratoath, Co. Meath. The purpose of this assessment is to identify and assess the potential population, human health and well-being effects of the proposed project, and to deliver evidence-based recommendations that maximize health benefits and mitigate or remove potentially negative impacts associated with the proposed developments.

This chapter describes the demographic and socio-economic profile of the receiving environment and potential impact of the proposed development on population, i.e. human beings, and human health. Any likely negative impacts would be addressed through mitigating factors and actions to be applied to minimise these effects.

4.2 The Proposed Scheme

This section gives a short form development description for the development. Please refer to the statutory public notice below:

> *"The proposed development will principally consist of the construction of 452 no. residential units and all associated ancillary accommodation, open space and site development works. The total gross floorspace (GFA) of the overall development is c.55,714.4 (c.59,177 with ancillary uses included) of which c.54,175 is residential and c.1,539.4 is non-residential uses. The proposed development will principally consist of 150 no. semi-detached and terraced dwelling houses (3-bed - with option to convert attic in 89 no. units, thereby creating 4-bed houses), 182 no. maisonettes (15 no. 1-bed & 167 no. 3-bed) and 120 no. apartments (100 no. 2-bed and 20 no. 3-bed)(with balconies/terraces across all elevations), with heights ranging from 2-3 storey terraced houses and 3-4-storey duplex buildings (1 storey ground floor units and 2 storey first and second floor units; 2 storey ground and first floor units and 2 storey second and third floor units) and 6-storey apartment blocks. The scheme provides the following house types (as detailed in the application pack materials):61 no. A1 (with the option to provide as A2 given similar appearance), 28 no. A2 (with the option to provide as A1 given similar appearance), 30 no. B1, 31 no. B2, 42 no. M1, 42 no. M2, 34 no. M3, 34 no. M4, 15 no. M5, 15 no. M6, 60 no. D1, 20 no. D2, 20 no. D3, 20 no. D4. The scheme is presented across 12 neighbourhoods (A-H & J-M), each with its own designated central communal open space, car and cycle parking (746 no. car parking spaces and 816 no. cycle parking space) as follows:*
>
> ***Neighbourhood A:*** *consisting of 38 no. units comprising 4 no. 2 storey three-bedroom terraced housing units, 30 no. apartments (25 no. two-bedroom units and 5 no. three-bedroom units), 4 no. 2 storey three-bedroom maisonettes, ancillary accommodation, including lobby (c.53 sq. m), post room (c.13 sq. m), ESB storage (c.11 sq. m), water storage (c.14 sq. m), refuse storage (c.29 sq. m), bike storage (c.135 sq. m), car park (c.702 sq. m) associated private balconies/terraces/rear gardens, communal open space (c.662 sq. m), 51 no. surface and undercroft car parking spaces (42 no. residential and 9 no. visitor) and 92 no. cycle parking spaces.*

Neighbourhood B: *consisting of 43 no. units comprising 23 no. terraced housing units (10 no. 2 storey three-bedroom units and 13 no. 3 storey three-bedroom units), 20 no. 2 storey three-bedroom maisonettes, ancillary accommodation including, associated private balconies/terraces/rear gardens/winter gardens, communal open space (c.1,753 sq. m), 76 no. car parking spaces (66 no. residential and 10 no. visitor) and 52 no. cycle parking spaces.*

Neighbourhood C: *consisting of 62 no. units comprising 12 no. 2 storey terraced housing units, 30 no. apartment units (25 no. two-bedroom units and 5 no. three-bedroom units), 20 no. maisonette units (18 no. 2 storey three-bedroom units and 2 no. single storey one-bedroom units), ancillary accommodation, including lobby (c.53 sq. m), post room (c.13 sq. m), ESB storage (c.11 sq. m), water storage (c.14 sq. m), refuse storage (c.29 sq. m), bike storage (c.135 sq. m),), car park (c.702 sq. m), associated private balconies/ terraces/rear gardens, communal open space (c. 1,270 sq. m), 96 no. surface and undercroft car parking spaces (74 no. residential and 22 no. visitor) and 142 no. cycle parking spaces.*

Neighbourhood D: *consisting of 38 units comprising 14 no. terraced housing units (7 no. 2 storey three-bedroom units and 7 no. 3 storey three-bedroom units), 24 no. maisonettes (20 no. 2 storey three-bedroom units and 4 no. single storey one-bedroom units), ancillary accommodation, including associated private balconies/terraces/rear gardens, communal open space (c.798 sq. m), 62 no. car parking spaces (52 no. residential and 10 no. visitor), 60 no. cycle parking spaces and an ESB substation (c.14 sq. m).*

Neighbourhood E: *consisting of 30 units comprising 18 no. 2 storey three-bedroom terraced housing units, 12 no. 2 storey three bedroom maisonettes, ancillary accommodation, including associated private balconies/terraces/rear gardens, communal open space (c.643 sq. m), 56 no. car parking spaces (48 no. residential and 8 no. visitor), 30 no. cycle parking spaces and an ESB substation (c.14 sq. m).*

Neighbourhood F*: consisting of 36 units comprising 20 no. terraced housing units (12 no. 2 storey three-bedroom units and 8 no. 3 storey three-bedroom units), 16 no. 2 storey three-bedroom maisonettes, ancillary accommodation, including associated private balconies/terraces/rear gardens, communal open space (c.664 sq. m), 64 no. car parking spaces (56 no. residential and 8 no. visitor) and 42 no. cycle parking spaces.*

Neighbourhood G: *consisting of 29 units comprising 11 no. 3 storey three-bedroom terraced housing units, 18 no. maisonettes (15 no. 2 storey three-bedroom units and 3 no. single storey one-bedroom units), ancillary accommodation, including associated private balconies/terraces/rear gardens/winter gardens, communal open space (c.430 sq.m), 48 no. car parking spaces (40 no. residential and 8 no. visitor), 48 no. cycle parking spaces and an ESB substation (c.14 sq.m).*

Neighbourhood H: *consisting of 50 units comprising 8 no. terraced housing units (4 no. 2 storey three-bedroom terraced housing units, 4 no. 3 storey three-bedroom terraced housing units), 30 no. apartments units (25 no. two-bedroom units and 5 no. three-bedroom units), 12 no. 2 storey three-bedroom maisonettes, ancillary accommodation, including associated private balconies/terraces/rear gardens/winter gardens, 4 no. commercial/local retail units (c.533.6 sq. m), 4 no. wc (c.44 sq. m), lobby (c.50 sq. m), post room (c.14 sq. m), ESB storage(c.13 sq. m), water storage (c.14 sq. m), refuse storage (c.30 sq. m), communal bins (c.11 sq. m), bike storage (107 sq. m), communal open space (c.1,153 sq. m), 76 no. surface and undercroft car parking spaces (58 no. residential and 18 no. visitor) and 118 no. cycle parking spaces and an ESB substation (c.14 sq. m).*

Neighbourhood J: *consisting of 37 units comprising 13 no. terraced housing units (5 no. 2 storey three-bedroom units and 8 no. 3 storey three-bedroom units), 24 no. maisonette units (20 no. 2 storey three-bedroom units and 4 no. single storey one-bedroom units, ancillary accommodation, including associated private balconies/terraces/rear gardens/winter gardens, communal open space (c.1,148 sq. m), 56 no. car parking spaces (50 no. residential and 6 no. visitor) and 60 no. cycle parking spaces.*

Neighbourhood K: *consisting of 30 no. apartment units (25 no. two-bedroom units and 5 no. three-bedroom units), ancillary accommodation, including associated private balconies, ancillary childcare facility (c.1,003 sq. m) with associated play areas (c.727 sq. m), lobby (c.53 sq. m), post room (c.14 sq. m), ESB storage (c.13 sq. m), water storage (c.14 sq. m), refuse storage (c.28 sq. m), bike storage (c.132 sq. m), car park (c.702 sq. m) communal open space (c.200 sq. m), 38 no. surface and undercroft car parking spaces (30 no. residential and 8 no. visitor) and 92 no. cycle parking spaces, in addition to 22 no. car parking spaces for the creche.*
Neighbourhood L: *consisting of 35 units comprising 15 no. terraced housing units (11 no. 2 storey three-bedroom units and 4 no. 3 storey three-bedroom units), 20 no. maisonettes (18 no. 2 storey three-bedroom units and 2 no. single storey one-bedroom units), ancillary accommodation, including associated private balconies/terraces/rear gardens/winter gardens, communal open space (c.845 sq. m), 57 no. car parking spaces (50 no. residential and 7 no. visitor), 50 no. cycle parking spaces and an ESB substation (c.14 sq. m).*
Neighbourhood M: *consisting of 24 units comprising 12 no. terraced housing units (6 no. 2 storey three-bedroom units and 6 no. 3 storey three-bedroom units), 12 no. 2 storey three-bedroom maisonettes, ancillary accommodation, including associated balconies/terraces/rear gardens/winter gardens, communal open space (c.1,017 sq. m), 39 no. car parking spaces (36 no. residential and 3 no. visitor), 30 no. cycle parking spaces and an ESB substation (c.14 sq. m).*

The proposed development also includes 2.247 ha of landscaped public open space which includes a civic plaza (0.513 ha), greenway spine (1.087 ha) and parklands (0.674 ha); solar PV Panels in various locations; and public lighting. All associated site development works above and below ground including hard and soft landscaping, roads/footpaths/cycle paths, play areas, boundary treatments, SuDs, pumping station, EV charging points, green roofs, ESB substations and services to facilitate the development.

Planning permission is also sought for a second phase of the Ratoath Outer Relief Road (RORR) (c. 22,825 sq. m), that will run along the southern boundary of the application site and join up to the existing constructed section of the RORR. The section of the RORR proposed as part of this development runs from a new signalised junction on the R155, east for approximately 1100m, to the end of the site boundary. The proposed roadway will provide access for the site in the form of two priority controlled junctions. A series of pedestrian and cycle connections are provided to site from the Fairyhouse Road (R155), Glascarn Lane and the new RORR as well as a pedestrian link to Carraig Na Gabhna. The site provides permeability through its internal road and shared surface networks, including pedestrian and cycle paths (implementing a segregated pedestrian and cycle path proposed along the RORR) but also within the site. A greenway will be provided across the site that will connect the R155 Fairyhouse Road with Garraig Na Gabhna road and Glascarn Lane. This greenway will provide pedestrian/cyclist connection to the newly proposed pedestrian/cyclist infrastructure along the RORR. Planning permission is also sought for all associated site development and infrastructural works, services provision, foul and surface water drainage, an extension to the foul water network, surface water and watermain along the RORR required to facilitate the development, access roads/footpaths, lighting, landscaping and boundary treatments."

4.3 Assessment Methodology

This EIAR document has been prepared in accordance with the European Union EIA Directive 85/337/EC (as amended by 97/11/EC, 2003/4/EC, 2011/92/EU), Directive 2014/52/EU, and in

accordance with the Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (published in August 2018) and the 2017 Draft EIA Guidelines published by the EPA.

The 2014 Directive's title change to assess the impact on 'Population and Human Health' and the 2017 Draft EIA Guidelines published by the EPA have been adhered to, including the requirement that 'the assessment of impacts on population & human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in the EIAR e.g. under the environmental factors of air, water, soil etc'.

The assessment of potential impacts of the Proposed Development on the Population and Human Health of residents in the Study Area are based on local population information sourced from the Central Statistics Office (CSO) Census data captured in the previous Censuses of 2011 and 2016. Data sets analysed in this assessment include:

- Population Data
- Household Data
- Economic Activity and Employment Data
- General Human Health Data

Population data reflects on the growth, age and gender distribution, and nationalities of people in the Study Area. Household data reflects on the household composition and predominant family cycles of households in the Study Area. The economic and employment context draws on principle economic status data of persons in the Study Area aged 15 years and older. Census data was also used to reflect on the (self-evaluated) general health status of residents in the Study Area.

The data used analyses the socio-economic and demographic attributes of the Study Area as recorded by the Census at ED level. Data from the 2011 and 2016 Censuses were used to identify and highlight change in the social fabric of the Study Area over time. All data was sourced directly from the CSO and then modelled and reproduced according to project requirements.

To provide further context to the social and demographic assessment, a similar data analysis exercise, but at broader scale, was performed on the Meath Region and the State.

Furthermore, an assessment of the current provision of social infrastructure was conducted through spatial analysis, while planning permission data informed other current and prospective development and land use activity in the Study Area in relation to the Proposed Development.

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

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

4.3.1 The Study Area

A Study Area selected for this assessment comprises of a 2km buffer of subject site as depicted below in **Error! Reference source not found.**. To analyze the effects of the proposed development on

Population and Human Health within the catchment area surrounding the site, the Study Area comprising of 24 Small Areas (SA) in proximity to the site has been assessed in detail. This delineation of the Study Area provides a good representation of the socio-economic and demographic characteristics of the immediate populated area potentially impacted by the proposed development. The Study Area captures an area of the application site, Ratoath town centre and neighbourhoods to the west, south and east.

The rationale behind choosing this study area was that it best demonstrates the demographics of the area in the context of its surrounding land uses to the west, south and east, as well as Ratoath town centre to the north.

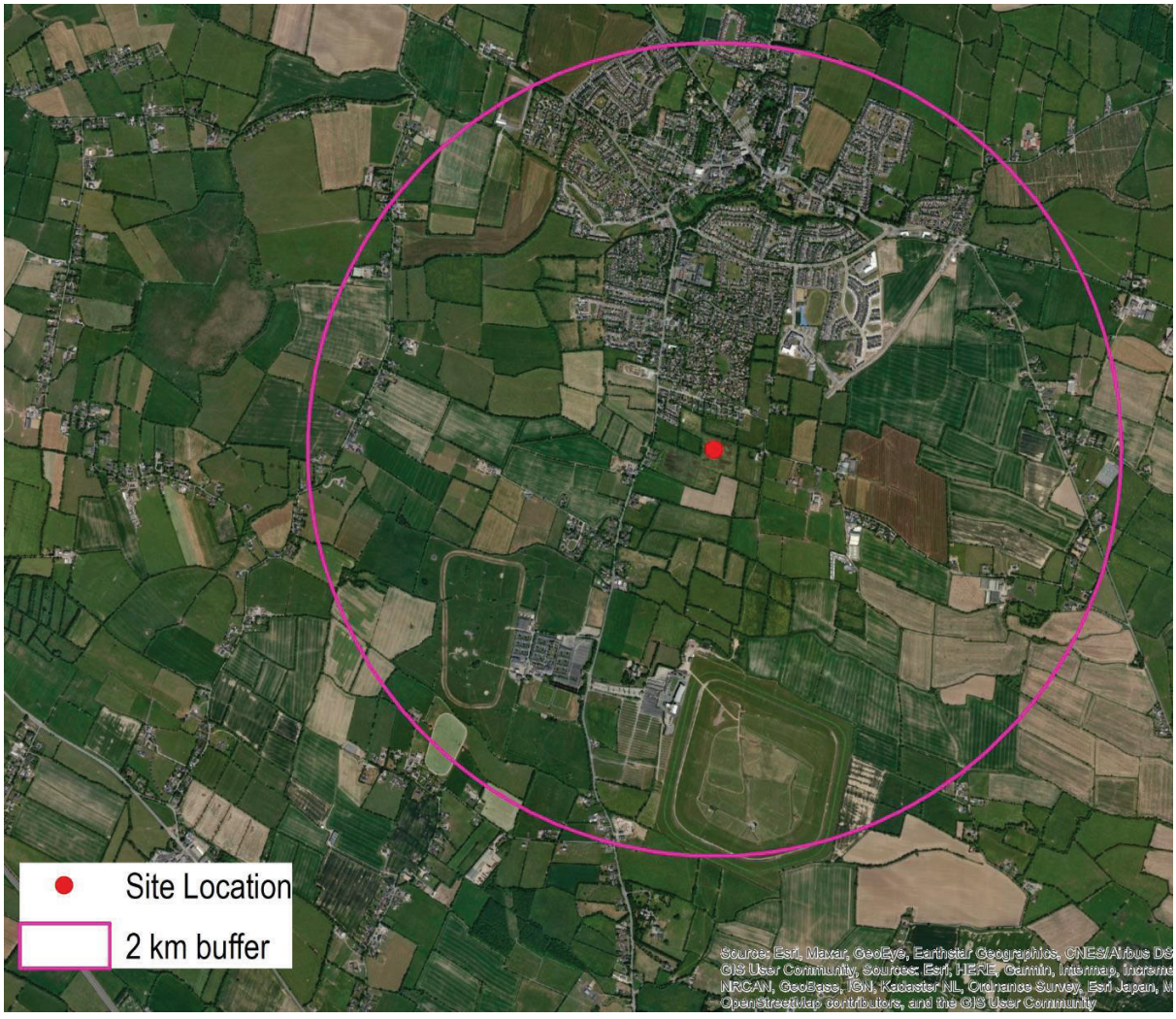


Figure 4.1: Study Area

The site itself is c. 14.166 ha in size and is irregular in shape. It is bounded to the north by Glascarn Lane, the rear of houses at Glascarn Lane, further existing residential dwellings and a permitted strategic housing development (Reg Ref: TA17/305196); to the east and south by existing agricultural fields and by Glascarn Lane; and to the west by Fairyhouse Road (R155), the rear of houses at Fairyhouse Road, the Carraig Na Gabhna and Cairn Court developments, and existing agricultural fields. The subject site is located on lands within the following town lands (in part): Legagunia, Commons, Jamestown, Glascarn and Newtown.

Please refer to Figure 4.2 below (Site Layout Plan) for more details.

Figure 4.2: Site Layout Plan (Source: RKD Architects)

4.3.2 Data Sources

This chapter has been prepared using a range of different information sources and databases, including: -

- Primary data sources (Small Area Population Statistics (SAPS) data from Census 2011 and 2016 produced by the CSO Office);
- Maps of the surrounding area;
- Other relevant environmental data considered during the Environmental Impact Assessment (EIA);
- Secondary data sources, including research by the CSO and the Department of Education and Skills;
- Observation of local settlement and travel patterns and identification of community facilities; and
- Department of Education and Skills data.

In the case of publicly available data, the most recent and up-to-date data source has been used. Data of this nature represents a snapshot in time and cannot capture more recent population and human health changes (including the impact of Coronavirus/COVID-19), but nevertheless represents the most robust basis for assessment.

This assessment is also informed directly by information included in the accompanying planning applications and EIAR. This assessment will consider the interaction of population and human health impacts and other environmental impacts identified through topic assessments in the wider EIAR.

4.4 Receiving Environment

This section provides findings of the baseline analysis performed on the assessment themes to develop an understanding of the current state of the environment where the proposed developments will be located. This analysis informs the professional conclusions reached as to whether impacts will be negative or beneficial, and of low, medium, or high significance.

4.4.1 Population Characteristics

Data analysis on the Study Area and Meath region show differing trends in the distribution of the population in various age cohorts, with the Study Area having a noticeably larger portion of its population in the 35-64 years of age cohort, and a much smaller portion between the ages of 65+ or above compared to Meath Region figures.

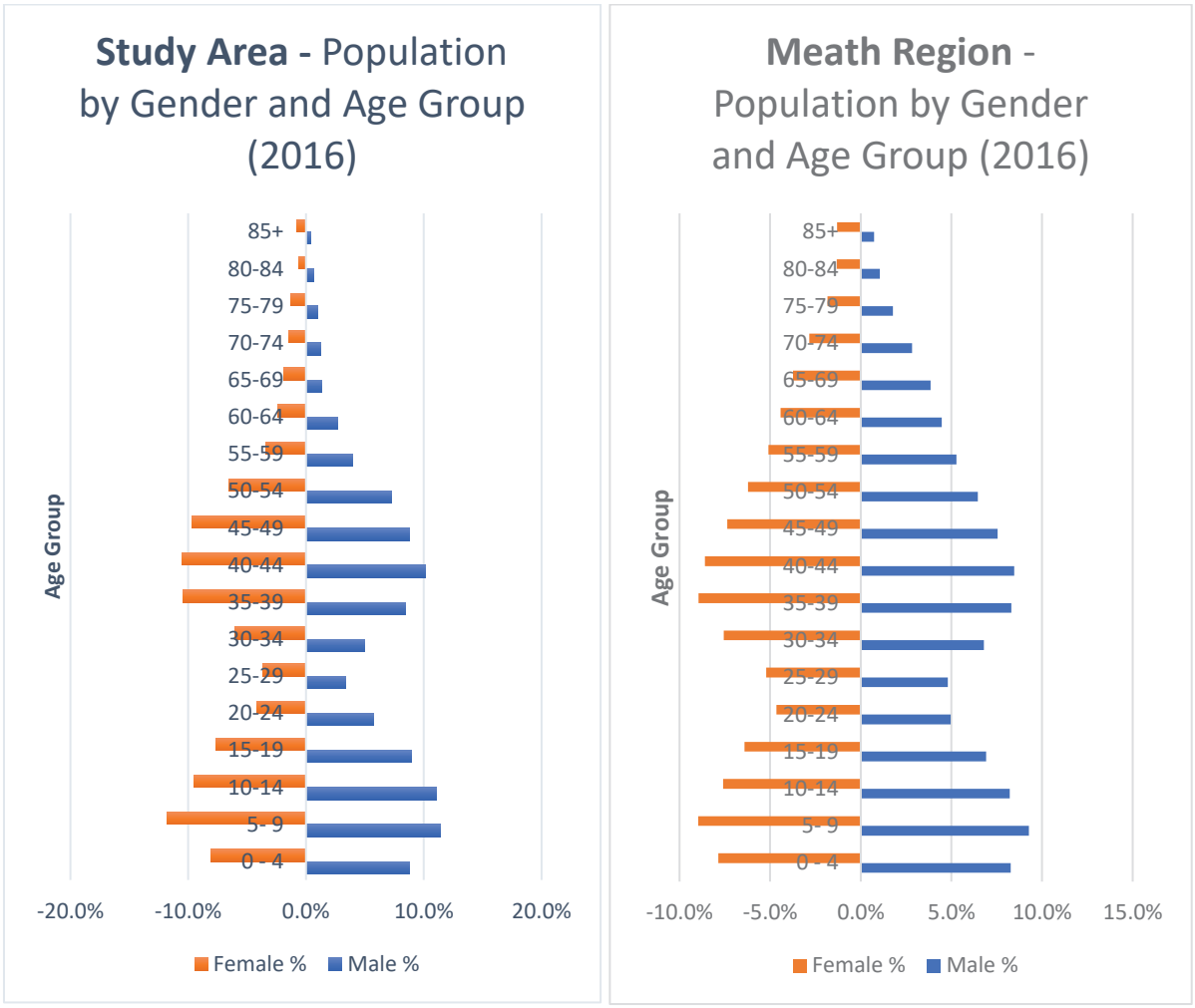


Figure 4.3*:* Study Area and Meath Region Population Pyramids

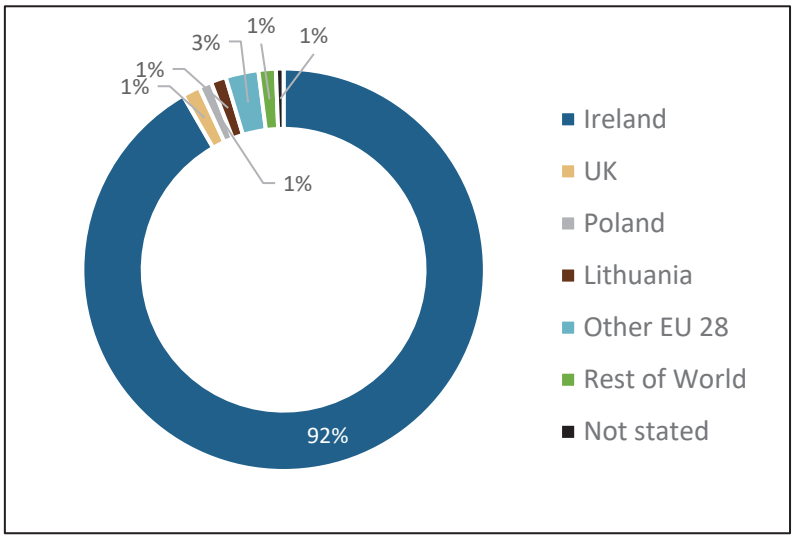
The CSO Census results (Census 2016) indicate that there were 8,977 residents in the Study Area, which increased by 4% from 8,614 as recorded in the 2011 Census.

The largest portion of the population of the Study Area is between the ages of 35-64, and between 2011 and 2016, this age cohort saw a 14.5% increase. The 65+ age group also saw a considerable growth (+30.4%) between 2011 and 2016. However, the 0-4 and 20-24 age groups both saw a decrease of -29% and -22.5%. Although the percentage growth in the 65+ age group appears very high at 30.4%, the numerical value of the increase is only 111 people in the intercensal period.

Table 4.1: Study Area, Meath Region, and State Population by Age Group (Summary)

Age	Study Area				Meath Region	State
	2011 No.	2016 No.	% Change	% 2016	% 2016	% 2016
0-4	1,080	757	- 29%	8.4%	8.1%	7%
5-19	2,246	2,705	17%	30.1%	23.7%	20.5%
20-34	1,619	1,255	- 22.5%	14%	17%	19.6%
35-64	3,305	3,785	13%	42.2%	40.6%	39.5%
65+	364	475	24%	5.3%	10.7%	13.4%
Total	**8,614**	**8,977**	**4%**		**195,044**	**4,761,865**

While the Study Area and Meath Region have a majority in Irish nationals (92% and 88.8% respectively), there is also a notable presence of other nationalities as seen in Figure 4.4 below.



At Study Area level in 2016, 'Other EU' nationals and people from the 'Rest of the World made up 4% of the total population. In addition to the previously mentioned nationalities, the Study Area also consisted of several other Nationalities including UK, Poland, Lithuania and 'Rest of World'.

Figure 4.4: Study Area Nationalities

The number of foreign nationals in the Study Area, decreased from 2011 to 2016 by 195, with the largest decrease in foreign nationals from 'Rest of World' countries (-51%). Foreign nationals in the Meath Region make up 11.2% of the population, compared to 13% foreign nationals in the State.

4.4.2 Household Characteristics

Trends in household data from the intercensal period for the Study Area are summarized in the table below.

Table 4.2 – Study Area Household Composition

	Study Area				Meath	State
Composition of Households	**2011**	**2016**	**Change**	**2016%**	**2016**	**2016**
Single person	291	289	-2	3.2%	5.9%	8.5%
Married couple	293	256	-37	5.7%	9.6%	10.9%
Cohabiting couple	130	90	-40	2.0%	2.3%	2.9%
Married couple and children	1,355	1,375	20	64.2%	54.2%	46.5%
Cohabiting couple and children	141	160	19	6.7%	6.3%	5.7%
Father and children	25	26	1	0.8%	1.2%	1.3%
Mother and children	193	232	39	7.3%	7.4%	8.9%
Couple and others	26	20	-6	0.7%	1.2%	1.5%
Couple children and others	58	70	12	4.0%	4.3%	3.6%
Father children and others	2	8	6	0.3%	0.3%	0.3%
Mother children and others	21	17	-4	0.8%	1.3%	1.4%
Two or more family units	22	35	13	2.2%	2.9%	2.6%
Non-family households and relations	29	26	-3	0.9%	1.1%	1.9%

Two or more non-related persons	41	43	2	1.2%	1.8%	4.1%
Total Households	**2,627**	**2,647**	**20**	**2,647**	**62,234**	**1,702,289**

The most notable difference in household composition comparison is '*Single person'*, which makes up 3.2% of the study area. In comparison, this figure is almost half that of the Meath region average (5.9%).

Other notable household compositions are '*Married Couple and Children'* at 64.2% in the study area and 54.2% in the Meath region; both of which are higher than the State figure of 46.5%. The 'married couple' composition in the Study Area is 5.7%, which is lower than the Meath Region at 9.6% and slightly lower than the State figure of 10.9%.

Distribution is relatively evenly split across other compositions. Of note, the composition with the largest change in the Study Area from the 2011-2016 intercensal period was 'cohabitating couple' (-40; -30.8%) and 'Mother and children' (+39, +20.2%).

As identified in the population and households' statistics, the Study Area characteristics highlight a majority of older adult population with a tendency to live in 'married couple and children' households. An increase in the number of older adult population (65+ years) is also noted. This trend is also seen in the change in family cycles in the study area, with an increase in early school, pre-adolescent, and retired families in the intercensal period, and a subsequent 4% increase in average household size from 3.28 (2011) to 3.41 (2016).

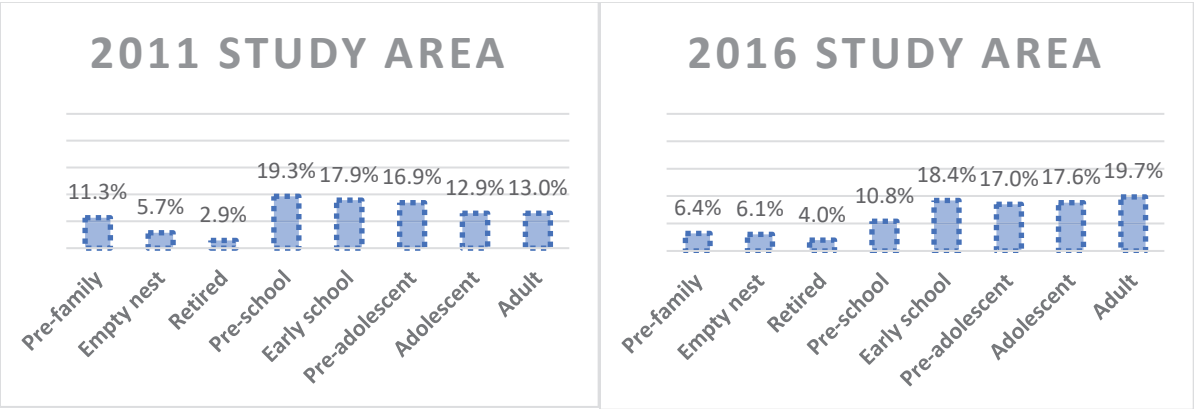


Figure 4.5: Study Area Family Cycle Stages

4.4.3 Education

Among residents of the Study Area aged 15 and over, a total of 47.4% hold some form of Third Level qualification (Level 6 or above), which is higher than the national average of 39.3%.

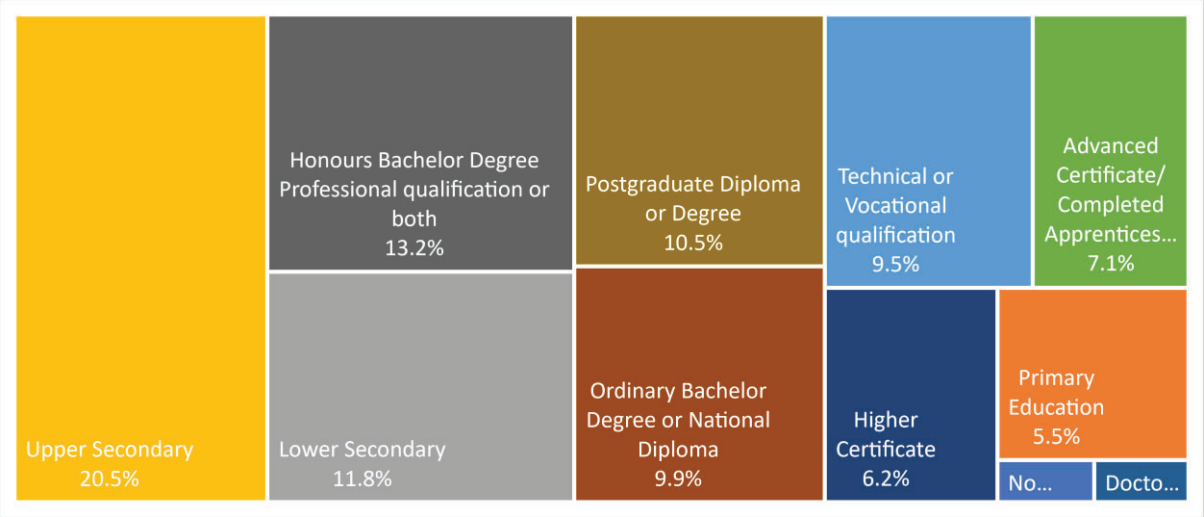


Figure 4.6: Study Area Educational Attainment

As visible in Figure 4.7 below, the general level of Third Level (Level 6+) education in the Study Area has increased by 3.4%, with a general decrease in people having less than 'up to leaving certificate' qualifications noted in the 2011 – 2016 intercensal period.

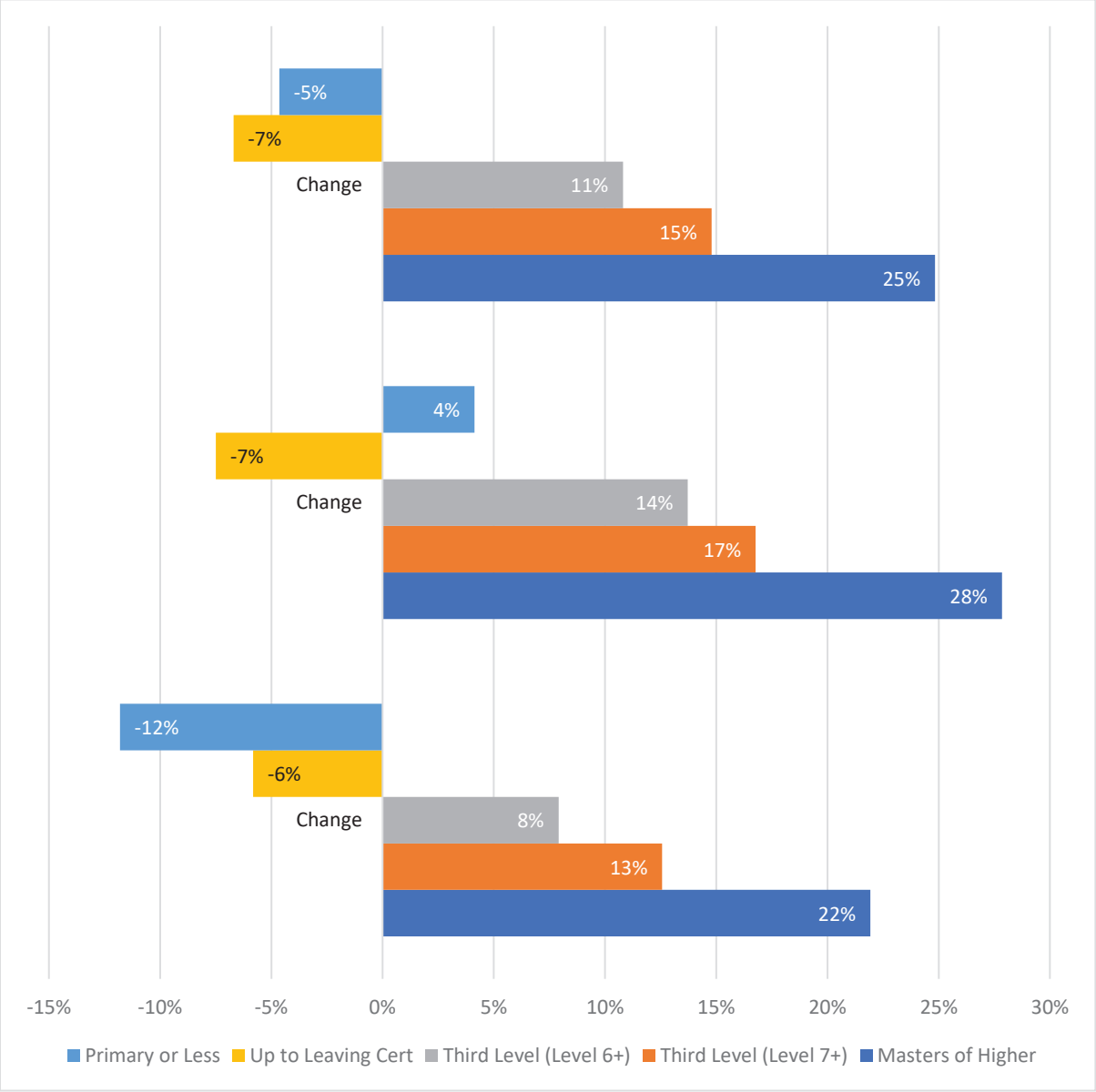


Figure 4.7: Changes in Level of Education in Study Area

4.4.4 Educational Facilities in the Study Area

There are three primary schools and one post-primary school located within the Study Area. In addition, there are also eight childcare facilities within the Study Area. As visible from Figure 4.8 below, all education facilities are located to the north of the subject site. Table 4.3 lists the schools (primary and post primary) in the area, as well as the number of pupils over the last two academic years as recorded by the Department of Education and Skills[4].

[4] Number of pupils as recorded by Department of Education and Skills (DES). Available at: https://www.education.ie/en/Publications/Statistics/Data-on-Individual-Schools/

Figure 4.8: Education Facilities in the Study Area

Table 4.3: Primary and Post Primary Education Facilities in the Study Area

PRIMARY SCHOOLS IN STUDY AREA				
Official Name	**Type**	**DES Enrolment Figure by Academic Year[5]**		**Change in Enrolment Figure**
		2020/2021	**2021/2022**	
Ratoath Junior N S	Primary	334	300	**-34**
Ratoath Senior N S	Primary	480	470	**-10**
St Paul's N S	Primary	640	609	**-31**
TOTAL		**1,454**	**1,379**	**-75**

SECONDARY / POST-PRIMARY SCHOOLS IN STUDY AREA				
Official Name	**Type**	**DES Enrolment Figure by Academic Year**		**Change in Enrolment Figure**
		2020/2021	**2021/2022**	
Ratoath College	Post-Primary	1,091	1,112	**21**

As illustrated in Table 4.3 above, the enrolment of primary schools in the area is quite minimal, with a net decrease in enrolment of 75 pupils over the past two academic years; the most notable of which being St. Paul's National School (-31).

In contrast, an increase is noted in the enrolment figures of the secondary school in the Study Area, of which its enrolment increased throughout the two academic years, subsequently providing an additional 21 secondary school places from 2020/2021 to 2021/2022. A likely explanation for this would be

[5] Figures correct as of May 2022. Available at: https://www.education.ie/en/Publications/Statistics/Data-on-Individual-Schools/

changing demographics in the area, as illustrated in Section 4.4.1 above.

The eight childcare facilities within the Study Area provide both all-day and sessional childcare. Capacity figures for these childcare facilities have been sourced using Túsla registration reports. However, these represent the maximum capacity of children allowed at each facility and does not represent the current enrolment figures.

Table 4.4: Childcare Facilities within the Study Area

Official Name	Service Type	Túsla Records[6]	
		Capacity*	Age Profile
Little Robyn'z Montessori	Sessional	11	2.5-6 years
Ratoath Childcare Centre Limited Building B	Full day/Part time/Sessional	104	0-6 years
Seagrave Montessori	Sessional	15	2-6 years
Flintstones Pre-school	Sessional	13	2-6 years
Millview Childcare	Full day/Part time/Sessional	60	0-6 years
Fox Lodge Manor Montessori & Playschool	Full day/Part time/Sessional	70	2-6 years
Forever Friends Pre-school	Sessional	22	2-6 years
Happy Days (Ratoath)	Full day/Part time/Sessional	46	2-6 years
All Childcare Facilities		**341**	

*Based on Tusla a.m figures

4.4.5 General Human Health

The Census records the self-evaluated general health status of respondents (as opposed to the health status confirmed by medical practitioners). In terms of general health and wellbeing, disparate changes were recorded throughout the spectrum as seen in Table 4.5 below.

Table 4.5: Study Area Population by General Health and Gender

	Male			Female			Total			
General Health	2011	2016	% Change	2011	2016	% Change	2011	2016	% Change	2016%
Very good	3,130	3,202	2.3%	3,167	3,225	1.8%	6,297	6,427	2.1%	71.6%
Good	920	945	2.7%	867	974	12.3%	1,787	1,919	7.4%	21.4%
Fair	133	175	31.6%	169	216	27.8%	302	391	29.5%	4.4%
Bad	24	31	29.2%	22	52	136.4%	46	83	80.4%	0.9%
Very bad	9	4	-55.6%	3	3	0%	12	7	-41.7%	0.1%
Not stated	83	82	-1.2%	87	68	-21.8%	170	150	-11.8%	1.7%
Total	4,299	4,439	3.3%	4,315	4,538	5.2%	8,614	8,977	4.2%	

[6] Source: Túsla Register of Early Years Services by County. Available at: https://www.tusla.ie/services/preschool-services/list-of-pre-school-services-by-county/

From the table above, it is noted that varied percentage changes in health status were recorded throughout the Study Area in the 2011 – 2016 intercensal period. Disparate changes included a 55.6% decrease in males with 'very bad' health, compared to a 27.8% increase in females in 'fair' health. 71.6% of the Study Area population are noted as being in 'very good' health, with a general incline in health also noted as the number of people in 'very good', 'good', and 'fair' health all increased in the intercensal period.

A social infrastructure analysis was conducted in the surrounding area identified a number of healthcare facilities which are illustrated in **Error! Reference source not found.** below. These healthcare facilities include a dentistry practice, a health centre, an optician, pharmacies (4), and speciality facilities (5). As seen in figure 4.8 below, healthcare facilities are generally centred towards the northern portion of the Study Area.

Figure 4.9: Healthcare Facilities in the Study Area

4.4.6 Economic Activity and Employment

The principal economic status, as captured by the CSO, provides a breakdown for the number of people aged 15 years and older in the labour force who are economically active and inactive, unemployed, or those looking for their first job. Persons or groups over 15 years of age not participating in the labour force are typically students, home makers, retirees, and persons unable to work due to illness or disability and they are therefore considered not to be economically active. The following table provides an overview of the labour force in the Study Area.

Table 4.6: Population Aged 15 years and Over by Principal Economic Status

	Study Area				Meath Region	State
Principal Economic Status	**2011**	**2016**	**Change**	**2016%**	**2016%**	**2016%**
At work	3,720	4,006	7.7%	64.0%	57.0%	53.4%
Looking for first regular job	38	22	- 42.1%	0.4%	0.7%	0.8%
Unemployed having lost or given up previous job	437	253	- 42.1%	4.0%	6.5%	7.1%
Student	631	917	45.3%	14.7%	11.0%	11.4%
Looking after home/family	538	513	- 4.6%	8.2%	9.1%	8.1%
Retired	344	403	17.2%	6.4%	12.0%	14.5%
Unable to work due to permanent sickness or disability	97	134	38.1%	2.1%	3.5%	4.2%

	Study Area				Meath Region	State
Principal Economic Status	**2011**	**2016**	**Change**	**2016%**	**2016%**	**2016%**
Other	7	10	- 42.9%	0.2%	0.3%	0.4%
Total	**5,812**	**6,258**	7.7%			

With a steady decline of 42.1% in unemployment, the number of persons 'at work' in the Study Area has increased by 7.7% from 2011 to 2016. The number of 'Students' also increased by 45.3%; a possible explanation for this could be the increase in people aged 5-19 in the study area during 2011-2016 period (20%).

The decrease in people 'looking after family/home' and subsequent increases in people in employment resulted in a 7.7% increase in the economically active labour force. In comparison, employment rates in the Meath Region and State are below the study area at 57.0% and 53.4% of the working age population, respectively.

4.4.7 Social Infrastructure and Amenities

Social Infrastructure (SI) is defined by the European Association of Long-Term Investors[7] as a subcategory of infrastructure that are physical assets in the social sector that provide personal (individual/household) benefits and community benefits to increase social cohesion. The figures below provide an overview of the social infrastructure available within proximity to the subject site.

As visible in **Error! Reference source not found.**4.10, 4.11, 4.12 and 4.13 below, a variety of different Social Infrastructure (SI) and Amenity facilities are within close proximity to the subject site. Table 4.7 below lists the number of SI facilities within two kilometres from the site.

[7] Fransen, L., del Bufalo, G., Reviglio, E. (2018). Boosting Investment in Social Infrastructure in Europe, Report of the High-Level Task Force on Investing in Social Infrastructure in Europe 2018. [PDF File]. Retrieved from: https://ec.europa.eu/info/sites/info/files/economy-finance/dp074_en.pdf

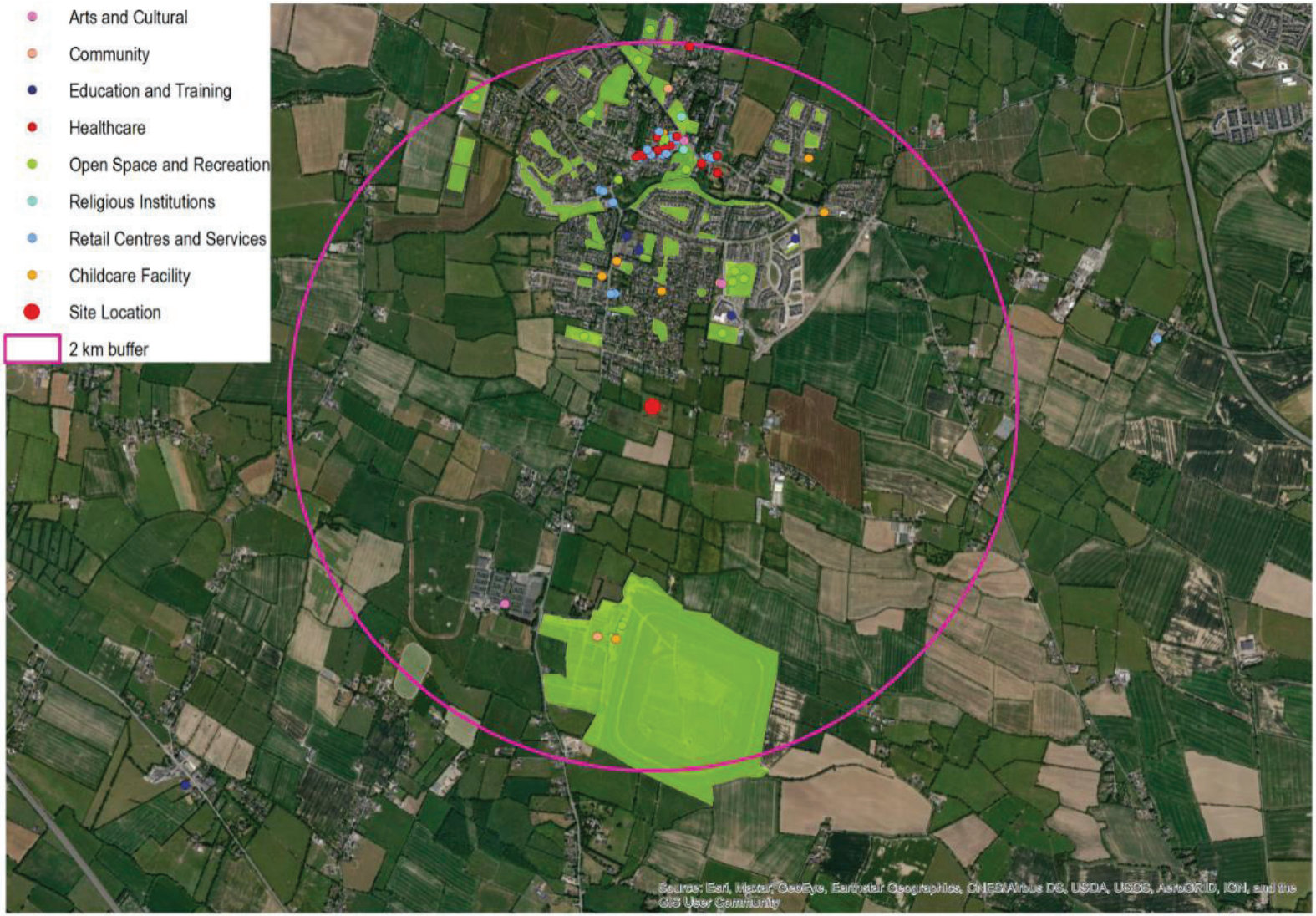


Figure 4.10: Overview of Facilities and Amenities within 2km of the Study Area

Figure 4.11: Community Services and Facilities within 2km of the Study Area

Figure 4.12: Retail Facilities within 2km of the Study Area

Figure 4.13: Sport and Recreation Facilities within 2km of the Study Area

Table 4.7: Social Infrastructure and Amenities Within 2km from Proposed Development

Creche	8
Primary School	3
Secondary School	1
Arts and Cultural	6
Community	5
Healthcare	13
Open Space and Recreation	17
Religious Institutions	2
Retail Centres and Services	18

Social infrastructure near the subject site caters for different age groups and family cycles resident to this area. In total, there are 8 creches available to provide childcare for parents with small children, with an additional childcare facility also proposed as part of this application.
Separately, there are 3 primary schools and 1 no. post primary school located within the Study Area also. A range of healthcare facilities are accessible in the Study Area, in addition to 17 no. open space and recreation facilities.

In addition, a variety of retail offerings of different size and diversity are available in the Study Area. As seen in **Error! Reference source not found.**4.12 above, there are multiple food/grocery retail offerings close to the subject site, with Centra, Tesco Express and Supervalu supermarkets all within close proximity.

In addition, Ratoath is well serviced by public transport, with numerous bus stops located within and adjacent to Ratoath town centre (most of which are within 2kilometres of the subject site). Specifically, Bus Eireann route 103 typically runs every 20-40minutes from Ratoath town centre to Dublin city centre with an average journey time of less than one hour.

The increase in population brought on by the development of this site will positively impact retail sales in the Study Area by adding to the increase in spending power for facilities in proximity to the site. Residents will also benefit from the established retail and amenity offerings within Ratoath town centre and surrounding areas.

4.4.8 Recent Development and Planning Applications

A record of planning applications within 2km of the subject site[8] from 2014 to March 2022 indicate that 9 residential planning applications were granted permission, of which 4 developments have commenced, totalling to 205 new units. The location of the fully commenced, commenced, and granted applications are indicated in **Error! Reference source not found.** below.

[8] Sourced from An Bord Pleanála

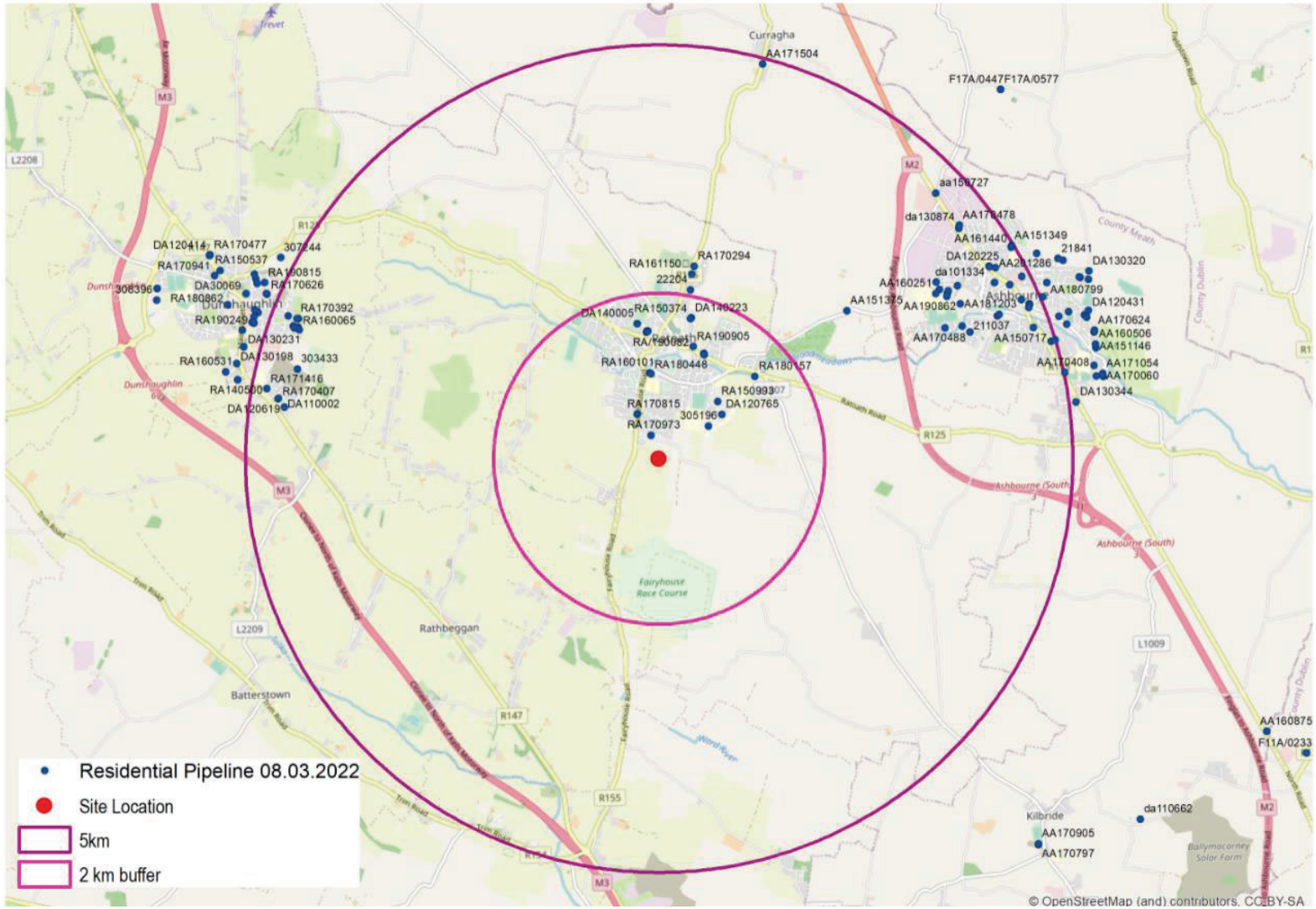


Figure 4.14: Residential Development Planning Applications in Proximity to the Proposed Development

The applications, as illustrated in Figure 4.14 above, will see up to 205 units built. This shows a growing number of residential developments over the last number of years in the north of Ratoath town centre, indicating demand for residential development in the area and also the suitability of the area for higher density developments.

Given the location of the granted residential developments to the north of the town centre, it is considered that the proposals would represent a more sequential and balanced approach to development in the area, if granted. In addition, the proposed development is well aligned with current development trends and will contribute positively to the existing and forthcoming housing supply in the area.

4.5 Identification of Likely Significant Impacts

This section provides a description of the specific, direct, and indirect impacts that the Proposed Developments may have during both their construction and operational phases. Mitigation measures required to alleviate any such effects are discussed further in Chapter 15 of this EIAR. Potential impacts are assessed under the following headings: Population and Human Health; Economic Activity and Employment; Childcare/Creche facilities; Primary and Post Primary Schools; Amenities and Open Space; Water; and Local Attractions and Tourism Activities.

For a more detailed assessment of potential impacts associated with other environmental factors, please refer to the specific chapters of the EIAR.

The analysis comprises a study of the key assessment themes as well as consideration of the construction phase, with a conclusion reached in relation to the Proposed Development on the baseline characteristics as described above. The characteristics of this impact assessment are defined below, as per the EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2017):

Table 4.8: Information to be Contained in Environmental Impact Assessment Reports (EPA 2017)

Type	Description
Probability of Effects	Likely Effects: The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented. Unlikely Effects: The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Quality of Effects	Positive Effects: A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities). Neutral Effects: No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error. Negative/adverse Effects: A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the

Type	Description
	reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).
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 Effects: An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. Moderate Effects: An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends. Significant Effects: An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment. Very Significant: An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment. Profound Effects: An effect which obliterates sensitive characteristics
Duration and Frequency of Effects	Momentary Effects: Effects lasting from seconds to minutes Brief Effects: Effects lasting less than a day Temporary Effects: Effects lasting less than a year Short-term Effects: Effects lasting one to seven years. Medium-term Effects: Effects lasting seven to fifteen years. Long-term Effects: Effects lasting fifteen to sixty years. Permanent Effects: Effects lasting over sixty years Reversible Effects: Effects that can be undone, for example through remediation or restoration Frequency of Effects: Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)

4.5.1 Impact on Population and Human Health

The construction phase of the Proposed Development may give rise to short term impacts to the locality such as, construction traffic and surface contaminants, dust, exhaust emissions, noise, and littering. All detail of the expected impact of the construction phase will be assessed in the relevant topic assessments in the applicable chapters of this EIAR, including Chapter 8 'Air & Climate' and Chapter 9 'Noise & Vibration', from which the subsequent impact on human health will be considered.

Probability	Quality	Significance	Duration
Likely	Negative	Slight	Temporary

The operational stage of the development is unlikely to cause any adverse impacts on the existing and future residents of the locality in terms of human health. The design of the development has been formulated to provide for a safe environment for the future residents and visitors alike. The paths, roadways and public realm have been designed in accordance with the best practice and applicable guidelines. All open areas have been designed to be inviting, safe and conveniently located.

Probability	Quality	Significance	Duration
Likely	Positive	Moderate	Permanent

4.5.2 Impact on Economic Activity and Employment

The construction of the Proposed Development is likely to have a positive effect on economic activity and employment. The development in the short term will provide for increased construction related employment. During the construction phase, businesses directly involved in the sector and those indirectly involved in the supply chain would generate economic benefits that would provide for a positive net impact on the economy. The construction phase will also provide for indirect positive impacts through spending in local businesses around the site, such as retail services, together with wider benefits in the construction sector, building materials supply services and professional and technical professions. These beneficial impacts on economic activity will be largely temporary but will contribute to the overall future viability of the construction sector and related services and professions over the phased construction period.

Probability	Quality	Significance	Duration
Likely	Positive	Moderate	Temporary

The operational phase of the Proposed Developments will result in the provision of a total of 452no. residential units. In total, the development will provide accommodation for approximately 1,243 persons, based on an occupancy rate of 2.75 persons per unit (CSO Average Household Size, 2016).

Considering the number of people in employment in the area based off 2016 census data (64%), it can be expected that circa 796 of the population generated will be working. This increase in occupancy in the area will enhance local spending power and will assist with the delivery of a critical mass of population which will support a wide range of additional local employment generating opportunities.

Therefore, in the long term, the proposed development is likely to provide additional spend in the local shops and restaurants, providing a positive impact. The increased number of residents in the area will also create additional demand for ancillary services such as barbers/salons, dry cleaners etc., which would strengthen the retail mix. It would also provide permanent employment in the creche facility proposed as part of the development.

Separately, the proposed development also includes the provision of 4no. retail / commercial units and a creche facility. It is considered that these elements of the development will bring a positive impact on economic activity and employment in the area, as they will provide both part-time and full-time employment and also contribute to the existing retail / commercial provision on offer in the locality.

Probability	Quality	Significance	Duration
Likely	Positive	Moderate	Permanent

4.5.3 Impact on Childcare / Creche Facilities

During the construction phase, the childcare and creche facilities within close vicinity of the subject site might be temporarily impacted by construction noise, traffic, and emissions. All detail of the expected impact of the construction phase on childcare facilities will be assessed in the relevant topic assessments in the applicable chapters of this EIAR, from which the subsequent impact on human health will be considered.

Probability	Quality	Significance	Duration
Unlikely	Neutral	Slight	Temporary

Section 4.7 of the 'Sustainable Urban Housing: Design Standards for New Apartments' (2018) guidelines state that in relation to childcare facilities:

> *"… the threshold for provision of any such facilities in apartment schemes should be established having regard to the scale and unit mix of the Proposed Development and the existing geographical distribution of childcare facilities and the emerging demographic profile of the area.* ***One-bedroom or studio type units should not generally be considered to contribute to a requirement for any childcare provision and subject to location, this may also apply in part or whole, to units with two or more bedrooms."***

Accordingly, discounting the studio and one-bedroom units in accordance with the Apartment Guidelines, childcare space is required for 437[9] dwellings. Applying the Childcare Facilities Guideline standard of 20 places per 75 no. dwellings, the total requirement arising from the scheme is 117 places.

However, not all children in the 0-4 age cohort will require private childcare. The 2016 Quarterly National Household Survey (QHNS) (prepared by the CSO) indicates that in the Mid-East region, an average of

[9] **452 – 15** (total no. units - 1-bed units)

25% of pre-school age children attend private childcare. The figures for the State and the South-East (Meath) Region are set out in Table below.

Table 4.9: Type of Childcare utilised for pre-school children, Quarterly Household Survey Q3 of 2016.

Type of Childcare	Mid-East Region	State
Parent/Partner	65%	62%
Unpaid relative or friend	16%	17%
Paid relative or friend	5%	3%
Childminder/Au-Pair/Nanny	13%	13%
Childcare Facility	14%	19%
Other	<1%	1%

Applying the figure above of people who utilise the services of a childcare facility in the Mid-East region (14%), it is anticipated that the proposed development would create an actual demand of 70 children (according to the Childcare Guidelines calculation set out above of 437 units).

It is however acknowledged that the 14% QNHS estimate for the Meath Region is an average and one would expect the percentage to be greater in areas where there are higher instances of both parents working, and therefore requiring private childcare. Therefore, in order to stress test this estimate, it is assumed that 40% of children aged 0-4 years in the development may require private childcare. On this basis, circa 175 pre-school childcare places would be required. In any event, regardless of what variables are used, it is expected that the demand for private childcare arising out of the development can be met by the various childcare facilities that are present in the Study Area.

In addition, the proposed childcare facility included as part of this development (1,003 sq.m) will have ample capacity to accommodate any childcare needs arising from the development, as well as being able to accommodate additional need in the area also.

Probability	Quality	Significance	Duration
Likely	Positive	Slight	Permanent

4.5.4 Impact on Primary and Post Primary Schools

During the construction phase, the impact on primary and post primary school facilities is expected to be minimal. Although there are 3 primary schools and 1 secondary school located within 2km of the subject site, all schools are located closer to Ratoath town centre; north of the subject site.

All detail of the expected impact of the construction phase on education facilities will be assessed in the relevant topic assessments in the applicable chapters of this EIAR, from which the subsequent impact on human health will be considered.

Probability	Quality	Significance	Duration
Unlikely	Neutral	Not significant	Temporary

The 2016 Census data for the study area gives the share of population in the Primary School and Post Primary School years as per Table 4.10 below. This percentage share was used to estimate the number of primary and post-primary school children the Proposed Development would generate.

Table 4.10: Projected Population for the Development at Full Occupancy (not including studio and 1-bed unit population equivalent)

	Study Area Population in 2016	**Estimated school going population for the Proposed Development**
	% Share	
Primary School (5-12)	17.6%	77
Post Primary School (13-18)	11.3%	49

Based on an average household size of 2.75, the estimated population of the development will be 1,243 people. In order to estimate the primary and post primary school child yield generated from the development, the population generated by studio and 1-bedroom apartment units have been discounted given their improbability of generating a child yield and in accordance with the Apartment Guidelines previously noted. Therefore, 437 no. units at an average of 2.75 persons per household will yield an estimated population of 1,202 persons.

Based on the 2016 Census figures for the area, the population estimate for the 5-12 age cohort (primary school) (17.6%) is estimated to be 77 children. the population estimate for the 13-18 age cohort (Post primary school) (11.3%) is estimated to be 49. However, the Proposed Development will not generate this level of demand instantly given that the development will be constructed in a phased manner. It is expected that the primary and post primary school facilities in proximity of the Proposed Development will sufficiently absorb the school going population generated by the development.

Probability	**Quality**	**Significance**	**Duration**
Likely	Neutral	Moderate	Permanent

4.5.5 Impact on Amenities and Open Space

Construction of the Proposed Development will take place on a greenfield site located to the south of Ratoath town centre. As such, the Proposed Development will not negatively impact amenities of open space on the development site, as the site is not currently in use. The Proposed Developments will, however, add new areas to the existing network of pedestrianised public open space and landscaped areas.

Chapter 14 'Landscape' assesses the impact on landscape character, which is expected to be temporary during the construction phases of development. These impacts will be short term until such a time as construction is finished and the proposed high-quality landscaping matures. In any event the impacts are not considered to be significant on population and human health.

Probability	**Quality**	**Significance**	**Duration**

Unlikely	Neutral	Imperceptible	Temporary

The amenity and open space impacts likely to arise from the Proposed Developments will be positive over the long term as it will add to the character and aesthetics of the existing site. Moreover, the layout of the Proposed Development and generous quantum of public open space serve to mitigate any impacts through sensitive urban and landscape design. The design of the Proposed Development's residential and public space offerings serves to improve and add to the visual character and identity of the surrounding areas and, as such, the impact is considered to be positive for the site. The planned landscaping will mature over the long term and create public spaces that are conducive to enjoyable public interaction. Please refer to Chapter 14 'Landscape' of this EIAR for a more detailed assessment.

Probability	Quality	Significance	Duration
Likely	Positive	Significant	Long-term

4.5.6 Impact on Water

The impact on water during the construction and operational phases of both Proposed Developments, with applicable mitigation measures, are assessed and outlined in Chapter 7 'Water' of the EIAR. These mitigation measures will serve to minimise potential adverse impacts of the construction phase to the water environment, thereby avoiding any associated risk to human health from water contamination.

4.5.7 Impact on Local Attractions and Tourism Activities

It is not expected that the construction of the proposed development would have a negative impact on the local/tourist attractions in the area. The closest attractions near the subject site is Tayto Park and The Cu Chulainn Coaster, both of which are located c. 10 minutes' drive from the site. As a precautionary measure, the implementation of mitigating measures detailed in Chapter 15 of this EIAR will limit potential disturbances to these local attractions and tourism activities.

Probability	Quality	Significance	Duration
Unlikely	Neutral	Imperceptible	Temporary

The local/tourist attraction impacts likely to arise from the Proposed Development will be positive and permanent over the long term. The attractions will enjoy increased exposure through the higher volume of resident and visitor numbers to the area. The increased spending power will likely spill over into the local tourism and related supplementary services (transport, food and beverage services, tour operators, etc.), with the potential to create a range of additional employment opportunities.

Probability	Quality	Significance	Duration
Unlikely	Neutral	Imperceptible	Permanent

4.6 Do Nothing Scenario

This section considers the potential impacts should the Proposed Development not take place. In a 'Do Nothing' scenario, the subject site would remain as is and would potentially be left vacant thereafter. The environmental receptors discussed throughout this EIAR would in all likelihood remain unchanged while the potential for any likely significant adverse environmental impacts arising from the proposed development would not arise.

Consequently, in a 'Do Nothing' scenario, the potential for any significant positive impacts from the construction and operation of the Proposed Development would also not arise.

Moreover, a 'Do Nothing' scenario would involve the subject site remaining in its current underdeveloped, underutilised state. Subsequently, the site would not fulfil its local, regional and national planning policy objectives.

4.7 Mitigation Measures

A range of construction related remedial and mitigation measures are proposed throughout this EIAR document with reference to the various environmental topics examined and the inter-relationships between each topic. Through the provision of these remedial and mitigation measures, any negative impacts on population and human health during the construction phase shall be appropriately mitigated.

Both Developments have been designed to avoid negative impacts on population and human health through the design and provision of physical and social infrastructure as described in Chapter 3 'Description of Projects & Alternatives' of this EIAR. Mitigation measures are proposed throughout the various chapters of this EIAR to avoid any adverse impacts from the proposed scheme and accordingly no further mitigation measures are considered necessary. Readers are directed to Chapter 15 of this EIAR for a summary of mitigation measures proposed from this EIAR.

4.8 Residual Impacts

Any adverse likely and significant environmental impacts will be avoided by the implementation of the remedial and mitigation measures proposed throughout this EIAR. Positive impacts are likely to arise due to an increase in employment and economic activity associated with the construction of the proposed development. The overall predicted likely and significant impact of the construction phase will be short-term, temporary and neutral.

Furthermore, the proposed development will contribute to further growth and expansion of the neighbourhood contributing to the existing and future populations. The predicted impacts of the Operational Phase are therefore considered to be long term and positive to population and human health.

4.9 Potential Cumulative Impacts

Overall, the cumulative impacts of the development on the population and human health are envisaged to be positive. The new population will contribute to the economic viability of the area, increasing local spending power, and the development of a new creche facility and open spaces will add to the viability and vibrancy of the area. Local businesses, transport, schools, etc. will benefit from the increase in resident population, and this will deliver a further economic injection into the area.

The mix of residential tenure will provide a more sequential, balanced approach to Ratoath. Furthermore, the development will provide much needed residential dwellings in a location that provides easy access to multiple retail, social infrastructure and amenity offerings to residents and visitors alike.

In addition, the scheme includes the provision of 4no. retail/commercial units which will provide both part-time and full-time employment to the area, as well as adding to the vitality of retailing offering in the area. In addition, the scheme also includes the development of a Creche facility. It is envisaged that this facility would provide employment to the area, as well as also offering additional childcare spaces to the wider area.

Finally, the proposals will also include the construction of the second phase of the Ratoath Outer Relief Road (RORR) which will run along the southern boundary of the subject site. The construction of this road will bring forward a critical piece of infrastructure for the area and will therefore be extremely beneficial for everyone in the area.

4.10 Interactions Arising

There are numerous inter-related environmental topics described in detail throughout this EIAR which are of relevance to population and human health. The main high-level interactions between Population, Land, and Human Health and other environmental factors include Water (Chapter 7), Air and Climate (Chapter 8), Noise and Vibration (Chapter 9), Traffic (Chapter 11) and Landscape (Chapter 14). Please refer to the specific chapters of this EIAR where detailed assessments relating to these environmental topics are provided.

4.11 Monitoring

In relation to the impact of the development on population and human health, it is considered that the monitoring measures outlined in the chapters of this EIAR which address other environmental matters such as water, air quality and climatic factors, landscape and visual impact and noise sufficiently address monitoring requirements.

4.12 References

List of sources drawn upon in preparing this chapter:

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency, May 2022);
- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency, Draft August 2017);
- Advice Notes for Preparing Environmental Impact Statements, Draft September 2017;
- Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002);
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2002);
- Central Statistics Office Census Data - www.cso.ie
- Tusla Data - https://www.tusla.ie
- Department of Education and Skills - https://www.education.ie/en/
- An Bord Pleanála - http://www.pleanala.ie/

5. Biodiversity

5.1 Introduction

The Biodiversity assessment has been undertaken by Altemar Limited. It assesses the biodiversity value of the proposed development area and the potential impacts of the development on the ecology of the surrounding area and within the potential zone of influence (ZOI). The programme of work in relation to biodiversity assessment was designed to identify and describe the existing ecology of the area and detail designated sites, habitats or species of conservation interest that could potentially be impacted by the proposed development. It also assesses the significance of the likely impacts of the scheme on the biodiversity elements, and designs mitigation measures to alleviate identified impacts.

A separate AA Screening, in accordance with the requirements of Article 6(3) of the EU Habitats Directive, has been produced to identify potential impacts of the development on European (Natura 2000) sites, Annex species or Annex habitats. It concludes that '*On the basis of the content of this report, the competent authority is enabled to conduct a Stage 1 No European sites are within the zone of influence of these works. There is no direct hydrological pathway for pollutants to European sites. Having taken into consideration the surface water discharge from the proposed development, the distance between the proposed development site to designated conservation sites, lack of direct hydrological pathway to conservation sites and the settlement, dilution effect of surface runoff and the treatment of foul effluent within an existing licenced WwTP, it is concluded that the proposed development would not give rise to any significant effects on European sites.*'

5.2 Background to Altemar

Altemar Ltd. is an established environmental consultancy that is based in Greystones, Co. Wicklow that has been in operation in Ireland since 2001. Bryan Deegan MCIEEM is the Managing Director of Altemar Ltd. and holds a M.Sc. Environmental Science, BSc (Hons.) in Applied Marine Biology and a National Diploma in Applied Aquatic Science. He has over 27 years' experience as an environmental consultant in Ireland and was the ecologist for all aspects of this project. Previous projects where Altemar were the lead project ecologists include the Lidl Ireland GmbH regional distribution centres in Newbridge and Mullingar, 18 airside projects for daa at Dublin Airport and 7 fibre optic cable landfalls in Ireland including the New York to Killala cable project in 2015. Bryan Deegan is the sole "External Expert" that provides support to Inland Fisheries Ireland in relation to environmental assessment.

5.3 Methodology

included examining records and data from the National Parks and Wildlife Service (NPWS), National Biological Data Centre (NBDC) and the Environmental Protection Agency (EPA), in addition to aerial, 6 inch maps and satellite imagery. A habitat survey of the site was undertaken within the appropriate seasonal timeframe for terrestrial fieldwork. Field surveys were carried out as outlined in Table 5.1. All surveys were carried out in the appropriate seasons. The presence of mammals is indicated principally by their signs, such as resting areas, feeding signs or droppings - though direct observations are also occasionally made. Habitat mapping was carried out according to Fossitt (2000) using AcrGIS 10.5 and displayed on Bing satellite imagery or street mapping. Any rare or protected species or habitats were noted. As part of the fieldwork an invasive species assessment was carried out. Birds noted on site were classed based on the Birds of Conservation Concern In Ireland classification, of red, amber and green, which is based on an assessment of the conservation status of all regularly occurring birds on the island of Ireland.

Table 5.1

Area	Surveyors	Survey Dates
Terrestrial Ecology/ Avian/ Aquatic Ecology	Bryan Deegan	23rd August 2019, 23rd April 2021, 24th May 2020 and 30th August 2021.
Bat Survey	Bryan Deegan	24th May 2020 and 30th August 2021
Mammal/ Amphibian Survey	Bryan Deegan (Chris Smal)	19th February 2020, 17th February 2022, (13th, 14th and 20th April 2021)

- **Proximity to Designated Conservation Sites and Habitats/Species of Conservation Interest**

The designated conservation sites within 15km of the site were examined for potential impact. This assessment included sites of international importance; Natura 2000 sites (European sites) (Special Areas of Conservation (SAC), Special Protection Areas (SPA)) in addition to Ramsar sites and sites of National importance ((Natural Heritage Areas (NHA), proposed Natural Heritage Areas (pNHA). Up to date GIS data (2022 NPWS data shapefiles) were acquired and plotted against the proposed development site. A data search of rare and threatened species within 10km of the proposed site (GIS shapefile) was provided by NPWS. Additional information on rare and threatened species was researched through the National Biodiversity Data Centre maps. Terrestrial and Avian Ecology

- **Bat Fauna**

Onsite trees were inspected for bats and/or their signs using a powerful torch (141 Lumens) – Petzl MYO RXP. The site survey was supplemented by a review of Bat Conservation Ireland's (BCIreland) National Bat Records Database. Bat detector and emergent surveys were carried out on the 24th May 2020 and 30th August 2021

- ***Zone of Influence***

The potential ZOI of the project was deemed to be the area of the site with potential for localised downstream impacts via the surface water discharge network from the development. The Ratoath Stream and the Fairyhouse Stream are approximately 303 m and 415 m respectively from the proposed development site. Surface water from the south-west portion of the site will drain naturally to the drainage ditch, which travels under the Fairyhouse Road where it then travels in a westerly direction towards the Bradystown Stream, which ultimately connects to the Ratoath Stream and the Broadmeadow Stream. The Broadmeadow Stream outfalls to Malahide Estuary. The remainder of the site will discharge attenuated flows to the existing surface water network on the Ratoath Outer Relief Road to the north-east.

- **Rating of Effects**

The rating of effects was carried as per EPA EIAR guidelines (2022):

Table 5.2 Impact Description Terminology

Magnitude of impact (change)		Typical description
High	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.
Medium	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Low	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial	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
Negligible	Adverse	Very minor loss or alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.

Criteria for Establishing Receptor Sensitivity/Importance

Importance	Ecological Valuation
International	Sites, habitats or species protected under international legislation e.g. Habitats and Species Directive. These include, amongst others: SACs, SPAs, Ramsar sites, Biosphere Reserves, including sites proposed for designation, plus undesignated sites that support populations of internationally important species.
National	Sites, habitats or species protected under national legislation e.g. Wildlife Act 1976 and amendments. Sites include designated and proposed NHAs, Statutory Nature Reserves, National Parks, plus areas supporting resident or regularly occurring populations of species of national importance (e.g. 1% national population) protected under the Wildlife Acts, and rare (Red Data List) species.

Importance	Ecological Valuation
Regional	Sites, habitats or species which may have regional importance, but which are not protected under legislation (although Local Plans may specifically identify them) e.g. viable areas or populations of Regional Biodiversity Action Plan habitats or species.
Local/County	Areas supporting resident or regularly occurring populations of protected and red data listed-species of county importance (e.g. 1% of county population), Areas containing Annex I habitats not of international/national importance, County important populations of species or habitats identified in county plans, Areas of special amenity or subject to tree protection constraints.
Local	Areas supporting resident or regularly occurring populations of protected and red data listed-species of local importance (e.g. 1% of local population), Undesignated sites or features which enhance or enrich the local area, sites containing viable area or populations of local Biodiversity Plan habitats or species, local Red Data List species etc.
Site	Very low importance and rarity. Ecological feature of no significant value beyond the site boundary.

Quality of Potential Impacts on Biodiversity

	Impact Description
Negative /Adverse Impact	A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).
Neutral Impact	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Positive Impact	A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).

Significance of Impacts

Significance of Impact	Description of Potential Impact
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable2 changes in the character of the environment but without significant consequences.
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.

Significance of Impact	Description of Potential Impact
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the 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 impact which obliterates sensitive characteristics.

Duration of Impact

Duration of Impact	Description
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting less than a year
Short-term	Effects lasting one to seven years.
Medium-term	Effects lasting seven to fifteen years.
Long-term	Effects lasting fifteen to sixty years.
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration
Likely Effects	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely Effects	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Extent of Effects	Description

Duration of Impact	Description
Extent	Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.

- **Difficulties Encountered**

No difficulties were encountered in relation to the preparation of the biodiversity report. All surveys were carried out as per standard practice CIEEM guidance and no difficulties were encountered. The bat surveys were undertaken within the active bat period (April to September) and detector surveys were possible.

5.4 Baseline Environment

agricultural grassland. There are some mature hedgerow boundaries defining each field. A row of single detached dwelling bound the site along Glascarn Lane to the north and north western boundary. The R155 is located to the west and there are 3 single storey dwellings located along this route and will be bound on 3 sides by the proposed development. The eastern boundary is adjoining to neighbouring agricultural lands. The new and proposed phase 2 of the RORR will connect to the existing completed RORR and will connect the R125 to the R155, running south along the proposed development.

5.4.1 Designated Sites

The site is not within a designated site. The nearest European site to the proposed development is 12.8 km away (Rye Water Valley Carton SAC). There is no direct or indirect hydrological pathway or biodiversity corridor from the proposed development site to this SAC. There is an indirect pathway via the surface water network to Malahide Estuary (Malahide Estuary SAC and Malahide Estuary SPA) as there is Surface water from the south-west portion of the site will drain naturally to the drainage ditch, which travels under the Fairyhouse Road where it then travels in a westerly direction towards the Bradystown Stream, which ultimately connects to the Ratoath Stream and the Broadmeadow Stream. The Broadmeadow Stream outfalls to Malahide Estuary. The remainder of the site will discharge attenuated flows to the existing surface water network on the Ratoath Outer Relief Road to the north-east.

5.4.2 Species Data

Table 5.3 European sites within 15 km of the proposed development

European Site	Distance	Direct Hydrological/ Biodiversity Connection
Special Areas of Conservation		
Rye Water Valley Carton SAC	12.8 km	**No**
Malahide Estuary SAC	16.6 km	**No (Yes, indirect)**
Special Protected Areas		
Malahide Estuary SPA	16.9 km	**No (Yes, indirect)**

Table 5.4 Nationally designated sites within 15 km of the proposed development

Designation	Site Name	Distance	Direct Hydrological/ Biodiversity Connection
pNHA	Royal Canal	12.1 km	**No**
pNHA	Rye Water Valley/ Carton	12.8 km	**No**
pNHA	Liffey Valley	13.4 km	**No**

Designation	Site Name	Distance	Direct Hydrological/ Biodiversity Connection
pNHA	Balraith Woods	14.8 km	**No**

Table 5.5 National Biodiversity Data Centre Records within the 10km^2 grid.

The following Protected Species were noted under the National Biodiversity Data Centre records as having been sighted within the 10km^2 grid (grid reference O05):

Common Frog (*Rana temporaria*), Smooth Newt (*Lissotriton vulgaris*), Barn Owl (*Tyto alba*), Barn Swallow (*Hirundo rustica*), Black-headed Gull (*Larus ridibundus*), Common Coot (*Fulica atra*), Common Grasshopper Warbler (*Locustella naevia*), Common Greenshank (*Tringa nebularia*), Common Kestrel (*Falco tinnunculus*), Common Kingfisher (*Alcedo atthis*), Common Linnet (*Carduelis cannabina*), Common Pheasant (*Phasianus colchicus*), Common Redshank (*Tringa totanus*), Common Snipe (*Gallinago ga*llinago), Common Starling (*Sturnus vulgaris*), Common Swift (*Apus apus*), Common Wood Pigeon (*Columba palumbus*), Corn Crake (*Crex crex*), Eurasian Curlew (*Numenius arquata*), Eurasian Teal (*Anas crecca*), Eurasian Tree Sparrow (*Passer montanus*), Eurasian Woodcock (*Scolopax rusticola*), European Golden Plover (*Pluvialis apricaria*), European Nightjar (*Caprimulgus europaeus*), Grey Partridge (*Perdix perdix*), Herring Gull (*Larus argentatus*), House Martin (*Delichon urbicum*), House Sparrow (*Passer domesticus*), Jack Snipe (Lymnocryptes *minimus*), Lesser Black-backed Gull (*Larus fuscus*), Little Egret (*Egretta garzetta*), Mallard (*Anas platyrhynchos*), Mew Gull (*Larus canus*), Northern Lapwing (*Vanellus vanellus*), Northern Wheatear (*Oenanthe oenanthe*), Rock Pigeon (*Columba livia*), Sand Martin (*Riparia riparia*), Sky Lark (*Alauda arvensis*), Spotted Flycatcher (*Muscicapa striata*), Stock Pigeon (*Columba oenas*), Yellowhammer (*Emberiza citrinella*), Smooth Hornwort (*Phaeoceros l*aevis), Gipsy Cuckoo Bee (*Bombus (Psithyrus) bohemicus*), Large Red Tailed Bumble Bee (*Bombus (Melanobombus) lapidarius*), Moss Carder-bee (*Bombus (Thoracombus) muscorum*), Ephemerella notata, Bifid Crestwort (*Lophocolea bidentata*), Common Crystalwort (*Riccia sorocarpa*), Common Frillwort (*Fossombronia pusilla*), Dilated Scalewort (*Frullania dilatata*), Even Scalewort *(Radula complanata*), Glaucous Crystalwort (*Riccia glauca*), Anomalous Bristle-moss (*Orthotrichum anomalum*), Bird's-claw Beard-moss (*Barbula unguiculata*), Bryum dichotomum, Common Cord-moss (*Funaria hygrometrica*), Common Feather-moss (*Eurhynchium praelongum*), Common Pottia (*Tortula truncata*), Crimson-tuber Thread-moss (*Bryum rubens*), Cylindric Ditrichum (*Ditrichum cylindricum*), Ephemerum serratum var. minutissimum, Field Forklet-moss (*Dicranella staphylina*), Flat Neckera (*Neckera complanata*), Intermediate Screw-moss (*Syntrichia intermedia*), Lesser Bird's-claw Beard-moss (*Barbula convoluta*), Marble Screw-moss (*Syntrichia papillosa*), Neat Feather-moss (*Scleropodium purum*), Pill Bryum (*Bryum violaceum*), Pink-fruited Thread-moss (*Pohlia melanodon*), Revolute Beard-moss (*Pseudocrossidium revolutum*), Rough-stalked Feather-moss (*Brachythecium rutabulum*), Schreber's Forklet-moss (*Dicranella schreberiana*), Silky Wall Feather-moss (*Homalothecium sericeum*), Silver-moss (*Bryum argenteum*), Small Hairy Screw-moss (*Syntrichia laevipila*), Streaky Feather-moss (*Brachythecium glareosum*), Swartz's Feather-moss (*Oxyrrhynchium hi*ans), Wall Screw-moss (*Tortula muralis*), Brown Long-eared Bat (*Plecotus auritus*), Brown Rat (*Rattus norvegicus*), Daubenton's Bat (*Myotis daubentonii*), Eurasian Badger (*Meles meles*), European Otter (*Lutra lutra*), Lesser Noctule (*Nyctalus leisleri*), Nathusius's Pipistrelle (*Pipistrellus n*athusii), Pine Marten (*Martes martes*), Pipistrelle (*Pipistrellus p*ipistrellus sensu lato), Soprano Pipistrelle (*Pipistrellus pygmaeus*), West European Hedgehog (*Erinaceus europaeus*) Yellowhammer (*Emberiza citrinella*),

Invasive Species
Indian Balsam (*Impatiens glandulifera*), Japanese Rose (*Rosa rugosa*), Sycamore (*Acer pseudoplatanus*), Traveller's-joy (*Clematis vitalba*), Wall Cotoneaster (*Cotoneaster horizontalis*), Harlequin Ladybird (*Harmonia axyridis*), Jenkins' Spire Snail (*Potamopyrgus antipodarum*), Eastern Grey Squirrel (*Sciurus carolinensis*), European Rabbit (*Oryctolagus cuniculus*)

An assessment of files received from the NPWS (Code No. 2020_185), which contain records of rare and protected species and grid references for sightings of these species, was carried out. There are no recorded sightings within the Site itself, however Common Frog (*Rana temporaria*) was the nearest

noted species, approximately 5 km to the south west of the site boundary. No other species of conservation importance were noted at high resolution within 1 km^2 based on NPWS records.

Table 5.6 Species found by NPWS within 10km.

Common Frog (*Rana temporaria*), Badger (*Meles meles*), Irish Hare (*Lepus timidus subsp. Hibernicus*), Stoat (*Mustela erminea)*

Figure 5.1: Site outline and location

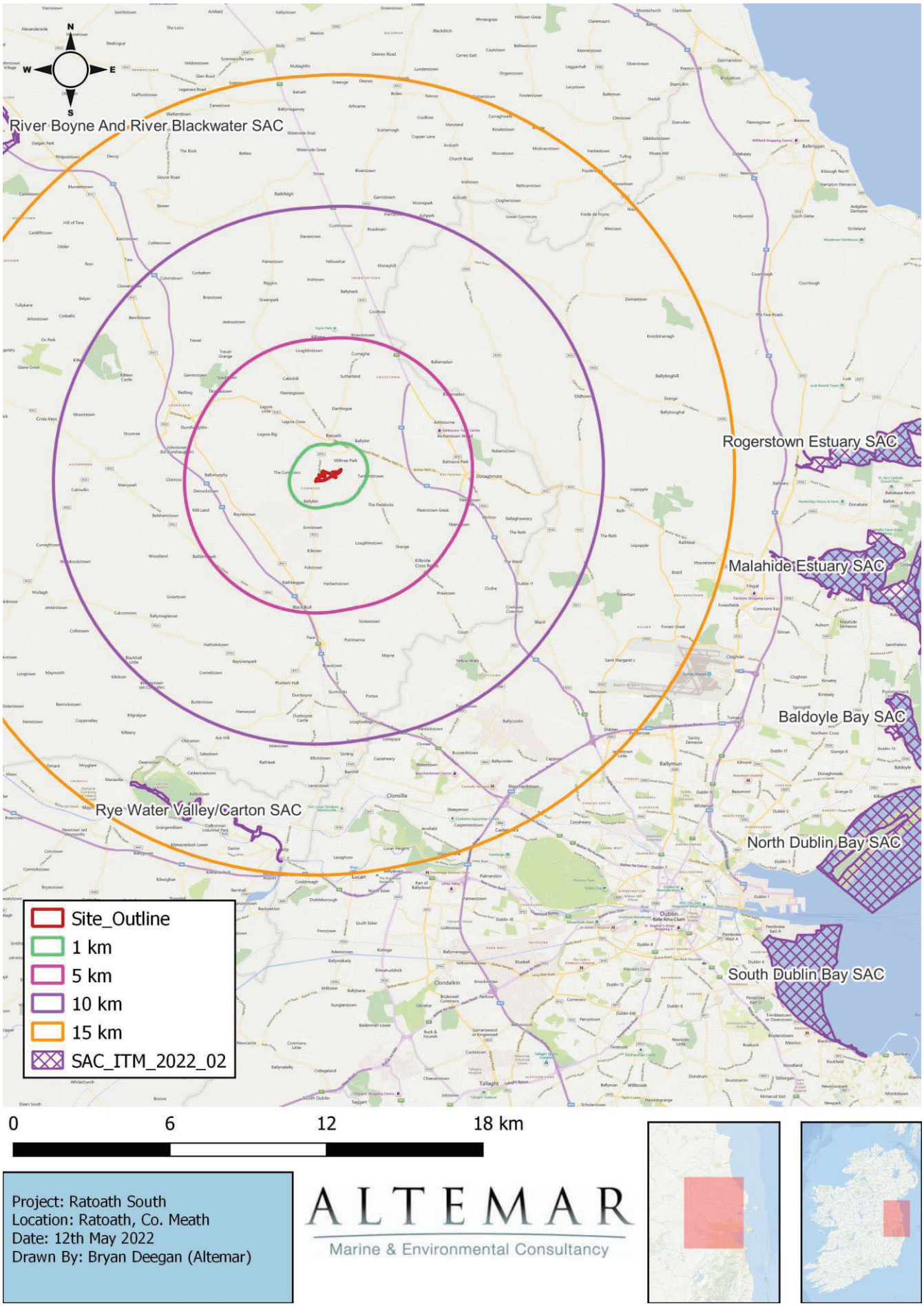


Figure 5.2: SACs within 15 km of the proposed development

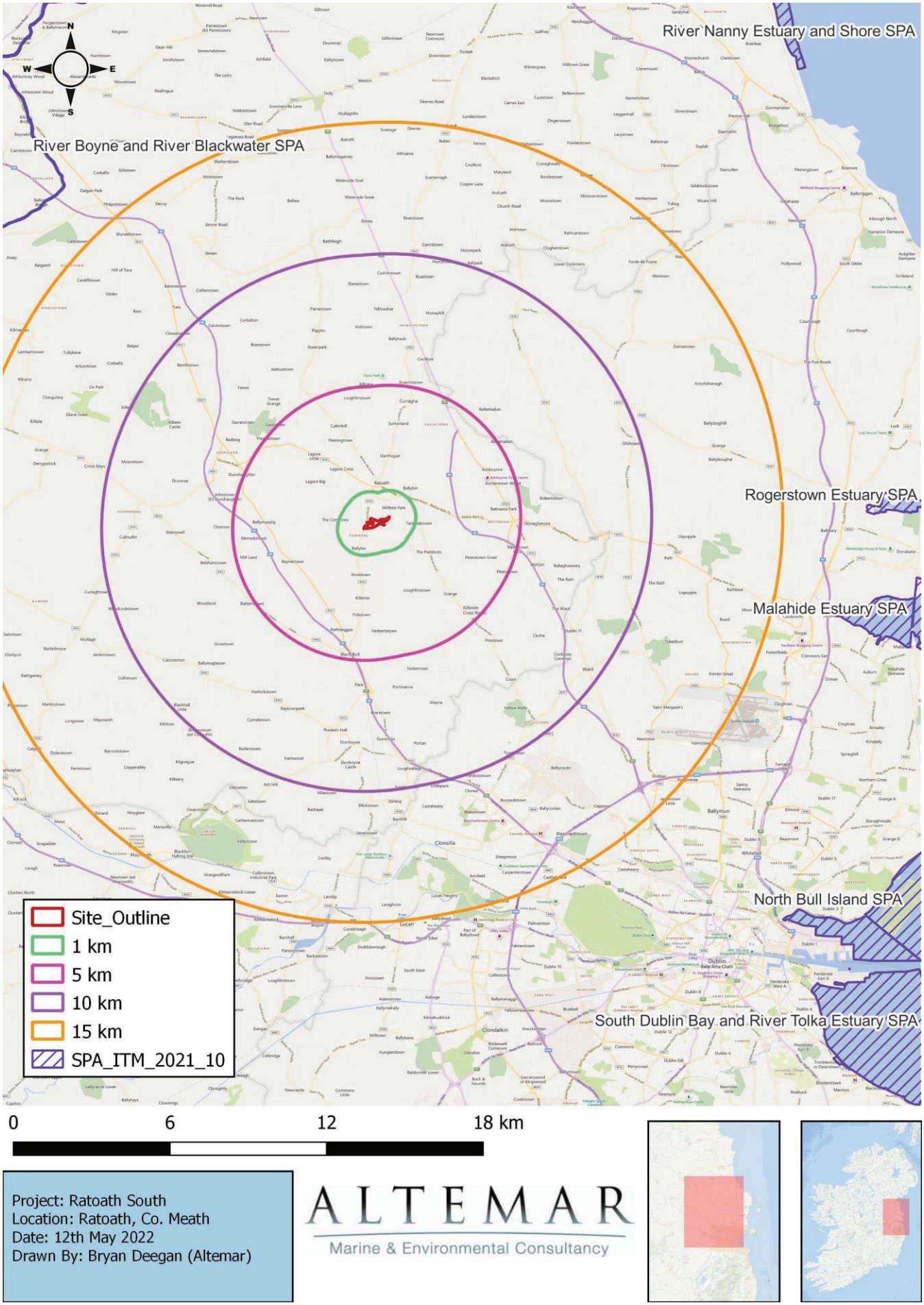


Figure 5.3: SPAs within 15 km of the proposed development

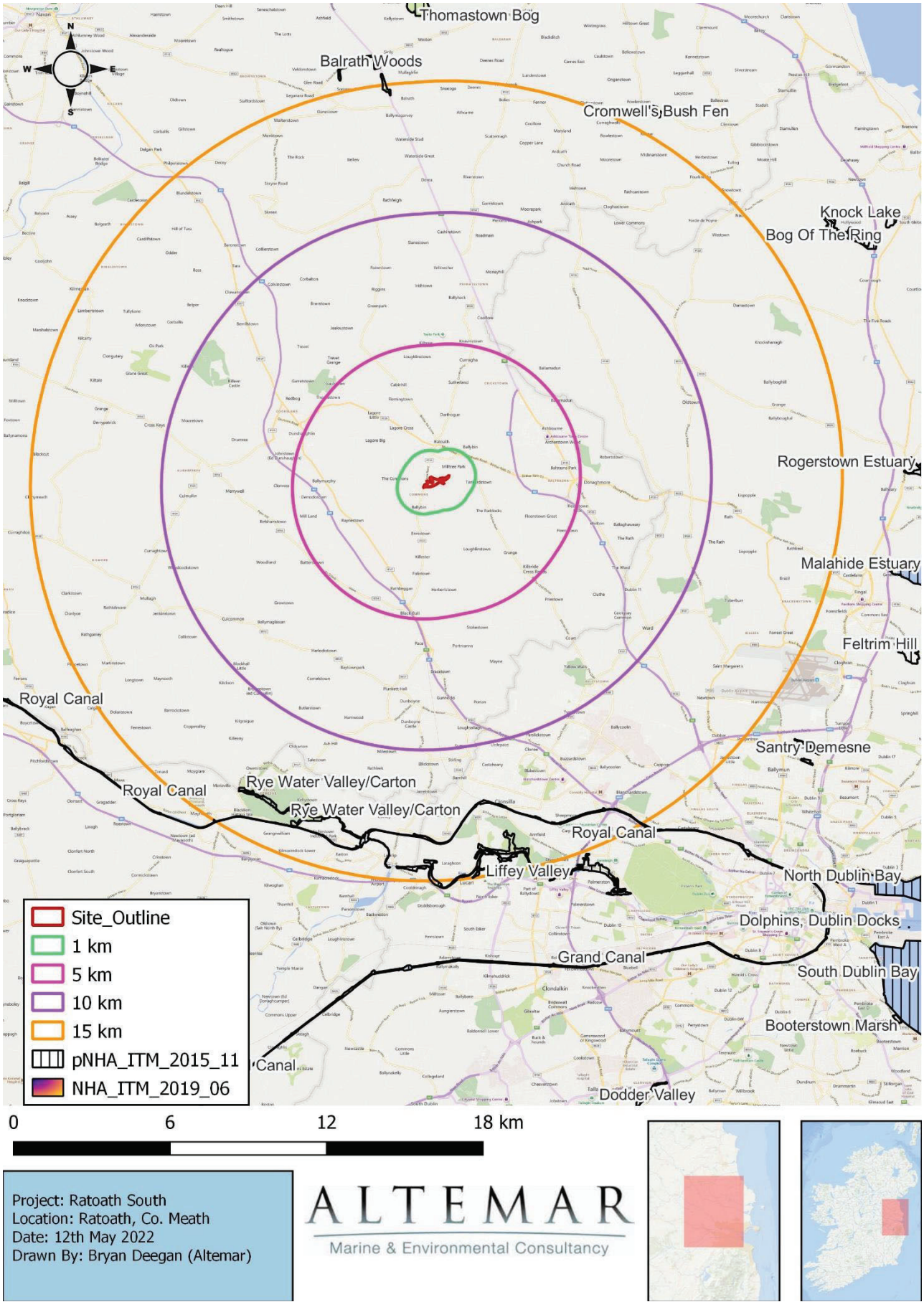


Figure 5.4: pNHA and NHA within 15 km of the proposed development **Figure 5.5:** Waterbodies proximate to the proposed development

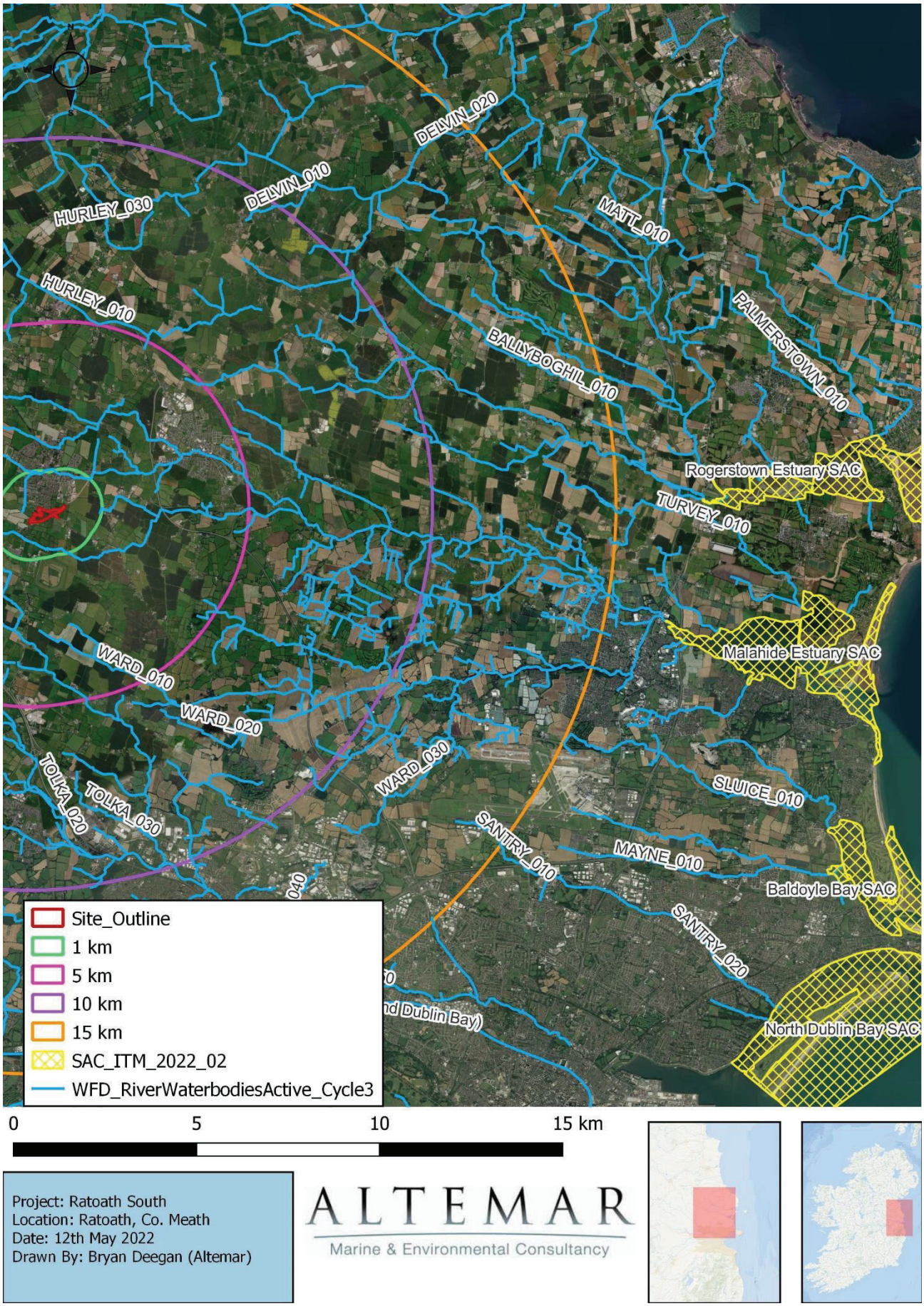


Figure 5.6: Waterbodies and SACs proximate to the proposed development Evaluation of

5.5 Characteristics of the Proposed Development

5.5.1 Description of the site

The development will consist of the construction of 452 no. residential units which are located in 12 neighbourhoods. Building heights range across the site from 2- and 3-storey terraced houses, through to 4-storey maisonette buildings, and 6-storey apartment blocks. Private open space associated with the residential units is provided in the form of rear gardens, balconies, terraces and winter gardens. The development includes a crèche with associated outdoor play areas at ground floor and at roof level; 4 no. commercial/retail units; a landscaped public open space which includes a civic plaza; communal open space in the form of communal courtyards for each neighbourhood; associated car and cycle parking serving the full development and uses therein; green roofs at various locations; solar PV panels; a second phase of the Ratoath Outer Relief Road (RORR), that will run along the southern boundary of the application site, with 2 no. multi-modal entrances; a series of pedestrian and cycle connections from the Fairyhouse Road (R155), Cairn Court, Glascarn Lane and the new RORR; internal road and shared surface networks including pedestrian and cycle paths; public lighting and all associated site development and infrastructural works, services provision, ESB substations, foul and surface water drainage, extension to the foul network, access roads/footpaths, lighting, landscaping and boundary treatment works and all ancillary works necessary to facilitate the development.

5.5.2 Characteristics of the site

Lands located immediately to the south of the existing built area of Ratoath in County Meath. The site has a stated area of 13ha and is irregular in shape. The site is currently in use as agricultural grassland some of which has been abandoned for several years. There are some mature hedgerow boundaries defining each field.

5.5.3 Site Survey

Numerous site assessments were carried out as outlines in Table 5.1. The Fossitt habitat map is based on the most recent habitat assessment carried out on 30th August 2021.

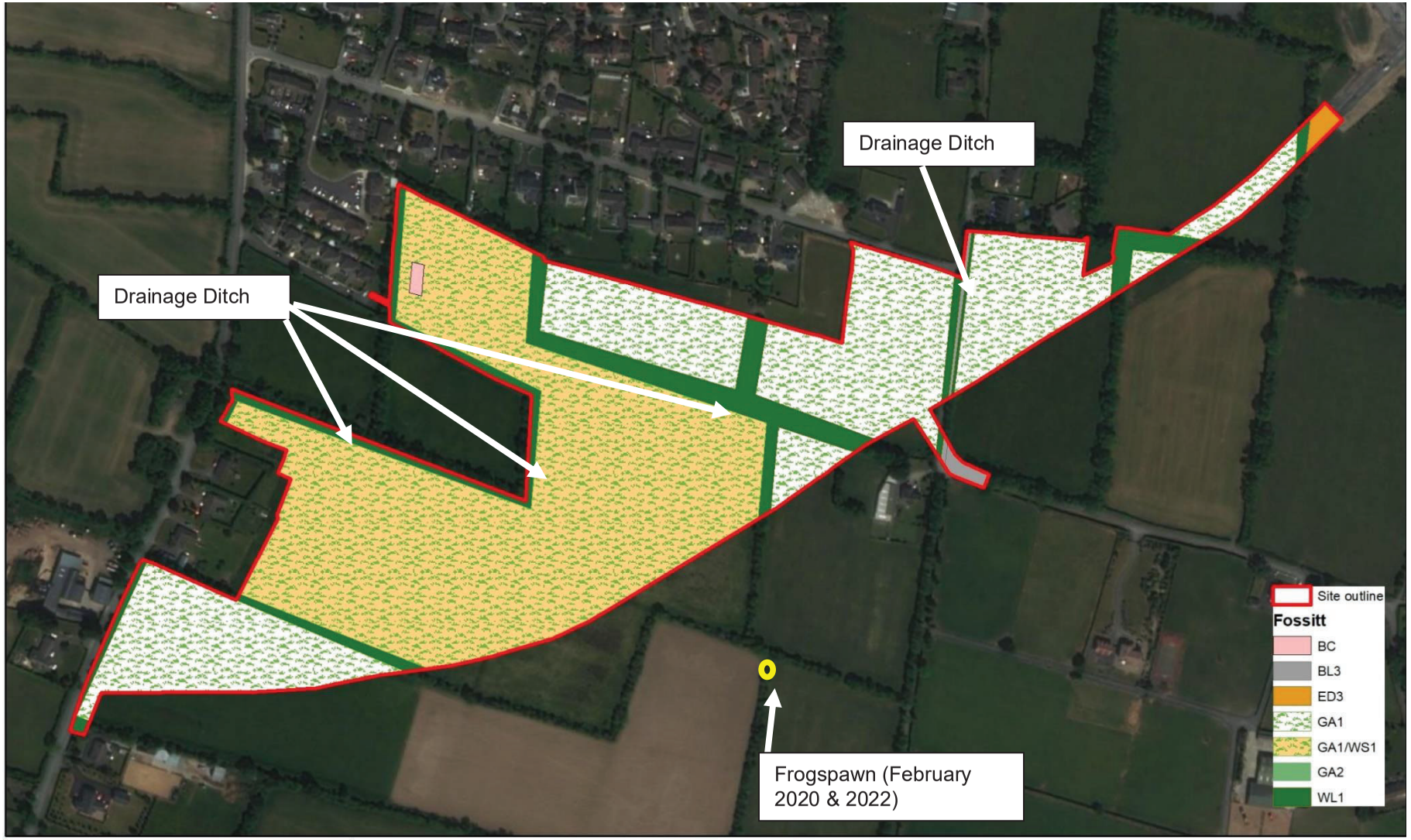


Figure 5.9: Fossitt Habitat Map

Plate 1. GA1-Agricultural Grassland.

GA1-Agricultural Grassland.

Improved agricultural grassland is located in the southeastern and northeastern areas of the site. The grassland in these fields appears to be well managed and was recently cut (August 2021) (Plate 1). Biodiversity in these areas was poor and the fields were dominated by thistles (*Cirsium arvense*, *C. vulgare*), clover (*Trifolium repens*), plantains (*Plantago spp*.), creeping buttercup (*Ranunculus repens*), dandelion (*Taraxacum spp*.), docks (*Rumex spp*.). In the central area of the site the land has remained abandoned for several years and this area of land appeared damper with rush (Juncus sp.) and juvenile willow (Salix sp.) (scrub) becoming to dominate.

WL1- Hedgerows

Field boundaries on site consist primarily of mature unkempt hedgerows many of which are beginning to form treelines. It is considered that this formed the most important habitat on site. Numerous mature/semi-mature ash (*Fraxinus excelsior*) were noted within the habitat. Within several of the hedgerows were drainage ditches and had water in the February 2020 survey. Species within the hedgerows included bramble (*Rubus fruticosus*), elder (*Sambucus nigra)*, blackthorn (*Prunus spinosa)*, hawthorn *(Crataegus monogyna),* holly *(Ilex aquifolium),* Sycamore *(Acer pseudoplatanus),* dog-rose *(Rosa canina), crab apple (Malus sylvestris),* ash *(Fraxinus excelsior),* ivy *(Hedera helix), Goat Willow (Salix caprea),* gorse *(Ulex europaeus),* elm *(Ulmus glabra),* privet *(Ligustrum sp),* plantains (*Plantago spp*.), rosebay willowherb (*Chamaenerion angustifolium*), hedge bindweed (*Calystegia sepium*), nettle (*Urtica dioica*), cow parsley (Anthriscus sylvestris) and cleavers *(Galium aparine)* were noted. In addition, an area of Leyland Cypress (Cupressus × leylandii) and Lawson Cypress (*Chamaecyparis lawsoniana*) was places near houses proximate to the site. A mammal survey was carried out in February 2020. Evidence of fox (*Vulpes vulpes*) and rabbit (*Oryctolagus cuniculus*) was noted on site. Several small burrows were noted within the hedgerows. A faunal survey carried out by Chris Smal in April 2021 across the wider lands including the majority of the site did not reveal mammal activity of conservation importance within the majority of the site. A supplementary site visit in February 2022 by Altemar (across the entire redline) did not reveal signs of mammal activity of conservation importance including resting or breeding places. No species of conservation importance or their resting or breeding places were noted. However, in one area to the south of the site (not on site) where a pond was located in the hedgerow frogspawn was noted during the February 2020 and 2022 surveys. It would be expected that the wet drainage ditches on site could form frog breeding areas.

Evaluation of Habitats

The proposed development site is primarily a series of agricultural grassland surrounded by hedgerows in addition to areas that have undergone recent construction activity and reprofiling. The drainage ditches (acting as a biodiversity corridor) and hedgerows would be seen as the most important habitats on site, not because of the species noted but, by the linear nature of the elements providing biodiversity corridors and bat foraging routes to the surrounding areas. No other habitats of conservation significance were noted within the site outline.

Plant Species

The plant species encountered at the various locations on site are detailed above. No rare or plant species of conservation value were noted during the field assessment. Records of rare and threatened species from NBDC and NPWS were examined. No rare or threatened plant species were recorded in the vicinity of the proposed site. No invasive plant species that could hinder removal of soil from the site during groundworks, such as Japanese knotweed, giant rhubarb, Himalayan balsam or giant hogweed were noted on site.

Bats

Bat assessments (Appendix 5.1) were carried out including emergent survey on the 24th May 2020 and 30th August 2021. There were no seasonal or climatic constraints as surveys were undertaken within the active bat season in good weather conditions with temperatures of greater than 10°C after dark. Winds were very light and there was no rainfall. A single soprano pipistrelle was observed emerging from a large ash tree that is covered in ivy in the central/western portion of the site. This tree and the corresponding hedgerow are to be retained. Foraging activity of soprano pipistrelle, common pipistrelle and Leisler's bats were noted along the hedgerows on site.

Terrestrial Mammals

Badgers have been noted within the 10km^2 grid by the NPWS and in adjacent lands to the south (Appendix 5.2). However, no badgers or badger activity was noted on site. Otters (*Lutra lutra*) activity or holts were not noted on site. No evidence of deer was noted on site. Hedgehogs (*Erinaceus erinaceus)* have been recorded by NPWS within the 10km square. No hedgehogs were seen during the site visits, but may be present on site. No protected terrestrial mammals were noted on site or in the immediate vicinity of the site. Evidence of rabbit and fox activity was noted on site.

Amphibians/Reptiles

The common frog (*Rana temporaria*) was not observed on site. However, frogspawn was noted beside the drainage ditch. There are features within the site boundary that could be important to frogs including the grassland and drainage ditches. The common lizard (*Zootoca vivipara*) or smooth newt (*Lissotriton vulgaris*) were not recorded on site.

Birds

No rare or bird species of conservation value were noted during the field assessment. The following bird species were noted on site: No qualifying interests of nearby SPA's or red listed bird species of conservation importance were noted on site.

Table 5.5: Bird Species noted in the vicinity of the proposed development.

Common Name	*Scientific Name*	*Status*
Woodpigeon	*Columba palumbus*	*Green*
Wren	*Troglodytes troglodytes*	*Green*
Robin	*Erithacus rubecula*	*Amber*
Blackbird	*Turdus merula*	*Green*
Blue tit	*Parus caeruleus*	*Green*
Great tit	*Parus major*	*Green*
Rook	*Corvus frugilegus*	*Green*
House Sparrow	*Passer domesticus*	*Amber*
Barn Swallow (not nesting)	*Hirundo rustica*	*Amber*
Jackdaw	*Corvus monedula*	*Green*
Magpie	*Pica pica*	*Green*
Pheasant	*Phasianus colchicus*	*Green*
Goldfinch	*Carduelis carduelis*	*Green*
Hooded crow	*Corvus cornix*	*Green*

5.6 Predicted Impacts

5.6.1 Construction Phase

Designated European Sites within 15 km

The proposed development is not within a designated European site. Rye Water Valley Carton SAC is 12.8 km from the proposed development site. There is no direct or indirect hydrological pathway or biodiversity corridor from the proposed development site to this SAC. The potential impacts from the proposed development on European sites is assessed in the accompanying AA Screening. The AA screening concluded that "*No European sites are within the zone of influence of these works. There is no direct hydrological pathway for pollutants to European sites. Having taken into consideration the surface water discharge from the proposed development, the distance between the proposed development site to designated conservation sites, lack of direct hydrological pathway to conservation sites and the settlement, dilution effect of surface runoff and the treatment of foul effluent within an existing licenced WwTP, it is concluded that the proposed development would not give rise to any significant effects on European sites*."

Impacts: Neutral, short-term, unlikely, localised.

Ecology

The construction of the proposed development would potentially impact on the existing ecology of the site and the surrounding area. These potential construction impacts would include impacts that may arise during site clearance, re-profiling of the site, and the building phases of the proposed project.

Impacts: ***Minor adverse, long-term, likely, localised***.

Terrestrial Ecology
During the Site visits, no protected flora or terrestrial mammalian species of conservation importance were recorded on-Site or in NPWS or NBDC records. Loss of habitat and habitat fragmentation may affect some common mammalian species. No protected mammals were noted on-site. Frogs and reptiles were not observed on-Site. The common lizard may occur on-Site but was not observed. However, the development will result in the removal of the majority of internal hedgerows in addition to some perimeter hedgerows which would form nesting and foraging habitats and drainage ditches for local biodiversity. Landscaping of the development will result in tree planting across the site but connectivity of biodiversity corridors will be reduced.

Impacts: ***Minor adverse, long-term, site, not significant***. Mitigation is required in the form of pre-construction inspections.

Bats
A bat fauna assessment (Appendix 5.1), including a bat detector survey, was carried out and bats were noted foraging on site. The removal of hedgerows will result in the removal of foraging areas and an increase in lighting would be expected to reduce foraging on site.

Impacts: ***Minor adverse, negative, long term, site, not significant***. Mitigation is required in the form of a pre construction inspection of trees to be felled, the provision of bat boxes and a post construction light spill assessment.

Avian Fauna
Clearance, reprofiling and construction of the site will result in the loss of nesting habitat in addition to foraging habitat for birds

Impacts: ***Moderate adverse, negative, medium term, site, not significant***. Mitigation is required in the form of site clearance outside bird nesting season and the provision of a biodiversity pack for each house on site to include one bird box and two native trees to provide nesting and foraging potential for birds.

5.6.2 Operational Phase

Once construction, all on site drainage will be connected to separate foul and surface water systems. Surface water run-off will comply with SUDS. The biodiversity value of the site would be expected to improve as the landscape measures mature. It would be expected that the localised ecological impacts in the long-term would be minor adverse once the landscape has established

Designated European Sites within 15 km
The proposed development is not within a designated European site. Rye Water Valley Carton SAC is 12.8 km from the proposed development site. There is no direct or indirect hydrological pathway or biodiversity corridor from the proposed development site to this SAC. The potential impacts from the proposed development on the European sites at Malahide Estuary (Malahide Estuary SAC and Malahide Estuary SPA) were considered as there is an indirect pathway via the surface water network. However, given the distance from the proposed development site to these European sites, any pollutants, silt laden run off or dust that enters the surface water network will be diluted or dispersed to negligible levels prior to reaching these sites. During the operational phase Foul water from the site will be treated at Ringsend WwTP and surface water discharge will ultimately discharge to the Broadmeadow Stream.

Impacts: Neutral long-term, unlikely, localised.

Terrestrial Ecology
As the landscape measures improve with maturity, it would be expected that the biodiversity value of the site to birds and flora would also increase.

Impacts: Minor adverse, negative, long term, site, not significant.

Bats
The proposed project will result in increased lighting and fragmentation. As landscaping matures these impacts would reduce. The buildings are solid structures with strong reflective properties and would be expected to be clearly visible to bats. Bat collisions with the buildings would not be expected.

Impacts: ***Minor adverse, negative, long term, site, not significant***. Mitigation is required in the form of the provision of bat roosting opportunities and a post construction light spill assessment.

Avian Fauna
Increased activity and lighting will result in the disturbance of avian fauna but this would be expected not to extend significantly beyond the site. As landscaping matures the biodiversity value of the site would improve.

Impacts: ***Minor adverse, negative, long term, site, not significant***. Mitigation is required in the form of the provision of a biodiversity pack for each house on site to include one bird box and two native trees to provide nesting and foraging potential for birds.

5.7 Do Nothing Scenario

The site would continue to be farmed and the currently abandoned fields in the center of the site would be expected to improve in biodiversity as the stands of willow would continue to grow. The drainage ditches would remain on site.

- **Storage/Use of Materials, Plant & Equipment**

- Materials, plant and equipment shall be stored in the proposed site compound location;
- Plant and equipment will be parked in areas remote from any sensitive locations, including the watercourses, ponds and drainage ditches, at the end of the working day;
- Hazardous liquid materials or materials with potential to generate runoff shall be stored in areas remote from any sensitive locations;
- All hazardous liquid materials shall be stored in a bunded area and spill containment measures will be in place;
- All oils, fuels and other hazardous liquid materials shall be clearly labelled and stored in an upright position in an enclosed bunded area within the proposed development site compound. The capacity of the bunded area shall conform with EPA Guidelines – hold 110% of the contents or 110% of the largest container whichever is greater;

- Fuel may be stored in the designated bunded area or in fuel bowsers located in the proposed compound location. Fuel bowsers shall be double skinned and equipped with certificates of conformity or integrity tested,

- in good condition and have no signs of leaks or spillages;

- Smaller quantities of fuel may be carried/stored in clearly labelled metal jerry cans. Green for diesel and red for petrol and mixes. The Jeri cans shall be in good condition and have secure lockable lids. The Jeri cans shall be stored in a drip tray when not in use. They will not be stored within 50m[10] of watercourses or drains that lead to watercourses or ponds;

- Drip trays will be turned upside down if not in use to prevent the collection of rainwater;

- Waters collected in drip trays must be assessed prior to discharge. If classified as contaminated, they shall be disposed by a permitted waste contractor in accordance with current waste management legal and regulatory requirements;

- Plant and equipment to be used during works, will be in good working order, fit for purpose, regularly serviced/maintained and have no evidence of leaks or drips;

- No plant used shall cause a public nuisance due to fumes, noise, and leakage or by causing an obstruction;

- Re-fuelling of machinery, plant or equipment will be carried out in the site compound as per the appointed Construction Contractor re-fuelling controls;

- The appointed Construction Contractor EERP will be implemented in the event of a material spillage;

- All persons working will receive work specific induction in relation to material storage arrangements and actions to be taken in the event of an accidental spillage. Daily environmental toolbox talks / briefing sessions will be conducted for all persons working to outline the relevant environmental control measures and to identify any environment risk areas/works.

- **Surface Water Mitigation**

Sufficient onsite cleaning of vehicles prior to leaving the site and on nearby roads, will be carried out, particularly during groundworks.

The Site Manager will be responsible for the pollution prevention programme and will ensure that at least daily checks are carried out to ensure compliance. A record of these checks will be maintained.

The site compound will include a dedicated bund for the storage of dangerous substances including fuels, oils etc. Refuelling of vehicles/machinery will only be carried out within the bunded area.

A project ecologist will be appointed and be consulted in relation to all onsite drainage during construction works. Consultation with the project ecologist will not involve the formulation of new mitigation measures for the purposes of protecting any European Site, and relate only to the implementation of those mitigation measures already stated in the submission or the formulation of mitigation for other purposes.

[10] Standard Operation Procedures for TII are to ensure that "Oil storage tank(s) and the associated filling area and distribution pipe work should be at least 10m distant from surface watercourses (rivers, lakes, streams, field drains) and 50m from wells or boreholes. As a precaution 50m has been selected in this instance. https://www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Crossing-of-Watercourses-during-the-Construction-of-National-Road-Schemes.pdf

Dewatering of excavations may be necessary. Appropriate monitoring of groundwater levels during site works will be undertaken. Standard construction phase filtering of surface water for suspended solids will be carried out. Unfiltered surface water discharges or runoff are not permitted from the site.

Proposals to connect up onsite drainage during construction to the pond shall be carried out under the guidance of the project ecologist.

Concrete trucks, cement mixers or drums/bins are only permitted to wash out in designated wash out area greater than 50m from sensitive receptors including drains and drainage ditches.

Spill containment equipment shall be available for use in the event of an emergency. The spill containment equipment shall be replenished if used and shall be checked on a scheduled basis.

All site personnel will be trained in the importance of good environmental practices including reporting to the site manager when pollution, or the potential for pollution, is suspected. All persons working on-site will receive work specific induction in relation to surface water management and run off controls. Daily environmental toolbox talks / briefing sessions will be conducted to outline the relevant environmental control measures and to identify any environment risk areas/works.

- **Air & Dust**

The main activities that may give rise to dust emissions during construction include the following:

- Excavation of material;
- Materials handling and storage;
- Movement of vehicles (particularly HGV's) and mobile plant.
- Contaminated surface runoff

Mitigation measures to be in place:

- Consultation will be carried with an ecologist[11] throughout the construction phase;
- Trucks leaving the site with excavated material will be covered so as to avoid dust emissions along the haulage routes.
- Speed limits on site (15kmh) to reduce dust generation and mobilisation.

Site Management

- Regular inspections of the site and boundary should be carried out to monitor dust, records and notes on these inspections should be logged.
- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.

[11] Consultation with the project ecologist will not involve the formulation of new mitigation measures for the purposes of protecting any European Site, and relate only to the implementation of those mitigation measures already stated in the submission or the formulation of mitigation for other purposes.

- Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.

Monitoring

- Undertake daily on-site and off-site inspection, where receptors are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces within 100 m of site boundary, integrity of the silt control measures, with cleaning and / or repair to be provided if necessary.

Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Fully enclose specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.
- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.
- Any road that has the potential to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions.

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste Management

- Avoid bonfires and burning of waste materials.

Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.
- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust.

The Contractor will be required to consult with an ecologist prior to the beginning of works to identify any additional measures that may be appropriate and/or required.

Storage/Use of Materials, Plant & Equipment

- Materials, plant and equipment shall be stored in the proposed site compound location;
- All oils, fuels and other hazardous liquid materials shall be clearly labelled and stored in an upright position in an enclosed bunded area within the proposed development site compound. The capacity of the bunded area shall conform with EPA Guidelines – hold 110% of the contents or 110% of the largest container whichever is greater;
- Fuel may be stored in the designated bunded area or in fuel bowsers located in the proposed compound location. Fuel bowsers shall be double skinned and equipped with certificates of conformity or integrity tested, in good condition and have no signs of leaks or spillages;
- Smaller quantities of fuel may be carried/stored in clearly labelled metal Jeri cans. Green for diesel and red for petrol and mixes. The Jeri cans shall be in good condition and have secure lockable lids.
- All hazardous liquid materials shall be stored in a bunded area and spill containment measures will be in place;
- Drip trays will be turned upside down if not in use to prevent the collection of rainwater;
- Waters collected in drip trays must be assessed prior to discharge. If classified as contaminated, they shall be disposed by a permitted waste contractor in accordance with current waste management legal and regulatory requirements;
- Plant and equipment to be used during works, will be in good working order, fit for purpose, regularly serviced/maintained and have no evidence of leaks or drips;

- No plant used shall cause a public nuisance due to fumes, noise, and leakage or by causing an obstruction;
- Re-fuelling of machinery, plant or equipment will be carried out in the site compound as per the appointed Construction Contractor re-fuelling controls;

- **Mitigation For Birds**

Relevant guidelines and legislation (Section 40 of the Wildlife Acts, 1976 to 2012) in relation to the removal of trees and timing of nesting birds will be followed e.g. trees or shrubs will not be removed during the nesting season (1st March to 31st August).

Mitigation is required in the form of the provision of a biodiversity pack for each house on site to include one bird box and two native trees to provide nesting and foraging potential for birds. Three swift nesting boxes will be places on each apartment building.

- **Mitigation for Mammals/Amphibians**

A preconstruction mammal/amphibian inspection will be carried out to ensure mammals and amphibians of conservation importance are not on site prior to construction.

- **Mitigation for Flora**

Mitigation is required in the form of the provision of a biodiversity pack for each house on site to include two native trees.

- **Mitigation for bats**

As outlined in Appendix 5.1 *"Mitigation is required in the form of a pre construction inspection of trees to be felled, the provision of 8 bat boxes and a post construction light spill assessment."*

5.8 Residual Impacts

The successful implementation of the mitigation measures outlined in this chapter of the EIAR would be seen as important elements to the successful mitigation of the loss of biodiversity on-site in addition to ensuring that works do not impact on the downstream aquatic ecology. The application of the mitigation measures outlined in this EIAR will help reduce the impact on biodiversity ecology such significant impacts do not arise. It is considered that, where possible, biodiversity enhancement measures have been incorporated into the design for the benefit of the overall biodiversity value of the site and offset the loss of biodiversity on site. The overall residual impact of the proposed Project on biodiversity will be a minor adverse, long-term, site, not significant impact. This is primarily as a result of the loss of terrestrial habitats on-site, supported by the creation of additional terrestrial biodiversity features, mitigation measures and landscaping strategy.

5.9 Interactions

The biodiversity elements of this EIAR have involved consultation with a wide section of the Project Team particularly in relation to the construction management, design, drainage, lighting and landscape elements of the proposed Project. There are numerous inter-related environmental topics described in detail throughout this EIAR document which are of relevance to the biodiversity chapter. There is potential for interaction between the biodiversity and other chapters outlined in the EIAR, during

construction and operation. The mitigation measures that will be put in place for the proposed development will ensure that the impact on biodiversity would be minor adverse not significant following the implementation of mitigation measures.

5.10 Monitoring

An Ecologist will be appointed to monitor the Site during pre-construction surveys, construction phase and post-construction. This would include obtaining derogation licences, if necessary, from the NPWS.

5.11 Difficulties Encountered

No difficulties were encountered in the preparation of the Biodiversity Chapter of this EIAR.

5.12 References

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6. Land & Soils

6.1. Introduction

This Chapter was completed by O'Connor Sutton Cronin and Associates Limited and assesses the likely and significant impacts associated with the proposed mixed-use development on the geological and hydrogeological environment.

The following topics will be assessed in this chapter of the EIAR:

- Subsoil and Bedrock
- Hydrogeology

This chapter provides a description of the project (in connection with soils, geology, and hydrogeology); the baseline soils, geology, and hydrogeology for the project site; and a statement of the likely significant impacts associated with both the construction and operational phases of the development. A 'do nothing' scenario has also been considered. Mitigation measures are proposed in the form of avoidance, prevention, reduction, offsetting, and reinstatement or remedial measures, and recommendations for monitoring are included where appropriate predicted residual effects are described.

Assessments for the Site are detailed in this Chapter with relevant technical information included in the following standalone reports:

- OCSC (2021) Engineering Services Report
- IGSL (2020) Site Investigation Report

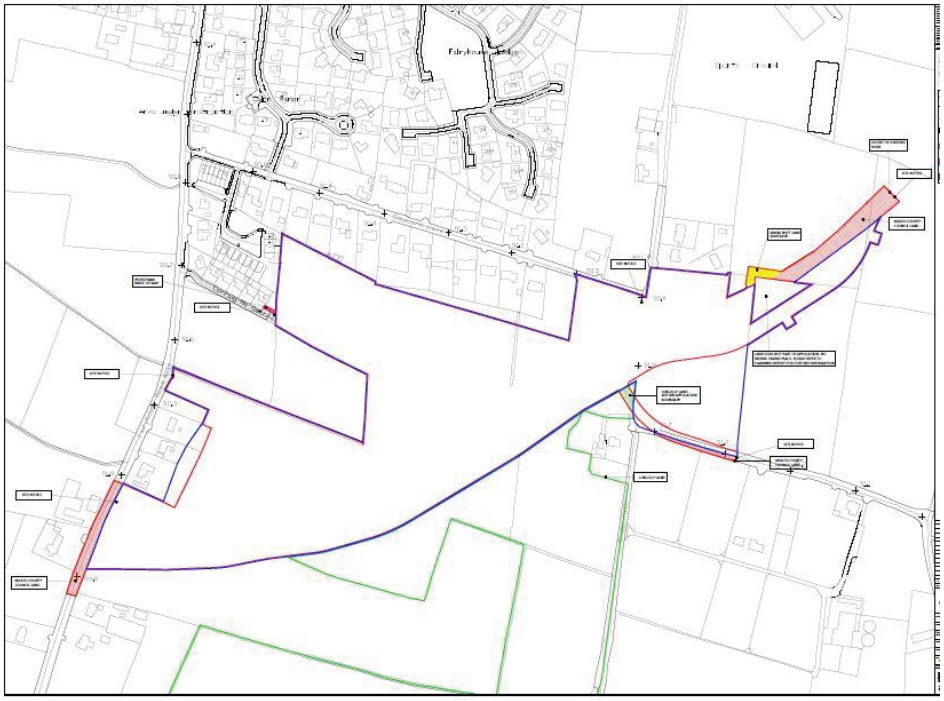
6.1.1. Author Information

This chapter was prepared by Sinéad Doran (BSc EnvSci), Kate Santos (BSc EnvEng, HDipCompSci); reviewed by Glenda Barry (BSc, MSc) and approved by Eleanor Burke (BSc, MSc, DAS, CSci, MIEnvSc), OCSC Environmental Division Manager, Chartered Scientist, and Member of the Institution of Environmental Sciences.

6.1.2. Proposed Development

This application relates to a proposed primarily residential development on a 14.166ha site located in Newtown, Ratoath, Co. Meath as shown in Figure 6.1. A full description of the proposed development is set out in Chapter 1 (Introduction) of this EIAR.

Figure 6.1: Site boundary



Source: RKD Architects for Beo Properties Limited.

Permission is sought by Beo Properties Ltd. for a Strategic Housing Development in Newtown, Ratoath, Co. Meath. The 14.166ha site is bounded by agricultural lands to the south; detached houses and Glascarn Lane to the north; agricultural lands and an existing house to the east; and Fairyhouse Road, detached houses, and agricultural land to the west.

The development will consist of the construction of 452 no. residential units which are located in 12 neighbourhoods. Building heights range across the site from 2- and 3-storey terraced houses, through to 4-storey maisonette buildings, and 6-storey apartment blocks. Private open space associated with the residential units is provided in the form of rear gardens, balconies, terraces and winter gardens. The development includes a crèche with associated outdoor play areas at ground floor and at roof level; 4 no. commercial/retail units; a landscaped public open space which includes a civic plaza; communal open space in the form of communal courtyards for each neighbourhood; associated car and cycle parking serving the full development and uses therein; green roofs at various locations; solar PV panels; a second phase of the Ratoath Outer Relief Road (RORR), that will run along the southern boundary of the application site, with 2 no. multi-modal entrances; a series of pedestrian and cycle connections from the Fairyhouse Road (R155), Cairn Court, Glascarn Lane and the new RORR; internal road and shared surface networks including pedestrian and cycle paths; public lighting and all associated site development and infrastructural works, services provision, ESB substations, foul and surface water drainage, extension to the foul network, access roads/footpaths, lighting, landscaping and boundary treatment works and all ancillary works necessary to facilitate the development.The proposed site layout is shown in Figure 6.2.

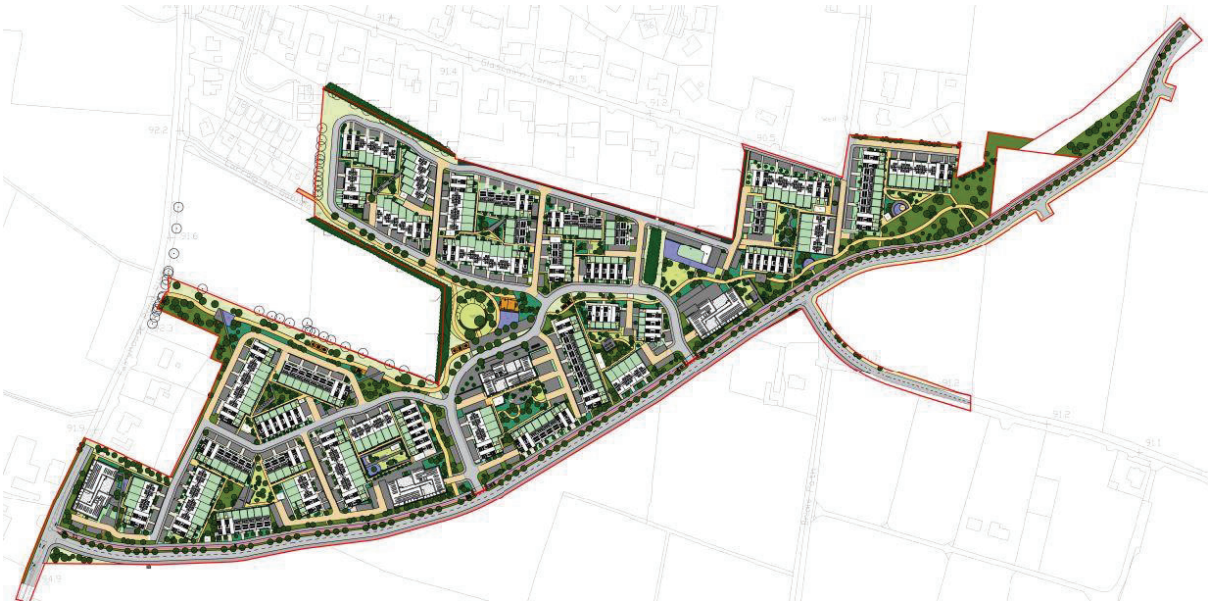
The entrance to the scheme will be from the Fairyhouse Road to the west of the site and from Glascarn Lane to the east via a new access from this road.

The scheme will link the currently exisiting section of the Outer Relief Road at Ratoath College to the R155 – Fairyhouse Road. The road layout to the proposed residential development will be designed as a Home zone / Shared Street led concept, where streets are intended for a range of activities and are primarily places for people, not places for vehicles. The provision of the RORR is an objective of the Ratoath Local Area Plan 2009 – 2015 (LAP) and will link the R125 Swords-Ratoath-Dunshaughlin

Regional Road with the R155 Fairyhouse- Ratoath-Primatestown Regional Road on the southeast side of the town. The Ratoath Outer Relief Road with have full pedestrian and cycle crossing facilities.

A 3.0m wide Greenway will be constructed through the development and will be located away from the RORR.

Figure 6.2: Site Layout



6.1.3. Aspects relevant to this Chapter

The activities associated with the project which have the potential for impact are detailed in Table 6.1.

Table 6.1: Site Activities Summary

Phase	Activity	Description
Construction	Discharge to Ground	Run-off percolating to the ground at the construction site.
	Earthworks: Excavation of Superficial Deposits	Limited excavation will take place at the Site for the provision of building foundations and the installation of services.
	Storage of Hazardous Material	Fuel for re-fuelling on-site machines and chemical storage (such as for concrete curing) during the construction phase.
	Import/Export of Materials	All suitable surplus subsoil, if any exists, will be exported for reuse off-Site to a reuse site subject to the requirements under the Waste Management Act (e.g., Article 27 or 28). Where material cannot be reused, it will be recovered or disposed of by the Waste Hierarchy and Waste Management Act. Limited excavation will take place at the Site for the provision of building foundations, installation of services, and construction of roads. Aggregates will be required for sub-base under roads and buildings. All sub-base materials must meet the relevant engineering

		specifications. The use of recycled or secondary aggregates should be considered as a replacement for primary aggregates.
Construction and Operation	Construction of sub-surface structures	Excavations will be undertaken to facilitate the implementation of services. It is not considered that the construction at the required depths will impede groundwater flow.
	Infilling	A degree of fill will occur during the works which will require the importation of concrete, 6F2 stone, topsoil, and class 2 material. Construction materials that contain recycled/recovered content should be considered as part of the procurement stage.
Operation	Drainage Works	Altering of groundwater/surface water regime by drainage and increasing the hard standing area.
Operation /Unplanned Events	Storage of hazardous materials	No fuel oil storage is required for the operational phase. All heating will be provided by natural gas systems.

6.2. Methodology

6.2.1. Scoping

The assessment has been carried out generally in accordance with the following guidelines:

- Guidelines on the Information to be contained in Environmental Impact Assessment Reports DRAFT (EPA, August 2017);
- Advice Notes for preparing Environmental Impact Statements DRAFT (EPA, September 2015);
- Guidelines on information to be contained in Environmental Impact Statements (EPA, 2002);
- Advice Notes on Current Practice in the preparation of Environmental Impact Statements (EPA, 2003);
- Guidelines for the preparation of Soils, Geology, and Hydrogeology chapters of Environmental Impact Statements (IGI, 2013);
- Geology in Environmental Impact Statements, A Guide (IGI, 2002);
- Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology, and Hydrogeology for National Road Schemes (NRA 2009);
- Control of Water Pollution from Construction Sites (CIRIA, 2001); and
- Environmental Handbook for Building and Civil Engineering Projects (CIRIA, 2000).

The assessment followed a phased approach as outlined in Chapter 4.4 of the Advice Note (EPA, 2015) and the Institute of Geologists of Ireland (IGI) Guidelines (IGI 2013). A Conceptual Site Model (CSM) was developed to identify any likely Source-Pathway-Receptor linkages relating to the Site and the proposed development. The phases of assessment are outlined below.

6.2.2. Detailed Methodology

6.2.2.1 Phase 1: Initial Assessment

An initial assessment was conducted which defined the project in terms of location, type, and scale; established the baseline conditions; established the type of soil/geological environment; established the activities associated with the project; and determined potential impacts.

These objectives were achieved by way of a geological desk study and baseline data collection. A full list of sources for the desk study together with relevant legislation are included in Section 6.2.1 and are briefly listed below:

- Ordnance Survey of Ireland maps;
- Geological Survey of Ireland Groundwater and Geotechnical map viewer;
- Environmental Protection Agency Envision Maps; and
- National Monuments Service maps.

Additional information has been compiled through consultation and feedback from the project/EIAR Team.

The information obtained from the above-listed sources was used to establish the baseline conditions for the Site, and all available information was compiled into a preliminary CSM. The CSM is based on the accepted Source-Pathway-Receptor model for assessing environmental impacts. The CSM went through iterative reviews and was updated with site-specific data obtained through site investigations and studies.

6.2.2.2 Phase 2: Historic Site Investigations and Studies

One site investigation is known to have been undertaken on the Site and was conducted by IGSL from June to July 2020 on behalf of OCSC. This investigation is discussed further in Section 6.3.13. a standpipe

The report also references the undertaking of a standard penetration and installion of a standpip in one cable percussion borehole.

6.2.2.3 Phase 3: Refinement of the Conceptual Site Model

Throughout the desk-based study, the CSM was continually updated, tested, and refined. The outcome is presented in this Chapter along with associated figures.

6.2.2.4 Phase 4: Detailed Assessment and Impact Determination

A Detailed Assessment and Impact Determination was carried out which incorporates the full range of site investigations and studies, the refined CSM, and a full assessment of any potential impacts.

The approach adopted is as per the IGI Guidelines (IGI, 2013), and each potential effect of the Beo Properties, Ltd. application has been described in terms of Quality, Significance, Extent, Probability, and Duration. The classification of impacts/effects in this chapter follows the definitions provided in the Draft Guidelines (EPA, 2017).

Additional guidance and EIA definitions are contained in NRA Guidelines (NRA, 2009). These guidelines provide useful matrices outlining how additional assessment criteria and are based on the importance of a feature to be protected and the magnitude of the potential impact. This approach has been adopted where appropriate.

Where the Initial Impact Determination concluded that the level of potential impact is capable of measurable and noticeable consequences, it is carried into the next assessment phase.

6.2.2.5 Phase 5: Mitigation, Residual, and Final Impact Assessment

Phase 5 builds on the outcome of the initial assessment and detailed site assessments by identifying mitigation measures to address the identified impacts. Mitigation measures that are known to be effective have been built into the project design and have been considered in this process. The development, including all identified mitigation measures (assumed implemented), is then subject to impact assessment to identify any residual impacts.

The Final Impact Assessment presented in this Chapter incorporates the outputs from the Detailed Assessment and Impact Determination, Mitigation Measures, and Residual Impact Assessment.

6.2.2.6 Phase 6: Completion of the EIAR Section

The final phase of work was the completion of this EIAR Section with associated Figures and Appendices. The format follows the EPA Guidance Note and Design Team Template.

6.2.2.7 Assumptions and Limitations

The description of existing conditions is based on the available desk study information supplied by the design team.

6.3. Baseline Environment

The receiving environment is discussed in terms of geomorphology, superficial and solid geology, contamination, and hydrogeology. This section and the accompanying Figures can be considered as the geo-environmental CSM for the project site.

6.3.1. Sourcing Baseline Information

The Site is in County Meath, just 1km outside of Ratoath town centre, and has been studied with regard to geology, including the properties and characteristics of the soil, subsoil, and bedrock. Sources of information included databases held by the Geological Survey of Ireland (GSI), Environmental Protection Agency (EPA), Ordnance Survey of Ireland (OSI), and National Parks and Wildlife Service (NPWS). A full list of references is included in Section 6.12 of this Chapter.

6.3.2. Topography & Setting

Ground levels across the site generally decrease from southwest to northeast towards Glascarn Lane. Levels along the public road forming the south-western boundary of the site are approximately 93.5 mAOD and these fall to approximately 90.5 mAOD along the north-eastern boundaries of the site.

According to Meath County Council's Development Plan 2021-2027, the Site is located in the Local Authority Zone of A2 - New Residential. The Local Authority Zone description for the Site is 'To provide for new residential communities with ancillary community facilities, neighbourhood facilities and employment uses as considered appropriate for the status of the centre in the Settlement Hierarchy.' The regional site location is illustrated in Figure 6.3.

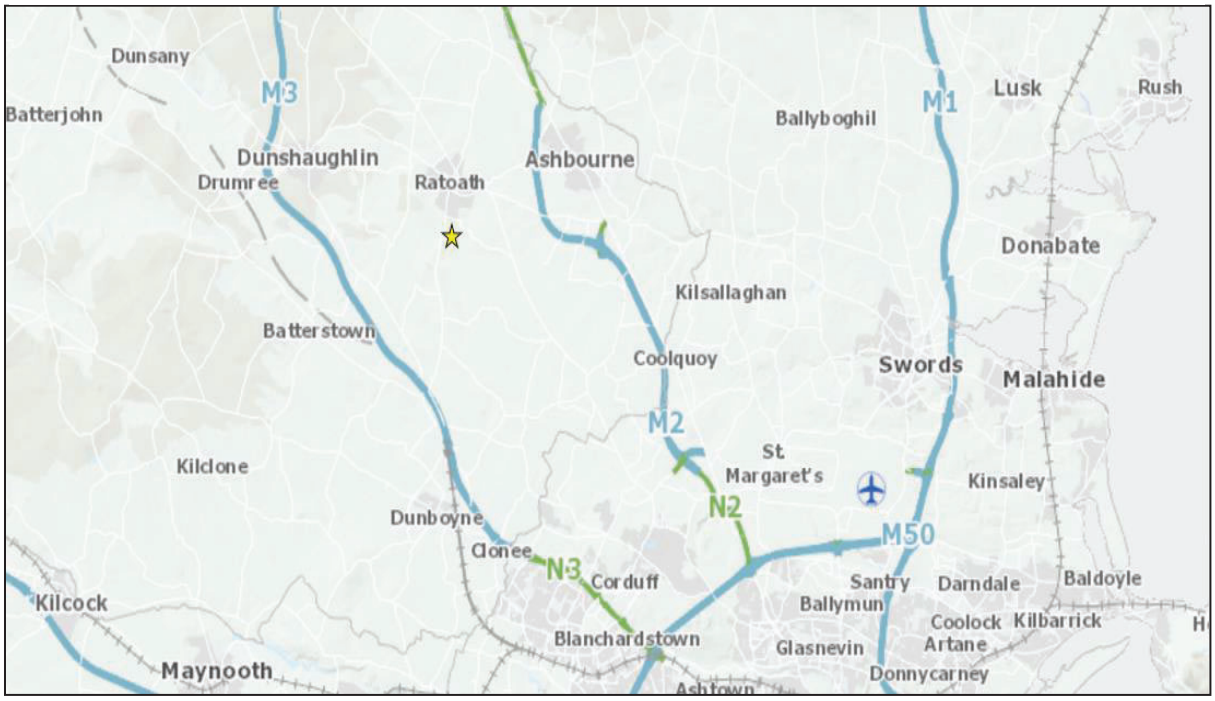


Figure 6.3 **Regional Site Location**

Source: GSI, 2022; Site location indicated by the yellow star

As shown in Figure 6.3, the Site is located within an area to the northwest of Dublin City where development is becoming increasingly suburban with expanding residential and General Enterprise and Employment areas. The Site is bordered by agricultural lands to the south; detatched houses and Glascarn Lane to the north; agricultural lands and an existing house to the east; and Fairyhouse Road, detatched houses, and agricultural land to the west. The adjacent land uses are listed in Table 6.2 below.

Table 6.2 Adjacent Land Uses

Boundary	Land use
North	Detatched houses and Glascarn Lane
South	Agricultural lands
East	Agricultural lands and an existing house
West	Fairyhouse Road, detetched houses, and agricultural land

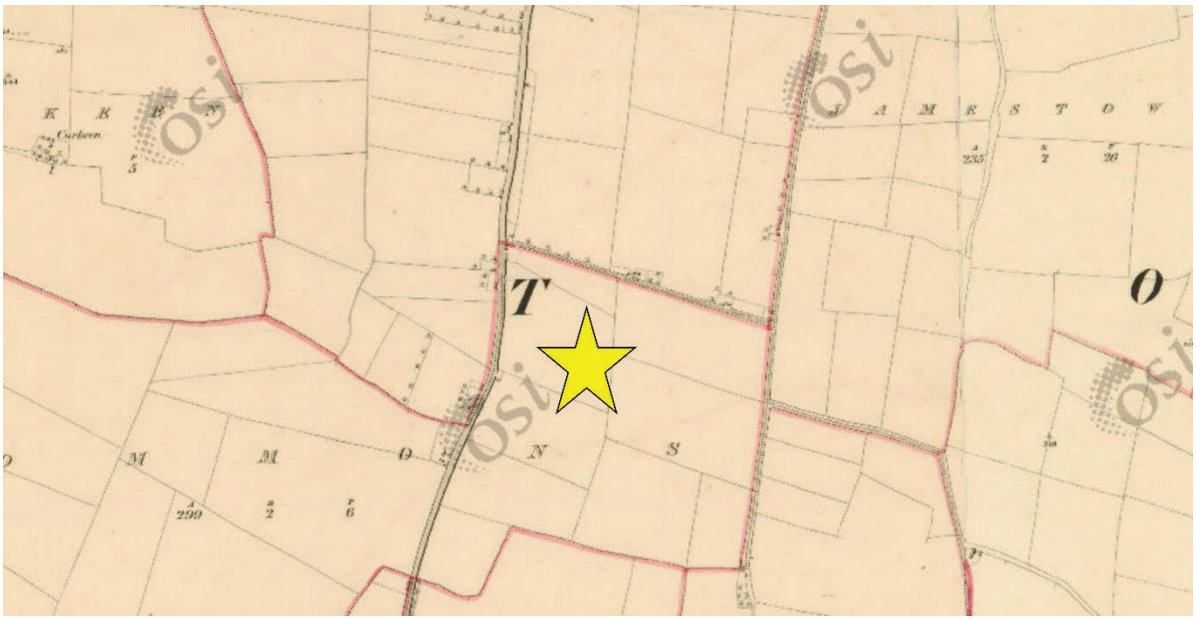
6.3.3. Areas of Geological Interest & Historic Land-Use

The GSI online mapping service was consulted regarding areas of geological interest near the Site. The nearest area of geological heritage is 'Dunshaughlin' which is located approximately 4.6km northwest of the Site at its nearest point. The Dunshaughlin site is classified as a County Geological Site (site code MH026), and consists a basin-shaped body of silica derived from decalcified limestone, undated but possibly formed from Tertiary weathering. The site is a large-scale enclosed limestone depression, now infilled with silica deposits, of similar magnitude to the Carran Depression in Clare. This site is unexposed at the ground surface and is only known through geophysical surveys and from a limited drilling program.

The assessment of impacts on the cultural heritage from the proposed development is detailed in Built Heritage (Chapter 13 of this EIAR). Given the distance from the Site to the Dunshaughlin geological heritage site, it is considered to be outside of the zone of influence of the proposed development in relation to land and soils.

The OSI 6" historical map (1837-1842) shows the site as undeveloped except for a structure on the western edge of the site along Ferryhouse Road. Adjoining land in all directions was undeveloped except for scattered dwellings along Ferryhouse Road and Glascarn Lane as shown in Figure 6.4.

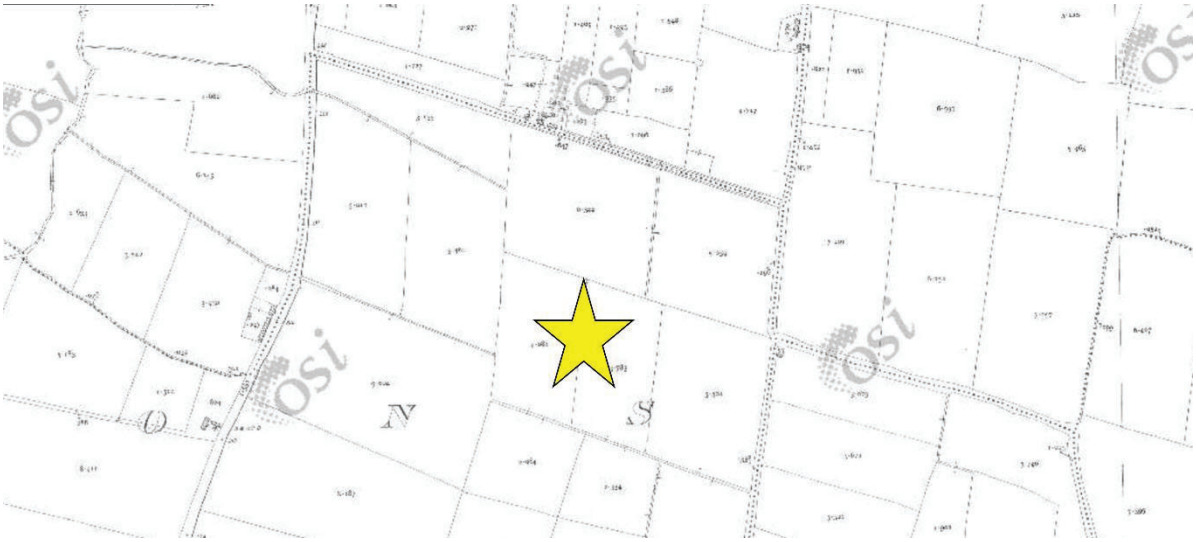
Figure 6.4: **Location of the proposed development in 1837-1 25 Inch OS Map**



Source: OSI, 2022; Site location indicated by yellow star.

The historic 25-Inch Map (1888-1913) shows no changes to the site from the 6" historical map (1837-1842) other than the removal of the building along the western site boundary. Surrounding land use remained largely unchanged other than the alteration to some nearby structures and the removal of others as shown in Figure 6.5.

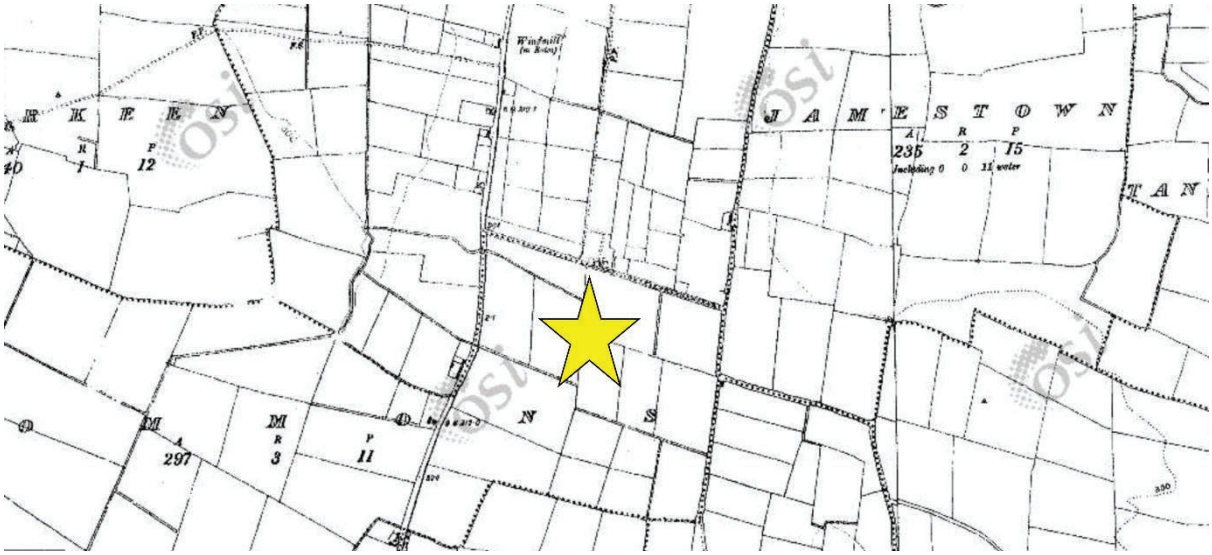
Figure 6.5: Location of the proposed development in 1888-1913 25 Inch OS Map



Source: OSI, 2022; Site location indicated by yellow star

The 6-inch Cassini Map (the 1830s to 1930s) shows no change to the site and no significant changes to the surrounding area since the historic 25-Inch Map (1888-1913) as shown in Figure 6.6.

Figure 6.6: Location of the proposed development on Cassini OS Map (1830 - 1930)



Source: OSI, 2022; Site location indicated by yellow star

The Geohive aerial image from 1995 indicates the site as unchanged from the Cassini mapping. Geohive and Google Earth aerial images from 2000 to July 2021 show the Site as undeveloped and

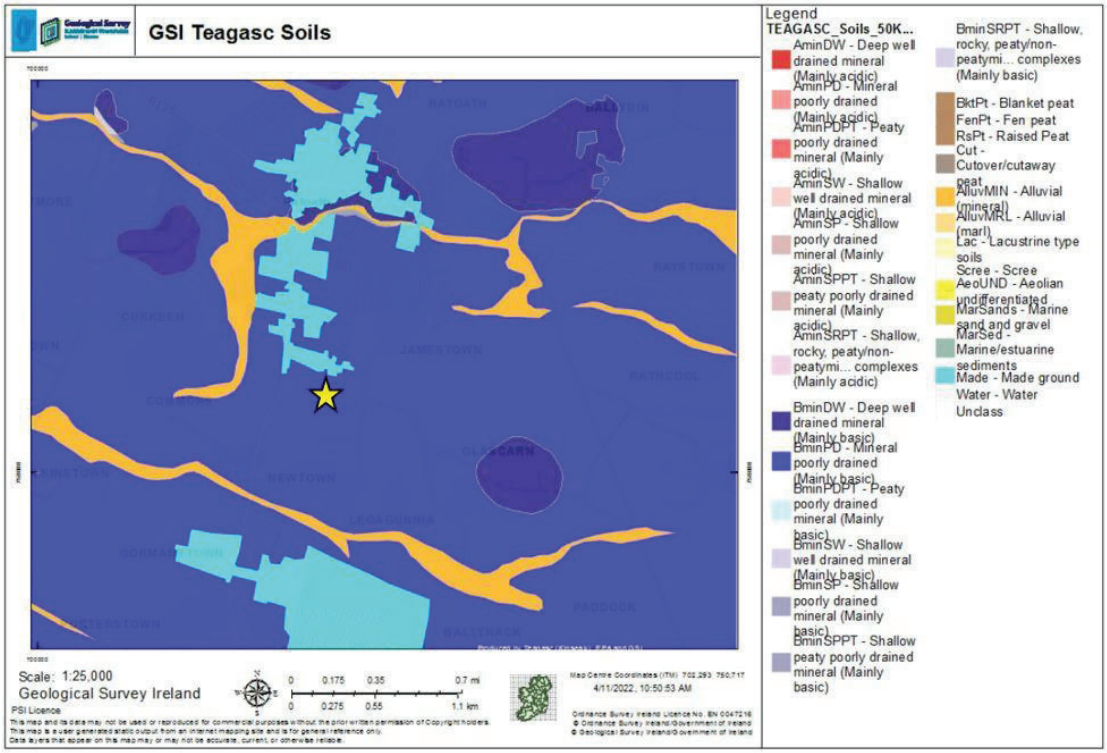
similar to its current configuration. Currently, the site is greenfield used for agricultural purposes and can be accessed from Glascarn Lane to the east and Fairyhouse Road to the west.

Extensive residential development had occurred along Ferryhouse Road and Glascarn Lane between the time of the Cassini mapping and the 1995 aerial image. Additional residential development had also occurred to the east, southwest, and north of the site since that time. Between 1995 and 2000 significant residential development had occurred to the north of the Site. No significant changes to adjoining or nearby properties were observed from 2000 to July 2021 other than a development of a BMX track to the northwest between 2009 and 2012 and the commencement of the first section of the Ratoath bypass to the northeast by 2019. This work has appeared to have been completed by 2020

6.3.4. Regional Soils

According to the Teagasc Soil Information System, the site and its surrounding agricultural land are classified as Bmin PD, poorly drained, mainly basic mineral soils. To the north of the site, the soil is classified as made ground as shown in Figure 6.7 from the GSI online mapping.

Figure 6.7: Teagasc Topsoils



Source: GSI, 2022; site location is indicated by the yellow star

The quarternary sediments underling the site has been classified as Carboniferous Till derived from limestones. This is the dominant subsoil type in the region, along with Alluvium, Till derived from Namurian sandstones and shales, and Lacustrine sediments.

The Till subsoil underlying the Site is a glacial deposit resulting from glaciations that covered the region during the Pleistocene and Quaternary periods. As ice moves over its substrate, pieces of rock are incorporated into its basal layers, making the ice very abrasive. The ice subsequently scours and erodes the bedrock over which it flows. The rock material eroded by and incorporated into the ice is eventually deposited, either directly by the ice as till (commonly known as boulder clay) or by meltwater which causes grading of the deposits into gravel, sand, silt, or clay. Local withdrawal and recedence of the ice sheet has led to the formation of fluvioglacial sediments (gravel and sand lenses) and glaciomarine sediments (stiff/firm laminated clays, silts, and sands) which can exhibit significant lateral and vertical variations in grain size distribution over short distances. The presence of shales within local quaternary sediments may be due to shales within the “Calp” limestone formation which occurs

extensively in Meath. The “Calp” is a Carboniferous limestone with extensive amounts of interbedded shales or a highly calcareous shale lithology.

These glacial deposits influence the local drainage pattern, resulting in poorly drained land in the inter-drumlin zones relative to the steeper drumlin slopes (Clarke et al., 2007). The deposits are thin or absent in the upland areas, but on the lowlands till thicknesses of over 30m are common throughout County Meath.

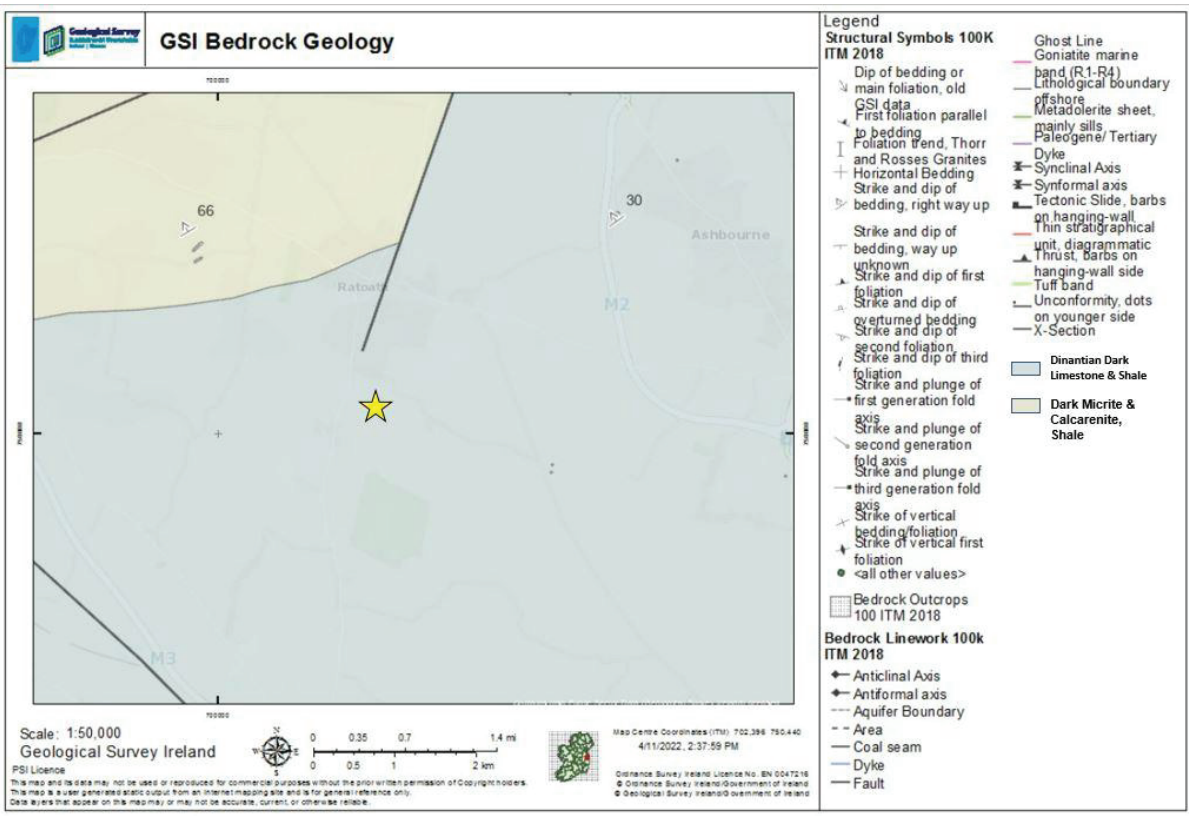
Boulder clays generally exhibit exceptionally low permeability in the order of 1x10-7 to 1x10-9 m/s or lower. The glacial boulder clay will tend to function as an aquitard between the other more permeable formations, namely the overlying made ground and the sands and gravels.

6.3.5. Regional Geology

The bedrock of the greater southeast region of County Meath consists of mainly Dinantian Upper Impure Limestones which are part of the Lucan Formation and smaller amounts of Dinantian Lower Impure Limestones; Dinantian mixed sandstone, shales, and limestones; Dinantian Sandstones; and Ordovician volcanic and metasediments. The limestone is colloquially known as “Calp” and is estimated to be up to 800m thick. The homogeneous sequence has been described as a dark grey to black limestone and shale consisting of dark grey, massive limestones; shaley limestones; and massive mudstones. The average bed thickness is less than 1m, but these normally thin-bedded lithologies can reach thicknesses of 2m or more.

There is a fault located less than 0.4km away from the site, from the formation of a Structural linework feature. Secondary dolomitisation along faults in the Dublin area suggests that they have been and may still be open to allow fluid migration (GSI). The local bedrock geology mapped by the GSI is illustrated in Figure 6.8.

Figure 6.8: Local Bedrock Geology– site location indicated by the yellow star



Source: GSI, 2022; site location is indicated by the yellow star

6.3.6. Regional Hydrogeology

The primary Groundwater Body (GWB) in the region is the Swords GWB, which is the Calp Limestone bedrock aquifer. The Swords GWB covers some 199 km2, includes most of north of County Dublin, and extends west to include County Meath. The area area encompassed by the Swords GWB is low lying with elevations decreasing toward the east and more locally towards the streams in the area. In addition to the Carboniferous limestones and shales, there are also some sandstones present within this GWB.

The bedrock aquifer is a fracture system, i.e. it is dominated by secondary (fracture or fissure) flow with very little to no flow within the matrix making it largely impermeable.

The Swords GWB comprises:

- Mostly Ll: Locally important aquifer, which is moderately productive only in local zones,
- Some Pl: Poor aquifer which is generally unproductive except for local zones, and
- Small amounts (2% of total Area) of Lm: Locally important aquifer, which is generally moderately productive.

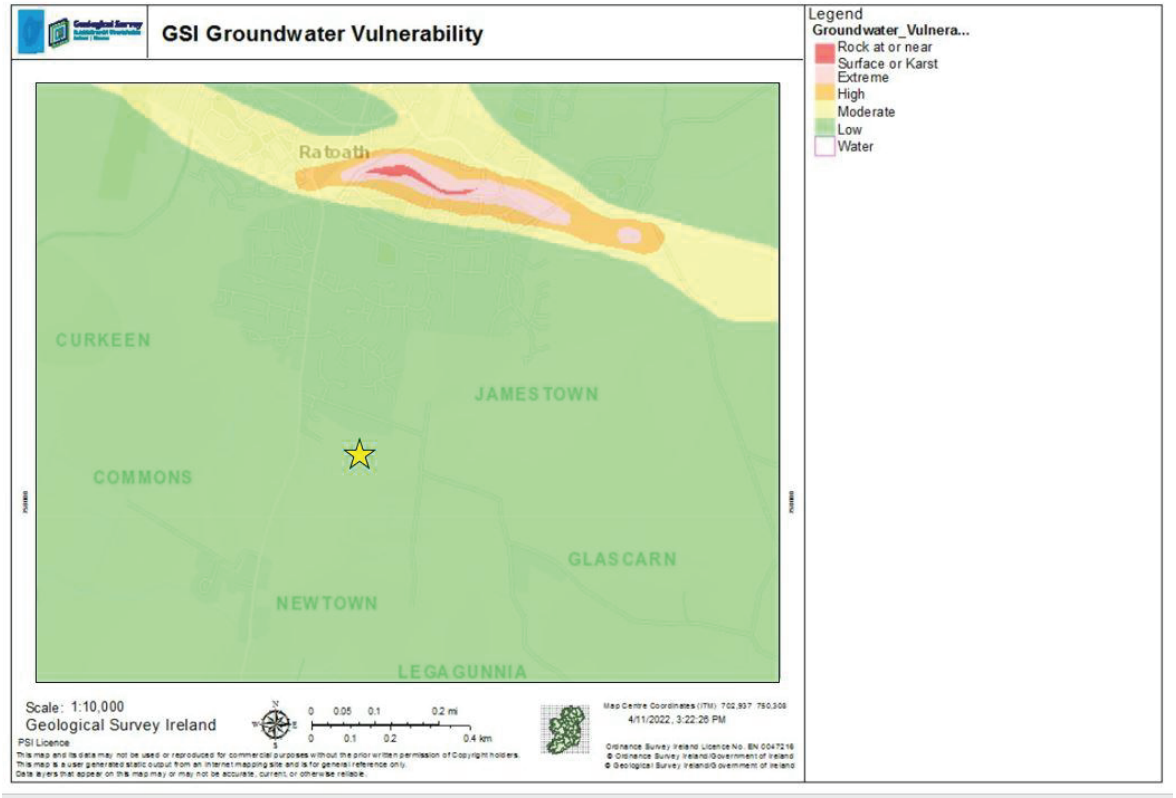
The Lucan Formation, located in the vicinity of the Ratoath, is classified by the GSI as a Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones. In the Dublin Basin, minor open NE/SW folds cause strike swings in otherwise predominantly E-W striking, moderate to shallow dipping strata. In general, permeability in this these rock units are likely to be moderate to low (1-10m2/d). Secondary dolomitisation along faults in the Dublin area suggests that they have been and may still be open to allow fluid migration. Pumping test analysis at the public supply boreholes at Dunboyne, Co. Meath provided transmissivity values of between 10 and 150 m2/d.

There is a distinct reduction in the permeabilities of these rocks with depth. Packer tests show permeabilities reduce by an order of magnitude for each five meters of depth in the limestone. The majority of groundwater flow will take place within the upper weathered and broken rock zone (3m) with additional isolated flow along fractures and fissures at depths up to 50mbgl.

6.3.7. Groundwater Vulnerability

The groundwater vulnerability beneath the proposed Site is Low (see Figure 6.9). Vulnerability ratings are related to a function of overburden thickness and permeability which might offer a degree of protection and/or attenuation to the underlying aquifer from surface activities and pollution. The general groundwater flow direction in this aquifer is towards the coast and also towards the overlying rivers. At their nearest points, areas of high groundwater vulnerability are located 0.9km north of the Site and 2.66km east of the Site. The closest area of extreme groundwater vulnerability is located 0.94km north of the proposed Site. There are no karst landforms identified in the vicinity of the Site.

Figure 6.9: Aquifer Vulnerability - site location indicated by the yellow star



Source: GSI, 2022; site location is indicated by the yellow star

6.3.8. Groundwater Status

An assessment conducted under the Water Framework Directive (WFD) has concluded that the groundwater within the Swords GWB is presently of "Good status". The Swords GWB has been deemed to be "Not at risk" of failing to meet its WFD objectives by 2027.

6.3.9. Groundwater Recharge

The Site and large parts of the surrounding area consists of agricultural land comprised of limestone Till and low permeability subsoil which will allow diffuse recharge of rainfall to the underlying aquifer. The proportion of the effective rainfall that recharges the aquifer is largely determined by the thickness and permeability of the soil and subsoil and by the slope of the land surface. Due to the generally low permeability of the aquifers within this GWB, a high proportion of the recharge will then discharge rapidly to surface watercourses via the upper layers of the aquifer. Groundwater circulation from recharge to discharge points will more commonly take place over a distance of less than a kilometre, effectively reducing further the available groundwater resource in the aquifer (GSI).

Based on the GSI website, the effective rainfall in the vicinity of the Ratoath site is 354.000 to 377.600mm/year. However, given the low permeability of the glacial tills, recharge to the bedrock aquifer is likely to be minima based on the GSI designated recharge coefficient of 7.50% for the Site area. Based on the GSI's Recharge Model, the total recharge would be equivalent to approximately 27 to 28 mm/year.

6.3.10. Groundwater Abstractions

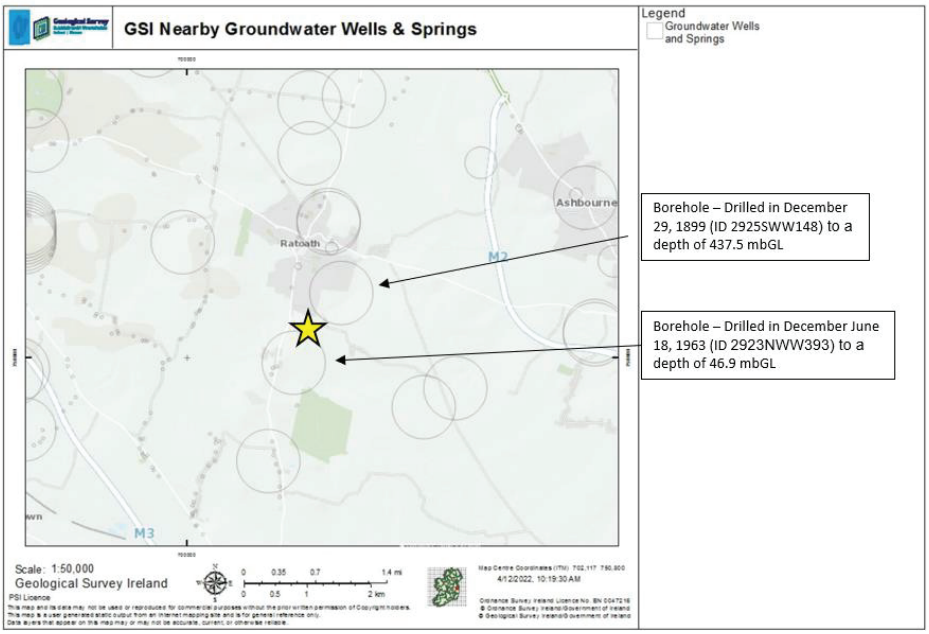
A search of the GSI groundwater well database was conducted to identify registered wells in the surrounding area. The nearest well to the Site (ID 2923NWW393) is located within or near the southwest corner of the Site. It was drilled to 46.9mbGL on June 18, 1963 for an unknown use and has a reported yield of 21.8 m3/day. The next nearest well (ID 2925SWW148) is located on or near the

northeast corner of the Site. It was drilled at Dezembro 29, 1899 to 437.5mbgl for domestic use and has a reported yield of 28 m3/day .

There are at least 26 other boreholes/wells within a 2km radius of the site. The borehole with the greatest depth (ID 2925SWW394) is located 0.95km north of the site and was drilled July 1, 1992, to 90mbGL and has a yield of 262 m3/day and it is used for public supply. Other boreholes in the area are used for domestic use, and there are serval dug wells to the west of the site.

Mapped wells and springs in the general vicinity of the Site identified by GSI are illustrated in Figure 6.10.

Figure 6.10: Wells and Springs



Source: GSI, 2022; site location indicated by the yellow star

The GSI also provides a framework for the protection of groundwater source zones (e.g., areas of contribution to water supply bores). There are no reported source protection zones (SPZs) within a 2km radius of the proposed Site. The nearest SPZ is located 4.7km northwest of the site in Dunshaughlin.

6.3.11. Nearby Site Investigations

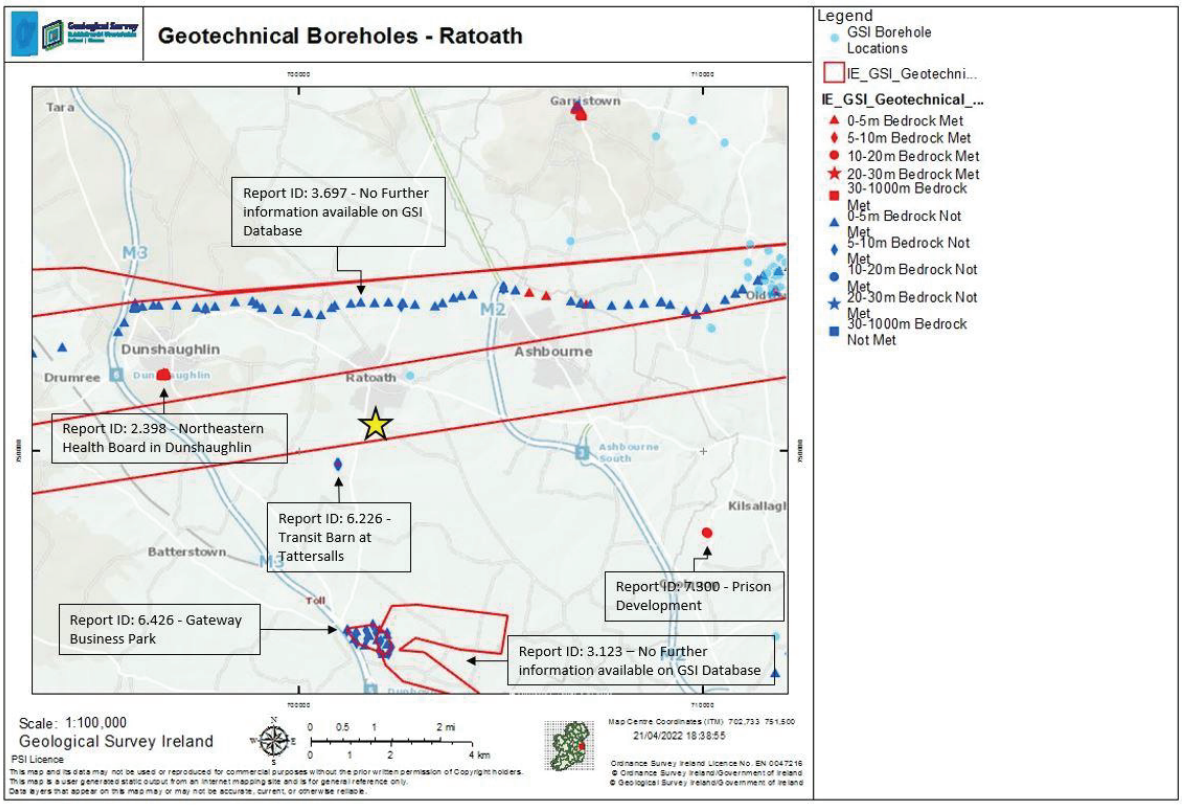
The GSI has compiled a database from site investigations previously carried out in Ireland. Figure 6.11 indicates SI locations on or near the Site. The Site lies within the boundaries of a geotechnical site, Report ID 3,694. The report was not made available by GSI.

There are several other External Geotechnical Sites located nearby. These include an investigation located 0.14km to the north of the site (Report ID 3,697) for which there is no available report; an investigation relating to the development of a Transit Barn at the Tattersalls Complex (Report ID 6,226) located 1.1km southwest of the site; and an investigation relating to the Northeastern Health Board in Dunshaughlin (Report ID 2,398) located 5km to the northwest of the site.

The Transit Barn at Tattersalls development site investigation report indicates that the site had been in-filled to a depth of 1.0 to 1.5m with material excavated in association with nearby development work. The boreholes revealed a soft, upper clay layer, presumably infill, although there were no indications of extraneous matter. Groundwater seepages were reported near the horizon of the underlying stiff,

gravelly clay. Samples of the sub-soils exhibited very low concentrations of soluble sulphates and near-neutral pH values (IGSL, 2005).

Figure 6.11: Nearby Site Investigations - Site location indicated by the yellow start



Source: NPWS, 2022; Site location indicated by the yellow star

6.3.12. Designated Area of Conservation

Ireland aims to conserve habitats and species through designation of conservation areas. This is a European and national legislation requirement. The National Parks & Wildlife Service (NPWS) is responsible for the designation of conservation sites in Ireland. The NPWS works with stakeholders including farmers, landowners and national and local authorities to achieve the requirements for conserving nature in these selected areas.

These conservation sites are referred to as 'European sites', a term which has replaced the previous 'Natura sites' designation. This recognises that Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) protect species and habitats shared across Europe and were originally designated under European legislation.

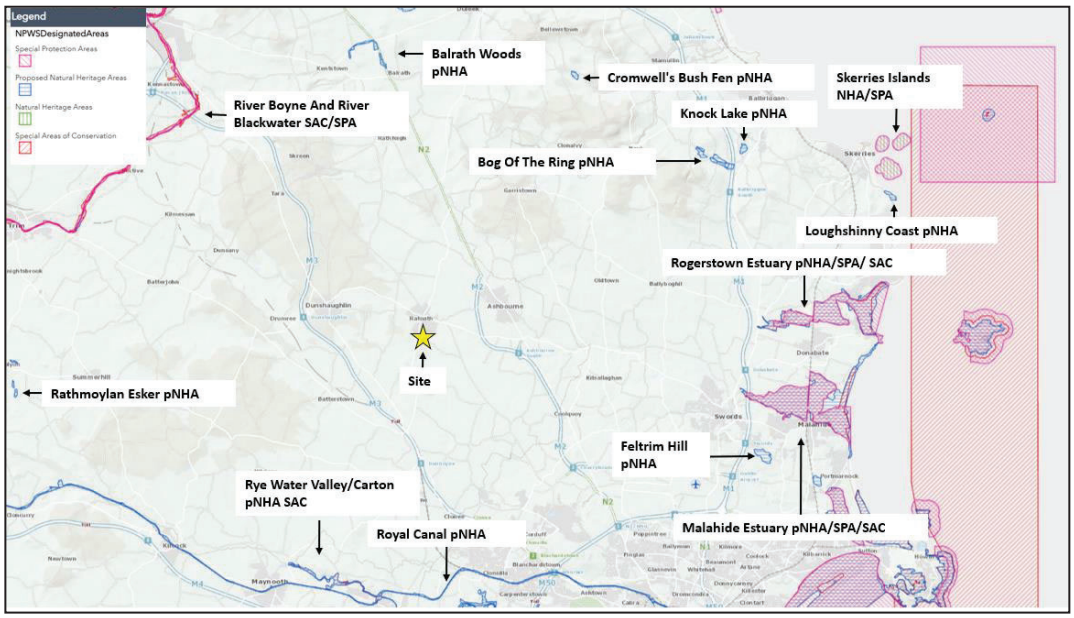
The SACs are areas designated under the European Union's Habitats Directive to be of value for species, plants, and habitats. They comprise marine and terrestrial SACs. SPAs are designated under the Birds Directive to protect internationally valuable populations of bird species. They comprise inshore marine SPAs and terrestrial SPAs.

The nearest designated area of conversation to the Site is the Rye Water Valley/ Carton SAC (Site Code 001398) located 13.1km to the south. The next nearest is the River Boyne And River Blackwater

SAC/SPA (Site Codes 002299 and 004232, respectively) located 19.2km northwest of the site. See Figure 6.12 below for a more detailed view of the European sites.

The nearest proposed Natural Heritage Area (pNHA) is the Royal Canal located 12.3km south of the Site (Site Code 002103). The second nearest pNHA is the Rye Water Valley/ Carton (Site Code 001398) located 13.1km to the south.

Figure 6.12: NPWS Designated Areas



Source: NPWS, 2022; Site location indicated by yellow star

6.3.13. Local Soils & Geology

A site investigation was undertaken on the Site by IGSL from June to July 2020 on behalf of OCSC. The investigation included the following:

1. 4 no. Cable Percussion Boreholes
2. 1 no. Rotary Borehole
3. 6 no. Trial Pits
4. 15 no. CBR by Plate Tests
5. 4 no. Infiltration tests to BRE Digest 365
6. 2 no. HD Dynamic Probes
7. Geotechnical Laboratory Testing
8. Chemical Laboratory Testing

The report also references the undertaking of a standard penetration and installion of a standpipe in one cable percussion borehole.

Logging undertaken during borehole and trial pit installation indicated that approximately 0.2 m of topsoil overlies firm to stiff, brown gravelly CLAY which extended to approximately 2 mbGL. Minor variations were noted in one of the pits, where boulder clay became sandier.

Stiff to very stiff, grey-black gravelly CLAY was present from approximately 2 mbGL to approximately 8.1 mbGL. Cobbles and the occasional boulders were encountered. Recovery below the gravelly clay layer was limited, but returns were identified as grey-black, sandy, cobbly gravel. From 10.00 to 16.50 mbGL alternating layers of gravel and sand were noted with some adverse 'blowing' noted in the fine sand layers.

No groundwater was encountered during the course of the borehole investigation although a minor water seepage was noted at 2.20 meters in one trial pit. No fall water was recorded in the first test cycle of the infiltration testing.

In-Situ CBR by Plate Bearing Testing was carried out at 0.50 mbGL. The CBR at Load Cycle from the 15 locations ranged from 3.0 to 21.5%; the CBR at Re-Load ranged from 4.4 to 45.1%.

The Heavy-Duty Dynamic Probes were conducted at two locations to measure the soil resistance, the results of which are outlined below:

- The Firm to Stiff, Brown, Gravelly CLAY layer at 1 mbGL had Standard Penetration Test (SPT) N values ranging from 14 to 19.
- The Stiff, Brown, Gravelly CLAY layer at 2 mbGL had N values ranging from 22 to 28.
- The Stiff to Very Stiff, Brown, Gravelly CLAY layer at 3 mbGL had N values ranging from 24 to 34.
- The Very Stiff, Brown, Gravelly CLAY layer at 4 mbGL had N values ranging from 31 to 38.
- The Very Stiff to Hard, Brown, Gravelly CLAY layer between 5 and 8 mbGL had N values ranging from 33 to 50, with the deeper layer from 8 to 16 meters mbGL with N values which were >50.

6.3.14. The Impact of subsurface structures on the Local Hydrogeology

No groundwater was noted during the course of the borehole investigation and only minor seepage was noted in an isolated sandy zone of one of the trial pits. Groundwater was recorded at 8.20 mbGL on 24/06/2020 in a standpipe installed in one of the boreholes during the site investigation detailed above. A reading taken three weeks later on 14/07/2020 indicated groundwater at 1.74 mbGL.

Although shallow groundwater may be present on the site, there will be no basement construction, so subsurface structures will be limited to shallow installations associated with foundations and services and, therefore, are not expected to impact on local hydrogeology.

6.3.15. Soils Contamination Assessment

The site is primarily a greenfield site with no potential contamination sources other than possible demolition debris and/or fill material from the demolition of a building which was noted along the western site boundary on the OSI 6" historical map (1837-1842). A detailed assessment of potential soil contamination and a waste classification has not been carried out for the Site. However, laboratory analysis of two soil samples from the site shows low levels of metals and inorganic and organic compounds.

Based on the available site investigation information, there is a very low potential risk associated with past site use as agricultural land to future residential or commercial receptors following site development.

There are several mechanisms used to address waste materials generated during construction in Ireland including Article 27 Declaration (by-product) and recovery solutions and those options outlined in Table 6.3.

Table 6.3 Soil Waste Categories

Waste Category	Title	Classification	Potential Outlet

		Category	
Category A	Inert Waste Criteria	Reported concentrations less than inert waste guidelines, which are based on waste acceptance criteria set out by the adopted EU Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Directive 1999/31/EC (2002). Results found to be non-hazardous using the HazWasteOnline application.	Potentially suitable for reuse or recovery subject to Planning and/or Waste Permissions and acceptance criteria.
Category B	Inert (with elevated PAHs)	Acceptance Criteria as laid out in Waste Licence W0129-02 and W0254-01. Reported concentrations less than inert waste guidelines, which are based on waste acceptance criteria set out by the adopted EU Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Directive 1999/31/EC (2002) with the exception of PAHs (Total 17 <100mg/kg). Results found to be non-hazardous using the HazWasteOnline application.	Disposal at, for example, Integrated Material Solutions or Walshestown Restoration
Category C1	Non-Haz Criteria	Analytical results greater than Category A criteria but less than non- hazardous waste guidelines, which are based on waste acceptance criteria set	Disposal/Recovery at licensed landfill (Ballynagran, Knockharley, Drehid). Material can be sent for recovery as engineering material

		out by the adopted EU Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Directive 1999/31/EC (2002) no limit for TOC. Results found to be non-hazardous using the HazWasteOnline application.	rather than disposed of (no landfill tax)
Category C2	Non-Haz Criteria but with trace asbestos	Results as per C1 but with trace asbestos	Material will need to be disposed of at a licensed landfill if trace asbestos is confirmed. If asbestos level is quantifiable then it may have to be disposed in N. Ireland or further abroad.
Category D	Hazardous	Analytical results found to be hazardous using the HazWasteOnline application.	None in Ireland (export) with the exception of Enva in Portlaoise.

6.3.16. Groundwater Contamination Assessment

The Site is a greenfield site with a low risk of potential contamination from past agricultural chemical sources. An assessment of potential groundwater contamination has not been carried out for the Site. Therefore, any risk associated with past site use to future residential or commercial receptors following site development cannot be quantified at this time.

6.3.17. Chemical / Gas Assessment

Gas Monitoring was not undertaken on the Site during the site investigation. Therefore, any risk associated with past site use to future residential or commercial receptors following site development cannot be quantified at this time.

6.3.18. Potential Pollutant Linkages

A critical element of the risk assessment process is the establishment of a Conceptual Site Model (CSM) for the Site. A CSM describes the potential sources of contamination at a site, the migration pathways it may follow, and the receptors it could impact. If complete source-pathway-receptor scenarios exist, then there is a potential pollutant linkage that needs to be characterised and assessed (via formal risk assessment). All three elements need to be present for a viable risk to exist (e.g., if a source and receptor exist but no pathway is present, there is no pollutant linkage and hence no risk).

A. Sources

- The potential contamination from nearby properties relate to residential fuel usage and chemicals from agricultural land usage.

- There is a potential for contamination associated with demolition debris or fill material from a former structure near the western site boundary and from agricultural land usage on Site.
- There will be a source of potential contamination present on site during the construction phase (e.g. machinery oils, fuel, cement, etc.).
- The presence and concentrations of any soil contaminants will require assessment prior to the commencement of construction works.
- Run-off from construction sites can contain minor levels of pollutants (e.g. mineral oils) with high concentrations of suspended solids.
- To keep excavations dry, dewatering may be required to lower the water table. Groundwater sampling will be required to determine the viability of discharging to the public sewer system during dewatering.
- Lowering the water table could impact on nearby buildings, creating void space which would allow soil particles to compress and settlement to occur; and
- There will be no significant sources of potential contamination present on-site during the operational phase of the development.

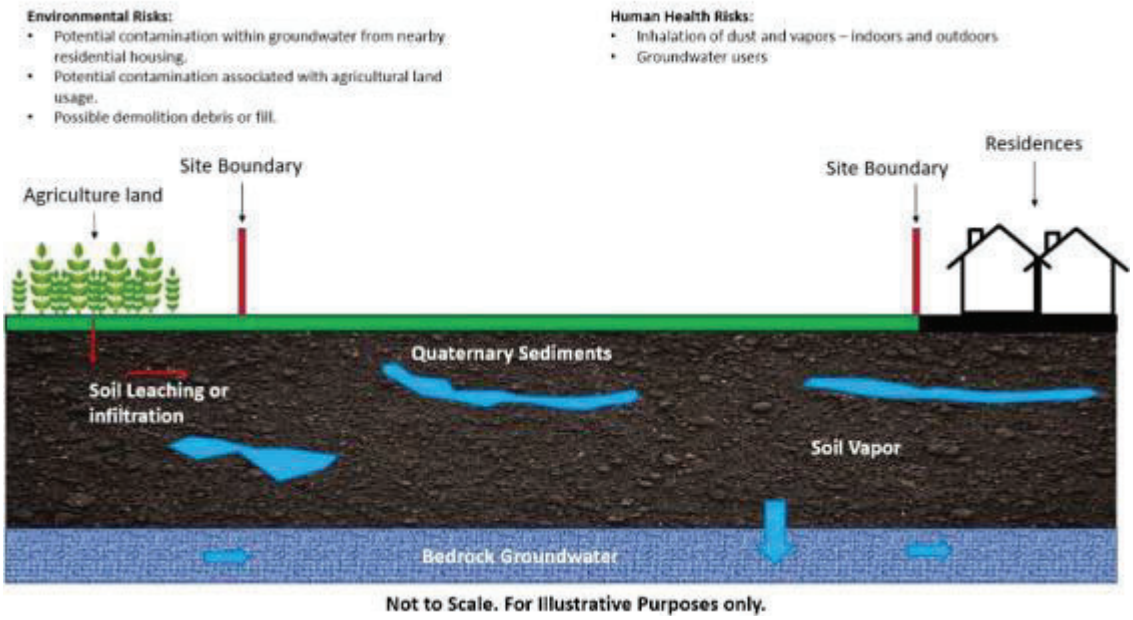
B. Receptors

- The bedrock aquifer constitutes a potential receptor;
- The surface water bodies in the area surrounding the site constitute receptors; and
- The surrounding land (buildings), soils, and geology constitute receptors.

C. Pathways

- Migration of contaminants from surface spills to land, soils, geology, groundwater, or surface water constitutes a potential pathway; and
- Migration of contaminated run-off (e.g., during the construction phase or operational phase) to groundwater, surface water, or surrounding geology constitutes a potential pathway.

Figure 6.13: Conceptual Site Model (CSM) based on existing site conditions



An environmental risk is only present when a pathway links a source with a receptor. The potential pollutant linkage CSM for the Ratoath SHD development is summarised in Table 6.3:

Table 6.3 CSM Pollutant Linkages - Geology and Groundwater

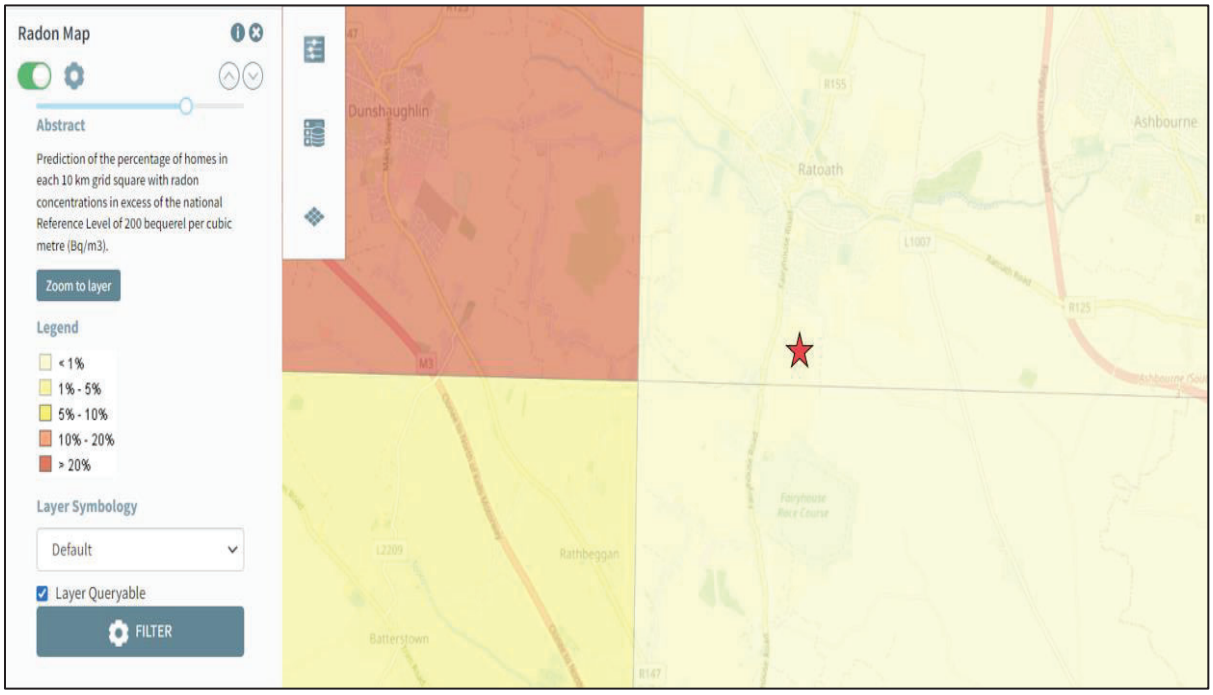
Source	Pathway	Receptor	Potentiel Polluant Linkage (Y/N)	Discussion
Deleterious materials stored on Site during construction	Migration of surface spills/ contaminated run-off	Surrounding Land/Soils or Groundwater in the bedrock aquifer	N	All materials stored on the Site will be subject to strict control measures and local containment measures (e.g., bunded tanks and wood pallets).
Contaminated run-off from construction activities			N	Generation of contaminated run-off will be reduced through the Construction Management Plan and control measures implemented during the construction phase.
Deleterious materials stored on Site during construction	Migration of surface spills/ contaminated run-off	Nearby waterbodies: Ratoath Stream 0.3km to the west of the site Fairyhouse Stream 0.3km to the west of the site	N	All materials stored on the Site will be subject to strict control measures and local containment measures (e.g. bunded tanks and pallets). There are roads and other infrastructure between the Site and the river water receptors. Appropriate setback and protection measures will be implemented to ensure no direct discharge to water bodies including the Ratoath Stream and the Fairyhouse Stream except were regulated under a Discharge Licence from the Regulating Authority.
Contaminated run-off from construction activities			N	Generation of contaminated run-off will be reduced through the Construction Management Plan and control measures implemented during the construction phase. Appropriate setback and protection measures to be implemented to ensure no direct discharge to watercourses except where regulated under a Discharge Licence from the Regulating Authority.
Potentially contaminated groundwater from the groundwater	Discharge into the public sewer	Nearby public sewers	N	The appointed dewatering contractor will be supplied where needed to facilitate the design of a pre-treatment system, if necessary. Hence, only

dewatering scheme				groundwater that meets the discharge license conditions will be discharged into the public sewer. Weekly sampling will be carried out and will be audited by the client's environmental consultant.
Lowering of the water table	Pumping of groundwater through dewatering wells and/or pits	Nearby buildings and/or water bodies	N	A detailed dewatering strategy will be developed for the Site to ensure to impacts beyond the site boundary.
Potential pesticide contamination of past use site as agricultural land or contamination related to demolition or fill materials associated with a historic structure on the site	Migration of potential contamination from the upper soils to the lower 'clean' soils and/ or bedrock	Surrounding Land/Soils or Groundwater in the bedrock aquifer	Y	Human exposure to potential contamination related to past site usage may occur through multiple exposure routes (oral, dermal, and inhalation). However, the low permeability of soils underlying the site will greatly reduce the risk ot migration of contamination to the bedrock aquifer. Soil and ground water sampling are required for assess the risk that potential contamination poses to human and the environment.

6.3.19. Radon

According to the EPA (now incorporating the Radiological Protection Institute of Ireland), less than one percent of the homes within the the Ratoath SHD development area that are estimated to have radon concentrations in excess of the national Reference Level of 200 becquerels per cubic meter (Bq/m3) as shown in Figure 6.14. This is the lowest possible radon classification. A High Radon Area is an area where it is predicted that 10% or more of homes will exceed the Reference Level.

Figure 6.14: Radon Map



Source: EPA, 2022; Site location indicated by the red star

6.3.20. Summary & Type of Geological/Hydrogeological Environment

Based on the regional and site-specific information available, the type of geological and/or hydrogeological environment as per the Institute of Geologists of Ireland (IGI) Guidelines is Type A – Passive geological and/or hydrogeological environment.

A summary of the site geology based on limited site investigation conducted by others in 2020 is outlined thus:

- The Ratoath development site is a greenfield and is currently used for agricultural purposes. The Site can be accessed from Glascarn Lane to the east and Fairyhouse Road to the west.
- There are no expected potential pollutant linkages associated with the construction or operation phases of the Site provided the mitigation measures in Table 6.4 are implemented.
- A high degree of consistency was found in the soils across the site.
- The topsoil was generally 200mm thick.
- The investigation indicated that topsoil overlies firm to stiff, brown gravelly CLAY which extended to approximately 2.0 mbGL. Slightly sandy clay was observed in one trial pit.
- Stiff to very stiff, grey-black gravelly CLAY was then encountered at a depth of 2.0 mbGL approximately 8.1 mbGL. Cobbles and the occasional boulders were encountered.
- Recovery below the gravelly clay layer was limited, but returns were identified as grey-black, sandy, cobbly gravel.
- From 10.0 to 16.5 mbGL alternating layers of gravel and sand were noted with some adverse ‘blowing’ noted in the fine sand layers.
- The Trial pit excavations were generally dry and stable, although a minor water seepage was noted at 2.20 meters in one trial pit. No other groundwater was encountered during the investigations.
- Groundwater level monitoring indicated water levels of 8.20 mbGL on 24/06/2020 and 1.74 mbGL on 14/07/2020 in one borehole on the site.
- In- Situ CBR by Plate Bearing Testing was carried out at 0.50 mbBGL. The CBR at Load Cycle from the 15 locations ranged from 3.0 to 21.5%; the CBR at Re-Load ranged from 4.4 to 45.1%.

6.4 Predicted Impacts

The predicted residual impacts of the proposal are outlined in the Detailed Assessment in Table 6.4.

6.4.1. Characteristics of the Proposed Development

The proposed Strategic Housing Development consists of a greenfield site located in Ratoath, County Meath. The 14.166a site is bounded by detatched houses and Glascarn Lane to the north; agricultural land to the south; agricultural lands and a house to the east; and Fairyhouse Road, detached houses, and agricultural land to the west.

The development will consist of the construction of 452 no. residential units consisting of two- and three-storey terraced houses, four-storey maisonette buildings, and six-storey apartment blocks with private and public open spaces. The development will include a crèche, four commercial/retail units, car and cycle parking, an extension to the Ratoath Outer Relief Road (RORR), internal roadways and pedestrian and cycle paths, and all necessary infrastructural works.

The entrances to the scheme will be from Fairyhouse Road to the west of the site and Glascarn Lane to the east. The extension to the RORR will link the existing Outer Relief Road at Ratoath College to the R155 – Fairyhouse Road. Upon completion, the RORR will link the R125 Swords-Ratoath-Dunshaughlin Road with the R155 Fairyhouse-Ratoath-Primatestown Road. The development also includes the construction of local shared streets and link roads.

6.4.2. Potential Impact of the Proposed Development

There are a number of effects on the geological and hydrogeological environments that will occur due to the proposed development, namely:

- Land take – change of use from agricultural to residential/commercial;
- Soil excavation – removal of soil for construction on the Site as well as limited excavation associated with lift sums, manholes, underground services, etc.
- Piling works, accidental spills, contaminated run-off, and/or contaminated groundwater discharged to sewer during the construction phase also have the potential to have an impact on the geology and hydrogeology of the Site and nearby land.

6.4.3. Construction Phase

In line with EIA guidance, each potential impact for the development should be described in terms of its Quality, Significance, Extent, Probability, and Duration. The potential impacts, mitigation measures, and resulting residual impacts have been combined in a Detailed Assessment Table in Table 6.4. The potential impacts are summarised below, and mitigation measures are presented in detail in Section 6.8. These impacts also relate to and interact with other chapters within the EIAR, specifically:

Chapter 4 Population and Human Health

Chapter 5 Biodiversity

Chapter 7 Water

Chapter 8 Air & Climate

Chapter 9 Noise and Vibration

Chapter 10 Material Assets: Built Services

Chapter 11 Traffic & Transportation

Chapter 12 Material Assets: Resource & Waste Management

Chapter 13 Cultural Heritage

Potential impacts expected to be encountered throughout the construction stage are as follows:

- Excavated and stripped soil can be disturbed and eroded by site vehicles during the construction phase. Rainfall and wind can also impact on non-vegetated/uncovered areas within the excavation or where the soil is stockpiled. This can lead to run-off with high suspended solid content which can impact water bodies. The potential risk from this indirect impact to water bodies and/or habitats from contaminated water would depend on the magnitude and duration of any water quality impact.
- There is a potential for dust from excavations or stockpiles to impact air quality. This is discussed further in Chapter 8 Air Quality and Climate.
- Construction phase dewatering may be required to maintain dry working conditions within excavations (due to rainfall and potential groundwater ingress). Pumped water will require discharge offsite (discharge to sewer).
- Noise and vibration will be generated through the construction phase, particularly during excavation works. Given that no rock excavation is required, it is anticipated that conventional excavation techniques (i.e. hard digging) will suffice. Noise and vibration impacts are considered in detail in Chapter 9, Noise and Vibration.
- The construction phase and any import or export of material to or from the Site (as part of excavation or infilling works) will have implications for traffic on the surrounding road network. These impacts are considered further in Chapter 10, Material Assets: Traffic.
- As with all construction projects, there is potential for water (surface water and/or groundwater) to become contaminated with pollutants associated with construction activity. Contaminated water which arises from construction sites can pose a significant short-term risk to groundwater quality for the duration of the construction if contaminated water is allowed to percolate to the aquifer. The potential main contaminants include:
    - Suspended solids (muddy water with increased turbidity) – arising from excavation and ground disturbance;
    - Cement/concrete (increased turbidity and pH) – arising from construction materials;
    - Hydrocarbons (ecotoxic) – accidental spillages from construction plant or onsite storage; and
    - Wastewater (nutrient and microbial rich) – arising from poor on-site toilet and washroom facilities.

6.4.4. Operational Phase

During the Operational Phase of the Ratoath development, there will be limited impact on the geological environment of the area. There is no requirement for any fuel oil stores as all heating will the fuelled by electrically powered hea.

6.5 Potential Cumulative Impact

The cumulative impacts take into account the combined effects of the proposed development and other proposed projects in the surrounding area. Cumulative impacts occur as a result of actions taking place in the same area and within the same timeframe as the proposed development.

This cumulative assessment assumes that the following extant planning permissions will be completed:

- (MCC reg. ref. RA150993) for a a housing development (128 dwellings) and ancillary works including the construction of a portion of an Outer Relief Road at Jamestown, Ratoath & Tankardstown Townlands situated approximately 0.62km northeast of the Site.
- (MCC reg. ref. SHD0009/20) for an amendment to the link road junction accessing Ratoath College on that portion of the Ratoath Outer Relief Road as approved under planning permission Ref. No. PL17.247003/ RA150993. The amendment a proposed seeks to modigy the approved but not yet constructed roundabout to now be a T-junction, including all associated ancillary site development works, all within the townlands of Jamestown, Ratoath, and Tankardstown and situated approximately 0.62km northeast of the Site.

- (MCC reg. ref. RA160101) for the demolition 3 no. detached houses and development of 19 new homes and associated site development works at The Milk Tree, Ratoath situated approximately 0.9km north of the Site.
- (MCC reg. ref. DA101258) for the change of house type from that previously granted under Register Reference No. DA/50537 to 3 No., three bed, detached dwellings and all associated site development works at Fox Lodge, Ratoath situated approximately 1.2km north of the Site
- (MCC reg. ref. DA120765) for the extension of duration of planning permission Ref. No. DA/70037 - housing development (286 dwellings) and ancillary site development worksouse type from that previously granted under Register Reference No. DA/50537 to 3 No., three bed, detached dwellings and all associated site development works at Jamestown, Raystown, and Tankardstown, Ratoath situated approximately 0.5km northeast of the Site.
- MCC reg. ref. 3051965) for the development comprising of 228 No. Residential Units, a childcare facility and all other ancillary site development works at Jamestown, Ratoath situated 0.6km northeast of the Site.

The residual impact from these developments on land and soils was determined to be negative, imperceptible, and permanent.

6.6 Do Nothing Scenario

6.6.1. Do Nothing Scenario of Predicted Impacts

In the 'Do Nothing' scenario, if the construction of the development at the Ratoath site does not take place, the existing baseline conditions will remain within the subject site and there would be no resulting additional impacts on land and soils.

6.6.2. 'Do Nothing' Scenario for Human Health

A ‘do-nothing’ scenario is not considered valid as the lands are currently zoned as A2 - New Residential - under Meath County Councils Development Plan 2021-2027. However, if a do-nothing scenario were to occur, the lands would not be developed, and there would be no adverse impacts to human health. In the event that the proposed project does not proceed, the lands would remain in their current condition in the short-term or until alternative development proposals are granted planning permission.

6.6.3. 'Do Nothing' Scenario of Residual Impacts

If the development does not progress, there would be no resulting additional impacts on the geological/hydrogeological environment in the area of the project site.

6.7 Risks to Human Health

The new development will provide new housing for both the locals and in line with the expected rise in the Irish population. No potential significant impacts on human health are predicted.

6.7.1. Construction Phase Risks

Construction phase risks to human health are primarily associated with the accidental release of contaminants or impacted runoff. However, control measures undertaken during the site development will be implemented to ensure that such releases do not occur.

6.7.2. Operation Phase Risks

No operational phase risks to human health are anticipated. The site will be heated using electically powered heat pumps, so there is no anticipated on-site storage of fuels.

6.8 Mitigation Measures

This section describes a range of recommendations and mitigation measures designed to avoid, reduce, or offset any potential adverse geological impacts identified.

6.8.1. Construction Phase Mitigation

To reduce the impacts on the soils, geology, and the hydrogeological environment, a number of mitigation measures will be adopted as part of the construction works on the Site. The measures will address the main activities of potential impact which include:

- Control of Soil Excavation and Export from Site;
- Sources of fill and aggregates for the project;
- Fuel and chemical handling, transport, and storage; and
- Control of water during construction.

6.8.2. Control of Soil Excavation

Topsoil and subsoil will be excavated to facilitate the development, the construction of new sewer and water mains connections, roadways, and all other associated services. The project will incorporate the 'reduce, reuse, and recycle' approach in terms of soil excavations on Site. The construction will be carefully planned to ensure only required materials will be excavated with as much material left in situ as possible. All excavation arisings will be reused on Site where possible/if suitable.

Soil stripping, earthworks, and stockpiling of soil will be carried out during the works. Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be mitigated through the implementation of an appropriate earthworks handling protocol during construction. It is anticipated that any stockpiles will be formed within the boundary of the excavation, and there will be no direct link or pathway from this area to any surface water body. It is anticipated that only local/low level of stockpiling will occur as the bulk of the material will be excavated either straight into trucks for transport off-Site or will be reused in other areas of the Site as fill.

Dust suppression measures (e.g. damping down during dry periods), vehicle wheel washes, road sweeping, and general housekeeping will ensure that the surrounding environment is free of nuisance dust and dirt on roads.

6.8.3. Export of material from Site

Where material cannot be reused off-Site, it will be sent for recovery/disposal at an appropriately permitted/licensed site. This will be discussed further in the Construction and Demolition Waste Management Plan. All material will be managed according to the applicable Waste Management Acts and subsequent regulations.

Further details are included in the Construction Management Plan and the Construction and Demolition Waste Management Plan.

6.8.4. Sources of Fill and Aggregates

All fill and aggregate for the project will be sourced from reputable suppliers as per the project Contract and Procurement Procedures. All suppliers will be vetted for:

- Aggregate compliance certificates/declarations of conformity for the classes of the material specified for the project;
- Environmental management status; and
- Regulatory and legal compliance status.

The use of fill and aggregate containing recycled or recovered materials shall be considered.

6.8.5. Fuel and Chemical Handling

The following mitigation measures will be taken at the construction site to prevent any spillages to the ground of fuels and prevent any resulting soil and/or groundwater quality impacts:

The following procedures will be implemented at designated bunded refueling areas on the Site (if required):

- Provision of spill kit facilities across the Site;
- Where mobile fuel bowsers are used, the following measures will be taken:
  - Any flexible pipe, pump, tap, or valve will be fitted with a lock and will be secured when not in use;
  - All bowser units to carry a spill kit, and operatives must have spill response training; and
  - Portable generators or similar static operation, fuel-containing equipment will be placed on suitable drip trays.
- In the case of drummed fuel or other potentially polluting substances being used during construction, the following measures will be adopted:
  - Secure storage of all containers of potentially polluting substances in a dedicated, internally-bunded chemical storage unit or inside concrete bunded areas;
  - Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
  - All drums to be quality approved and manufactured to a recognised standard;
  - If drums are to be moved around the Site, they should be done so secured and on spill pallets; and
  - Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.

The aforementioned list of measures is non-exhaustive and will be included in the Construction Management Plan.

6.8.6. Control of Water during Construction

Run-off from excavations/earthworks cannot be prevented entirely and is largely a function of the prevailing weather conditions. Earthwork operations will be carried out such that surfaces, as they are being raised, shall be designed with adequate drainage, falls, and profile to control run-off and prevent ponding and flowing. Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts. All runoff will be prevented from directly entering any watercourses.

During excavation, water ingress or collection within localised excavations is possible. Pumping of this water would be required to keep the excavation dry. Any discharge of water to the foul sewer during the construction phase would be regulated under a Discharge Licence obtained from the Regulator (Irish Water) and issued under the Water Pollution Act. Attenuation, pre-treatment, and monitoring of discharge water will likely be required under any Discharge Licence (Section 16 Licence). Pre-treatment and silt reduction measures on the Site will include a combination of silt fencing, settlement measures (silt traps, silt sacks, and settlement tanks), and hydrocarbon interceptors. Active treatment systems such as Siltbusters or similar may be required depending on turbidity levels and discharge limits. Qualitative and quantitative monitoring will be implemented as per the Conditions of any Discharge Licence. The client's environmental consultant will audit the sampling and analysis results as required to ensure conformance to the discharge licence limits and testing frequency requirements.

6.8.7. Construction Management Plan

In advance of the commencement of Site works, the works Contractor will provide a Construction Methodology document detailing their proposed construction methods and any additional requirements of the Design Team or Planning Regulator. The Contractor will also prepare a Construction Management Plan (CMP) and Environmental Plan. The CMP sets out the overarching vision of how the construction of the project will be managed in a safe and organised manner by the Contractor with the oversight of the Developer. The CMP is a living document and will go through a number of iterations before works commence and during the construction phase itself. It will set out requirements and standards which must be met during the construction stage and will include the relevant mitigation measures in the EIAR and any subsequent conditions relevant to the project.

6.8.8. Operational Phase Mitigation

During the operational phase of the Ratoath development, any excavations have the potential for an unavoidable impact on the geological environment of the area. However, as there will be no basements

associated with the development, these excavations will be shallow and unlikely to cause significant impact requiring mitigation. The proposed scheme will have a heating system which will be fuelled by electrically powered heat pumps; therefore, there is no requirement for fuel oil storage thereby removing any potential contamination source.

6.9 Residual Impacts

The predicted residual impacts of the proposal are outlined in the Detailed Assessment in Table 6.4.

6.9.1. Construction Phase

The predicted impacts of the construction phase are described in Table 6.5 in terms of quality, significance, extent, likelihood, and duration. The relevant mitigation measures are detailed, and the residual impacts are determined, taking into account the mitigation measures.

The primary residual impacts from the construction phase are the land take/change of use and the removal of soil to facilitate the development. These impacts are unavoidable given the nature, requirement, and design of the proposed development. The construction impact is assessed to be a slight, negative, short-term impact.

Table 6.4 Impact Determination At Construction Phase

Constraint		Impact Assessment							
Activity/ Source	**Construction Element**	**Impact Description**	**Quality**	**Significance**	**Extent**	**Likelihood**	**Duration**	**Mitigation**	**Residual Impact**
Earthworks	Excavation Construction	Excavation of natural soils for development, services, etc.	Negative	Moderate	Local	Certain	Permanent	The project has been designed to construct on the minimum amount of space. Material will be reused on-site where possible.	Moderate Negative
Earthworks	Excavation	Soil erosion causing airborne dust and/or nuisance dust on public roads and neighbouring properties	Negative	Slight	Local	Unlikely	Short-term	Dust suppression measures will be implemented to minimise dust generation during extended dry periods. Dust monitoring will be conducted throughout the excavation period. Vehicle wheel wash facilities will be installed at site exits, and a road sweeping programme will be implemented.	Imperceptible negative
Earthworks Altering Groundwater/ Surface water	Excavation Construction	Imported fill and aggregates will be required during the works	Negative	Slight - Moderate	Local (may be a number of quarry sites)	Likely	Permanent	Contract and Procurement Procedures will ensure that all aggregates and fill material required for the construction are sourced from reputable suppliers. Declarations of conformity/ compliance certificates will be required to ensure all aggregates	Imperceptible negative

Constraint		Impact Assessment							
Activity/ Source	**Construction Element**	**Impact Description**	**Quality**	**Significance**	**Extent**	**Likelihood**	**Duration**	**Mitigation**	**Residual Impact**
								meet the engineering specifications.	
Dewatering/ Lowering the water table	Excavation Construction	Discharge of potentially contaminated groundwater to sewer; possible settlement of buildings as a result of dewatering	Negative	Slight	Local - may be a number of near by buildings	Unlikely	Short-term	Dewatering contractor to be provided where it is needed, depending on conditions found on site and the excavation depth.	Imperceptible negative
Storage of potentially polluting materials	Site Clearance, Excavation, and General Construction	Potential leak or spillage from construction-related liquids on site	Negative	Significant	Local	Unlikely	Short-term	Good housekeeping and proper handling, storage, and disposal of any potentially polluting substances can prevent soil and/or water contamination. Designated and bunded storage areas will be maintained.	Imperceptible negative
Discharge to Groundwater	Excavation and General Construction	Potentially contaminated run-off percolating to ground and the underlying aquifer	Negative	Significant	Local	Unlikely	Short-term	There will be no direct discharge to groundwater during construction. Indirect discharges to the underlying bedrock aquifer may occur increasing the aquifer vulnerability as subsoil is removed	Imperceptible negative

Constraint		Impact Assessment							
Activity/ Source	**Construction Element**	**Impact Description**	**Quality**	**Significance**	**Extent**	**Likelihood**	**Duration**	**Mitigation**	**Residual Impact**
								from site. Protection of groundwater from potentially polluting substances will be dealt with through measures including correct handling and storage of potentially polluting substances.	

6.9.2. Operational Phase

During the Operational Phase of the Ratoath development, there will be no predicted impact on the geological environment of the area. There is no requirement for any fuel oil stores as all heating will be fuelled by electrically powered heat pumps. The residual impact is assessed to be a slight negative, imperceptible, permanent impact.

6.10 Monitoring

Monitoring shall be carried out as specified in any water Discharge Licence associated with the construction phase of the project. Monitoring of dust and noise shall also be carried out as specified in the planning permission should the development be allowed to proceed.

On-site pre-treatment of groundwater prior to discharge to sewer might be required dependent on groundwater chemistry results. This will be confirmed by the appointed dewatering contractor. Any water discharged to the public sewer will be monitored frequently to ensure it meets the limits stipulated by the discharge licence.

Record keeping and monitoring of the import and export of soils shall be carried out in accordance with the Waste Management Act. All waste hauliers and receiving facilities shall have valid permits in accordance with the Waste Management Acts and Planning Conditions.

There is no requirement for monitoring during the operational phase.

6.10.1. Interactions

During the construction phase, the following aspects would interact with land & soils and, in the absence of mitigation, may give rise to likely significant effects;

Site preparatory works (i.e. site clearance, re-profiling, etc.) during the construction stage can potentially impact the land & soils due to the risk of accidental spills, cross-contamination due to incorrect waste soils management, use of contaminated material as fill, etc.

During the operational phase, the potential interactions are;

Accidental Leaking of sewage, fuel, etc

The potential significant impacts on land and soils arising from these interactions have been considered and mitigation measures outlined where required. With mitigation measures in place, no significant permanent residual negative impacts are likely to occur.

6.11 Difficulties Encountered

No exceptional difficulties were experienced in compiling this EIAR.

6.12 References

- Clarke, A., Parkes, M., and Gatley, S. (2007) The Geological Heritage of Meath - An audit of County Geological Sites in Meath
- Environmental Protection Agency (2017). Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft)
- Environmental Protection Agency Envision Data Viewer: http://gis.epa.ie/Envision
- Geological Survey of Ireland - Groundwater bodies - Swords GWB: Summary of Initial Characterisation https://www.gsi.ie/en-ie/programmes-andprojects/groundwater/activities/understanding-ireland-groundwater/Pages/Groundwater-bodies.aspx
- Geological Survey of Ireland Geotechnical Data Viewer https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228
- Geological Survey of Ireland Geotechnical Database (Reports No 6,226 and 2,398)
- IGSL Ltd (2005) 'Report on a site Investigation At Tattersalls, Fairyhouse On behalf of Declan Collier'
- IGSL Ltd (2020) 'Site Investigation Report Housing development Ratoath County Meath'
- Institute of Geologists of Ireland (2013) Guidelines for the Preparation of Soils, Geology, and Hydrogeology Chapters of Environmental Impact Statements.
- OCSC (2022) 'Engineering Services Report Residential Development At Ratoath For Beo Properties Ltd.'

7. Water

7.1 Introduction

This chapter was completed by O'Connor Sutton Cronin and Associates Limited (OCSC). It evaluated the potential impacts of the proposed development on water and hydrological aspects of the site and surrounding area during the construction and operational phases.

7.1.1 Author Information

The chapter was prepared following the EPA guidance documents, "*Advice notes on current practice (in the preparation of Environmental Impact Statements)*" and "*Guidelines in the information to be contained in Environmental Impact Statements*."

This chapter was prepared by Sinéad Doran (BSc EnvSci), Kate Santos (EnvEng, HDipCompSci); reviewed by Glenda Barry (BSc MSc) and approved by Eleanor Burke (BSc, MSc, DAS, CSci, MIEnvSc), OCSC Environmental Division Manager, Chartered Scientist, and Member of the Institution of Environmental Sciences.

7.1.2 Consultation

This chapter was prepared in coordination with the details outlined in Chapter 5 – Biodiversity; Chapter 6 – Land and Soils; and Chapter 12 Material Assets – Resource & Waste Management.

OCSC engaged with Irish Water to prepare the application through the Pre-Connection Enquiry process. As a result, Irish Water has provided a Confirmation of Feasibility for the proposed development and confirmed it as feasible without the requirement of upgrade works. i.e., no adverse impact.

7.2 Methodology

7.2.1 Scoping

An initial assessment was carried out, which defined the project in terms of location, type, and scale and established the baseline conditions, the hydrological environment, the activities associated with the project, and initial assessment and impact determination. These objectives were achieved by way of a desk study. Additional information has been compiled through consultation and feedback from stakeholders and the Design Team.

Under the Water Framework Directive (WFD) and corresponding Regulations, the water quality of Ireland's surface and groundwater is assessed biologically, physically, and chemically. Assessments are conducted by the EPA and Local Authorities and have been compiled and presented in a standardised manner for River Basin Districts. Baseline information on the local and regional surface water bodies, their status, and threats were obtained from a range of documents and online sources, including the EPA's Water Quality database, Ireland's Water Framework Directive "Water Matters" online resource, and the Eastern River Basin District (ERBD) website and reports.

7.2.2 Detailed Methodology

Water Infrastructure Services

Assessment of existing and proposed infrastructure for wastewater drainage, water supply, and surface water drainage was conducted in accordance with I.S. EN752: 2017 'Drain & Sewer Systems outside Buildings', 'The Greater Dublin Region Code of Practice for Drainage Works' (GDRCOP), 'Irish Water's Code of Practice for Wastewater Infrastructure', Irish Water's IW-CDS-5030-03 Revision 2, the recommendations of the 'Greater Dublin Strategic Drainage Study', (GDSDS), and the 'Institute of Hydrology Report 124 (IH 124) method'.

The OCSC Engineering Services Report (ESR) estimates the wastewater drainage effluent and the water demand calculated using Irish Water's Code of Practice for Wastewater Infrastructure and the

Irish Water's Code of Practice for Water Infrastructure. In addition, the OCSC ESR contains existing record drawings for the combined drainage network and water supply network for the area surrounding the subject lands obtained from Irish Water, and online GIS mapping from Geological Survey Ireland (GSI).

Allowable surface water runoff from the development site has been calculated on the OCSC ESR using the 'CIRIA C753 – The SuDS Manual' and the 'Greater Dublin Strategic Drainage Study' (GDSDS) in accordance with Dublin City Council Development Plan requirements to estimate existing greenfield runoff rates.

A Pre-Commencement Enquiry Form was submitted to Irish Water to assess the potential impact of the proposed development on the existing public wastewater infrastructure and water supply based on estimated occupancy as per their guidance documents. As a result, Irish Water has provided a Confirmation of Feasibility for the proposed development indicating that it is feasible without the requirement of upgrade works, i.e., no adverse impact.

OCSC Consulting Engineers has prepared a Site-Specific Flood Risk Assessment (FRA) submitted with this application under separate cover. This assessment considered flood risk to the proposed development from all potential sources and its possible impact on flood risk during the critical 1 in 10, 100, and 1,000-year storm events. Relevant sources/mechanisms of flooding include tidal/coastal, fluvial, pluvial, existing drainage and water infrastructure, proposed drainage and water infrastructure, and groundwater.

The flood risk assessment was conducted following the Planning System and Flood Risk Management Guidelines for Planning Authorities (Department of Environment, Heritage and Local Government and the Office of Public Works), C624 Development and Flood Risk (Construction Industry Research and Information Association, CIRIA). This assessment was aligned with Meath County Development Plan 2021-2027. Record information on the existing infrastructure was obtained from Meath County Council and Irish Water.

Information on all services was obtained from the topographical site survey, site inspections, OCSC Engineering services report, and Irish Water and Ordnance Survey Ireland mapping. These are discussed in Chapter 12 Material Assets – Resource & Waste Management, and the OCSC ESR, which accompanies this application.

7.3 Baseline Environment

The proposed development site consists of a 14.166ha greenfield site located south of Ratoath, County Meath and northwest of Dublin City centre. The Site is bounded by detached houses and Glascarn Lane to the north; agricultural land to the south; agricultural lands and a house to the east; and Fairyhouse Road, detached houses, and agricultural land to the west.

According to Meath County Council's Development Plan 2021-2027, the Site is located in the Local Authority Zone of A2 - New Residential. The Local Authority Zone description for the Site is 'To provide for new residential communities with ancillary community facilities, neighbourhood facilities, and employment uses as considered appropriate for the status of the centre in the Settlement Hierarchy'.

7.3.1 Regional Hydrology

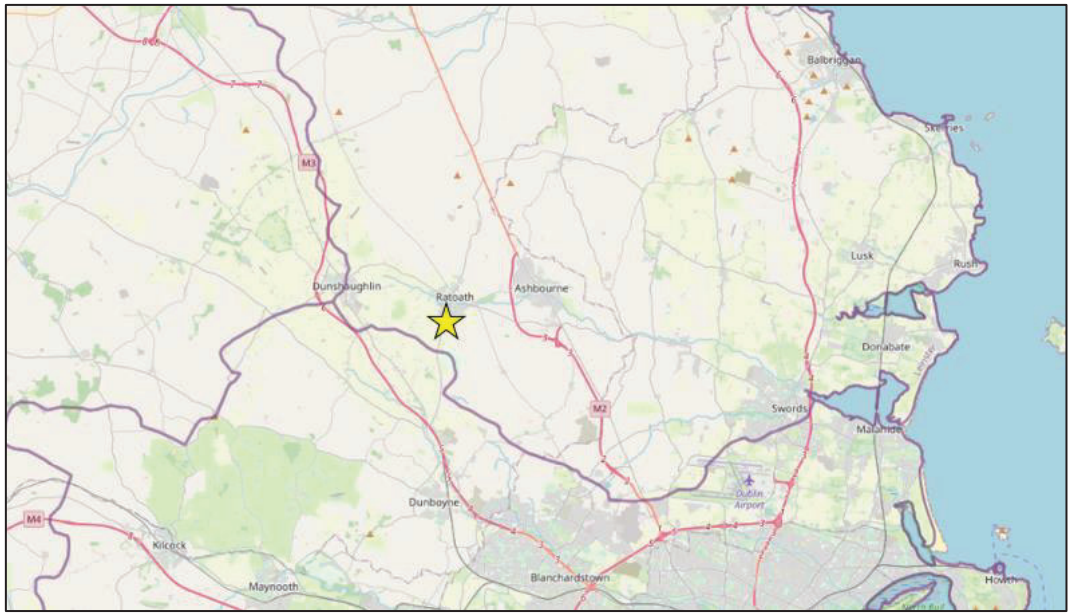
The site lies within the Eastern River Basin District (ERBD). The ERBD covers a large area (c. 6,300 km2) extending from parts of Co. Cavan in the north to south Wicklow and from parts of Co. Westmeath to the Irish Sea. The main river catchments in the ERBD are the Boyne, the Nanny/Delvin, the Liffey, and the Avoca/Vartry.

The district is further divided into Hydrometric Areas (H.A.), and the site lies within Fingal East Meath district HA08, which is the catchment draining to the north-western Irish Sea. The HA08 is drained by the Rivers Nanny and Delvin and by all streams that enter tidal water between Mornington Point and Sea Mount, Co. Dublin and drains an area of 711km². The largest urban centre in the catchment is Swords. This catchment's other main urban centres are Donabate, Lusk, Skerries, Balbriggan,

Stamullin, Laytown, Bettystown, Duleek, Ashbourne, Ratoath, and Dunshaughlin. The total population of the catchment is approximately 159,230, with a population density of 224 people per km² (EPA, 2021). The significant pressure affecting the greatest number of water bodies in this catchment is agriculture, followed by hydromorphology, urban wastewater, domestic wastewater, urban run-off, industry, and mines and quarries.

The location of the Site within the Fingal East Meath Hydometric Area is shown in Figure 7.1.

Figure 7.1: Hydrometric Areas



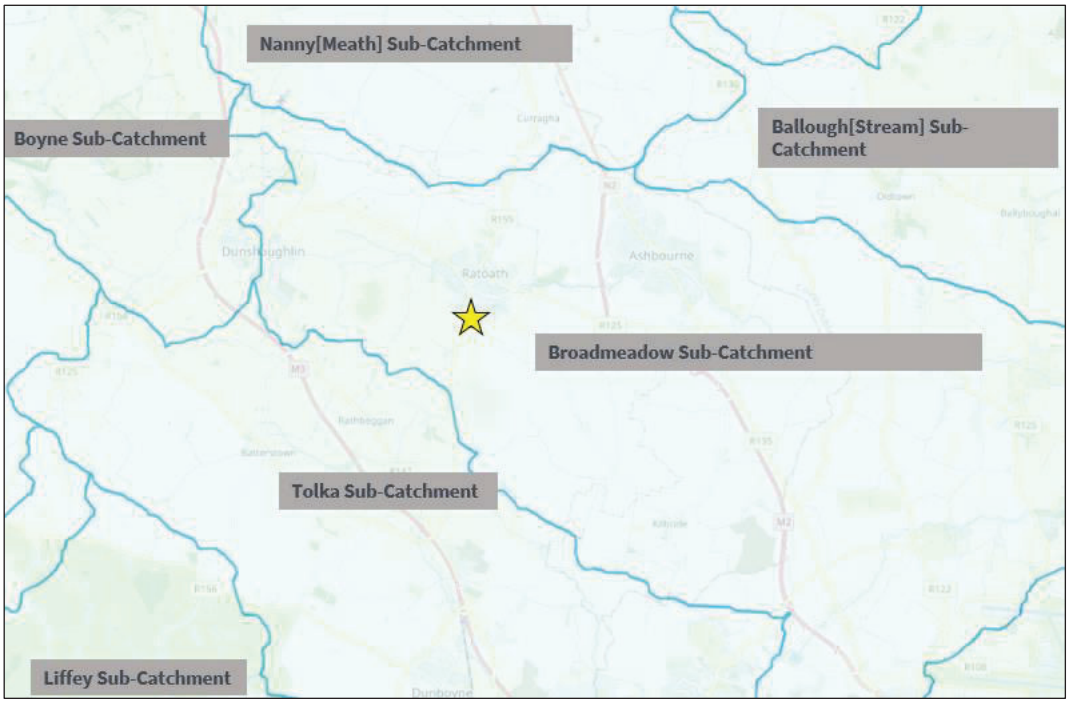
Source: EPA, 2022; Site location shown by yellow star

The Site is located within three sub-basins of HA08: Ratoath Stream, Fairyhouse Stream, and the Broadmeadow River. The Broadmeadow River is part of the Broadmeadow sub-catchment (Broadmeadow_SC_010) that pertains to Swords Broadmeadow Estuary. It rises near Ratoath and flows in an easterly direction through Ashbourne and Rowlestown, eventually flowing into the Broadmeadow Water, north of Swords. The Dunshaughlin Stream enters the Broadmeadow River upstream of Ashbourne, while the Fairyhouse Stream enters the river downstream of the town. (Local Authority Water Programme, 2019). The Broadmeadow River flows for 25 km through Co. Meath and northern Co. Dublin before entering the Irish Sea at Broadmeadow Estuary. The Nanny-Delvin catchment is 711km2.

The Broadmeadow sub-catchment has a Poor 2013-2018 ecological status with elevated orthophosphate and ammonia. The Ratoath Stream and Fairyhouse Stream both have 'Poor' ecological status and impacted supporting nutrient conditions with elevated orthophosphate. Ammonia is also elevated in Ratoath Stream, and dissolved oxygen levels fail for the Fairyhouse Stream (WFD Application a, 2018).

The location of the Site within the Broadmeadow Sub-Catchment is shown in Figure 7.2.

Figure 7.2: WFD SubCatchments

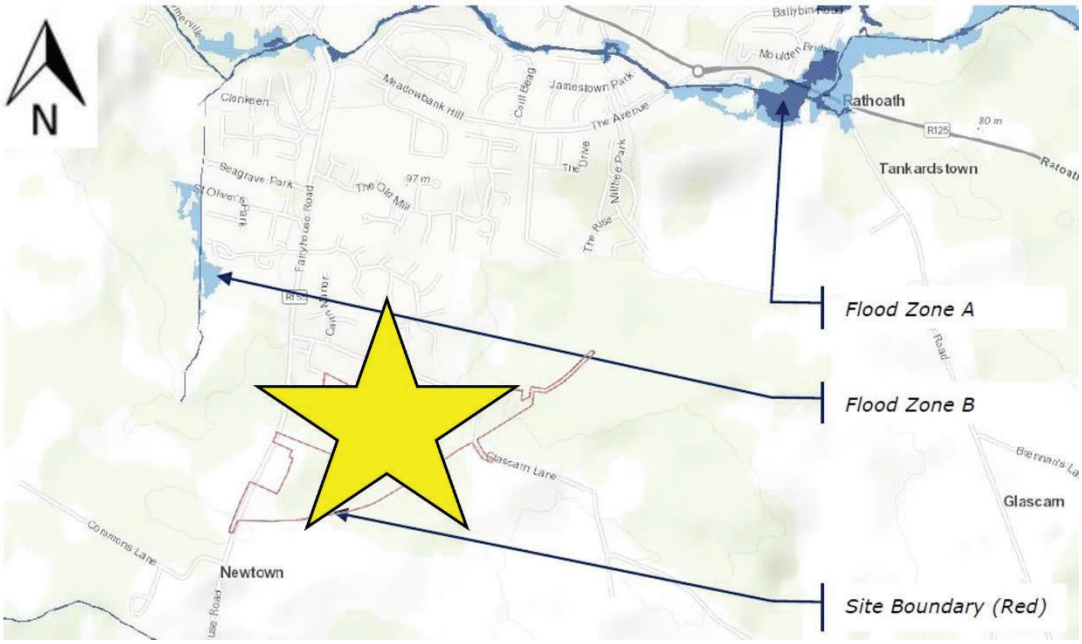


Source: EPA, 2022; Site location shown by yellow star

Based on the GSI website, the aquifer beneath the Site is 'Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones'. The groundwater vulnerability beneath the proposed Site is Low. The effective rainfall in the vicinity of the Ratoath site is 377.600mm/year. The GSI has designated the recharge coefficient in the immediate area of the Site as 7.50%. Based on the GSI's Recharge Model, the total recharge would be equivalent to approximately 28 mm/year.

The site and its vicinity are located in Flood Zone C and are not at risk of fluvial flooding. There have been no records of flooding found for the site vicinity (Meath County Council, 2019). There are no flooding issues within the site and its immediately surrounding area, but Bradystown Stream to the west of the site is located in a flood Zone B, while Ratoath Stream to the north is located in a flood zone A (OPW, 2016). In Ratoath, Broadmeadow River is an area where a flood relief scheme can be found. See Figure 7.3 for the Site location relative to Flood Zones.

Figure 7.3: Flood Zones



Source: OCSC FRA Report, 2021

Malahide Estuary (also known as Broadmeadow or Swords Estuary) is situated in north Co. Dublin between the towns of Malahide and Swords. The estuary is bisected by a railway viaduct built in the 1800s, which creates an inner and outer site (NPWS, 2013). The inner estuary of the Broadmeadow Estuary covers an area of 3.3km² and is located approximately 15km north of Dublin City. The Broadmeadow River rises in Dunshaughlin and travels to Broadmeadow Estuary, which drains to the Malahide Estuary prior to discharging to the Irish Sea (Fingal County Council, 2019). For WFD assessment and classification, the estuary is considered of poor status for a transitional waterbody.

Agricultural Areas dominate the Broadmeadow Estuary land use to the north and south. These include Heterogeneous agricultural areas, Pastures, and Arable land. Land to the west and southwest of the estuary is dominated by Artificial Surfaces from Urban fabric to Industrial, commercial, and transport units. A bridge on the M1 Motorway crosses the estuary and covers some saltmarsh habitats. The estuary is bisected by a railway causeway which restricts the tidal flow between the inner and outer estuary, thus creating an artificial brackish "lagoon" west of the railway (NPWS, 2013).

The Broadmeadow Estuary is a transitional waterbody with a water level of 9.722 mOD, last taken in 2020 (OPW, 2020). The WFD report (2013-2018) for this transitional waterbody classifies the overall status as 'Poor' based on general physico-chemical elements, fish, phytoplankton, and macroalgal growths with an objective to achieve good status by 2027. The main threat to the waterbody is excess nutrients entering surface waters. Diffuse urban pressures caused by misconnections, leaking sewers, and runoff from paved and unpaved areas are also a threat. It has been noted that the estuary has high recorded salinity levels indicating that the sea exerts a greater influence on this water body than freshwater from the river (Inland Fisheries Ireland, 2010). The catchment is currently 'At risk' under the WFD due to discharge pressures from domestic wastewater (WFD Application b, 2018).

The Broadmeadow Estuary has been designated as a European Site under the Habitat's Directive where it is classified as part of the Malahide Estuary with the following designations:

- Malahide Estuary Special Area of Conservation (SAC) (000205)
- Malahide Estuary Special Protection Area (SPA) (004025)
- Malahide Estuary Proposed Natural Heritage Area (pNHA) (000205)

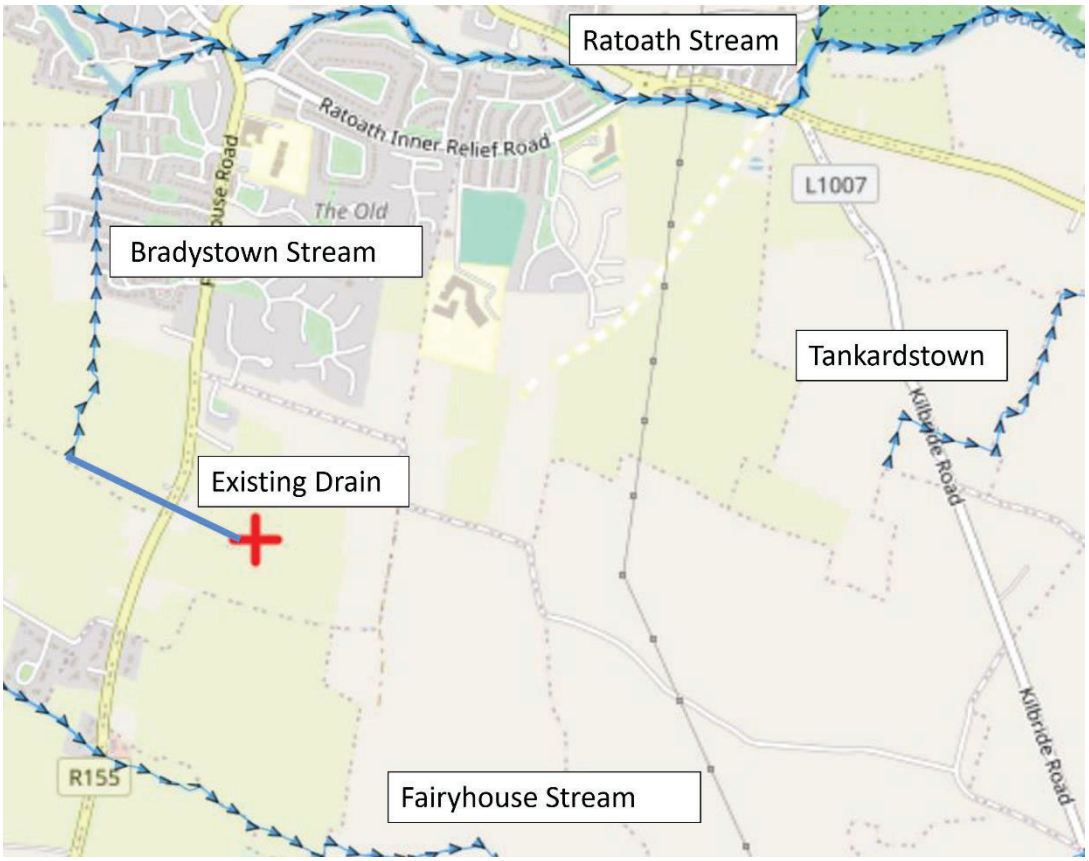
Other nearby European sites include the following:

- Rogerstown Estuary is located 3km north of Broadmeadow Estuary and is classified as a SAC, SPA, and pNHA
- Baldoyle Bay is located 4km south of the site and is classified as a SAC, SPA, and pNHA.

7.3.2 Local Hydrology

The Fairyhouse Stream is location 0.6km south of the Site; the Bradystown Stream is 0.3km west of the Site; and Ratoath Stream is situated 1km north of the Site and Tankardstown stream located over 1km to the east as shown in Figure 7.4. There are no watercourses within or adjacent to the site boundary. There is an existing drainage ditch onsite, the Site is not located in an area which benefits from an Office of Public Works Arterial Scheme.

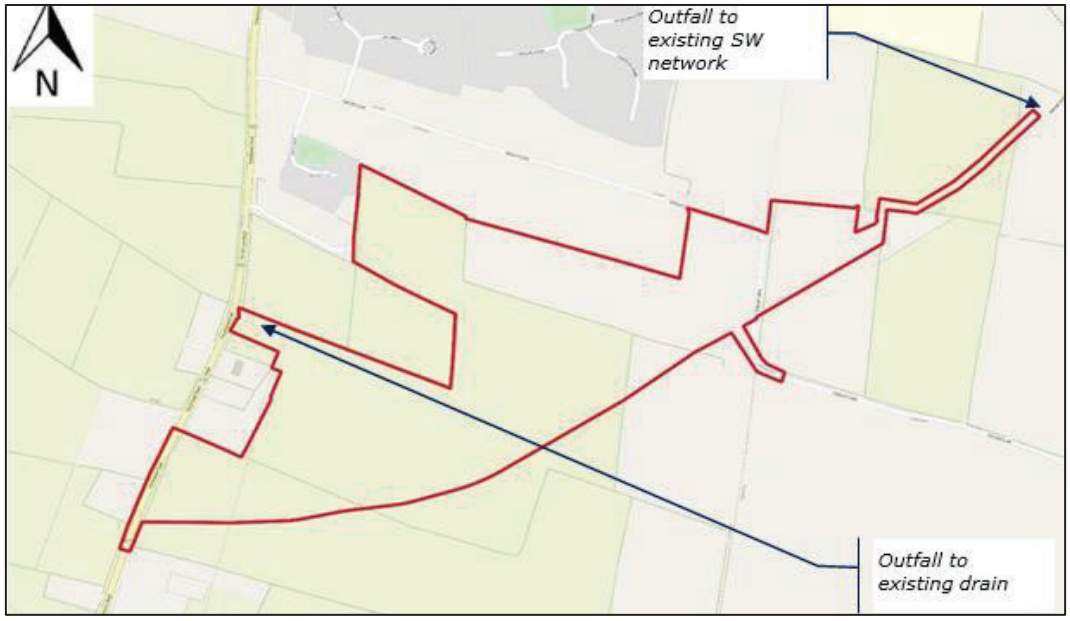
Figure 7.4: Location of Nearby Streams/River



Source: EPA, 2022

The catchment area for the surface water network is 14.8 ha which includes the subject development and additional land to the west. The site is located within two surface water catchment areas with all surface water runoff on the Site currently draining to onsite drainage ditches. The two catchment areas within the Site are separated by a surface water drain. The northern catchment drains in a northerly direction. The southern catchment drains to the ditch which forms the catchment boundary. From there it flows to the west the Fairyhouse Road and toward the Ratoath Stream. The locations of the proposed surface water outfalls from these two catchment areas within the Site are shown on Figure 7.5.

Figure 7.5: Proposed Surface Water Outfalls



Source: OCSC Engineer Services Report, 2021

There is minimal surface water infrastructure in the vicinity of the proposed site. As discussed above, a drainage ditch running east to west within the site boundary currently drains a portion of the Site. In addition, there is a surface water network constructed as part of the Ratoath Outer Relief Road to the northeast of the proposed development. The outfall on the northeast corner of the site as shown on Figure 7.5 will discharge to this network which has been sized to accommodate greenfield runoff flows from upstream catchment areas. This network discharges attenuated flows to adjacent streams via an attenuation pond.

The OCSC ESR states that infiltration tests were attempted at four locations across the Site and that there was no fall in water recorded during the tests. The Report states the existing ground has low permeability in the clay soils.

According Met Éireann, the Standard Average Annual Rainfall (SAAR) value for the development site is 842mm.

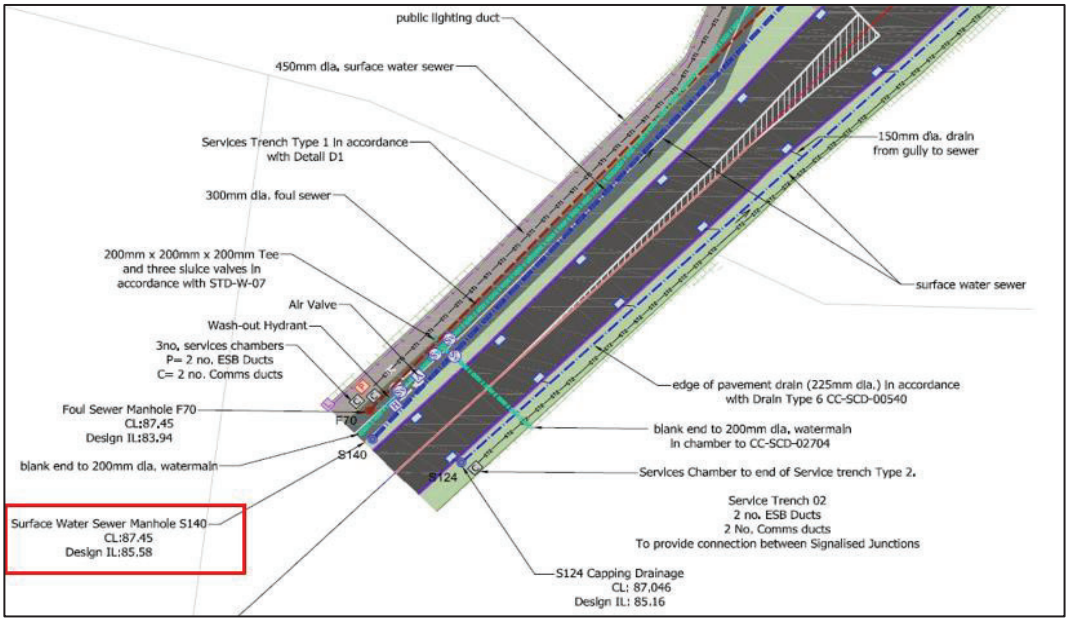
The OCSC ESR estimated that the rainfall-runoff discharging from the portion of the greenfield site that is to be developed (i.e. c. 12.34ha of the overall c. 14.8ha) is QBARRURAL = 178.29l/s (11.63l/s/ha) in its existing condition. However, the Met Eireann Data stated in Appendix C of the OCSC ESR that the stormwater inflow into the receiving combined sewer is limited to 3.57l/s/ha, QBARRURAL = 54.67l/s.

The 2013 to 2018 WFD reports for Ratoath Stream, Fairyhouse Stream, and Broadmeadow River classify the overall status of these water bodies as ‘poor’ with an objective to obtain good status by 2027. In addition, these three water bodies are currently ‘at risk’ of not achieving a good status by 2027 due to significant pressure of nutrients and diffuse urban sources of pollution.

7.3.3 Water Infrastructure Services

The existing site is currently greenfield, with no wastewater discharge to the local wastewater infrastructure. There is a 150mm and a 225mm foul sewer network in Ratoath. A new wastewater connection serving the proposed development is to be provided to the wastewater infrastructure existing 300 mm sewer located on the Ratoath Outer Relief Road. The existing Ratoath Outer Relief Road infrastructure is shown in Figure 7.6.

Figure 7.6: Ratoath Outer Relief Road Infrastructure



Source: OCSC Engineer Services Report, 2021

The foul sewers (collecting wastewater) are in the ownership of Irish Water and are operated and maintained in conjunction with Meath County Council. The existing foul sewer provides services to domestic, commercial, and industrial customers in the town of Ratoath. The Ratoath wastewater goes to Ringsend Wastewater Treatment. Figure 7.7 shows the existing Irish Water distribution network in the vicinity of the site.

Figure 7.7: Irish Water Distribution Network

Source: Irish Water, 2021

Wastewater from Dublin has been treated in Ringsend since 1906. The current Ringsend Wastewater Treatment Plant (WwTP), built in 2005, is the largest in Ireland and was designed to cater for an equivalent of 1.64 million people. The Ringsend WwTP provides over 40% of Ireland's wastewater treatment capacity, is currently overloaded, and is not in compliance with the EU's Urban Wastewater

Treatment Directive. The average daily load received at Ringsend Wastewater Treatment Plant in 2019 was 1.98 million population equivalent with peaks well in excess of this.

A major upgrade that is now underway will allow the Ringsend WwTP to treat the increasing volumes of wastewater arriving at the plant to the required standard, enabling future housing and commercial development. The project will deliver, on a phased basis, the capacity to treat the wastewater for a population equivalent of 2.4 million while achieving the standards of the Urban Wastewater Treatment Directive.

Irish Water is working to provide infrastructure to achieve compliance with the Urban Wastewater Treatment Directive for a population equivalent of 2.1 million in the second half of 2023. When all the proposed works are complete in 2025, the Ringsend WwTP will be able to treat wastewater for up to 2.4 million population equivalent (Irish water).

The Greater Dublin Drainage Project is a regional wastewater project to serve the Greater Dublin Area and parts of the surrounding counties of Kildare and Meath with a planned treatment plant in North County Dublin. The project includes an orbital sewer and two pumping stations, which will divert drainage from the north of Dublin City to the new treatment plant, thus freeing up additional treatment capacity at the Ringsend treatment works, which is currently treating drainage from this area. Subject to being granted planning approval, it is anticipated that this project will be operational in 2026.

7.4 Predicted Impacts

7.4.1 Characteristics of the Proposed Development

The development will consist of the construction of 452 no. residential units which are located in 12 neighbourhoods. Building heights range across the site from 2- and 3-storey terraced houses, through to 4-storey maisonette buildings, and 6-storey apartment blocks. Private open space associated with the residential units is provided in the form of rear gardens, balconies, terraces and winter gardens. The development includes a crèche with associated outdoor play areas at ground floor and at roof level; 4 no. commercial/retail units; a landscaped public open space which includes a civic plaza; communal open space in the form of communal courtyards for each neighbourhood; associated car and cycle parking serving the full development and uses therein; green roofs at various locations; solar PV panels; a second phase of the Ratoath Outer Relief Road (RORR), that will run along the southern boundary of the application site, with 2 no. multi-modal entrances; a series of pedestrian and cycle connections from the Fairyhouse Road (R155), Cairn Court, Glascarn Lane and the new RORR; internal road and shared surface networks including pedestrian and cycle paths; public lighting and all associated site development and infrastructural works, services provision, ESB substations, foul and surface water drainage, extension to the foul network, access roads/footpaths, lighting, landscaping and boundary treatment works and all ancillary works necessary to facilitate the development.

The entrance to the scheme will be from Fairyhouse Road to the west of the site and from Glascarn Lane to the east. The development will link the current built section of the Outer Relief Road at Ratoath College to the R155 – Fairyhouse Road. The road is to run on the eastern side of the town and link the R125 Swords-Ratoath-Dunshaughlin Regional Road with the R155 Fairyhouse- Ratoath-Primatestown Regional Road. The development also includes the construction of local shared streets and link roads. The streets are designed for a range of activities and are primarily places for people, not vehicles.

Local Hydrology

A wastewater connection, serving the proposed development, is to be provided to the wastewater infrastructure in the Ratoath Outer Relief Road. It is proposed to separate the wastewater and surface water drainage networks, which will serve the proposed development, and provide independent connections to the local public foul and surface water sewers, respectively.

The wastewater from each unit will connect to the new gravity pipe network within the development, which has been designed in accordance with the Irish Code of Practice for Wastewater Infrastructure. The overall surface water drainage system serving the proposed development will consist of a gravity

sewer network that will convey runoff from the roofs and paved areas to the outfall manhole, which will discharge a controlled flow rate to the existing surface water network in the Ratoath Outer Relief Road to the northeast.

Water Utility Services

A further component of the Sustainable Urban Drainage System (SUDS) protocol is to increase surface water runoff's overall quality before it enters a natural watercourse or a public sewer, which ultimately discharges to a water body. This protocol is to ensure the highest possible standard of surface water quality.

The site of the proposed development comprises approximately 14.166ha. The surface water has been designed to cater for the proposed development and an additional 0.354ha to the west.

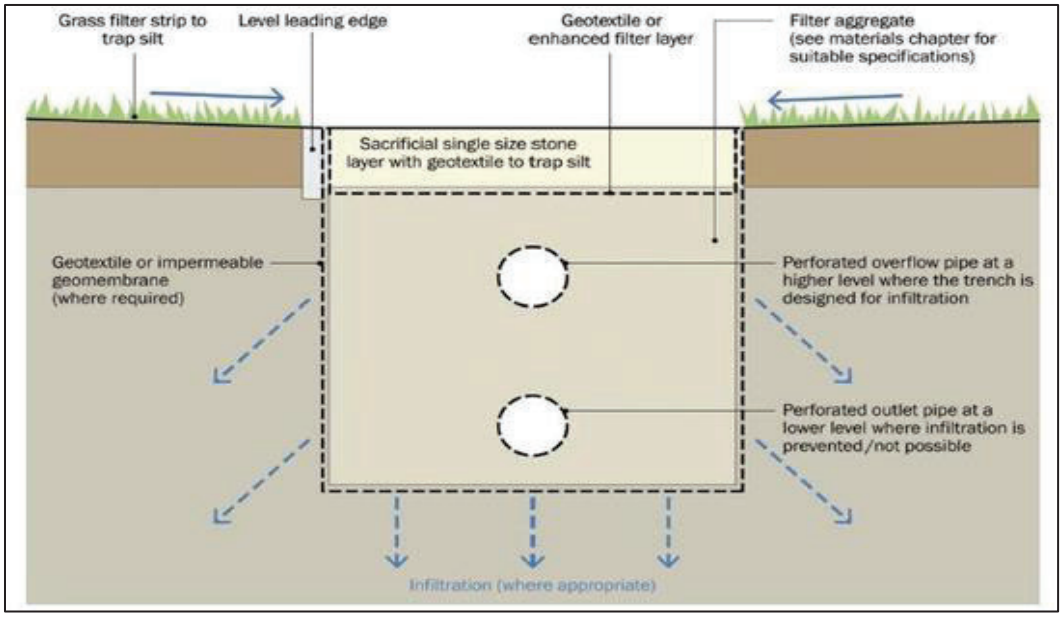
Surface water within the Site will enter a gravity surface water network constructed throughout the proposed road layout and discharge to the existing network to the north of the site. The development's surface water runoff will be attenuated to restrict the outfall flow rate to a rate equivalent to that of greenfield runoff.

The development is designed to comply with the Greater Dublin Strategic Drainage Strategy (GDSDS) requirements. It will have the physical capacity to retain surface water volumes and, if necessary, release these attenuated surface water volumes to an outfall at a controlled flow rate not greater than the greenfield runoff equivalent. The discharge from the development will be restricted by a flow control device in the final manhole within the development prior to discharging to the existing surface water networks, which limits discharge from the whole site to the greenfield runoff rate (Qbar) of 54.67 l/s (3.57 l/s/ha).

Flow Control devices are to be provided immediately downstream of attenuation systems in order to restrict the surface water discharge from the site to a flow rate equivalent, or below, the natural greenfield equivalent runoff rate of 54.67 l/s. It is proposed to provide the Hydro-brake optimum vortex flow control unit (or similar approved by MCC) at the 5 no. design locations. This will occur downstream of the attenuation systems, prior to discharging to the existing surface water networks in the Ratoath Outer Relief Road and existing surface water drainage ditch, with the appropriate measures of attenuation provided.

The proposed surface water drainage system comprises a SUDS consisting of pervious paving, green roof, filter drains, trapped road gullies, underground pipe network, silt traps, oil separator, concrete storage systems, and flow control devices. The proposed SUDS devices provide a treatment train for rainfall runoff, delivering interception storage, water quality treatment, runoff volume reduction, and runoff rate reduction. A typical filter drain, which will be incorporated into the onsite SUDS is shown in Figure 7.8.

Figure 7.8: Filter Drain (Typical Detail)



Source: OCSC ESR, 2021

Based on the nature and extent of the proposed development, the expected daily wastewater generation is 12.78m3/day with an equivalent Dry Weather Flow (DWF) of 2.45l/s. With a peaking factor of 6.98 l/s for domestic flow, the resulting peak flow is expected to be 7.54l/s.

7.5 Potential Cumulative Impact

7.5.1 Interactions

During the construction phase, the following aspects would interact with water and hydrology and, in the absence of mitigation, may give rise to likely significant effects;

Material Assets Built Services: The construction of the proposed services (water supply, drainage, etc.) may affect the local hydrological and hydrogeological environment as there is a risk of suspended solids runoff.

Land & Soils: Site preparatory works (i.e. site clearance, re-profiling, etc.) during the construction stage have the potential to impact the hydrology and hydrogeology due to accidental spills, suspended solids becoming entrained in surface water runoff, etc.

During the operational phase, the potential interactions are;

Material Assets Built Services: There will be an increased demand on potable water supply and on the municipal drainage system.

The potential significant impacts on water and hydrology arising from these interactions have been considered within the relevant discipline and mitigation measures outlined, where required. With mitigation measures in place, no significant, permanent, residual, negative impacts will occur.

7.5.2 Potential Cumulative Impacts

Based on an assessment of the current overall environment in the vicinity of the proposed development; the current infrastructure and proposed and potential changes to this infrastructure in the vicinity of the Site based on the current application and nearby proposals; the design life and life cycle for the current application and nearby proposals; and the County Development Plan, the potential cumulative impacts may be considered to be Moderate and Long-term. Any impact which may occur would be consistent with existing and emerging trends, with the proposed development likely having a design life in the order of fifty years.

Any new developments in the surrounding area would be required to provide sustainable drainage systems designed to reduce flow rates to greenfield equivalent and reduce overall discharge volumes while improving the discharge quality. Wastewater and water supply impacts would be subject to a similar Pre-Connection Enquiry process and approval by Irish Water. Therefore, the cumulative impact of new developments in the vicinity of the subject development would likely have a moderate but sustainable impact on the receiving environment.

Any redevelopment in the area complying with current best-practice methods will likely lead to an improvement in surface water runoff conditions, as is expected with the proposed subject development.

Predicted impacts during the construction phase of Site works are detailed in Table 7.1 below.

Table 7.1 Impact determination – construction phase

Constraint		Impact Assessment							
Activity/ Source	Construction Element	Impact Description	Quality	Significance	Extent	Likelihood	Duration	Mitigation	Residual Impact
Earthworks	Site Clearance Excavation Construction	Excavation of natural soils for development, services, etc.	Negative	Moderate	Local	Certain	Permanent	The project has been designed to construct on the minimum amount of space. Material will be reused on-site where possible.	Moderate Negative
Earthworks	Excavation	Soil erosion causing airborne dust and/or nuisance dust on river/streams	Negative	Slight	Local	Unlikely	Short-term	Dust suppression measures will be implemented to minimise dust generation during extended dry periods. Dust monitoring will be conducted throughout the excavation period. Vehicle wheel wash facilities will be installed at site exits, and a road sweeping programme will be implemented.	Imperceptible negative
Earthworks Altering Groundwater/ Surface water	Excavation Construction	Imported fill and aggregates will be required during the works	Negative	Slight - Moderate	Local (maybe a number of quarry sites)	Likely	Permanent	Contract and Procurement Procedures will ensure that all aggregates and fill material required for the construction are sourced from reputable suppliers. Declarations of conformity/ compliance certificates will be required to ensure	Imperceptible negative

Constraint		Impact Assessment							
Activity/ Source	Construction Element	Impact Description	Quality	Significance	Extent	Likelihood	Duration	Mitigation	Residual Impact
								all aggregates meet the engineering specifications.	
Dewatering/ Lowering the water table	Site Clearance, Excavation, and General Construction	Discharge of potentially contaminated groundwater to sewer; possible settlement of buildings as a result of dewatering	Negative	Slight	Local - maybe a number of nearby buildings	Likely	Short-term	The appointed dewatering contractor will be supplied where needed. The contractor will design an on-site pre-treatment system based on the risk assessment results.	Imperceptible negative
Storage of potentially polluting materials	Excavation and General Construction	Potential leak or spillage from construction-related liquids on site	Negative	Significant	Local	Unlikely	Short-term	Good housekeeping and proper handling, storage, and disposal of any potentially polluting substances can prevent soil and/or water contamination. Designated and bunded storage areas will be maintained.	Imperceptible negative
Discharge to Groundwater		Potentially contaminated run-off percolating to	Negative	Significant	Local	Unlikely	Short-term	There will be no direct discharge to groundwater during construction. Indirect discharges to the underlying bedrock aquifer may occur increasing	Imperceptible negative

Constraint		Impact Assessment							
Activity/ Source	Construction Element	Impact Description	Quality	Significance	Extent	Likelihood	Duration	Mitigation	Residual Impact
		ground and the underlying aquifer						the aquifer vulnerability as subsoil is removed from site. Protection of groundwater from potentially polluting substances will be dealt with through measures including correct handling and storage of potentially polluting substances.	

7.6 Do Nothing Scenario

7.6.1 Do Nothing Scenario of Predicted Impacts

If the proposed development were not undertaken, it is expected that there would be no change on the subject site and, therefore, no impact on water and hydrology arising from the subject site.

7.6.2 'Do Nothing' Scenario of Residual Impacts

If the proposed development were not undertaken, it is expected that there would be no change on the subject site and, therefore no impact on water services and hydrology arising from the subject site. The existing lands would be retained for agricultural use.

7.7 Risks to Human Health

7.7.1 Construction Phase

The construction phase of the proposed development has the potential to give rise to short-term contamination however this is considered unlikely and a low risk. Ensuring water quality and compliance with the Water Pollution Acts would be seen as the primary method of ensuring no significant impact on watercourses and neighbouring sites.

7.7.2 Operational Phase

The operational stage of the development is unlikely to cause any adverse impacts on the existing and future hydrological environment of the locality once all mitigation measures are fully in place.

7.8 Mitigation Measures

7.8.1 Construction Phase

Discharge from the excavated areas could potentially lead to siltation, surcharge, and flooding within the sewerage system during the construction phase. However, it is envisaged that the contractor will put in place temporary drainage facilities to manage water within excavations. Water entering excavation areas may be collected and discharged to the sewerage system following treatment (such as silt traps and interceptors) and at a flow rate subject to the conditions of a discharge licence from Irish Water. During the final stages of construction, the proposed surface water network will provide sufficient mitigation measures, through the provisions listed previously (principally the pervious paving, trapped road gullies, and silt traps). However, an oil separator will be provided as an additional and final mitigation measure, upstream of the attenuation system.

Effluent from the onsite welfare facilities for construction personnel could potentially lead to pollution of watercourses and flooding within the sewerage system during the construction phase. However, welfare facilities will be managed such that wastewater effluent from these facilities will be discharged to the sewerage system at a location and a flow rate subject to the conditions of a discharge licence from Irish Water. To reduce the risk of defective or leaking sewers, all new sewers will be pressure tested and CCTV surveyed to ascertain any possible defects. Such defects, if they arise, would be repaired prior to the connection to the mains sewers.

Section 7.2 has a more detailed description of the mitigations measures for the Surface Water Drainage/ Wastewater Drainage Systems.

All excavated materials shall be sorted and separated on site to suitable stockpiles of the smallest possible area and remote from the adjacent streams. Stockpile areas shall be designed with suitable drainage and erosion protection to prevent the creation of soil bearing runoff and mixing of materials.

If encountered, contaminated soils should be excavated and disposed off-site in accordance with the Waste Management Acts 1996-2001 & associated regulations and guidance provided in the TII's Guidelines for the Management of Waste from National Road Construction Projects.

Measures will be implemented throughout the construction stage to prevent contamination of the soil and the adjacent Ratoath Stream, Fairyhouse Stream, and Broadmeadow River from fuel, oil, and other hazardous materials (paints, cleaning agents, herbicides, fertilisers, etc.). Suitable bunded areas will be installed for all fuel storage tanks with a minimum 110% storage volume. Designated fuel filling points will be put in place at secure locations, remote from Ratoath Stream, Fairyhouse Stream, and Broadmeadow River, with appropriate oil separators to provide protection from accidental spills. Oil-absorbent materials shall be provided as an emergency measure in the event of a fuel spill. All oils, solvents, and paints used during construction will be stored within temporary bunded areas or chemical storage containers to minimise any impact on the water environment from material spillages. If concrete mixing is carried out on site, the mixing plant will be sited in a designated area with an impervious surface.

The appointed contractor will be required to prepare and implement a Waste Construction & Environmental Management Plan to ensure the mitigation of all potential impacts during the construction phase. This plan should be agreed with the Local Authority prior to the commencement of construction.

The contractor will be required to prepare and implement a Surface Water Management Plan that ensures avoidance and minimisation of effects. Surface water storage in excavations may be directed to on-site settlement ponds, where silt removal will be facilitated prior to discharge off site at a controlled rate. Periodic testing of the surface water discharge may also be undertaken.

7.8.2 Operational Phase

During the project's operational phase, sustainable drainage systems, trapped gullies and silt-trap manholes will reduce the amount of debris discharging into the surface water system and, ultimately, the public combined sewer network.

Pervious paving, green roofs, filter drains, trapped road gullies, underground pipe network, silt traps, oil separators, concrete storage systems, and flow control devices will assist in reducing runoff volumes and improving water quality.

Best management drainage policies, in accordance with CIRIA 753 – The SuDS Manual - will be implemented and incorporated into the design and management of the surface water drainage system.

All surface water drains and sewers/ wastewater drains and sewers will be tested and surveyed prior to connection to the public sewers to minimise the risk of uncontrolled groundwater penetration or leakage of foul water to groundwater on the site.

During the operational phase, the surface water network (drains, gullies, manholes, AJs, SuDS devices, and attenuation system) will need to be regularly maintained and cleaned, where required. A suitable maintenance regime of inspecting and cleaning should be incorporated into the safety file/maintenance manual for the development.

Mitigation measures to be implemented during the construction and operational phases are outlined in Table 7.2.

Table 7.2 Mitigation Measures - Construction

Mitigation Measures
All excavated materials shall be sorted and separated into stockpiles. The stockpiles will be kept remote from the adjacent Ratoath Stream, Fairyhouse Stream, and Broadmeadow River. Stockpile areas shall be designed with appropriate drainage and erosion protection to prevent the creation of soil bearing runoff and mixing of materials.
If contaminated soils are found on site, they will be excavated and disposed of off-site in accordance with the Waste Management Acts 1996-2001 and associated regulations and

guidance provided in the TII's Guidelines for the Management of Waste from National Road Construction Projects.
Bunded areas for oil storage tanks and oil separators will be installed at fuel filling points to protect from accidental spills during the construction phase. Oil-absorbent materials shall be provided as an emergency measure in the event of a fuel spill.
The site-specific Waste Construction & Environmental Management Plan will be approved by the Local Authority prior to the commencement of construction.
The Surface Water Management Plan will be implemented to ensure surface water storage in excavations will be directed to on-site settlement ponds, where silt removal will occur before discharge off site at a controlled rate. Periodic testing of the surface water discharge will be undertaken as required.
Any concrete mixing plant shall be sited in a designated area with an impervious surface.
All oils, solvents, and paints used during construction will be stored within temporary bunded areas or chemical storage containers to minimise any impact on the water environment from material spillages.
Any construction phase discharge to the wastewater sewerage infrastructure shall comply with the conditions of a Discharge Licence from Irish Water. New sewers will be pressure tested and CCTV surveyed to detect defective or leaking sewers. Such defects, if they arise, would be repaired prior to the connection of any future development to the sewers.

Table 7.3 Mitigation Measures - Operation

Mitigation Measures
Water sewerage system treatment (such as silt traps and interceptors) will be implemented following conditions of a discharge licence from Irish Water.
Sustainable drainage systems, trapped gullies and silt-trap manholes will decrease the amount of debris discharging into the surface water system and, eventually, to the public combined sewer network.
Pervious paving, green roofs, filter drains, trapped road gullies, underground pipe network, silt traps, oil separator, concrete storage systems, and flow control devices will reduce runoff volume and improve water quality.
Best management drainage policies, in accordance with CIRIA 753 – The SuDS Manual - will be implemented and incorporated into the design and management of the surface water drainage system.
All surface water drains and sewers/ wastewater drains and sewers will be tested and surveyed prior to connection to the public sewers to minimise the risk of uncontrolled groundwater penetration or leakage of foul water to groundwater on the site.
During the operational phase, the surface water network (drains, gullies, manholes, AJs, SuDS devices, and attenuation system) will need to be regularly maintained and cleaned, where required. A suitable maintenance regime of inspecting and cleaning should be incorporated into the safety file/maintenance manual for the development.

7.9 Residual Impacts

7.9.1 Construction Phase

Provided the sustainable drainage systems and all mitigation measures are fully implemented as part of the proposed works, the predicted environmental impacts on the downstream receiving drainage infrastructure should reduce from Moderate to Slight. This should include any mitigation measures proposed in respect of flora and fauna, which is dealt with separately in this EIAR.

The impact from the proposed development on the public drainage systems will be an increase in the quantity and rate of discharge of wastewater from the site to the existing public sewer system, with the contributing flows coming mainly from the site office and welfare facilities.

There will be a minor water supply demand for site offices and facilities during the construction phase.

There will be minor traffic disruption in the vicinity of the Site when excavation works are being carried out.

7.9.2 Operational Phase

In the absence of mitigation measures, there are numerous potential impacts associated with the proposed development. For example, an increase in surface water run-off could impact on processes of erosion, sedimentation, and potentially salinity.

However, surface water discharge from the site will be restricted by means of attenuation to restrict the surface water runoff to less than the greenfield runoff equivalent. There has been no history of flooding in the area; therefore, no adverse impact in respect of flooding downstream is envisaged as a result of the proposed development.

The surface water design has been prepared in accordance with best practice incorporating significant sustainable drainage systems, which include the installation of pervious paving, green roofs, filter drains, trapped road gullies, underground pipe network, silt traps, oil separator, concrete storage systems, and flow control devices. The integrated sustainable drainage system will reduce runoff volume and improve water quality prior to discharging to the public combined sewer network.

The impact of the proposed development on the existing wastewater / combined sewer drainage network at Ratoath Outer Relief Road will result in an increase in the of discharge of wastewater from the site. These increased flows can be accommodated, as confirmed by Irish Water as part of the Pre-Connection Enquiry process.

The proposed development will result in an increase in water demand on the water distribution network. This increase in demand can be accommodated by the connection of the existing network to the watermains, as noted by Irish Water in the Confirmation of Feasibility letter.

7.10 Monitoring

The requirement and recommendation for monitoring related to the hydrological environment is as follows:

Qualitative and quantitative monitoring of any water to be discharged to the combined sewerage during the construction and operation phases. This might include flow monitoring and a regular sampling and analysis programme as required by the Regulating Authority under any Discharge Licence.

Monitoring proposals related to the construction and operational phases of work on the Site are outlined in Table 7.3.

Table 7.3 Monitoring Proposals

Monitoring Proposals
Watching Brief and Discovery Strategy for any potentially contaminated material to ensure adequate classification and disposal (refer to Chapter 6 of Vol. II of this EIAR, Land and Soils);
Monitoring of retaining wall structures, including inclinometers, tilt-meters, and water movements of either seepages or through control points during the construction programme. The specific monitoring requirements and frequency will be defined in the Contractor's CMP;
Regular inspection of on-site fuel storage facilities to ensure environmental 'best-practices' are being employed during construction;
Upon installation of new drains and pressure testing to assess the potential for leaks to occur in the newly constructed drains; and
Following completion of the proposed drainage systems, a short-term flow and rainfall survey (involving in-pipe flow monitors and rain gauges on site) will be carried out to identify misconnections and allow for comparison with watermain meter readings to facilitate assessment and identification of any leakages.

7.11 Difficulties Encountered

No exceptional difficulties were experienced in compiling this EIAR.

7.12 References

- Code of Practice for Wastewater Infrastructure (2020) – Irish Water
- Code of Practice for Water Infrastructure (2020) – Irish Water
- Control of water pollution from linear construction projects – Technical guidance, Publication C648, CIRIA, 2006;
- Environmental Handbook for Building and Civil Engineering Projects (2000) – Construction Industry Research and Information Association
- Environmental Protection Agency 2021 3rd Cycle Draft Nanny Delvin Catchment Report (HA 08) - Catchment Science & Management Unit
- Environmental Protection Agency Envision Data Viewer: http://gis.epa.ie/Envision
- Fingal County Council 2019 Appendix C Estuary West Draft Masterplan Surface Water Management Plan (SWMP)
- Greater Dublin Strategic Drainage Study (2005) – Fingal County Council, Dublin City Council, Dún Laoghaire-Rathdown County Council, South Dublin County Council, Wicklow County Council, Kildare County Council, Meath County Council
- Guidelines on Procedures for the Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (2009) – National Roads Authority
- Inland Fisheries Ireland 2010 Sampling Fish for the Water Framework Directive Transitional Waters 2010 Broadmeadow Water Estuary
- I.S. EN12056: 2000 Gravity Drainage Systems inside Buildings (2000) – National Standards Agency Ireland
- I.S. EN752: 2017 Drain & Sewer Systems outside Buildings (2017) – National Standards Agency Ireland
- Local Authority Waters Programme 2019 Ashbourne (Broadmeadow) Priority Area for Action: Desk Study Summary
- Meath County Council 2019 Flood Risk Assessment and Management Plan for the Meath CDP 2020-2026
- National Parks & Wildlife Service 2013 Malahide Estuary Special Protection Area (Site Code 4025) Version 1
- Office of Public Works 2020 https://waterlevel.ie/hydro-data/search.html?free=Broadmeadow#
- Pollution Prevention Guideline PPG3 Use and design of oil separators in surface water drainage systems (2006) – U.K. Environment Agency

- The Greater Dublin Region Code of Practice for Drainage Works (2012) – Fingal County Council, Dublin City Council, Dún Laoghaire-Rathdown County Council, South Dublin County Council, Wicklow County Council, Kildare County Council, Meath County Council
- The Office of Public Works 2016 Broad Meadow Model Fluvial Flood Extent Map
- Wastewater Treatment Manuals (1999) – Environmental Protection Agency
- WFD Application a 2018 WFD Cycle 2 Catchment Nanny-Delvin Subcatchment Broadmeadow_SC_010 Code 08_3 https://catchments.ie/wp-content/files/subcatchmentassessments/08_3%20Broadmeadow_SC_010%20Subcatchment%20Assessment%20WFD%20Cycle%202.pdf
- WFD Application b 2018 WFD Cycle 2 Catchment Liffey and Dublin Bay Subcatchment Mayne_SC_010 Code 09_17 https://www.catchments.ie/wp-content/files/subcatchmentassessments/09_17%20Mayne_SC_010%20Subcatchment%20Assessment%20WFD%20Cycle%202.pdf

8. Air & Climate

8.1 Introduction

This chapter assesses the likely air quality and climate impacts associated with the proposed residential development at Ratoath, Co. Meath. A full description of the development can be found in Chapter 1.

This chapter was completed by Ciara Nolan, a Senior Environmental Consultant in the air quality section of AWN Consulting Ltd. She holds an MSc. (First Class) in Environmental Science from University College Dublin and has also completed a BSc. in Energy Systems Engineering. She is an Associate Member of both the Institute of Air Quality Management (AMIAQM) and the Institution of Environmental Science (AMIEnvSc). She has been active in the field of air quality for 5 years, with a primary focus on consultancy. She has prepared air quality and climate impact assessments for numerous EIARs for a range of projects including commercial, residential, industrial, pharmaceutical and data centre developments.

8.2 Methodology

8.2.1 Criteria for Rating of Impacts

Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set (see Table 8.1 and Appendix 8.1).

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2011, which incorporate EU Directive 2008/50/EC, which has set limit values for a number of pollutants. The limit values for NO_2, PM_{10} and $PM_{2.5}$, are relevant to this assessment (see Table 8.1). Although the EU Air Quality Limit Values are the basis of legislation, other thresholds outlined by the EU Directives are used which are triggers for particular actions (see Appendix 8.1).

With regards to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland. Furthermore, no specific criteria have been stipulated for nuisance dust in respect of this development.

With regard to dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/(m^2*day) averaged over a one year period at any receptors outside the site boundary. Recommendations from the Department of the Environment, Heritage & Local Government (DEHLG, 2004) apply the Bergerhoff limit of 350 mg/(m^2*day) to the site boundary of quarries. This limit value can also be implemented with regard to dust impacts from construction of the proposed development.

Table 8.1: Air Quality Standards Regulations

Pollutant	Regulation [Note 1]	Limit Type	Value
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m^3
		Annual limit for protection of human health	40 µg/m^3

Pollutant	Regulation Note 1	Limit Type	Value
		Critical level for protection of vegetation	30 µg/m^3 NO + NO_2
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 µg/m^3
		Annual limit for protection of human health	40 µg/m^3
Particulate Matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 µg/m^3

Note 1 EU 2008/50/EC – Clean Air For Europe (CAFÉ) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC

Climate Agreements

Ireland is party to both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The Paris Agreement, which entered into force in 2016, is an important milestone in terms of international climate change agreements and includes an aim of limiting global temperature increases to no more than 2°C above pre-industrial levels with efforts to limit this rise to 1.5°C. The aim is to limit global GHG emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to GHG emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress was also made in the Paris Agreement on elevating adaption onto the same level as action to cut and curb emissions.

In order to meet the commitments under the Paris Agreement, the EU enacted *Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013* (the Regulation). The Regulation aims to deliver, collectively by the EU in the most cost-effective manner possible, reductions in GHG emissions from the Emission Trading Scheme (ETS) and non-ETS sectors amounting to 43% and 30%, respectively, by 2030 compared to 2005. Ireland's obligation under the Regulation is a 30% reduction in non-ETS greenhouse gas emissions by 2030 relative to its 2005 levels.

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) (Government of Ireland, 2015) was enacted (the Act). The purpose of the Act was to enable Ireland '*to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050*' (3.(1) of No. 46 of 2015). This is referred to in the Act as the '*national transition objective*'. The Act made provision for, *inter alia*, a national adaptation framework. In addition, the Act provided for the establishment of the Climate Change Advisory Council with the function to advise and make recommendations on the preparation of the national mitigation and adaptation plans and compliance with existing climate obligations.

The first Climate Action Plan (CAP) was published by the Irish Government in June 2019 (Government of Ireland, 2019). The Climate Action Plan 2019 outlined the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The 2019 CAP also detailed the required governance arrangements for implementation including carbon-proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas. The Government published the second Climate Action Plan in November 2021 (Government of Ireland, 2021). The plan contains similar elements as the 2019 CAP and aims to set out how Ireland can reduce our greenhouse gas emissions by 51% by 2030 (compared to 2018 levels) which is in line with the EU ambitions, and a longer-term goal of to achieving net-zero emissions no later than 2050. The 2021 CAP outlines that emissions from the Built Environment sector must be reduced to 4 – 5 $MtCO_2e$ by 2030 in order to meet our climate targets. This will require further

measures in addition to those committed to in the 2019 CAP. This will include phasing out the use of fossil fuels for the space and water heating of buildings, improving the fabric and energy of our buildings, and promoting the use of lower carbon alternatives in construction.

Following on from Ireland declaring a climate and biodiversity emergency in May 2019 and the European Parliament approving a resolution declaring a climate and environment emergency in Europe in November 2019, the Government approved the publication of the General Scheme for the Climate Action (Amendment) Bill 2019 in December 2019 (Government of Ireland 2019b) followed by the publication of the Climate Action and Low Carbon Development (Amendment) Act 2021 (No. 32 of 2021) (hereafter referred to as the 2021 Climate Act) in July 2021 (Government of Ireland, 2021). The 2021 Climate Act was prepared for the purposes of giving statutory effect to the core objectives stated within the CAP.

The purpose of the 2021 Climate Act is to provide for the approval of plans '*for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050'*. The 2021 Climate Act will also '*provide for carbon budgets and a decarbonisation target range for certain sectors of the economy*'. The 2021 Climate Act defines the carbon budget as '*the total amount of greenhouse gas emissions that are permitted during the budget period*'. The 2021 Climate Act removes any reference to a national mitigation plan and instead refers to both the Climate Action Plan, as published in 2019, and a series of National Long Term Climate Action Strategies. In addition, the Environment Minister shall request each local authority to make a '*local authority climate action plan'* lasting five years and to specify the mitigation measures and the adaptation measures to be adopted by the local authority.

8.2.2 Construction Phase Methodology

Air Quality

The assessment focuses on identifying the existing baseline levels of PM_{10} and $PM_{2.5}$ in the region of the proposed development by an assessment of EPA monitoring data. Thereafter, the impact of the construction phase of the development on air quality was determined by a qualitative assessment of the nature and scale of dust generating construction activities associated with the proposed development.

Construction phase traffic also has the potential to impact air quality and climate. The UK DMRB guidance (UK Highways Agency, 2019), states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the local air quality assessment. The use of the UK guidance is recommended by the TII (2011) in the absence of specific Irish guidance, this approach is considered best practice and can be applied to any development that causes a change in traffic.

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;
- A change in speed band;
- A change in carriageway alignment by 5m or greater.

The construction stage traffic will not increase by 1,000 AADT or 200 HDV AADT and therefore does not meet the above scoping criteria. As a result a detailed air assessment of construction stage traffic emissions has been scoped out from any further assessment as there is no potential for significant impacts to air quality.

Climate

The impact of the construction phase of the development on climate was determined by a qualitative assessment of the nature and scale of greenhouse gas generating construction activities associated with the proposed development.

8.2.3 Operational Phase Methodology

Air Quality

The air quality assessment has been carried out following procedures described in the publications by the EPA (2015; 2017) and using the methodology outlined in the guidance documents published by the UK Highways Agency (2019a) and UK Department of Environment Food and Rural Affairs (DEFRA) (2016; 2018). Transport Infrastructure Ireland (TII) reference the use of the UK Highways Agency and DEFRA guidance and methodology in their document *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011). This approach is considered best practice in the absence of Irish guidance and can be applied to any development that causes a change in traffic.

In 2019 the UK Highways Agency DMRB air quality guidance was revised with *LA 105 Air Quality* replacing a number of key pieces of guidance (HA 207/07, IAN 170/12, IAN 174/13, IAN 175/13, part of IAN 185/15). This revised document outlines a number of changes for air quality assessments in relation to road schemes but can be applied to any development that causes a change in traffic. Previously the DMRB air quality spreadsheet was used for the majority of assessments in Ireland with detailed modelling only required if this screening tool indicated compliance issues with the EU air quality standards. Guidance from Transport Infrastructure Ireland (TII, 2011) recommends the use of the UK Highways Agency DMRB spreadsheet tool for assessing the air quality impacts from road schemes. However, the DMRB spreadsheet tool was last revised in 2007 and accounts for modelled years up to 2025. Vehicle emission standards up to Euro V are included but since 2017, Euro 6d standards are applicable for the new fleet. In addition, the model does not account for electric or hybrid vehicle use. Therefore, this a somewhat outdated assessment tool. The LA 105 guidance document states that the DMRB spreadsheet tool may still be used for simple air quality assessments where there is unlikely to be a breach of the air quality standards. Due to its use of a “dirtier” fleet, vehicle emissions would be considered to be higher than more modern models and therefore any results will be conservative in nature and will provide a worst-case assessment.

The 2019 UK Highways Agency DMRB air quality revised guidance *LA 105 Air Quality* states that modelling should be conducted for NO_2 for the base, opening and design years for both the do minimum (do nothing) and do something scenarios. Modelling of PM_{10} is only required for the base year to demonstrate that the air quality limit values in relation to PM_{10} are not breached. Where the air quality modelling indicates exceedances of the PM_{10} air quality limits in the base year then PM_{10} should be included in the air quality model in the do minimum and do something scenarios. Modelling of $PM_{2.5}$ is not required as there are currently no issues with compliance with regard to this pollutant. The modelling of PM_{10} can be used to show that the project does not impact on the $PM_{2.5}$ limit value as if compliance with the PM_{10} limit is achieved then compliance with the $PM_{2.5}$ limit will also be achieved. Historically modelling of carbon monoxide (CO) and benzene was required however, this is no longer needed as concentrations of these pollutants have been monitored to be significantly below their air quality limit values in recent years, even in urban centres (EPA, 2021a). The key pollutant reviewed in this assessment is NO_2. Concentrations of PM_{10} have been modelled for the base year to indicate that there are no potential compliance issues. Modelling of operational NO_2 concentrations has been conducted for the do nothing and do something scenarios.

The TII guidance (2011) states that the assessment must progress to detailed modelling if:

- Concentrations exceed 90% of the air quality limit values when assessed by the screening method; or

- Sensitive receptors exist within 50m of a complex road layout (e.g. grade separated junctions, hills etc).

The UK DMRB scoping criteria outlined above in Section 8.2.2 has been used in the current assessment to determine the road links required for inclusion in the modelling assessment. Sensitive receptors within 200m of impacted road links are included within the modelling assessment. Pollutant concentrations are calculated at these sensitive receptor locations to determine the impact of the proposed development in terms of air quality. The guidance states a proportionate number of representative receptors which are located in areas which will experience the highest concentrations or greatest improvements as a result of the proposed development are to be included in the modelling (UK Highways Agency, 2019a). The TII guidance (2011) defines sensitive receptor locations as: residential housing, schools, hospitals, places of worship, sports centres and shopping areas, i.e. locations where members of the public are likely to be regularly present. A total of six high sensitivity receptors (R1 – R6) were included in the modelling assessment, these include a number of residential properties, Ratoath National School (R1) and St. Paul's National School (R4). The receptors modelled are detailed in Figure 8.1.

The following model inputs are required to complete the assessment using the DMRB spreadsheet tool: road layouts, receptor locations, annual average daily traffic movements (AADT), percentage heavy goods vehicles (%HGV), annual average traffic speeds and background concentrations. Using this input data the model predicts the road traffic contribution to ambient ground level concentrations at the worst-case sensitive receptors using generic meteorological data. The DMRB model uses conservative emission factors, the formulae for which are outlined in the DMRB Volume 11 Section 3 Part 1 – HA 207/07 Annexes B3 and B4. These worst-case road contributions are then added to the existing background concentrations to give the worst-case predicted ambient concentrations. The worst-case ambient concentrations are then compared with the relevant ambient air quality standards to assess the compliance of the proposed development with these ambient air quality standards.

The TII document *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011) details a methodology for determining air quality impact significance criteria for road schemes which can be applied to any project that causes a change in traffic. The degree of impact is determined based on both the absolute and relative impact of the proposed development. The TII significance criteria have been adopted for the proposed development. The significance criteria are based on NO_2 and PM_{10} as these pollutants are most likely to exceed the annual mean limit values (40 µg/m^3).

Conversion of NO_x to NO_2

NO_X (NO + NO_2) is emitted by vehicles exhausts. The majority of emissions are in the form of NO, however, with greater diesel vehicles and some regenerative particle traps on HGV's the proportion of NO_X emitted as NO_2, rather than NO is increasing. With the correct conditions (presence of sunlight and O_3) emissions in the form of NO, have the potential to be converted to NO_2.

Transport Infrastructure Ireland states the recommended method for the conversion of NOx to NO_2 in "*Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes*" (2011). The TII guidelines recommend the use of DEFRAs NOx to NO_2 calculator (2020) which was originally published in 2009 and is currently on version 8.1. This calculator (which can be downloaded in the form of an excel spreadsheet) accounts for the predicted availability of O_3 and proportion of NOx emitted as NO for each local authority across the UK. O_3 is a regional pollutant and therefore concentrations do not vary in the same way as concentrations of NO_2 or PM_{10}.

The calculator includes Local Authorities in Northern Ireland and the TII guidance recommends the use of 'Armagh, Banbridge and Craigavon' as the choice for local authority when using the calculator. The choice of Craigavon provides the most suitable relationship between NO_2 and NO_x for Ireland. The "All Non-Urban UK Traffic" traffic mix option was used.

Update to NO_2 Projections using DMRB

In 2011 the UK DEFRA published research (Highways England, 2013) on the long term trends in NO_2 and NO_X for roadside monitoring sites in the UK. This study marked a decrease in NO_2 concentrations

between 1996 and 2002, after which the concentrations stabilised with little reduction between 2004 and 2010. The result of this is that there now exists a gap between projected NO_2 concentrations which UK DEFRA previously published and monitored concentrations. The impact of this 'gap' is that the DMRB screening model can under-predict NO_2 concentrations for predicted future years. Subsequently, the UK Highways Agency published an Interim advice note (IAN 170/12) in order to correct the DMRB results for future years. This methodology has been used in the current assessment to predict future concentrations of NO_2 as a result of the proposed development.

Traffic Data Used in Modelling Assessment

Traffic flow information was obtained from O'Connor Sutton Cronin (OCSC) Consulting Engineers on 11/04/2022 for the purposes of this assessment. Data for the Base Year 2019 and the Do Nothing and Do Something scenarios for the opening year 2024 and design year 2039 were provided. In addition, a Do Maximum scenario for the design year of 2039 was also included, this scenario allows for the redistribution of traffic as a result of the full construction of the Ratoath Outer Relief Road (RORR). The scenarios modelled are outlined below and further details are provided within the Traffic Impact Assessment and Chapter 11.

- Do Nothing – no development taking place, allowance for natural background traffic growth.
- Do Something – natural background traffic growth and additional traffic estimated to be generated by the proposed development and the approved third party SHD developments. The proposed RORR (Ratoath Outer Relief Road) is partially constructed.
- Do Maximum – natural background traffic growth, additional traffic estimated to be generated by the proposed development, the adjoining SHD developments, fully constructed RORR and future 100 no. residential development.

The traffic data is detailed in Table 8.2. Only road links that met the DMRB scoping criteria and that were within 200m of receptors were included in the modelling assessment. Background concentrations have been included as per Section 8.3.2 of this chapter based on available EPA background monitoring data (EPA, 2021).

This traffic data has also been used in the operational stage climate impact assessment.

Table 8.2: Traffic Data used in Air Modelling Assessment

Road Name	Speed (kph)	% HGV	Base	Do Nothing	Do Something	Do Nothing	Do Something	Do Max
			2019	2024		2039		2039
Meadowbank Hill	50	10%	6,600	7,260	8,959	8,786	10,485	7,662
R155 Fairyhouse Rd	50	10%	11,526	12,683	14,661	15,366	17,344	15,021
Main Street	50	4%	7,769	8,501	9,645	10,147	11,291	11,294
The Avenue	50	5%	5,369	5,880	7,580	7,037	8,737	3,583
The Avenue	50	5%	6,276	6,873	8,086	8,221	9,434	4,766
R155 Fairyhouse Road	50	6%	6,935	7,599	9,577	9,106	11,084	5,583

Figure 8.1: Location of Sensitive Receptors used in Air Quality Modelling Assessment

Climate

Ireland has annual GHG targets which are set at an EU level and need to be complied with in order to reduce the impact of climate change. Impacts to climate as a result of GHG emissions are assessed against the targets set out by the EU under *Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013,* which has set a target of a 30% reduction in non-ETS sector emissions by 2030 relative to 2005 levels.

As per the EU guidance document *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment* (European Commission, 2013) the climate baseline is first established by reference to EPA data on annual GHG emissions (see Section 8.3.3). Thereafter the impact of the proposed development on climate is determined. Emissions from road traffic associated with the proposed development have the potential to emit carbon dioxide (CO_2) which will impact climate.

The UK Highways Agency has published an updated DMRB guidance document in relation to climate impact assessments *LA 114 Climate* (UK Highways Agency, 2019b). The following scoping criteria are used to determine whether a detailed climate assessment is required for a proposed project during the operational stage. During the operational phase, if any of the road links impacted by the proposed development meet the below criteria then further assessment is required.

- A change of more than 10% in AADT;
- A change of more than 10% to the number of heavy duty vehicles; and

- A change in daily average speed of more than 20 km/hr.

There are a number of road links that will experience an increase of 10% or more in the AADT. These road links have been included in the detailed climate assessment (see Table 8.3).The impact of the proposed development at a national / international level has been determined using the procedures given by Transport Infrastructure Ireland (2011) and the methodology provided in Annex D in the UK Design Manual for Roads and Bridges (UK Highways Agency, 2007). The assessment focused on determining the resulting change in emissions of carbon dioxide (CO_2). The Annex provides a method for the prediction of the regional impact of emissions of these pollutants from road schemes and can be applied to any project that causes a change in traffic. The inputs to the air dispersion model consist of information on road link lengths, AADT movements and annual average traffic speeds (see Table 9.2).

The EU guidance (2013) also states indirect GHG emissions as a result of a development must be considered, this includes emissions associated with energy usage. In addition to the EU guidance, the Institute of Environmental Management and Assessment (IEMA) guidance note on 'Assessing Greenhouse Gas Emissions and Evaluating their Significance' (IEMA, 2022) states that "*the crux of significance regarding impact on climate is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050"*. Mitigation has taken a leading role within the guidance compared to the previous edition published in 2017. Early stakeholder engagement is key and therefore mitigation should be considered from the outset of the project and continue throughout the project's lifetime in order to maximise GHG emissions savings.

The Energy Statement prepared by BBSC in relation to this assessment and included as part of the overall SHD application has been reviewed and used to inform the operational phase climate assessment. This report outlines a number of measures in relation to energy usage from the proposed development primarily in relation to heat and electricity. A number of measures have been incorporated into the overall design of the development to reduce the impact to climate where possible, in line with the objectives of the IEMA guidance (2022).

Table 8.3: Traffic Data used in Climate Modelling Assessment

Road Link	Speed (kmph)	Link Length (km)	%HGV	Base	Do Nothing	Do Something	Do Nothing	Do Something
				2019	2024		2039	
4B	50	0.11	4%	4,051	4,432	4,919	5,290	5,776
4D	50	0.12	4%	8,626	9,434	10,385	11,248	12,199
5B	50	0.08	10%	6,600	7,260	8,959	8,786	10,485
5C	50	0.18	10%	11,526	12,683	14,661	15,366	17,344
7D	50	0.07	4%	9,619	10,517	12,049	12,530	14,033
8A	60	1.02	2%	2,180	2,379	2,922	2,821	3,365
8B	50	0.07	3%	9,603	10,498	12,185	12,502	14,189
8C	50	2.09	4%	7,769	8,501	9,645	10,147	11,291
9A	50	0.23	5%	5,369	5,880	7,580	7,037	8,737
9C	50	0.24	5%	6,276	6,873	8,086	8,221	9,434
9D	30	0.08	4%	1,819	1,990	2,979	2,373	3,362
10A	50	0.26	6%	6,935	7,599	9,577	9,106	11,084
10C	50	0.42	6%	6,935	7,599	8,533	9,106	10,040

8.3 Baseline Environment

8.3.1 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality is the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (i.e. traffic levels) (WHO, 2006). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM_{10}, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than $PM_{2.5}$) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles ($PM_{2.5}$ - PM_{10}) will actually increase at higher wind speeds. Thus, measured levels of PM_{10} will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Dublin Airport meteorological station, which is located approximately 16 km south-east of the site. Dublin Airport met data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (see Figure 8.2). For data collated during five representative years (2017 – 2021), the predominant wind direction is westerly to south-westerly with a mean wind speed of 5.3 m/s over the 30-year period 1990 - 2010 (Met Eireann, 2022).

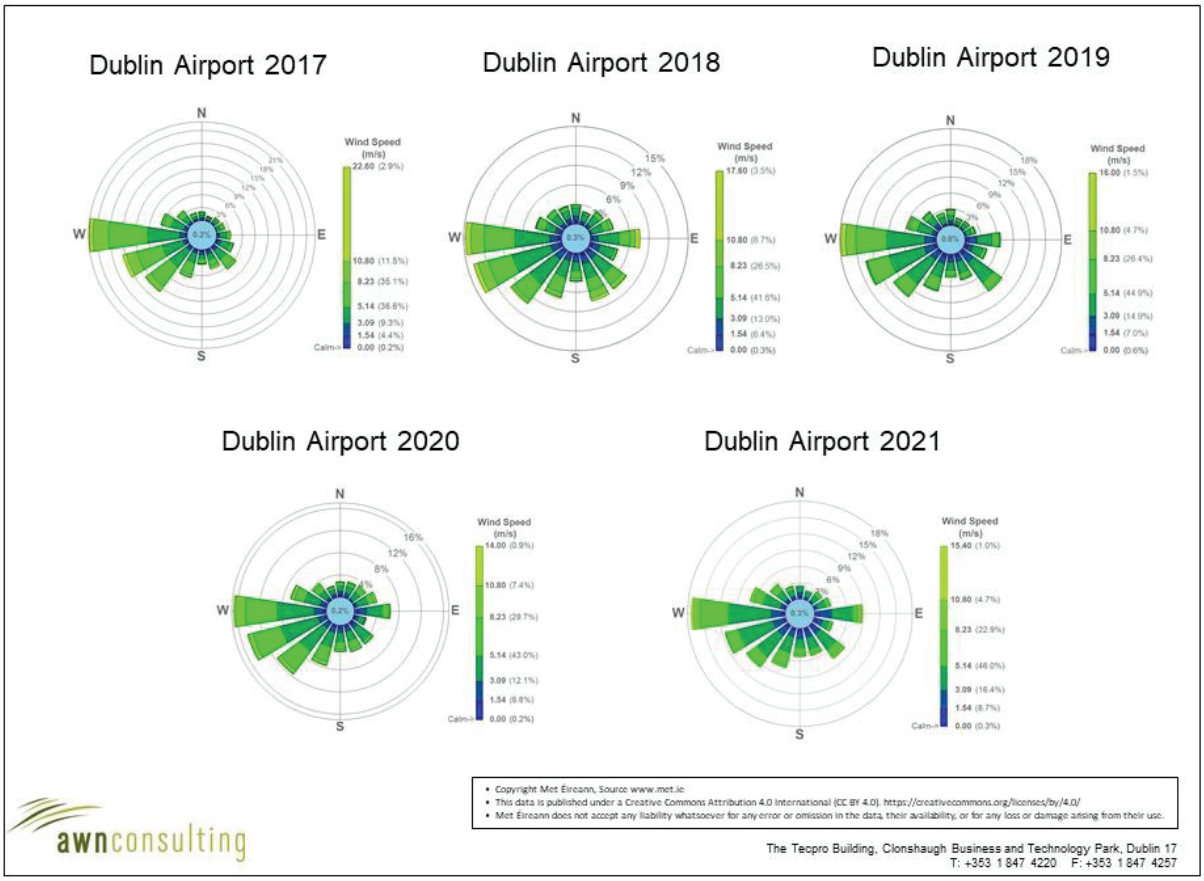


Figure 8.2: Dublin Airport Windroses 2017 – 2021

8.3.2 Baseline Air Quality

Air quality monitoring programs have been undertaken in recent years by the EPA. The most recent annual report on air quality in Ireland is "*Air Quality In Ireland 2020*" (EPA, 2021). The EPA website

details the range and scope of monitoring undertaken throughout Ireland and provides both monitoring data and the results of previous air quality assessments (EPA, 2022).

As part of the implementation of the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011), as amended, four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA, 2021b). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D.

In terms of air monitoring and assessment, the proposed development site is within Zone D (EPA, 2022). The long-term monitoring data has been used to determine background concentrations for the key pollutants in the region of the proposed development. The background concentration accounts for all non-traffic derived emissions (e.g. natural sources, industry, home heating etc.).

In 2020 the EPA reported (EPA, 2021) that Ireland was compliant with EU legal air quality limits at all locations, however this was largely due to the reduction in traffic due to Covid-19 restrictions. The EPA *Air Quality in Ireland 2020* report details the effect that the Covid-19 restrictions had on air monitoring stations, which included reductions of up to 50% at some monitoring stations which have traffic as a dominant source. The report also notes that CSO figures show that while traffic volumes are still slightly below 2019 levels, they have significantly increased since 2020 levels. 2020 concentrations are therefore predicted to be an exceptional year and not consistent with long-term trends. For this reason, they have not been included in the baseline section and previous long-term data has been used to determine baseline levels of pollutants in the vicinity of the proposed development.

Long-term NO_2 monitoring was carried out at the Zone D locations of Castlebar, Enniscorthy, Emo and Kilkitt for the period 2015 - 2019 (EPA, 2021). Long term average concentrations are significantly below the annual average limit of 40 µg/m^3; average results range from 2 – 10 µg/m^3 (Table 8.4) over the five year period. Based on the above information an estimate of the current background NO_2 concentration for the region of the proposed development is 8 µg/m^3.

Table 8.4: Trends in Zone A Air Quality – NO_2

Station	Averaging Period Note 1	Year				
		2015	2016	2017	2018	2019
Castlebar	Annual Mean NO_2 (µg/m^3)	8	9	7	8	8
	99.8th %ile 1-hr NO_2 (µg/m^3)	-	66	60	60	59
Kilkitt	Annual Mean NO_2 (µg/m^3)	2	3	2	3	5
	99.8th %ile 1-hr NO_2 (µg/m^3)	-	26	17	22	42
Emo	Annual Mean NO_2 (µg/m^3)	3	4	3	3	4
	99.8th %ile 1-hr NO_2 (µg/m^3)	-	36	28	42	28
Enniscorthy	Annual Mean NO_2 (µg/m^3)	9	10	-	-	-
	99.8th %ile 1-hr NO_2 (µg/m^3)	-	73	-	-	-

Note 1 Annual average limit value of 40 µg/m^3 and hourly limit value of 200 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Continuous PM_{10} monitoring was carried out at the Zone D locations of Castlebar, Claremorris, Enniscorthy and Kilkitt for 2015 - 2019. Levels range from 7 – 18 µg/m^3 over the five-year period (Table 8.5). In addition the 24-hour limit value of 50 µg/m^3 (as a 90.4th percentile) was complied with at all sites (EPA, 2021a). Based on the EPA data, an estimate of the current background PM_{10} concentration in the region of the proposed development is 13 µg/m^3.

Table 8.5: Trends in Zone A Air Quality – PM_{10}

Station	Averaging Period Note 1	Year				
		2015	2016	2017	2018	2019
Castlebar	Annual Mean PM_{10} (µg/m^3)	13	12	11	11	16
	90th %ile 24-hr PM_{10} (µg/m^3)	22	20	19	20	24
Kilkitt	Annual Mean PM_{10} (µg/m^3)	9	8	8	9	7
	90th %ile 24-hr PM_{10} (µg/m^3)	18	15	14	15	13
Claremorris	Annual Mean PM_{10} (µg/m^3)	10	10	11	12	11
	90th %ile 24-hr PM_{10} (µg/m^3)	17	17	17	20	20
Enniscorthy	Annual Mean PM_{10} (µg/m^3)	18	17	-	-	18
	90th %ile 24-hr PM_{10} (µg/m^3)	34	32	-	-	-

Note 1 Annual average limit value of 40 µg/m^3 and 24-hour limit value of 50 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Monitoring of both PM_{10} and $PM_{2.5}$ takes place at the station in Claremorris which allows for the $PM_{2.5}/PM_{10}$ ratio to be calculated. Average $PM_{2.5}$ levels in Claremorris over the period 2015 - 2019 ranged from 4 - 6 µg/m^3, with a $PM_{2.5}/PM_{10}$ ratio ranging from 0.4 – 0.6 (EPA, 2021a). Based on this information, a conservative ratio of 0.7 was used to generate an existing $PM_{2.5}$ concentration in the region of the development of 9.1 µg/m^3.

Background concentrations for the Opening Year 2024 and Design Year of 2039 have been calculated for the local air quality assessment. These have used current estimated background concentrations and the year on year reduction factors provided by Transport Infrastructure Ireland in the *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011) and the UK Department for Environment, Food and Rural Affairs LAQM.TG(16) (2018).

8.3.3 Climate Baseline

Anthropogenic emissions of greenhouse gases in Ireland included in the EU 2020 strategy are outlined in the most recent review by the EPA which details provisional emissions up to 2020 (EPA, 2021b). The data published in 2021 states that Ireland will exceed its 2020 annual limit set under the EU's Effort Sharing Decision (ESD), 406/2009/EC1 by an estimated 6.73 Mt. For 2021, total national greenhouse gas emissions are estimated to be 57.70 million tonnes carbon dioxide equivalent (Mt CO_2eq) with 44.38 MtCO_2eq of emissions associated with the ESD sectors for which compliance with the EU targets must be met. Agriculture is the largest contributor in 2021 at 37.1% of the total, with the transport sector accounting for 17.9% of emissions of CO_2.

GHG emissions for 2020 are estimated to be 3.6% lower than those recorded in 2019. Emission reductions have been recorded in 6 of the last 10 years. However, compliance with the annual EU targets has not been met for five years in a row. Emissions from 2016 – 2020 exceeded the annual EU targets by 0.29 MtCO_2eq, 2.94 MtCO_2eq, 5.57 MtCO_2eq,6.85 MtCO_2eq and 6.73 MtCO_2eq respectively. Agriculture is consistently the largest contributor to emissions with emissions from the transport and energy sectors being the second and third largest contributors respectively in recent years.

The EPA 2020 GHG Emissions Projections Report for 2020 – 2040 (EPA, 2021c) notes that there is a long-term projected decrease in greenhouse gas emissions as a result of inclusion of new climate mitigation policies and measures that formed part of the National Development Plan (NDP) which was published in 2018 and the Climate Action Plan published in 2019. Implementation of these are classed as a "*With Additional Measures scenario*" for future scenarios. A change from generating electricity using coal and peat to wind power and diesel vehicle engines to electric vehicle engines are envisaged under this scenario. While emissions are projected to decrease in these areas, emissions from agriculture are projected to grow steadily due to an increase in animal numbers. However, over the

period 2013 to 2020 Ireland is projected to cumulatively exceed its compliance obligations with the EU's Effort Sharing Decision (Decision No. 406/2009/EC) 2020 targets by approximately 12.2MtCO_2eq under the "With Existing Measures" scenario and under the "With Additional Measures" scenario. The projections indicate that Ireland can meet its non-ETS EU targets over the period 2021 – 2030 assuming full implementation of the Climate Action Plan and the use of the flexibilities available (EPA, 2021).

8.4 Predicted Impacts

8.4.1 Construction Phase

Air Quality

The greatest potential impact on air quality during the construction phase of the proposed development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 350 m of a construction site, the majority of the deposition occurs within the first 50 m. The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts etc.) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction. A review of Dublin Airport meteorological data (see Section 8.3.1) indicates that the prevailing wind direction is westerly to south-westerly and wind speeds are generally moderate in nature. In addition, dust generation is considered negligible on days where rainfall is greater than 0.2 mm. A review of historical 30 year average data for Dublin Airport indicates that on average 191 days per year have rainfall over 0.2 mm (Met Eireann, 2022) and therefore it can be determined that over 50% of the time dust generation will be reduced.

The proposed development can be considered moderate in scale and therefore there is the potential for significant dust soiling 50 m from the source (TII, 2011) (Table 8.6). There are a number of high sensitivity residential receptors bordering the site to the north along Glascarn Lane, some of which are within 50m. In the absence of mitigation there is the potential for moderate, negative, short-term impacts to nearby sensitive receptors as a result of dust emissions from the proposed development.

Table 8.6: Assessment Criteria for the Impact of Dust Emissions from Construction Activities with Standard Mitigation in Place

Source		**Potential Distance for Significant Effects (Distance from source)**		
Scale	**Description**	**Soiling**	**PM_{10}**	**Vegetation Effects**
Major	Large construction sites with high use of haul routes	100m	25m	25m
Moderate	Moderate sized construction sites with moderate use of haul routes	50m	15m	15m
Minor	Minor construction sites with limited use of haul routes	25m	10m	10m

Source: Assessment of Construction Impacts taken from "*Guidelines for the treatment of Air Quality During the Planning & Construction of National Road Schemes*" (TII, 2011)

There is also the potential for traffic emissions to impact air quality in the short-term over the construction phase. Particularly due to the increase in HGVs accessing the site. The construction stage traffic has been reviewed and a detailed air quality assessment has been scoped out as none of the road links impacted by the proposed development satisfy the DMRB assessment criteria in Section 8.2.2. It can therefore be determined that the construction stage traffic will have an imperceptible, neutral and short-term impact on air quality.

Climate

There is the potential for a number of greenhouse gas emissions to atmosphere during the construction of the development. Construction vehicles, generators etc., may give rise to CO_2 and N_2O emissions. The Institute of Air Quality Management document *Guidance on the Assessment of Dust from Demolition and Construction* (IAQM, 2014) states that site traffic and plant is unlikely to make a significant impact on climate. Therefore, the potential impact on climate is considered to be imperceptible, neutral and short-term.

8.4.2 Operational Phase

Air Quality

The potential impact of the proposed development has been assessed by modelling emissions from the traffic generated as a result of the development. The traffic data includes the Do Nothing, Do Something and Do Maximum scenarios (see Section 8.2.3). The impact of NO_2 emissions for the opening and design years was predicted at the nearest sensitive receptors to the development. This assessment allows the significance of the development, with respect to both relative and absolute impacts, to be determined.

Transport Infrastructure Ireland's document Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes (2011) detail a methodology for determining air quality impact significance criteria for road schemes and this can be applied to any development that causes a change in traffic. The degree of impact is determined based on both the absolute and relative impact of the proposed development. Results are compared against the 'Do-Nothing' scenario, which assumes that the proposed development is not in place in future years, in order to determine the degree of impact.

The results of the assessment of the impact of the proposed development on NO_2 in the opening year 2024 are shown in Table 8.7 and for design year 2039 are shown in Table 8.8. The Do Maximum scenario is assessed for the design year of 2039 only and the results are shown in Table 8.9. The annual average concentration is in compliance with the limit value at all worst-case receptors in 2024 and 2039. Concentrations of NO_2 are at most 37% of the annual limit value in 2024 and 2039. The redistribution of traffic as a result of the RORR under the Do Maximum scenario results in NO_2 concentrations that are at most 36% of the annual limit value. In addition, the hourly limit value for NO_2 is 200 µg/m^3 and is expressed as a 99.8th percentile (i.e. it must not be exceeded more than 18 times per year). The maximum 1-hour NO_2 concentration is not predicted to be exceeded in any modelled year (Table 8.10).

The impact of the proposed development on annual mean NO_2 concentrations can be assessed relative to "Do Nothing (DN)" levels. Relative to baseline levels, there are predicted to be some imperceptible to small increases in NO_2 concentrations at receptors R1 – R6 under the Do Something Scenario. Concentrations will increase by at most 1.0 µg/m^3 in 2024 and by 1.1 µg/m^3 in 2039 at worst-case receptor R2. The Do Maximum scenario results in a decrease in NO_2 concentrations at the majority of assessed receptors due to the redistribution of traffic as a result of the completion of the RORR. Concentrations of NO_2 under the Do Maximum scenario decrease by at most 1.61 µg/m^3 at receptor R5.

Using the assessment criteria outlined in TII guidance (TII, 2011) the impact of the proposed development in terms of NO_2 is considered negligible. Therefore, the overall impact of NO_2 concentrations as a result of the proposed development is long-term, negative and imperceptible under the Do Something scenario. The construction of the entirety of the RORR will result in a positive impact on NO_2 concentrations at the majority of receptors due to the redistribution of traffic, however, this is still considered to be negligible in terms of impact.

Concentrations of PM_{10} were modelled for the baseline year of 2019. The modelling showed that concentrations were in compliance with the annual limit value of 40 µg/m^3 at all receptors assessed, therefore, further modelling for the opening and design years was not required. Concentrations reached

at most 0.70 µg/m^3. When a background concentration of 13 µg/m^3 is included, the overall impact is 34% of the annual limit value at the worst-case receptor.

The impact of the proposed development on ambient air quality in the operational stage is considered long-term, localised, negative and imperceptible and therefore, no mitigation is required.

Table 8.7: Predicted Annual Mean NO_2 Concentrations – Opening Year 2024 Do Something Scenario (µg/m^3)

Receptor	Opening Year 2024				
	DN	DS	DS-DN	Magnitude	Description
R1	13.8	14.7	0.84	Small Increase	Negligible
R2	12.7	13.7	1.00	Small Increase	Negligible
R3	10.4	10.6	0.22	Imperceptible Increase	Negligible
R4	10.3	10.8	0.45	Small Increase	Negligible
R5	11.4	11.9	0.49	Small Increase	Negligible
R6	11.4	12.2	0.73	Small Increase	Negligible

Table 8.8: Predicted Annual Mean NO_2 Concentrations – Design Year 2039 Do Something Scenario (µg/m^3)

Receptor	Design Year 2039				
	DN	DS	DS-DN	Magnitude	Description
R1	14.4	14.8	0.35	Imperceptible Increase	Negligible
R2	13.2	14.3	1.10	Small Increase	Negligible
R3	10.3	10.6	0.26	Imperceptible Increase	Negligible
R4	10.2	10.7	0.53	Small Increase	Negligible
R5	11.6	12.1	0.56	Small Increase	Negligible
R6	11.6	12.4	0.82	Small Increase	Negligible

Table 8.9: Predicted Annual Mean NO_2 Concentrations – Design Year 2039 Do Maximum Scenario (µg/m^3)

Receptor	Design Year 2039				
	DN	Do Max	Do Max-DN	Magnitude	Description
R1	14.4	14.4	-0.06	Imperceptible Decrease	Negligible
R2	13.2	12.5	-0.72	Small Decrease	Negligible
R3	10.3	10.6	0.26	Imperceptible Increase	Negligible
R4	10.2	9.2	-1.06	Small Decrease	Negligible
R5	11.6	9.9	-1.61	Small Decrease	Negligible
R6	11.6	10.1	-1.49	Small Decrease	Negligible

Table 8.10: Predicted 99.8th percentile of Daily Maximum 1-hour NO_2 Concentrations (µg/m³)

Receptor	Opening Year 2024		Design Year 2039		
	DN	DS	DN	DS	Do Max
R1	48	51	51	52	50
R2	45	48	46	50	44
R3	36	37	36	37	37
R4	36	38	36	38	32
R5	40	42	40	42	35
R6	40	43	41	43	35

Climate

Climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. As a result of this there is the potential for flooding related impacts on site in future years. However, adequate attenuation and drainage have been provided for to account for increased rainfall in future years as part of the design of this development. Therefore, the impact will be long-term, localised, neutral and imperceptible.

There is also the potential for increased traffic volumes to impact climate. The predicted concentrations of CO_2 for the future years of 2024 and 2039 are detailed in Table 8.11. These are significantly less than the 2024 and 2030 targets set out under EU legislation (targets beyond 2030 are not available). It is predicted that in 2024 the proposed development will increase CO_2 emissions by 0.00086% of the EU 2024 target. Similarly low increases in CO_2 emissions are predicted to occur in 2039 with emissions increasing by 0.00103% of the EU 2030 target. Therefore, the potential climate impact of the proposed development is considered negative, long-term and imperceptible.

The proposed development has been designed to reduce the impact to climate where possible. A number of measures have been incorporated into the design to ensure the operational phase emissions are minimised. These are outlined fully within the Energy Statement prepared by BBSC and are summarised below.

The development will be a Nearly Zero Energy Building (NZEB) in accordance with the Part F and Part L 2021 requirements as appropriate. Each building will have an A2 Building Energy Rating (BER) that will comply with the Part L requirements. The following measures, or similar will be incorporated into the proposed development to achieve a more energy efficient (i.e. less carbon intensive) design. All measures will be reviewed at the detailed design stage and the most appropriate options will be implemented.

- High performance U-values;
- Improved air tightness;
- Improved thermal transmittance and thermal bridging;
- Use of renewable technologies to ensure energy consumption is in line with the Part L 2021 requirements these include photovoltaic panels and heat pumps;
- Use of energy efficient LED lighting.

Overall these measures will aid in reducing the impact to climate during the operational phase of the proposed development.

Table 8.11: Climate Impact Assessment

Year	Scenario	CO_2 (tonnes/annum)
2024	Do Nothing	2157
	Do Something	2502
2039	Do Nothing	2580
	Do Something	2925
Increment in 2024		344.9 Tonnes
Increment in 2039		345 Tonnes
Emission Ceiling (kilo Tonnes) 2024		40,113 Note 1
Emission Ceiling (kilo Tonnes) 2030		33,381 Note 1
Impact in 2024 (%)		0.00086 %
Impact in 2039 (%)		0.00103 %

Note 1 Target under *Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013*

8.5 Potential Cumulative Impact

8.5.1 Construction Phase

According to the IAQM guidance (2014) should the construction phase of the proposed development coincide with the construction of any other permitted developments within 350m of the site then there is the potential for cumulative dust impacts to the nearby sensitive receptors. A review of recent planning permissions for the area was conducted and it was found that there were 2 no. relevant sites for which cumulative impacts may occur should their construction phase and that of the proposed development overlap. These are residential developments at Jamestown, Ratoath, Raystown & Tankardstown, Ratoath, Co Meath (planning ref. DA120765) and at Jamestown, Ratoath, Co. Meath (planning ref. 305196).

There is the potential for cumulative construction dust impacts should the construction phases overlap with that of the proposed development. However, the dust mitigation measures outlined in Appendix 8.2 will be applied throughout the construction phase of the proposed development which will avoid 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 short-term, negative and imperceptible.

According to the IAQM guidance (2014) site traffic, plant and machinery are unlikely to have a significant impact on climate. Therefore, cumulative impacts are not predicted.

8.5.2 Operational Phase

Cumulative impacts have been incorporated into the traffic data supplied for the operational stage air and climate modelling assessments where such information was available (see Section 8.2.3). The results of the modelling assessment (Section 8.4.2) show that there is a long-term, negative and imperceptible impact to air quality and climate during the operational stage.

8.6 Do Nothing Scenario

Under the Do Nothing Scenario no construction works will take place and the previously identified impacts of fugitive dust and particulate matter emissions and emissions from equipment and machinery will not occur. The ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from new developments in the surrounding area, changes in road traffic, etc.). Impacts from increased traffic volumes and associated air emissions will also not occur. The Do Nothing scenario, in relation to the operational phase, was included in the dispersion modelling assessment (see Section 8.4.2) and was found to be imperceptible in relation to air quality and climate. Therefore, the overall Do Nothing scenario can be considered neutral in terms of both air quality and climate.

8.7 Risks to Human Health

8.7.1 Construction Phase

Dust emissions from the construction phase of the proposed development have the potential to impact human health through the release of PM_{10} and $PM_{2.5}$ emissions. As per Table 8.6 PM_{10} emissions can occur within 15m of the site for a development of this scale. There are a number of high sensitivity receptors bordering the site to the north along Glascarn Lane, a small number of which are within 15m of the site boundary.

Best practice mitigation measures are proposed for the construction phase of the proposed development which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the proposed development will be negative, short-term and imperceptible with respect to human health.

8.7.2 Operational Phase

Traffic related air emissions have the potential to impact air quality which can affect human health. However, air dispersion modelling of traffic emissions has shown that levels of all pollutants are below the ambient air quality standards set for the protection of human health. It can be determined that the impact to human health during the operational stage is long-term, neutral and imperceptible and therefore, no mitigation is required.

8.8 Mitigation Measures

8.8.1 Construction Phase

Air Quality

The proactive control of fugitive dust will ensure the prevention of significant emissions. The key aspects of controlling dust are listed below. Full details of the dust management plan can be found in Appendix 8.2 of this EIAR. These measures have been incorporated into the overall Construction Environmental Management Plan (CEMP) prepared in respect of the proposed development.

In summary the measures which will be implemented will include:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.
- Any road that has the potential to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions.

- Vehicles exiting the site shall make use of a wheel wash facility prior to entering onto public roads.

- Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph.

- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary.

- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.

- During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.

At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

Climate

Impacts to climate during the construction stage are predicted to be imperceptible however, good practice measures can be incorporated to ensure potential impacts are lessened. These include:

- Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods.

- Ensure all plant and machinery are well maintained and inspected regularly.

- Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.

8.8.2 Operational Phase

The impact of the operational traffic associated with proposed development on air quality and climate is predicted to be imperceptible with respect to the operational phase in the long term. Therefore, no site specific mitigation measures are required other than those set out in Section 8.4.2 in relation to operational phase energy usage.

8.9 Residual Impact

8.9.1 Construction Phase

Air Quality

Once the dust minimisation measures outlined in Section 8.8 and Appendix 8.2 are implemented, the impact of the proposed development in terms of dust soiling will be short-term, negative, localised and imperceptible at nearby receptors.

Climate

According to the IAQM guidance (2014) site traffic, plant and machinery are unlikely to have a significant impact on climate. Therefore, the predicted impact is short-term, neutral and imperceptible.

8.9.2 Operational Phase

Air Quality

Air dispersion modelling of operational traffic emissions associated with the proposed development was carried out using the UK DMRB model. The modelling assessment determined that the change in emissions of NO_2 at nearby sensitive receptors as a result of the proposed development will be imperceptible. Therefore, the operational phase impact to air quality is long-term, localised, negative and imperceptible.

Climate

Modelling of operational phase CO_2 emissions as a result of the traffic associated with the proposed development was carried out to determine the impact to climate. It was found that emissions of CO_2 will increase by an imperceptible amount as a result of the proposed development and are significantly below the EU 2024 and 2030 GHG targets. The operational phase impact to climate is long-term, negative and imperceptible. In addition, the proposed development has been designed to reduce the impact to climate where possible during operation.

8.10 Monitoring

8.10.1 Construction Phase

Monitoring of construction dust deposition along the site boundary to nearby sensitive receptors during the construction phase of the proposed development is recommended to ensure mitigation measures are working satisfactorily. This can be carried out using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/(m_2*day) during the monitoring period of 30 days (+/- 2 days).

8.10.2 Operational Phase

There is no monitoring recommended for the operational phase of the development as impacts to air quality and climate are predicted to be imperceptible.

8.11 Difficulties Encountered

There were no difficulties encountered when compiling this assessment.

8.12 References

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UK Highways Agency (2019b) UK Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 14 LA 114 Climate

UK Office of Deputy Prime Minister (2002) Controlling the Environmental Effects of Recycled and Secondary Aggregates Production Good Practice Guidance

USEPA (1997) Fugitive Dust Technical Information Document for the Best Available Control Measures

World Health Organisation (2006) Air Quality Guidelines - Global Update 2005 (and previous Air Quality Guideline Reports 1999 & 2000)

9. Noise & Vibration

9.1 Introduction

This chapter assesses the likely noise and vibration impacts associated with the proposed residential development at Ratoath, Co. Meath. The proposed development is located at the south side of Ratoath and consists 452 units over 14.166 hectares. It includes the development of the Ratoath Outer Relief Road (RORR).

The proposed development will involve construction of a residential development, a childcare facility and all associated ancillary and infrastructural works. Please refer to the development description within the statutory notices for a complete description of the proposed development.

This section of the EIAR has been prepared by AWN Consulting in the context of current relevant standards and guidance. This assessment has been prepared by Alistair Maclaurin BSc PgDip MIOA, Senior Consultant at AWN Consulting who has prepared multiple EIS and EIAR documents throughout his 8 years' experience as an environmental consultant.

9.2 Assessment Methodology

The following methodology has been prepared based on the requirements of the EPA document Guidelines on the information to be contained in Environmental Impact Assessment Reports Draft August 2017 and on our experience of preparing the noise & vibration chapters for similar developments. The assessment will be undertaken using the following methodology:

- Baseline noise monitoring has been undertaken in the vicinity of the proposed development site in order to characterise the existing noise environment;
- A review of the most applicable standards and guidelines has been reviewed in order to set a range of acceptable noise and vibration criteria for the construction and operational phases of the proposed development;
- Predictive calculations relating to construction phase impacts have been undertaken at the nearest sensitive locations to the development site;
- Predictive calculations have been performed to assess the potential impacts associated with the operation of the development at the most sensitive locations surrounding the proposed development;
- A schedule of mitigation measures has been incorporated where required, to reduce, where necessary, the identified potential outward impacts relating to noise and vibration from the proposed development, and;
- The inward impact of noise in the surrounding environment into the proposed buildings has also been assessed to determine the requirements, for additional noise mitigation, where required, to provide suitable residential amenity.

9.2.1 Construction Noise

BS5228 ABC Methodology

There is no published statutory Irish guidance relating to the maximum permissible noise and vibration levels that may be generated during the construction phase of a project. It is common practice to use BS 5228:2009+A1:2014 *Code of Practice for Noise and Vibration Control on Construction and Open Sites* with respect to the controlling noise and vibration impacts. In this instance, appropriate criteria relating to permissible construction noise levels are taken from Part One of the standard *Noise*.

The approach adopted here calls for the designation of a noise-sensitive location into a specific category (A, B or C) based on exiting ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded at this location, indicates a significant noise impact is associated with the construction activities.

BS 5228-1:2009+A1:2014 sets out guidance on permissible noise levels relative to the existing noise environment. Table 9.1 sets out the values which, when exceeded, signify a significant effect at the facades of residential receptors.

Table 9.1 - Example Threshold of Significant Effect at Dwellings.

Assessment Category and Threshold Value Period (L_{Aeq})	Threshold Value in Decibels, dB		
	Category A[A]	Category B[B]	Category C[C]
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
Evenings and Weekends	55	60	65
Night-Time (23:00 to 07:00)	45	50	55

[A] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

[B] Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

[C] Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

For the appropriate assessment period (i.e. daytime in this instance) the ambient noise level is determined and rounded to the nearest 5 dB. If the construction noise exceeds the appropriate category value, then a significant effect is deemed to occur.

BS5228 Fixed Noise Thresholds

BS5228-1:2009+A1 gives several examples of acceptable thresholds for construction or demolition noise, the most simplistic being based upon the exceedance of fixed noise limits. For example, paragraph E.2 states:

"Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut."

Paragraph E.2 goes on to state:

> *"Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:*
>
> *70 decibels (dBA) in rural, suburban areas away from main road traffic and industrial noise;*
>
> *75 decibels (dBA) in urban areas near main roads in heavy industrial areas".*

Transport Infrastructure Ireland Fixed Noise Thresholds

Overall acceptable levels of construction noise for large construction projects are set out in the Transport Infrastructure Ireland (TII) publication Guidelines for the Treatment of Noise and Vibration in National Road Schemes . The levels should not be exceeded at noise sensitive locations during the construction phase of the development. Table 9.2 sets out these levels.

Table 9.2 - Maximum permissible noise levels at the façade of dwellings during construction

Days and Times	Noise Levels (dB re. 2x10-5 Pa)	
	$L_{Aeq(1hr)}$	$L_{Aeq(1hr)}$
Monday to Friday 07:00 to 19:00hrs	70	80
Monday to Friday 19:00 to 22:00hrs	60*	65*
Saturdays 08:00 to 16:30hrs	65	75

Sundays & Bank Holidays 08:00 to 16:30hrs	60*	65*

Note * Construction activity at these times, other than that required for emergency works, will normally require the explicit permission of the relevant local authority.

Adopted Criteria

Taking the above into account it is considered appropriate to adopt a construction noise limit at sensitive receptors of **70 dB $L_{Aeq,1hr}$** Monday to Friday 07:00 to 19:00hr and Saturday 08:00 to 14:00hr.

9.2.2 Construction Vibration

In terms of vibration, British Standard BS 5228-2:2009+A1:2014 *Code of Practice for Noise and Vibration Control on Construction and Open Sites – Vibration* recommends that, for soundly constructed residential properties and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. The standard also notes that below 12.5 mm/s peak particle velocity (PPV) the risk of damage tends to zero. It is therefore common, on a cautionary basis to use this lower value. Taking the above into consideration the vibration criteria in Table 9.3 are recommended for nearby properties.

Table 9.3 - Transient Vibration Guidance Values for Avoidance of Cosmetic Building Damage

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of:-		
Less than 15 Hz	15 to 40 Hz	40 Hz and above
12 mm/s	20 mm/s	50 mm/s

9.2.3 Operational Phase - Additional Traffic on Existing Public Roads

In order to consider the potential noise impact associated with the proposed development introducing additional traffic onto the existing road networks, and given that vehicle movements on public roads are assessed using a different parameter (the ten percentile noise level; L_{A10}), it is appropriate to consider the increase in traffic noise level that arises as a result of vehicular movements associated with the development in terms of the L_{A10} parameter.

In order to assist with the interpretation of the noise impact associated with vehicular traffic on public roads, Table 9.4 offers guidance as to the likely impact associated with any particular change in traffic noise level (Source Design Manual for Roads and Bridges, 2019).

Table 9.4 - Likely Impact Associated with Change in Traffic Noise Level

Long Term Magnitude	DMRB Magnitude of Impact Long Term Noise Change (dB $L_{A10,18hr}$ of L_{night})
Greater than or equal to 10.0	Major
5.0 to 9.9	Moderate
3.0 to 4.9	Minor
Less than 3.0	Negligible

9.2.4 Operational Phase – Operation of the Ratoath Outer Relief Road

There are no statutory guidelines or standards relating to the assessment of road traffic noise in Ireland. For new national roads in Ireland, it is standard practice to adopt the traffic noise design goal contained within the TII *document Guidelines for the Treatment of Noise and Vibration in National Road Schemes 2004* and Guidance contained within the TII's *Good Practice Guide for the Treatment of Noise during*

the Planning on National Road Schemes (2014). Both documents note the use of a traffic noise design goal of 60 dB L_{den} (free field residential façade criterion) for new national roads.

The following three conditions must be satisfied under the TII guidelines in order for noise mitigation to be provided:

a) the combined expected maximum traffic noise level, i.e. the relevant noise level, from the proposed road scheme together with other traffic in the vicinity is greater than the design goal of 60dB L_{den};
b) the relevant noise level is at least 1 dB more than the expected traffic noise level without the proposed road scheme in place, and;
c) the contribution to the increase in the relevant noise level from the proposed road scheme is at least 1 dB.

It should be noted that the Design Goal is applicable to new national road schemes only. In the case of this proposed development which is a regional link road, it would not strictly fall under the requirements for noise design goals set within the TII's guidance document. In the absence of other design standards for road traffic noise relating to new roads, however, the TII operational noise design criterion has been used as a guide for this project. It is acknowledged that it may not always be sustainable to achieve the 60 dB L_{den} design goal. In such circumstances, nevertheless, a structured approach should be taken in order to ameliorate as far as practicable road traffic noise through the consideration of mitigation measures which aid in reducing the overall potential noise impact of the road scheme.

9.2.5 Operational Phase – Mechanical Plant and Services

Once a development of this nature becomes fully operational, a variety of electrical and mechanical plant will be required to service the development. Most of this plant will be capable of generating noise to some degree. Some of this plant may operate 24 hours a day, and hence would be most noticeable during quiet periods (i.e. overnight). Noisy plant with a direct line-of-sight to noise sensitive properties would potentially have the greatest impact. Plant contained within plantrooms has the least potential for impact once consideration is given to appropriate design of the space.

British Standard BS 4142:2014+A1:2019 *Methods for Rating and Assessing Industrial and Commercial Sound* describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in this British Standard use 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.

For an appropriate BS 4142 assessment it is necessary to compare the measured external background noise level (i.e. the $L_{A90,T}$ level measured in the absence of plant items) to the rating level ($L_{Ar,T}$) of the various plant items, when operational. Where noise emissions are found to be tonal, impulsive in nature or irregular enough to attract attention, BS 4142 also advises that a penalty be applied to the specific level to arrive at the rating level.

The subjective method for applying a penalty for tonal noise characteristics outlined in BS 4142 recommends the application of a 2 dB penalty for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6 dB where it is highly perceptible.

The following definitions as discussed in BS 4142 as summarised below:

"ambient noise level, $L_{Aeq,T}$"	is the noise level produced by all sources including the sources of concern, i.e. the residual noise level plus the specific noise of mechanical plant, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T].
"residual noise level, $L_{Aeq,T}$"	is the noise level produced by all sources excluding the sources of concern, in terms of the equivalent continuous A-

	weighted sound pressure level over the reference time interval [T].
"specific noise level, $L_{Aeq,T}$"	is the sound level associated with the sources of concern, i.e. noise emissions solely from the mechanical plant, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T].
"rating level, $L_{Ar,T}$"	is the specific sound level plus any adjustments for the characteristic features of the sound (e.g. tonal, impulsive or irregular components);
"background noise level, $L_{A90,T}$"	is the sound pressure level of the residual noise that is exceeded for 90% of the time period T.

If the rated plant noise level is +10 dB or more above the pre-existing background noise level then this indicates that complaints are likely to occur and that there will be a significant adverse impact. A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the 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.

9.2.6 Operational Phase – Residential Inward Noise Impact

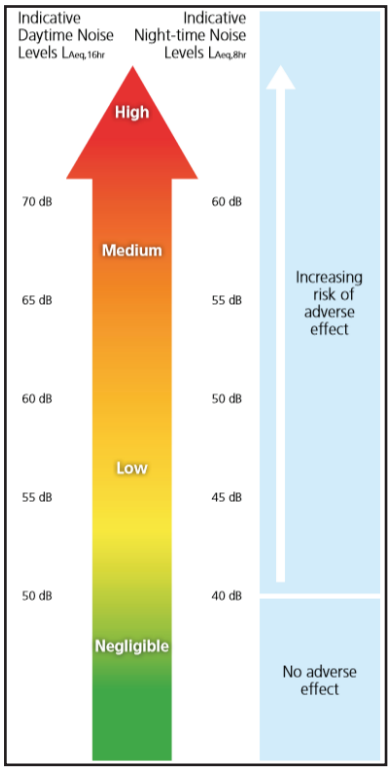
The *Professional Guidance on Planning & Noise* (ProPG) document was published in May 2017. The document was prepared by a working group comprising members of the Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH). Although not a government document, since it's adoption it has been generally considered as a best practice guidance and has been widely adopted in the absence of equivalent Irish guidance.

The ProPG outlines a systematic risk based 2-stage approach for evaluating noise exposure on prospective sites for residential development. The two primary stages of the approach can be summarised as follows:

- Stage 1 - Comprises a high-level initial noise risk assessment of the proposed site considering either measured and or predicted noise levels; and,
- Stage 2 – Involves a full detailed appraisal of the proposed development covering four "key elements" that include:
    - Element 1 - Good Acoustic Design Process;
    - Element 2 - Noise Level Guidelines;
    - Element 3 - External Amenity Area Noise Assessment;
    - Element 4 - Other Relevant Issues

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the site as a negligible, low, medium or high risk based on the pre-existing noise environment. Figure 9.1 presents the basis of the initial noise risk assessment, it provides appropriate risk categories for a range of continuous noise levels either measured and/or predicted on site.

Figure 9.1 - ProPG Stage 1 - Initial Noise Risk Assessment



It should be noted that a site should not be considered a negligible risk if more than 10 L_{AFmax} events exceed 60 dB during the night period and the site should be considered a high risk if the L_{AFmax} events exceed 80 dB more than 20 times a night.

Element 2 of the ProPG document sets out recommended internal noise targets derived from *BS 8233: 2014: Guidance on Sound Insulation and Noise Reduction for Buildings.* The recommended indoor ambient noise levels are set out in Table 9.5 and are based on annual average data, that is to say they omit occasional events where higher intermittent noisy events may occur.

Table 9.5 – ProPG Guideline Internal Noise Levels

Activity	Location	(07:00 to 23:00 hr)	(23:00 to 07:00 hr)
Resting	Living Room	35 dB $L_{Aeq, 16hr}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq, 16hr}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq, 16hr}$	30 dB $L_{Aeq, 8hr}$ 45 dB L_{AFmax}*

*Note The document comments that the internal $L_{AFmax,T}$ noise level may be exceeded no more than 10 times per night without a significant impact occurring.

In addition to these absolute internal noise levels, ProPG provides guidance on flexibility of these internal noise level targets. For instance, in cases where the development is considered necessary or desirable, and noise levels exceed the external noise guidelines, then a relaxation of the internal L_{Aeq} values by up to 5 dB can still provide reasonable internal conditions.

ProPG provides the following advice with regards to external noise levels for amenity areas in the development:

"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$."

9.2.7 Operational Phase – Vibration Criteria

There are no expected sources of vibration associated with the operational phase, therefore, vibration criteria are not specified for this phase.

9.3 Baseline Environment

9.3.1 Proposed Development and Surrounding Environment

The proposed development is located at the south side of Ratoath and consists 452 units over 14.166 hectares. It includes the development of the Ratoath Outer Relief Road (RORR). Please refer to the development description within the statutory notices for a complete description of the proposed development.

To the west of the site is the R155, Fairyhouse Road.

9.3.2 Survey Methodology

An environmental noise survey has been conducted at the site in order to quantify the prevailing noise environment. The survey was conducted in general accordance with *ISO 1996-2:2017 Acoustics - Description, Measurement and Assessment of Environmental Noise - Determination of Environmental Noise Levels*. Specific details are set out as follows.

9.3.3 Survey Locations

An unattended survey location (U1) was selected to determine noise levels within the development site and at the rear of houses on Glascarn Lane and Cairn Court.

In addition to the unattended location, three attended locations were selected to further characterise the noise environment at sensitive receptors surrounding the site as follows:

Location A1 – Representative of receptors on Fairyhouse Road, and also the western most boundary of the development site.

Location A2 - Representative of receptors facing on to Glascarn Lane.

Location A3 – Representative of receptors at the eastern boundary of the development site, on Glascarn Lane.

Figure 9.2 presents the monitoring locations.

Figure 9.2 - Noise Survey Locations

9.3.4 Procedure

Survey equipment was installed at measurement Location U1 between 11:29hrs on Wednesday 13th April to 13:14hrs on Friday 15th April 2022.

Sample periods for the noise measurements were 15 minutes.

Attended measurements at locations A1 – A3 were undertaken on 13th April 2022.

9.3.5 Instrumentation

Noise measurements were conducted using a Rion Type NL-42 Sound Level Meter for unattended survey locations and a Brüel & Kjær 2250L was used during the attended surveys. The measurement apparatus was check calibrated both before and after each survey using a Brüel & Kjær Type 4231 Sound Level Meter Calibrator.

9.3.6 Measurement Parameters

The noise survey results are presented in terms of the following parameters.

L_{Aeq}	is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.
L_{A90}	is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.
L_{AFmax}	is the instantaneous fast time weighted maximum sound level measured during the sample period.

The “A” suffix denotes the fact that the sound levels have been “A-weighted” in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x^{10-5}$ Pa.

9.3.7 Measurement Results

Location U1

The results of the baseline noise survey at location U1 is presented in Table 9.6.

Table 9.6 - Measurement Results at Location U1

Date	Period	Measured Ambient Noise Levels, dB		
		$L_{Aeq,T}$	L_{AFmax}	$L_{A90,T}$
13/04/22	Day (07:00 – 23:00)	53	76	45
	Night (23:00 – 07:00)	53	78	31
14/04/22	Day (07:00 – 23:00)	55	78	47
	Night (23:00 – 07:00)	52	76	31
15/04/22	Day (07:00 – 23:00)	56	78	46

Location A1

The results of the baseline noise survey at location A1 is presented in Table 9.7.

Table 9.7 - Measurement Results at Location A1

Date	Time	Measured Ambient Noise Levels, dB		
		$L_{Aeq,T}$	L_{AFmax}	$L_{A90,T}$
13/04/22	11:43	74	89	45
	12:58	75	88	49
	13:55	74	87	50

The noise environment at Location A1 was dominated by road traffic from the R155. Distant aircraft noise was also audible.

Location A2

The results of the baseline noise survey at location A2 is presented in Table 9.8.

Table 9.8 - Measurement Results at Location A2

Date	Time	Measured Ambient Noise Levels, dB		
		$L_{Aeq,T}$	L_{AFmax}	$L_{A90,T}$
13/04/22	12:15	60	81	41
	13:19	62	81	40
	14:14	63	85	41

The noise environment at Location A2 was dominated by road traffic on the local road network. Pedestrians and bird noise was also a factor at this location.

Location A3

The results of the baseline noise survey at location A3 is presented in Table 9.9

Table 9.9 Measurement Results at Location A3

Date	Time	Measured Ambient Noise Levels, dB		
		$L_{Aeq,T}$	L_{AFmax}	$L_{A90,T}$
13/04/22	12:38	52	71	43

	13:37	54	73	41
	14:31	52	73	42

The noise environment at Location A3 was dominated by road traffic on the local road network. Pedestrians and bird noise was also a factor at this location.

9.4 Predicted Impacts

9.4.1 Construction Phase - Noise

There are two particular elements to the construction phase:

- the construction of the various buildings and local roads within the proposed development
- the construction of the Ratoath Outer Relief Road.

A variety of items of plant will be in use for the purposes site clearance and construction of the development. The type and number of equipment will vary between the varying construction phases depending on the phasing of the works. There will be vehicular movements to and from the site that will make use of existing roads. Due to the nature of these activities, there is potential for the generation of elevated levels of noise.

The closest receptor locations are identified in Figure 9.3. In terms of distances to construction works, some properties are located at 20m distance to the construction works (e.g. properties in Location A and the properties along the southern section of Location B, however most are located at distances in excess of 30m from the development.

Figure 9.3 - Receptor Locations

Construction of the Main Site Buildings and Local Roads

The construction of the buildings and local roads will require site clearance, building construction works and landscaping works (excavators, loaders, dozers, concreting works, mobile cranes, generators). Noise source levels for these activities are quoted in the range of 70 to 80 dB L_{Aeq} at distances of 10m within BS 5228-1. For the purposes of this assessment, a combined sound power value of 115 dB L_w(A) has been used for construction noise calculations. This would include, for example, 5 no. items of construction plant with a sound pressure level of 80 dB L_{Aeq} at 10m operating simultaneously along the closest works boundary.

Given, the type and number of construction equipment will vary over the course of the construction phase, noise levels have been calculated at the closest noise sensitive locations assuming the construction noise levels and distances noted above. For the purpose of the assessment, a standard site hoarding of 2.4m high has been included in the calculations for noise sensitive boundaries. The calculations also assume that the equipment will operate for 66% of the working time. Table 9.10 summarises the result of this assessment.

Table 9.10 - Indicative Construction Noise Levels at Various Distances

Construction Phase	Sound Power at construction works, Lw(A)	Calculated noise levels at varying distances, dB L_{Aeq}				
		20m	30m	50m	60m	100m
Site Clearance General Construction Landscaping Road Works	115	71	68	63	62	57

The predicted noise levels detailed in the Table 9.10 indicate that during the main construction phase including site clearance, building construction works etc. assuming up to 5 items of plant are operating simultaneously at the closest noise sensitive boundaries, there is potential for the significance threshold to be exceeded at distances of 20m. The calculated noise levels at 20 and 30m represent the closest residential properties to the site. Construction noise levels at these properties are likely to exceed a construction noise limits of 70 dB when works are occurring immediately along the adjacent boundaries to these properties assuming the level of construction activities. However, it should be noted that this scenario is highly worst case and will occur for limited periods of time, additionally the exceedance predicted is of the order of 1 dB which can be considered an imperceptible exceedance. Construction works occurring within the remainder of the site will be at further distances from these properties and will result in reduced construction noise levels. The calculated results in Table 9.10 indicate that at distances of 30m and greater, construction noise levels are below the significance criteria. A schedule of best practice noise mitigation measures is included in Section 9.8.1.

Construction of the Ratoath Outer Relief Road

As per TII guidance, noise levels associated with construction may be calculated in accordance with methodology set out in BS5228 2009 + A1 2014: Part 1. This standard sets out sound power levels for plant items normally encountered on construction sites, which in turn enables the prediction of noise levels at selected locations. It is often not possible, however, to conduct detailed prediction calculations for the construction phase of a project. This is due to the fact that the programme for construction works has not been established in detail. Under such circumstances, best practice involves the consideration of appropriate mitigation measures to ensure construction activities do not exceed the recommended noise criteria as set out in Table 9.2.

A variety of items of plant will be in use, such as excavators, loaders, dumper trucks, generators in addition to vehicular movements to and from the site that will make use of existing roads. Due to the nature of the activities undertaken on a road construction site, there is potential for generation of high levels of noise in close proximity to the works.

BS5228:2009 +A1 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1 Noise sets out typical noise levels for items of construction plant. Table 9.11 lists the sound power levels of the plant used for calculation of the expected noise level at various distances

from the roadway. Construction noise calculations have been conducted at distances of 10 to 80m from the works for the main work phases. The calculations assume that plant items are operating for 66% of the time and that all plant items associated with the individual phases are operating simultaneously and at the same distance for any one scenario. A screening correction of 5 dB has been included in the calculations, assuming a partial screening from site hoarding along the site works.

Table 9.11 – Typical Construction Plant Sound Power Noise Levels

Plant Item (BS5228 Ref.)	Sound Power Level, dB(A) re 10^{-12} W
Wheeled loader C2.26	107
Tracked excavator (loading dump truck) C1.10	113
Dozer C.2.10	108
Dump Truck Tipping fill (C2.30)	107
Articulated dump truck (dumping rubble) C1-11	108
Tracked excavator (C2.21)	99
vibration rollers (C5.20)	103
Asphalt Paver & Tipping Lorry (C.5.31)	105
Diesel Generator (C4.76)	89
Road Rollers (C5.19)	108

Table 9.12 to Table 9.14 set out the predicted noise levels during various phases of road construction at distances of 10m to 80m from the works.

Table 9.12 - Indicative Construction Noise Levels During Site Clearance and Preparation

Site Clearance & Preparation	Calculated $L_{Aeq,T}$ at distance from road (m)			
	10m	25m	50m	80m
Wheeled loader (C2.26)	72	64	58	54
Tracked excavator (loading dump truck) (C1.10)	78	70	64	60
Dozer (C.2.10)	73	65	59	55
Dump Truck (C2.30)	72	64	58	54
Combined L_{Aeq}	**81**	**73**	**67**	**63**

Table 9.13 - Indicative Construction Noise Levels During Excavation and Fill Works

Site Clearance & Preparation	Calculated $L_{Aeq,T}$ at distance from road (m)			
	10m	25m	50m	80m
Tracked excavator (loading dump truck) (C1.10)	78	70	64	60
Articulated dump truck (dumping rubble) (C1.11)	73	65	59	55
Wheeled loader (C2.26)	72	64	58	54
Dozer C.2.10	73	65	59	55
Dump Truck Tipping fill (C2.30)	72	64	58	54
Combined L_{Aeq}	**81**	**74**	**68**	**63**

Table 9.14 - Indicative Construction Noise Levels During Road Works

Site Clearance & Preparation	Calculated $L_{Aeq,T}$ at distance from road (m)			
	10m	25m	50m	80m
Tracked excavator (C2.21)	64	56	50	45
Dump Truck (C2.30)	72	64	58	49
vibration rollers (C5.20)	68	60	54	42
Asphalt Paver & Tipping Lorry (C.5.31)	70	62	56	36
Diesel Generator (C4.76)	54	46	40	55
Road Rollers (C5.19)	73	65	59	57
Combined L_{Aeq}	**76**	**68**	**62**	**70**

The results of the assessment have indicated that at distances of beyond 50m from the works, the construction day time noise limit of 70 dB L_{Aeq} can typically be complied with for the scenarios assessed. At distances of up to 25m from the works, there is potential for the noise criterion to be exceeded in the absence of noise mitigation over and above the use of site hoarding. Properties at receptors A and C are within 25m of the proposed works, hence the use of localised screening and the range of best practice mitigation measures set out in Section 9.8.1 will be employed when working at close proximity to these locations to ensure the construction noise limits are not exceeded along the length of the scheme.

9.4.2 Construction Phase - Vibration

The main potential source of vibration during the construction programme is associated with piling and excavation activities depending on the methodologies used.

In order to assess potential vibration impacts at the closest sensitive buildings to the site works, a range of typical level of vibration during augured piling have been determined through reference to published empirical data within BS 5228 – Part 2. The following vibration magnitudes associated with rotary bored piling using a 600mm pile diameter for bored piling into soft ground over rock are summarised below:

- 0.54mm/s at a distance of 5m, for auguring;
- 0.22mm/s at a distance of 5m, for twisting in casing;
- 0.42mm/s at a distance of 5m, for spinning off, and;
- 0.43mm/s at a distance of 5m, for boring with rock auger.

The residential dwellings situated on the western perimeter of the site are located at the closest distances to the site. Considering the low vibration levels at very close distances to augured piling rigs, vibration levels at the nearest receptors are not expected to pose any significance in terms of cosmetic or structural damage. At further distances from the works vibration magnitudes will dissipate further resulting in lower vibration levels to those noted above and hence are orders of magnitude below the limit values in Table 9.3 for both structurally sound and more vulnerable buildings. In addition, the range of vibration levels is typically below a level which would cause any disturbance to occupants of the closest buildings along western perimeter of the site.

During ground breaking in the excavation phase, there is also potential for vibration to propagate through the ground. Empirical data for this activity is not provided in the BS 5228- 2:2009+A1:2014 standard, however the likely levels of vibration from this activity is expected to be significantly below the vibration criteria for building damage on experience from other sites. AWN Consulting have previously conducted vibration measurements under controlled conditions, during trial construction works, on a sample site where concrete slab breaking was carried out. The trial construction works consisted of the use of the following plant and equipment when measured at various distances:

- 3 tonne hydraulic breaker on small CAT tracked excavator
- 6 tonne hydraulic breaker on large Liebherr tracked excavator

Vibration measurements were conducted during various staged activities and at various distances. Peak vibration levels during staged activities using the 3 Tonne Breaker ranged from 0.48 to 0.25 PPV (mm/s) at distances of 10 to 50m respectively from the breaking activities. Using a 6 Tonne Breaker, measured vibration levels ranged between 1.49 to 0.24 PPV (mm/s) at distances of 10 to 50m respectively.

The range of values recorded provides some context in relation typical ranges of vibration generated by construction breaking activity likely required on the proposed site. The range of vibration magnitudes

indicate vibration levels at the closest neighbouring buildings noted in Figure 9.3 are likely to be below the limits set out in Table 9.3 to avoid any cosmetic damage to buildings.

In terms of disturbance to building occupants, works undertaken within close proximity to the residential receptors on the site perimeter have the potential to emit perceptible vibration levels. Mitigation and management of these works are discussed in Section 9.8.1.

Notwithstanding the above, any construction activities undertaken on the site will be required to operate below the recommended vibration criteria set out in Table 9.3 during all activities. Further discussion on mitigation measures during this phase are discussed in Section 9.8.1..

9.4.3 Operational Phase – Operation of Ratoath Outer Relief Road

Noise Model

A computer-based prediction model has been prepared in order to quantify the traffic noise level associated with the operational phase of the proposed road scheme. This section discusses the methodology behind the noise modelling process and presents the results of the modelling exercise.

SoftNoiseType 7810 Predictor

Proprietary noise calculation software was used for the purposes of this impact assessment. The selected software, SoftNoise Type 7810 Predictor, calculates traffic noise levels in accordance with CRTN and TII guidance.

Prediction of Traffic Noise

Noise emissions during the operational phase of the project have been modelled using Predictor in accordance with CRTN and with the application of the relevant conversion factors as detailed in the TII Guidance. The CRTN method of predicting noise from a road scheme consists of the following five elements:

- divide the road scheme into segments so that the variation of noise within this segment is small;
- calculate the basic noise level at a reference distance of 10 metres from the nearside carriageway edge for each segment;
- assess for each segment the noise level at the reception point taking into account distance attenuation and screening of the source line;
- correct the noise level at the reception point to take account of site layout features including reflections from buildings and facades, and the size of source segment, and;
- combine the contributions from all segments to give the predicted noise level at the receiver location for the whole road scheme.

Note that all calculations are performed to one decimal place. For the purposes of comparison with the design goals of 60dB L_{den}, the relevant noise level is to be rounded to the nearest whole number in accordance with guidance given in the TII document.

Input to the Noise Model

The noise model was prepared using road alignments drawings, topographical data, Ordnance Survey mapping and traffic flow data supplied by OCSC. A traffic flow volume of 6621 at 50 km/h was extracted from the Do Something design year of 2039. This traffic data was modelled to determine the impact of the new road on surrounding receptors. The traffic volumes discussed above are the highest traffic flow provided for the development by the traffic engineers that are described as the 'Do Maximum' in the traffic model outputs. This scenario takes account of traffic along the completed link road and the proposed development. The AADT values have been broken into 24 hourly periods using the TII Dinural profiles. The hourly noise predictions were conducted in accordance with Method A of the TII guidelines.

Output of the Noise Model

Predictor calculates noise levels for a set of receiver locations specified by the user. The results include an overall level in dB L_{den}.

Choice of Receiver Locations

Free-field traffic noise levels have been predicted at the closest existing and proposed properties in the vicinity of the scheme in question. For existing properties, noise levels have been calculated at those located at Receptor R1 to R3 in Figure 9.4. Noise levels have also been calculated at the proposed development buildings located adjacent to the proposed RORR.

A description of the modelled locations are summarised in Table 9.15.

Figure 9.4 - Prediction Locations for Existing Properties

Table 9.15 – Receptor Reference and Descriptions

Receiver	Description
R1	Carrabeg House on Fairyhouse Road
R2	House Located on Glascarn Lane
R3	House Located on Glascarn Lane
R4	House Located on Glascarn Lane
R5	Proposed Properties Adjacent to RORR

Model Results

The results of the modelling are presented in Table 9.16 indicate that the new link road will emit noise levels lower than the 60 dB L_{den} threshold at all existing properties. However, at R1 Carrabeg House the predicted noise level due to the new RORR approaches 60 dB L_{den}. As this property is located adjacent to an existing road that will contribute to the noise level impacting on this property a prediction exercise has been undertaken to compare a Do Nothing scenario from 2039 with the Do Something scenario of 2039 at this location to calculate the change in noise level. The model output for these scenarios predicts a noise level of 61 dB L_{den} for the Do Nothing 2039 scenario and a noise level of 62 dB L_{den} for the 2039 Do Maximum scenario, a change of +1 dB which, according to the guidance set out in Table 9.4, is Negligible.

For the proposed properties within the development the predicted noise level is 65 dB L_{den}, hence mitigation will be required for these properties. It is proposed that mitigation for the proposed residences

will be in the form of upgraded glazing specifications to ensure that internal noise levels remain good. This is explored further in Section 9.4.5.

The impact of the RORR and additional traffic associated with the proposed development is considered to be negative, not significant and long term for all existing receptors.

Table 9.16 – Predicted Noise Levels as a Result of the RORR

Receiver Location Reference	Description	Predicted Noise Level 2035 L_{den} (dB)	Mitigation Required?
R1	Carrabeg House on Fairyhouse Road	58	No
R2	House Located on Glascarn Lane	50	No
R3	House Located on Glascarn Lane	56	No
R4	House Located on Glascarn Lane	42	No
R5	Proposed Properties Adjacent to RORR	65	Yes*

*Note that these are properties that are proposed as a part of this development and hence the mitigation may include upgraded glazing and ventilation to ensure that internal noise levels remain 'good'. This is covered in the ProPG assessment within this chapter.

9.4.4 Operational Phase – Additional Traffic on Existing Roads

In terms of the additional operational traffic on local roads that will be generated as a result of this development the following comment is presented. In order to increase traffic noise levels by 1dB traffic volumes would need to increase by the order of 25% along the local road network. As outlined in the relevant sections of chapter relating to traffic, additional traffic introduced onto the local road network due to the construction phase of the proposed development will not result in a significant noise impact.

In summary, the predicted increase in noise levels associated with vehicles at road junctions in the vicinity of the proposed development is of long-term imperceptible impact.

9.4.5 Operational Phase – Inward Noise Impact – ProPG Stage 1

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the site as a negligible, low, medium or high risk based on the pre-existing noise environment. Figure 9.1 presents the basis of the initial noise risk assessment, it provides appropriate risk categories for a range of continuous noise levels either measured and/or predicted on site.

It should be noted that a site should not be considered a negligible risk if more than 10 L_{AFmax} events exceed 60 dB during the night period and the site should be considered a high risk if the L_{AFmax} events exceed 80 dB more than 20 times a night.

Paragraph 2.9 of ProPG states that,

> *"The noise risk assessment may be based on measurements or prediction (or a combination of both) as appropriate and should aim to describe noise levels over a "typical worst case" 24 hour day either now or in the foreseeable future."*

In this instance a 3D computer noise model of the development site has been developed to predict the noise levels across the entire site in order to investigate the initial noise risk. The noise model has used AADT traffic volumes for worst case predicted future traffic flows.

Model Results

To assess the initial noise risk assessment across the development site the noise model has been used to prepare noise contour maps for both daytime and night-time periods at 4m height above ground, this is to give an indication of expected noise levels at various levels of the development. These maps are presented in Figure 9.5 and Figure 9.6.

Figure 9.5 - L_{day} Noise Contours (dB)

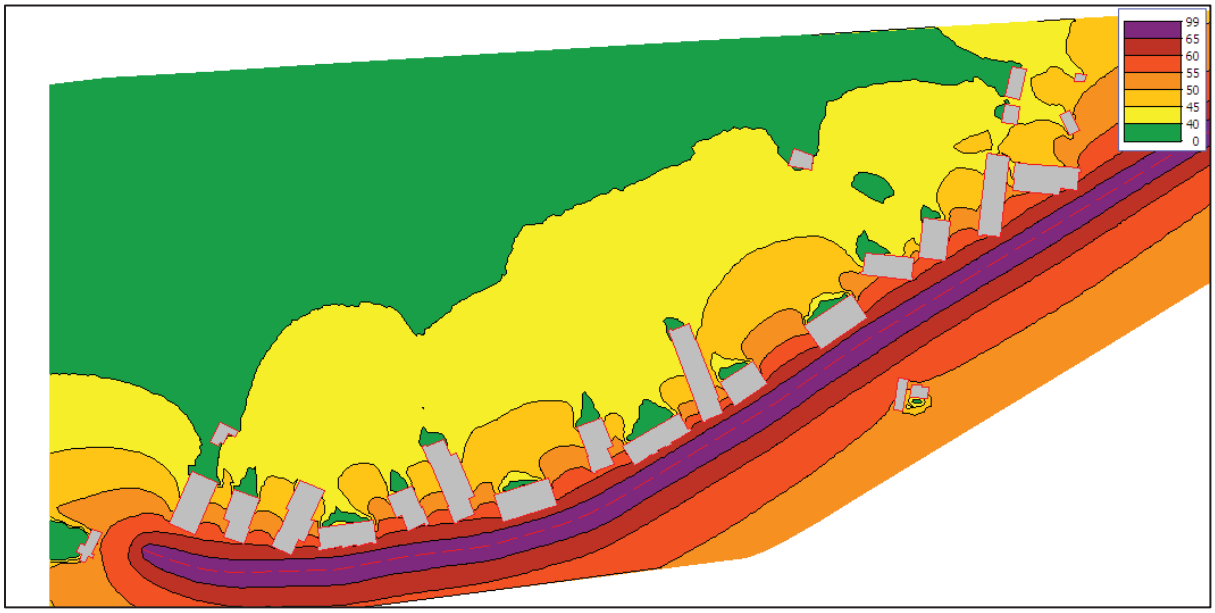
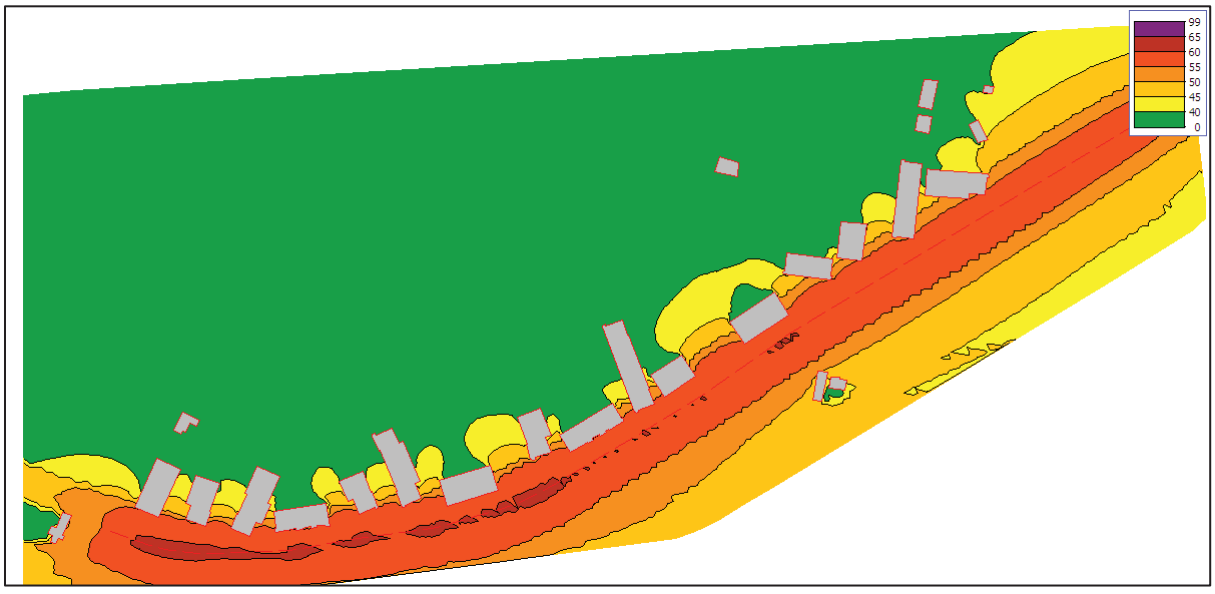


Figure 9.6 - L_{night} Noise Contours (dB)



ProPG Risk Assessment Conclusion

Giving consideration to the measured and predicted noise levels presented in the previous sections the initial site noise risk assessment has concluded that the level of risk across the site varies from low to medium noise risk.

ProPG states the following with respect to medium risks:

Medium Risk *As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.*

Given the above it can be concluded that the development site may be categorised as from low to medium Risk and as such an Acoustic Design Strategy will be required to demonstrate that suitable care and attention has been applied in mitigating and minimising noise impact to such an extent that an adverse noise impact will be avoided in the final development.

Façade Noise Levels

Noise levels have been predicted across the site during day and night-time periods with the proposed buildings in place.

Where façade noise levels are less than 55 dB $L_{Aeq,16hr}$ during the day and 50 dB $L_{Aeq,8hr}$ at night it is possible to achieve reasonable internal noise levels while also ventilating the dwellings with open windows. Therefore, for those properties where the façade noise levels are less than 55 dB $L_{Aeq,16hr}$ during the day and 50 dB $L_{Aeq,8hr}$ at night no further mitigation is required.

Where façade levels are above these levels the sound insulation performance of the building façade becomes important and a minimum sound insulation performance specification is required for windows and vents to ensure that the internal noise criteria are achieved.

The model for the proposed development has predicted that noise levels incident on facades overlooking the RORR will be 62 dB L_{day} and 58 dB L_{night}, hence mitigation in the form of upgraded glazing is required for these facades. The specification of the glazing is discussed in Section 9.8.2.

External Noise Levels

As can be seen in Figure 9.5 the predicted noise levels in the external areas to the rear of the properties overlooking the new RORR are below the 55 dB L_{Aeq} guidance level for external amenity areas taken from ProPG. It is therefore considered that the objective of achieving suitable external noise levels is achieved within the overall development.

9.4.6 Operational Phase - Building Services Plant

Once operational, there will be building services plant items required to serve the various buildings within the development. These will typically be limited to heating and cooling plant and extract units, depending on the building design and user requirements. Given the use of these buildings, the majority of plant items are likely to be required during daytime hours only, however, there may be requirement for night-time operational plant, depending on specific requirements.

The location or type of building services plant has not yet been established, therefore it is not possible to calculate noise levels to the surrounding environment. In this instance, is it best practice to set appropriate noise limits that will inform the detailed design during the selection and layout of building services for the development.

These items will be selected at a later stage, however, they will be designed and located so that there is no negative impact on sensitive receivers within the development itself. The cumulative operational noise level from building services plant at the nearest noise sensitive location within the development (e.g. apartments, creche rooms etc.) will be designed/attenuated to meet the relevant external noise criteria for day and night-time periods as set out in Section 9.2.5. Given the baseline noise levels

measured in Section 9.3.7 appropriate criteria for plant noise levels at the nearest sensitive noise receptors is considered to be 45 dB $L_{Aeq,1hr}$ for the day period and 31 dB $L_{Aeq,15min}$ for the night period.

9.5 Potential Cumulative Impact

There are no proposed or permitted developments located close enough within the local area to cause a cumulative impacts during the construction phase. For the operational phase cumulative impacts have been incorporated into the traffic data, hence there will be no change to the impacts presented within this document.

9.6 Do Nothing Scenario

In the absence of the proposed development being constructed, the noise environment at the nearest noise sensitive locations and across the development site itself will remain largely unchanged. The noise levels measured/noted during the baseline studies are considered representative of the Do-Nothing scenario. The Do-Nothing scenario is therefore considered neutral impact.

9.7 Risks to Human Health

Noise criteria are provided by relevant bodies with consideration of the likely impact of noise on human health. The construction phase is short-term and therefore any elevated levels of noise will be of limited duration and, as a result, are not expected to pose any risk to human health. In terms of the noise exposure of construction workers and potential hearing damage that may be caused due to exposure to high levels of noise, the Safety, Health and Welfare at Work (General Application) Regulations 2007 (Statutory Instrument No. 299 of 2007) provides guidance in terms of allowable workplace noise exposure levels for employees. The Regulations specify two noise Action Levels at which the employer is legally obliged to reduce the risk of exposure to noise. The appointed contractor will be required to comply with the Regulations and provide appropriate noise exposure mitigation measures where necessary.

9.8 Mitigation Measures

9.8.1 Construction Phase

The contract documents will clearly specify the construction noise criteria included in this chapter which the construction works must operate within. The Contractor undertaking the construction of the works will be obliged to take specific noise abatement measures and comply with the recommendations of BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise and the European Communities (Noise Emission by Equipment for Use Outdoors) Regulations, 2001. These measures will ensure that:

- No plant used on site will be permitted to cause an ongoing public nuisance due to noise
- The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract

- Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers
- Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use
- Any plant, such as generators or pumps that is required to operate before 07:00hrs or after 19:00hrs will be surrounded by an acoustic enclosure or portable screen

During the course of the construction programme, the contractor will be required to manage the works to comply with the limits detailed in Table 1 using methods outlined in BS 5228-1:2009+A1 2014. Part 1 – Noise BS 5228 -1: 2009+A1 2014 Part 2 which include guidance on several aspects of construction site practices, which include, but are not limited to the measures discussed below.

Selection of Quiet Plant

The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item of plant will be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action will be to identify whether or not said item can be replaced with a quieter alternative.

For static plant such as compressors and generators used at work areas such as construction compounds etc., the units will be supplied with manufacturers' proprietary acoustic enclosures where possible.

The contractor will evaluate the choice of excavation, breaking or other working method taking into account various ground conditions and site constraints. Where possible, where alternative lower noise generating equipment that would economically achieve, in the given ground conditions, equivalent structural/ excavation/ breaking results, these will be selected to minimise potential disturbance.

General Comments on Noise Control at Source

The following outline guidance relates to practical noise control at source techniques which relate to specific site considerations:

- For mobile plant items such as cranes, dump trucks, excavators and loaders, the installation of an acoustic exhaust and/or maintaining enclosure panels closed during operation can reduce noise levels by up to 10dB. Mobile plant will be switched off when not in use and not left idling;
- For percussive tools such as pneumatic concrete breakers or tools a number of noise control measures include fitting muffler or sound reducing equipment to the breaker 'tool' and ensuring any leaks in the air lines are sealed. Erection of localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries are other suitable forms of noise reduction ;
- For concrete mixers, control measures will be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum;
- For all materials handling, the contractor will ensure that best practice site noise control measures are implemented including ensuring that materials are not dropped from excessive heights;
- Where compressors, generators and pumps are located in areas in close proximity to noise sensitive properties/ areas and have potential to exceed noise criterion, these will be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation;

- Resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can be controlled by fixing resilient materials in between the surfaces in contact;
- Demountable enclosures can also be used to screen operatives using hand tools and may be moved around site as necessary, and;
- All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Screening

Typically screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to other forms of noise control. The effectiveness of a noise screen will depend on the height and length of the screen, its mass, and its position relative to both the source and receiver.

The length of the screen should in practice be at least five times the height, however, if shorter sections are necessary then the ends of the screen will be wrapped around the source.

BS 5228 -1:2009+A1 2014 states that on level sites the screen should be placed as close as possible to either the source or the receiver. The construction of the barrier will be such that there are no gaps or openings at joints in the screen material. In most practical situations the effectiveness of the screen is limited by the sound transmission over the top of the barrier rather than the transmission through the barrier itself. In practice screens constructed of materials with a mass per unit of surface area greater than 10 kg/m2 will give adequate sound insulation performance. As an example, the use of a standard 2.4m high construction site hoarding will provide a sufficient level of noise screening once it is installed at a suitable position between the source and receiver.

Working Hours

Normal working times will be 07:00 to 19:00hrs Monday to Saturday. Works other than the pumping out of excavations, security and emergency works will not be undertaken outside these working hours without the written permission of the Contracting Authority. This permission, if granted, can be withdrawn at any time should the working regulations be breached.

Works other than the pumping out of excavations, security and emergency works will not be undertaken at night and on Sundays without the written permission of the Contracting Authority. Night is defined as 19:00 to 07:00hrs.

When overtime and shift work is permitted, the hauling of spoil and delivery of materials outside normal

9.8.2 Operational Phase

As is the case in most buildings, the glazed elements of the building envelope are typically the weakest element from a sound insulation perspective. In general, all wall constructions (i.e. blockwork or concrete and spandrel elements) offer a high degree of sound insulation, much greater than that offered by the glazing systems. Therefore, noise intrusion via the wall construction will be minimal. It's also noted that the ventilation strategy will be for Mechanical Ventilation Heat Recovery units which are expected to provide strong sound insulation to external noise, hence ingress of noise through the ventilation systems is considered to be negligible for this assessment. The performance values set out below are to provide the range of the overall Rw values required. As part of the detailed design, the specifics in terms of octave band SRI performances will be established to take account of the finalised room layouts, room volumes and glazing dimensions.

Table 9.17 – Sound insulation performance requirements for glazing for each category.

Reference	Glazing Installation Location	Specification (dB R_w)
RED	All residential facades directly overlooking the RORR	35
GREEN	All other residential facades within the development	32

The acoustic specification for Glazing Type Red can be achieved using a double glazed configuration with slightly thicker glass panes than standard double glazing.

Glazing Type Green can be achieved using a standard double glazed configuration.

It is important to note that the acoustic performance specifications detailed herein are minimum requirements which apply to the overall glazing system. In the context of the acoustic performance specification the 'glazing system' is understood to include any and all of the component parts that form part of the glazing element of the façade, i.e. glass, frames, seals, openable elements etc.

As noted above, as part of the detailed design of the residential blocks, the specifics in terms of octave band SRI performances will be established to take account of the finalised room layouts, room volumes and glazing dimensions.

9.9 Residual Impacts

9.9.1 Construction Noise

It is predicted that when works take place at less than 50m distance to the receptors a moderate to significant impact will occur, hence the impacts are predicted to be:

Quality	Significance	Duration
Negative	Moderate - Significant	Short-Term

It should be noted that the assessment can be considered "worst case" and it is unlikely that all items of plant assessed will be in operational simultaneously.

9.9.2 Construction Vibration

Impacts are predicted as:

Quality	Significance	Duration
Negative	Slight	Short-Term

9.9.3 Outward Noise Impact – Road Traffic Noise

Impacts as a result of the operation of the RORR and additional traffic on existing roads are predicted as:

Quality	Significance	Duration
Negative	Not Significant	Long Term

9.9.4 Outward Noise Impact – Plant and Mechanical Noise

Following mitigation measures implemented at design stage the impacts are predicted to be:

Quality	Significance	Duration

Negative	Not Significant	Long Term

9.10 Monitoring

Construction Phase

The contractor will be required to ensure construction activities operate within the noise limits set out within Table 9.1. The contractor will be required to undertake regular noise monitoring at locations representative of the closest sensitive locations to ensure the relevant criteria are not exceeded.

Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.

Operational Phase

Noise or vibration monitoring is not required once the development is operational.

9.11 Difficulties Encountered

No difficulties were encountered during the formation of this chapter.

9.12 References

British Standard BS 4142: 2014+A1:2019: Methods for Rating and Assessing Industrial and Commercial Sound

Design Manual for Roads & Bridges 2019

British Standard BS 5228 (2009 +A1 2014): Code of Practice for Control of Noise and Vibration on Construction and Open Sites Part 1: Noise & Part 2: Vibration.

British Standard BS 7385 (1993): Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration.

Calculation of Road Traffic Noise, Department of Transport Welsh Office, HMSO, 1988.

ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.

ISO 9613 (1996): Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation.

EPA Guidelines on the Information to be contained in Environmental Impact Statements, (EPA, 2002).

EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), (EPA, 2003).

EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (Draft August 2017).

EPA Advice Notes for Preparing Environmental Impact Statements, (Draft, September 2015).

Professional Guidance on Planning & Noise (ProPG), (IoA, 2017).

10. Material Assets: Built Services

10.1 Introduction

This chapter was prepared by

- BBSC Consulting Engineers, Barry O'Neill BEng(Hons), CEng, MIEI, MCIBSE

10.2 Methodology

10.3 Baseline Environment

10.3.1 Existing ESB Infrastructure

The current electricity facilities near the site of the proposed development are supplied by Electricity Supply Board Networks (ESBN) through a ring network arrangement.

There are 1 no. overhead power lines crossing the subject lands (10kV-20kV) comprising 3nr cables each.

Records drawings were obtained from ESB Networks Ireland in preparation of this chapter and can be viewed in Figure 7:

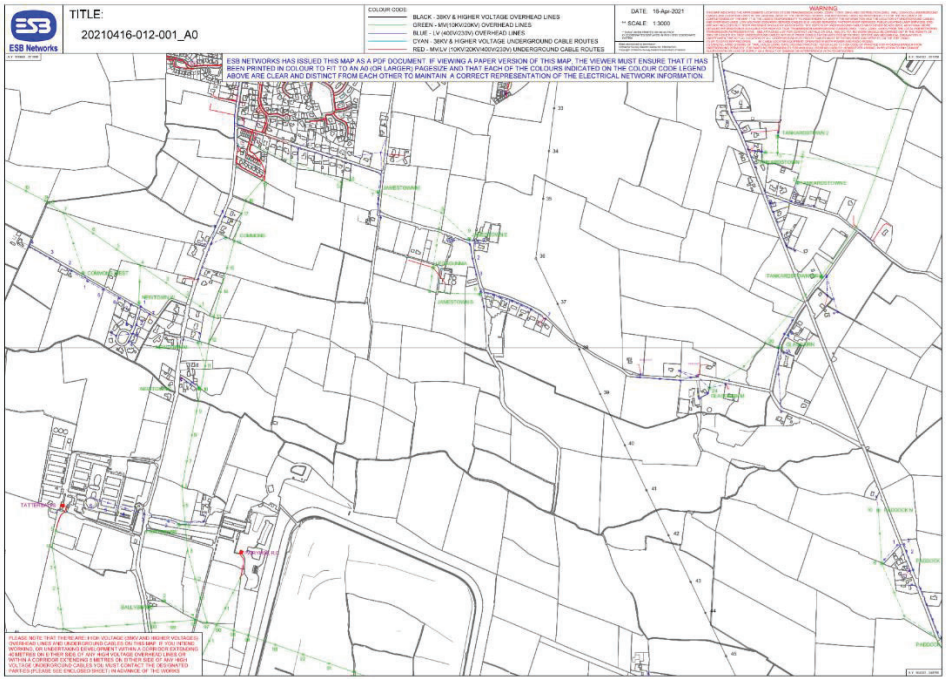


Figure 7 In ground ducted and Overhead cable services on the ESB network

The ESB drawing notes that cables drop from overhead to run in ground to service the Cairn Court and other estates in Ratoath.

10.3.2 Existing Telecoms Infrastructure

There are existing networks in the housing estates to the north of the development these are in ground ducted installations, and one-off houses to the west which are feed via overhead cables.

Records drawings were obtained from both Eir and Virgin Networks in preparation of this chapter and can be viewed in Figure 8 & Figure 9:

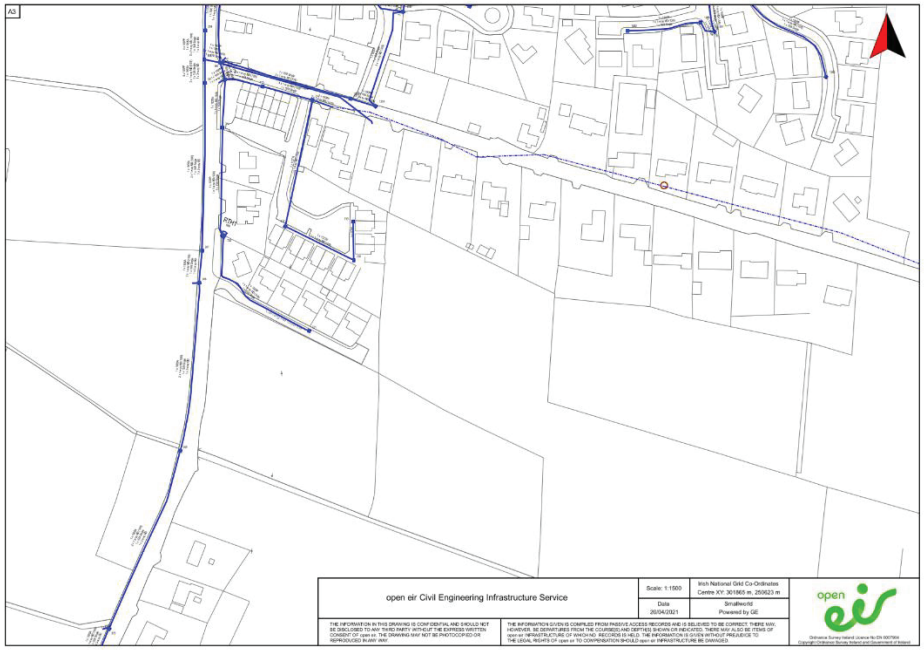


Figure 8 In ground ducted and Overhead cable services on the EIR network

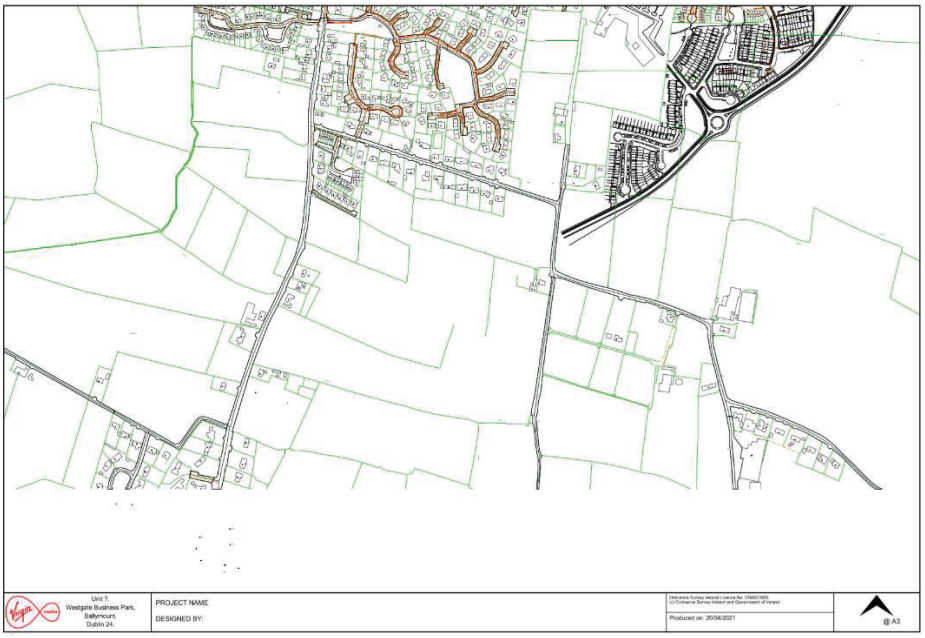


Figure 9 In ground ducted services on the Virgin network

Postal services to this area are provided by An Post.

10.3.3 Existing Gas Infrastructure

There are no known gas network pipes on the subject lands as was verified by the records drawings obtained from Gas Networks Ireland.

It is intended that a gas distribution network will be Gas Networks Ireland from their existing gas supply network on the Fairyhouse Road.

This will be achieved via a 180 4 bar GNI mains pipe interconnecting with the existing Gas network. Records drawings were obtained from Gas Networks Ireland in preparation of this chapter and can be viewed in Figure 10:

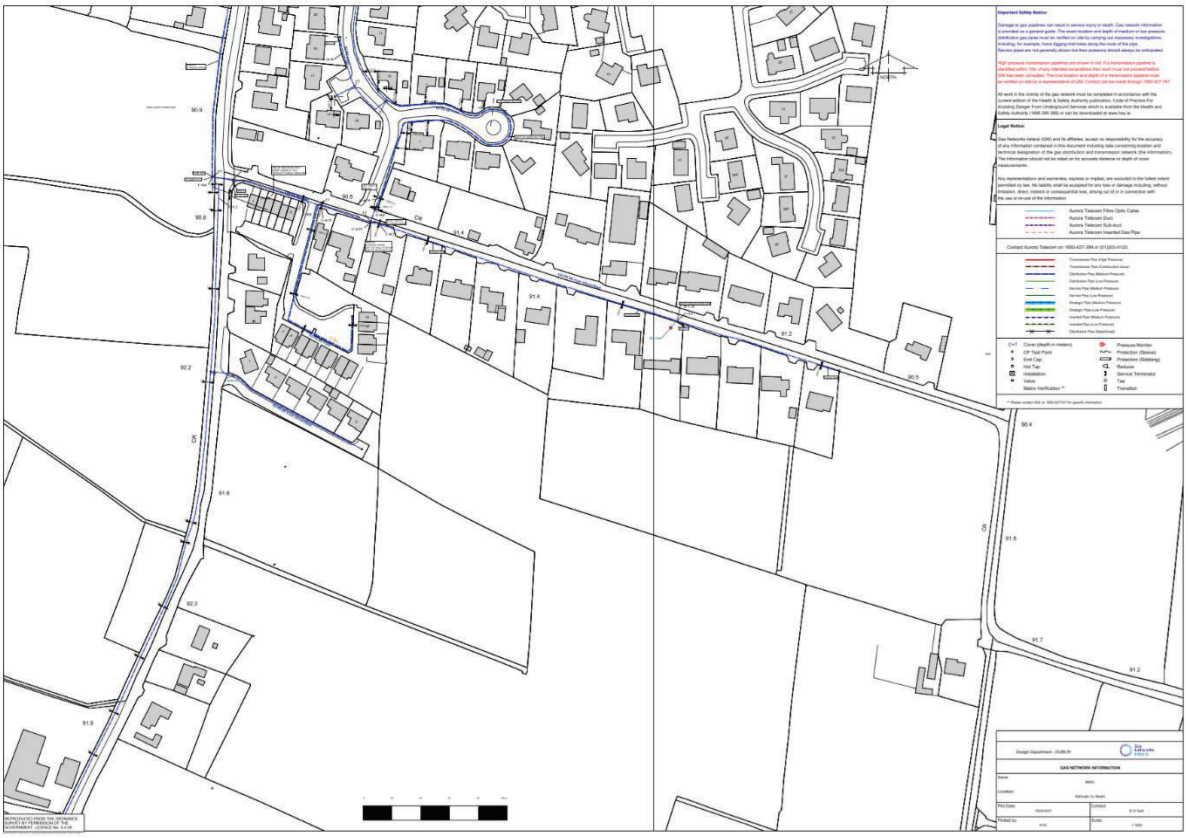


Figure 10 In ground Piped services on the Bord Gais Network

10.4 Predicted Impacts

10.4.1 Proposed ESB Infrastructure

It is intended that electrical power will be delivered by ESBN from their existing supply network and will require the construction of separate ESB sub-stations on the proposed development – these are identified on the submitted architects Site Plan, 7 number stations are proposed as outlined on Figure 11 below.

The High Voltage 10/20KVA lines and other lesser voltage (400/230V) lines, present a risk to the development and the public as a result these lines shall be rerouted via the sub-terranean 125mm red ducting, between 4 and 8nr duct, to ESB National Standards, installed in a proposed wayleave, under the direction and ownership of the ESB.

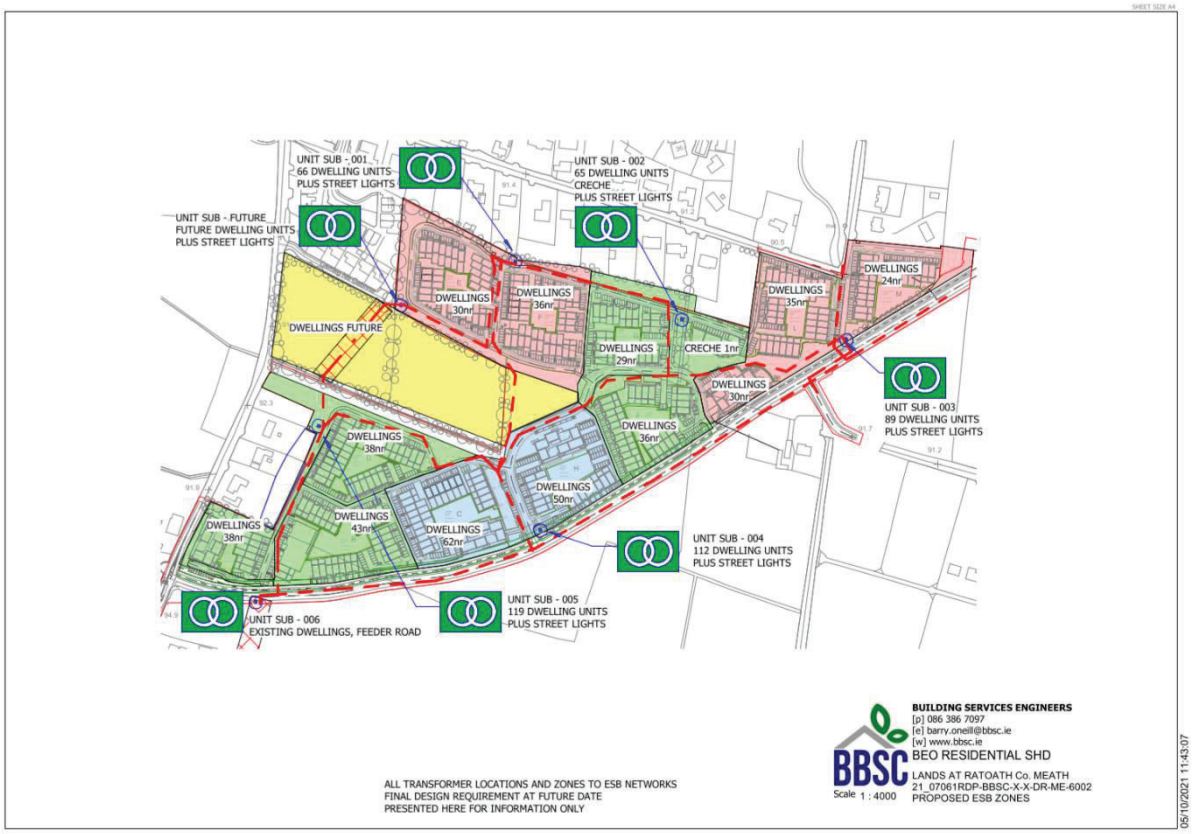


Figure 11 Proposed Site Electrical Sub Station from BBSC report "UTILITY IMPACT ASSESSMENT

Power supply, and the requirement for any alterations to the existing power supply network for the development of the subject site, will be agreed with ESB Networks in advance of construction.

Power will be supplied from the national grid to local sub stations for transforming power to 400V/ 230V for supply via in ground ducts to each dwelling or via cable trays to service apartments as is standard practice.

All power supply related works will be carried out in accordance with ESB Networks relevant guidelines.

An Electrical Diversified Load of between 2.6MVA and 3.2MVA is expected subject to ESB standard load estimation internal modelling.

It is estimated that at a minimum 7 nr sub stations of between 380KVA and 690KVA will be required to be supplied subject to ESB calculations, diversity, geography, routing, redundancy etc. with all 7 no. further sub-stations dispersed through the site and can be identified on the architects submitted site layout plan.

10.4.2 Proposed Telecoms Infrastructure

The existing housing estates to the east and north of the developments, existing infrastructure shall be extended into the proposed development as is normal practice for developments of this type.

For network integrity and security, the development will install, in ground, vendor neutral ducting to allow for any user to be provided by any vendor.

It is proposed to provide up to 4nr 125mm Green Ducts. Access to the ducts will be by means of manhole cover junction relay boxes, mounted in ground.

Telecommunications supply, and the requirement for any alterations to the existing telecommunications network for the proposed development, will be agreed in advance of construction with the relevant telecommunications providers.

- All telecommunications related works will be carried out in accordance with relevant guidelines such as PAS 2016:2010, Next generation access for new build homes – Guide to telecommunications.
- EIR National standards "Duct Access Technical & Operational Manual"
- Virgin National Standards "New Build Handbook"

To allow for the connection of fibre broadband local street mounted cabinets will be required, as is typical for such installations, as these allow for wiring terminations and other equipment to allow for connection to the internet.

These are typically 850x350x1250mm high and are site agreed once application to connect has been lodged with the users.

10.4.3 Proposed Gas Infrastructure

As the development relies on Electrically powered heat pumps for water heating and space heating, and with all cooking in dwellings being electrically powered also, the demand for Gas will be limited to cooking in for example school kitchens, cafes, restaurants etc. It is expected that the demand will be low.

However, the gas may be required to supply hydrogen for space heating or vehicle purposes and as a result limited infrastructure will be provided for technology not yet fully developed or in development.

Gas supply, and the requirement for any alterations to the existing gas supply network for the development of the subject site, will be agreed in advance of construction with Gas Networks Ireland.

All gas supply related works will be carried out in accordance with Gas Networks Ireland relevant guidelines.

For future proofing the development a Gas diversified load of 2.5MW is required to accommodate the site via in ground piped systems.

This will be developed by Bord Gais based on their operational needs and not on the development

10.4.4 Rules for road openings and site works

The works where so required, will follow standard rules of work as per HSA "Code of Practice

For Avoiding Danger from Underground Services" which details all requirements to ensure a safe and continued supply of Utility being amended and extended from an existing source.

Works to be carried out to Guidelines for Managing Openings in Public Roads, 2017, as published by Department of Transport, Tourism and Sport.

Figure 6.2.1 NSAI Summary of Colour Code for Buried Plastic Piping

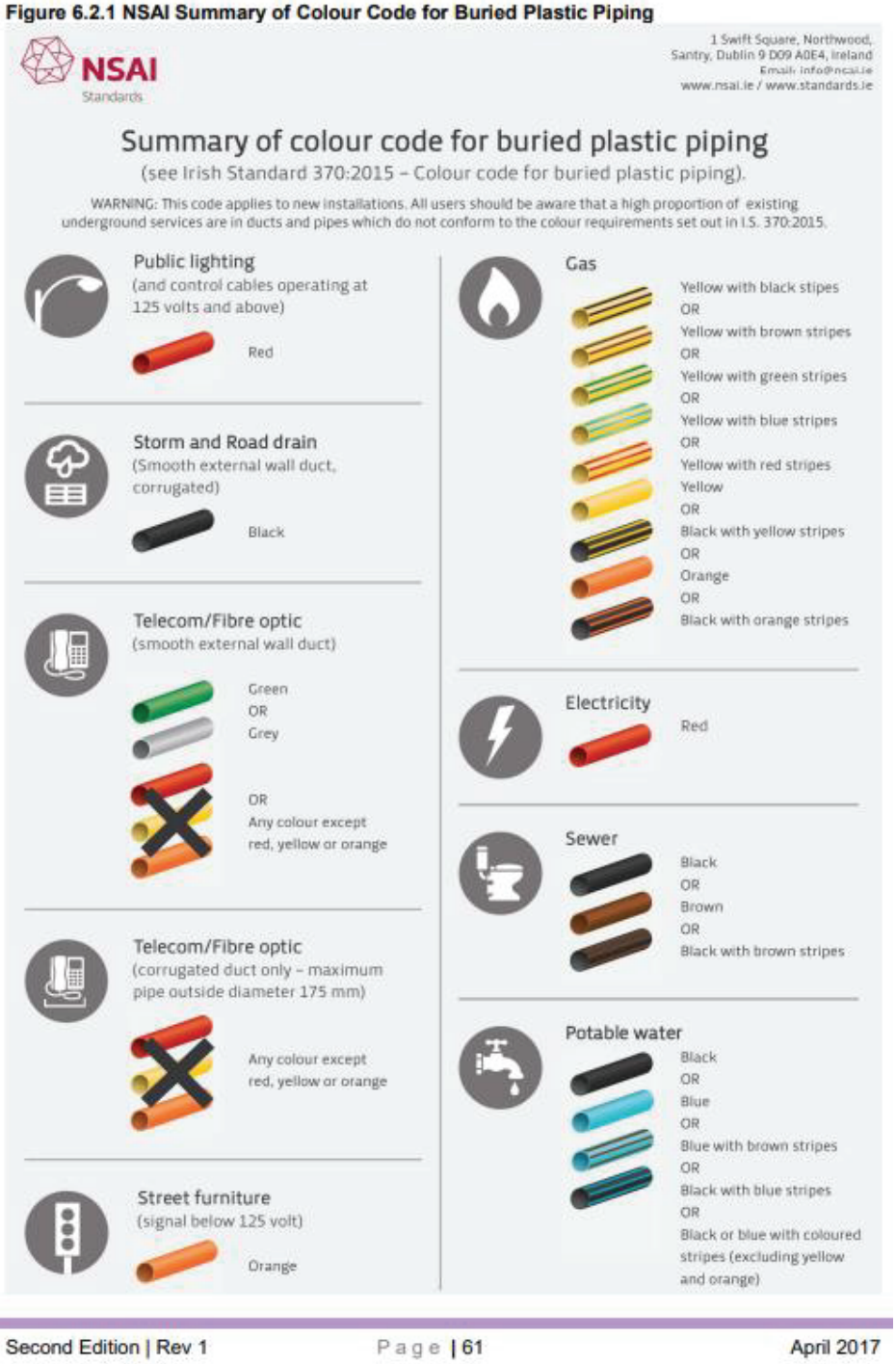


Figure 12 Extract from "Guidelines for Managing Openings in Public Roads"

10.5 Potential Cumulative Impact

10.5.1 Construction Phase

10.5.1.1 Telecoms

Telecommunications requirements during the construction phase will be primarily provided by means of mobile phones and or fixed line broadband.

The site compound will require a power and telecommunications connection, which comprise of connecting to the existing network. These connections shall be temporary and negligible in nature.

Fixed telecoms will not be operational during the construction phase.

The construction phase is unlikely to give rise to the requirement to divert fixed telecom lines but extend the existing infrastructure to suit site temporary construction requirements.

The local telecom ducted service may require to be extended into the site to facilitate telecoms on very focused and limited manner.

These works are normally characterised as a temporary, regionally short term, with minimal impact to existing users.

10.5.1.2 Natural Gas Supply

The supply of gas to the proposed development site will not be operational during the construction phase.

The proposed works will involve a live tap into the existing infrastructure carried out in accordance with standard rules relating to these works as outlined under Bord Gais requirements for same.

It is expected that no potential loss of supply from the Gas Networks Ireland infrastructure while carrying out works to provide service connections.

These works are normally characterised as a temporary, regionally short term, with minimal impact to existing users.

10.5.1.3 Electrical Supply

Construction related activities will require temporary connection to the local electrical supply network, for the servicing of the temporary site compound.

The development site will be connected to the local electricity network system, however given the scale and transient nature of construction works, the power demand on the local electricity systems is not considered significant and is not anticipated to impact upon local power supply.

These works are normally characterised as a temporary, regionally short term, with minimal impact to existing users or to the local electrical grid.

The diversion of the overhead power lines to sub-terrain ducting will be carried out by ESB under planned outages conditions, as a result these works are normally characterised as a temporary, regionally short term, with minimal impact to existing users or to the local electrical grid.

There is a potential for the connecting to ESB cable routes which could result in the loss of connectivity to and / or interruption of the supply from the electrical grid to the surrounding areas.

Any loss of supply will be managed by Eirgrid/ ESBN to minimise impact on neighbouring properties and as per the Commission for Regulation of Utilities and as per COMMISSION REGULATION (EU) 2017/1485, power loss may not exceed set time limits as outlined in national requirements imposed on Eirgrid by CRU.

It is noted that planned outages and servicing of overhead lines typically occurs every 4 to 5 years and is normal practice within Eirgrid and ESBN networks with no loss of power from the national grid to local sub systems.

10.5.2 Operational Phase

10.5.2.1 Telecoms

The impact of the operational phase of the proposed development will increase demand on the existing local systems, however by means of increasing bandwidth on the existing system there will be a minor impact on the existing telecoms network(s).

The potential impact from the operational phase on the telecoms network is likely minimal.

10.5.2.2 Natural Gas Supply

The development will be connected to the Gas Networks Ireland national gas supply network. The impact of the operational phase of the proposed development on the gas supply network is not likely to increase the demand on the existing supply. The potential impact from the operational phase on the gas supply network is minimal due to policy changes expected and being enacted to reduce societies demand on fossil fuels.

Provision for a new c.180mm 4bar GNI mains pipe shall be extended into the proposed development. Details of possible district regulation installation (DRI) units will be determined by GNI in advance of construction commencing to allow for future hydrogen distribution and meet current demands as outlined under 10.4.3 above.

10.5.2.3 Electrical Supply

The impact of the operational phase of the proposed development on the electrical supply network is likely to increase the demand on the existing supply.

Electrical supply will be by means of a number of in ground 125mm red coloured ductwork which will be provided to allow for ESB services to be distributed across the proposed development based on engineering requirements to be agreed with ESB.

Up to approximately 7 no. ESB sub-stations is expected, subject to ESB analysis, to be required to serve the development, with an additional sub-station expected to serve a future school, should it materialise.

Each unit sub will be centrally located to the surrounding areas to limit ESB runs. A 125mm ESB duct will be provided from the unit sub to the ESB mini-pillars to feed dwellings and public lighting.

Services to the home will be via a mini pillar (1 no, mini pillar serves up to 12 no. homes).

Services shall terminate with the ESB meters positioned on the external walls of each house within recessed wall cabinets.

The necessary cabling infrastructure will be provided as part of the development and provision will be made within each dwelling for ducting from the distribution board to an external box; this will allow the homeowner the installation of an e-car charging point.

The potential impact from the operational phase on the electricity supply network is long term in nature and will require additional power from the national grid. The additional load falls within the expected simulation of future energy needs as per of CRU's "Tomorrow's Energy Scenarios (TES) publications" requirements up to the year 2040.

There are no predicted cumulative impacts arising from the construction or operational phase

10.6 Do Nothing Scenario

10.7 Risks to Human Health

10.8 Mitigation Measures

10.8.1 Operational Phase – Electrical

As the time frames for planned outages is required to be planned the ESB will be engaged at an early stage to ensure any potential issues with utility connections are reviewed and mitigated as early in the process as possible. ESB will not engage with design process until such time as planning has been approved, and an application for power has been made with the scheme name and numbering has been approve by the local County Council.

10.8.2 Operational Phase – Gas

As the time frames for planned outages is required to be planned Bord Gais will be engaged at an early stage to ensure any potential issues with utility connections are reviewed and mitigated as early in the process as possible. Bord Gais will not engage with design process until such time as planning has been approved, and an application for Gas has been made with the scheme name and numbering has been approve by the local County Council.

10.8.3 Operational Phase – Communications

As the time frames for planned outages is required to be planned by Virgin, Eir, Siro will be engaged at an early stage to ensure any potential issues with utility connections are reviewed and mitigated as early in the process as possible. The Utility Companies will not engage with design process until such time as planning has been approved, and an application for Fibre and/or other communication fixed wiring systems has been made with the scheme name and numbering has been approve by the local County Council

10.9 Residual Impacts

10.9.1 ESB Infrastructure

Potential impacts for ESB are impacts on existing network capacity and potential issues with current harmonics if heat pumps are selected as energy source.

The proposed development has been designed in accordance with the ESB Networks requirements. The predicted impacts on power and electrical supply will be long-term, neutral and imperceptible.

It is noted in the CRU “Tomorrow’s Energy Scenarios 2019 Ireland System Needs Assessment Planning our Energy Future” outlines the impact of power in the Dublin Region and the Eirgrid requirement to ensure that sustainable energy is provided.

10.9.2 Telecoms Infrastructure

Potential impact for telecoms is considered to be negligible as the broadband capacity of the additional 457nr dwellings will not, on a diversity basis, exceed the current networks of Virgin, Eir and Siro fibre networks to be exceeded.

On a simple diversified basis 700GB/s would be required, if all units are streaming large files at the same time, in practical terms the network switches for development of this size would equal a large office building housing 1,400 persons which typically requires 2 nr 10GB fibre connections to meet the demand of the building, as this is a Housing Estate then road sides kiosks will house any other switch as required (for example 24 port Switches are typically 50mm high by 450mm deep and 437mm wide, number of kisoks will be advised by the utility upon planning permission approval).

10.10 Monitoring

10.11 Difficulties Encountered

10.12 References

- CRU “Tomorrow’s Energy Scenarios 2019 Ireland System Needs Assessment Planning our Energy Future”
- COMMISSION REGULATION (EU) 2017/1485
- Architects’ drawings as submitted
- All Reports as referenced in the application document by all members of the developers design team.
- HSA “Code of Practice For Avoiding Danger From Underground Services”
- Guidelines for Managing Openings in Public Roads, 2017, as published by Department of Transport, Tourism and Sport.

11. Traffic & Transportation

11.1 Introduction

O'Connor Sutton Cronin & Associates (OCSC) have been commissioned to assess the impact of the Traffic and Transportation with respect to the proposed residential development at Fairyhouse Road, Ratoath, Co. Meath. The exact site location can be seen in Figure 11-1 below.

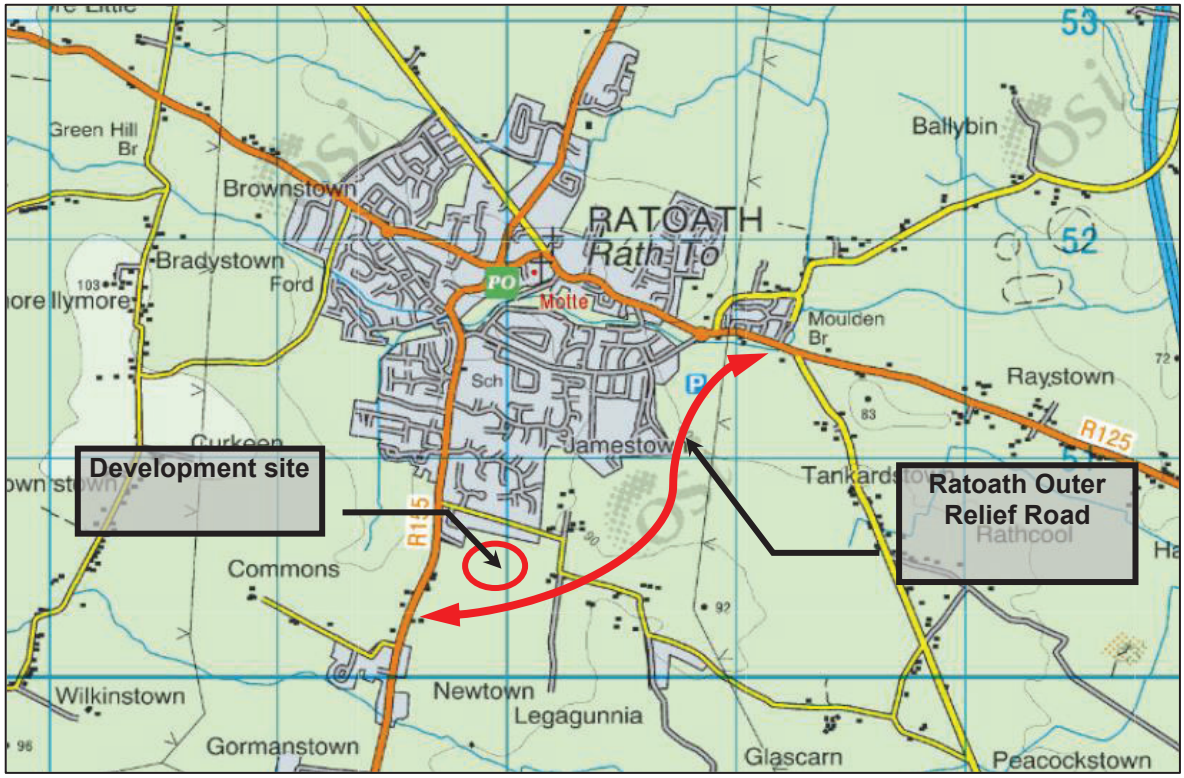


Figure 11-1: Site Location Map

The development will consist of the construction of 452 no. residential units, car and cycle parking, landscaping, public and communal open space, vehicular access and associated internal roads, pedestrian and cycle paths, and all associated site and infrastructural works.

The second phase of the Ratoath Outer Relief Road (RORR) is proposed as part of this development. The section of the RORR proposed as part of this development runs from a new junction with the R155 east for approximately 1100m to the end of the site boundary. The site will be accessed from the RORR through the means of two priority junctions.

The purpose of this chapter is to discuss the potential traffic and transportation impacts on the operation of the local road network once the development is fully completed.

11.2 Assessment Methodology

At the time of completing this assessment, the Covid 19 pandemic was ongoing and the associated restrictions on workplaces, schools and other activities put in place by the Government had a notable impact on travel patterns and traffic flows across the country.

On this basis, the use of recent, pre-covid data, was used in combination with the appropriate TII growth factors. OCSC contacted a number of surveyors to establish what recent pre-covid traffic survey data may be available locally and were successful in obtaining this for a number of the junctions in the study area from Idaso Ltd. These surveys were conducted in January 2019 (Site 4 – 5), March 2019 (Site 3), February 2018 (Site ATC 01, Site 7 - 8) and September 2018 (Site 9), before any Covid related restrictions were put in place and so are considered a true representation of the typical traffic flows on the network.

This approach was agreed upon at pre-planning stage with the local authorities along with the scope of study area was which includes the following junctions and locations:

- *Site ATC 01* : Fairyhouse Road;
- *Site 3* : Dunshaughlin Road / R155;
- *Site 4*: R155 / Somerville;
- *Site 5*: R155 / Meadowbank Hill;
- *Site 7*: Main Street / Moulden Bridge;
- *Site 8*: Main Street / Killbride Road;
- *Site 9*: Jamestown Park / The Avenue.

The exact locations of these junctions can be seen in *Figure 11.2* overleaf.

Figure 11-2: Traffic Count Locations

The surveys at Site 3 – 9 provided 15 minute interval junction turning counts and were carried out between the hours of 07:00 – 19:00 on the aforementioned dates. The survey at site ATC 01 was an automated traffic counter which recorded flows in each direction at 15 minutes intervals between 07:00 – 24:00.

The following classification system was used as follows:

- Motorcycle;
- Car;
- Light Goods Vehicle;
- Heavy Goods Vehicle (Class OGV 1 & 2);
- Bus (PSV).

The junction surveys also included the queue length surveys which recorded the maximum queue length observed on a per lane basis at each approach of each junction over 5 minutes intervals.

In order to include the impact of the future Ratoath Outer Relief Road (RORR) to be accounted for in this assessment, an origin-destination survey was also carried out on Wednesday 21st February 2018 which surveyed the total vehicles travelling between Fairyhouse Road – R155 to Main Street – R125. The origin-destination survey locations are shown below in Figure 11.3

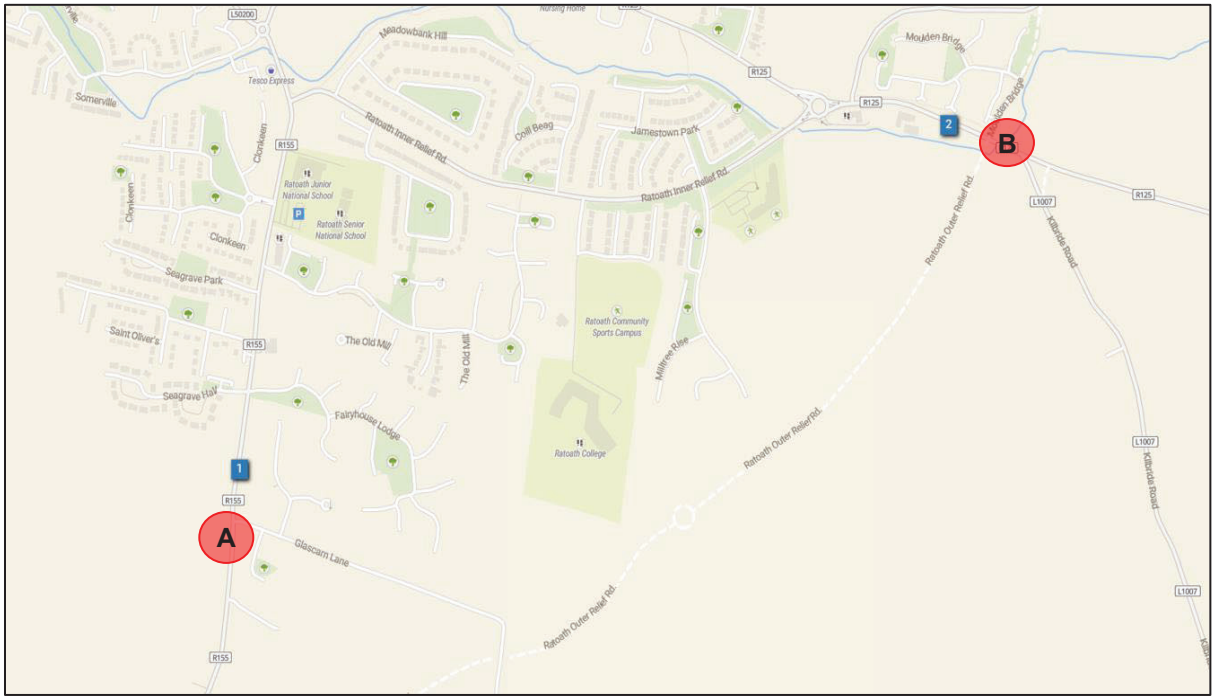


Figure 11-3: Origin – Destination Survey Locations

A full copy of the results of all traffic surveys can be found in the separately submitted *Traffic Impact Assessment Report.*

The base year flows were then adjusted to the predicted Year of Opening for the development (2024) and the Design Year (2039) using medium range NRA growth factors[12]. Consideration was given to the impact of the proposed Ratoath Outer Relief Road with respect to existing traffic flows and the potential to change travel patterns locally due to the new road creating shorter travel routes.

The traffic generation potential of this SHD development was then assessed using the Trics[13] planning database. This database contains information on thousands of sites in Ireland and the U.K. and can be used to predict the traffic that will be generated by numerous types of development. Consideration has also been given to the adjacent zoned lands to the west of the development site which are expected to be developed in the near future, subject to a separate planning application. The associated trip generation potential has been assessed and allowed for accordingly.

The estimated additional traffic was assigned to the local road network and its impact on the operation of the local links and junctions was assessed using guidance from the NRA, CIHT, the *Design Manual for Roads and Bridges* (DMRB) and a number of task specific traffic software (TRANSYT 15 and Junction 9). The assessment considered the following scenarios:

- Do Nothing – no development taking place in the local area and only allowance for natural background traffic growth;

[12] Unit 5.3 Link Based Growth Rates, Project Appraisal Guidelines; TII, October 2021
[13] **T**rip **R**ate **I**nformation **C**omputer **S**ystem

- Do Something – natural background traffic growth and the additional traffic estimated to be generated by the proposed development, the approved third party SHD developments and potential future phase 1 Masterplan on White land. The proposed RORR will be connected to completed section of RORR in line with the proposed development;
- Do Maximum – natural background traffic growth, the additional traffic estimated to be generated by the proposed development, the adjoining SHD developments, potential future phase 1 Masterplan on White land, fully constructed RORR and the potential future 100 no. residential development units.

11.3 Baseline Environment

The receiving environment is urban in nature. The main transportation arteries in the study area are the Fairyhouse Road, Meadowbank Hill, The Avenue, R155 and Main Street – R125 with the proposed Ratoath Outer Relief Road (RORR) acting as a key link for the area and to facilitate access to the proposed development.

Outside of the study area development generated traffic will dissipate and so is expected to have a negligible impact on the operation of the wider network. While there is expected to be substantial variation in the type of traffic travelling on the links locally, during the peak travel hours they would be expected to mainly carry commuter traffic based on the nature of the local area.

As noted earlier, base traffic levels have been surveyed on the local network in 2018 & 2019 when prior to Covid 19 global pandemic. By combining these base flows with the traffic generation estimates for the proposed development, the following peaks were identified:

- A.M. Peak Hour: 08:00 – 09:00;
- P.M. Peak Hour: 17:15 – 18:15.

The recorded flows during the above peak hours and across the course of an average day are shown in the *Traffic Impact Assessment* report submitted separately. Any apparent discrepancy in flows between sites may be attributed to vehicles accessing developments and minor roads between surveyed junctions.

TA 79/99 “Traffic Capacity of Urban Roads” from the DMRB provides information on the capacity of urban roads based on classification and width. *Table 1* following shows the capacities of various road types based on this manual and using a 60:40 split in flow.

Table 11-1: Urban Road Capacities

2 Way Single Carriageway – Busiest Direction of Flow (60/40 split)										
Carriageway Width (m)		*Total Number of lanes*								
		2				*2–3*	*3*	*3–4*	*4*	*4+*
		6.10	*6.75*	*7.30*	*9.0*	*10.0*		*12.3*	*13.5*	*18.0*
Road Type	UM	*Not Applicable*								
	UAP1	1020	1320	1590	1860	2010	2550	2800	3050	3300
	UAP2	1020	1260	1470	1550	1650	1700	1900	2100	2700
	UAP3	900	1110	1300	1530	1620	*	*	*	*
	UAP4	750	900	1140	1320	1410	*	*	*	*

The local links have been classified based on the associated definitions in the DMRB. Using the previous table, link capacities have been calculated and current Ratio of Flow to Capacity (RFC) values have been assessed for the key links bordering the site. These are shown for the base year peak hours in *Table 11.2.*

It should be noted that given the variation in width across the links in question, an average figure for each has been used which is rounded down to the nearest value shown in the above table, thus ensuring a conservative assessment of link capacity. Where bus lanes are present, a reduced width has been allowed for to account for their reduced usage, thereby ensuring a conservative assessment.

Table 11-2: Base Year Link RFC Values for Local Network

Link	Width (m)	Link Capacity (veh/hr)	A.M. Peak (veh/hr)	RFC (%)	P.M. Peak (veh/hr)	RFC (%)
Fairyhouse Road	6.75	1,260	373	30%	536	43%
Meadowbank Hill / The Avenue	6.1	900	447	50%	429	48%
R155	6.75	1,260	661	52%	797	63%
Main Street	7.3	1,470	764	52%	872	59%

Evident from above, all links are operating well within capacity in the base case.

In order to accurately assess the impact of the proposed development in the future, the base traffic flows for the local network have been expanded to the Year of Opening and the Design Year using the medium range TII growth factors detailed in *Table 11.3* following.

Year	Growth Rates	
	Light Vehicles	*Heavy vehicles*
2019 - 2024	8.95%	19.63%
2019 - 2039	28.59%	75.10%

Table 11-3: Background Traffic Growth Factors

The future year traffic flows depicted graphically can be found in the without development can be seen in the *Traffic Impact Assessment* report submitted separately

Site Accessibility

The existing public transport facilities which located in the vicinity of the proposed development are discussed in following.

Bus

There is an existing bus stops along Fairyhouse Road for the residents at the development site in the future. It is located in the vicinity to the development site, as outlined in Figure 11.4 below.

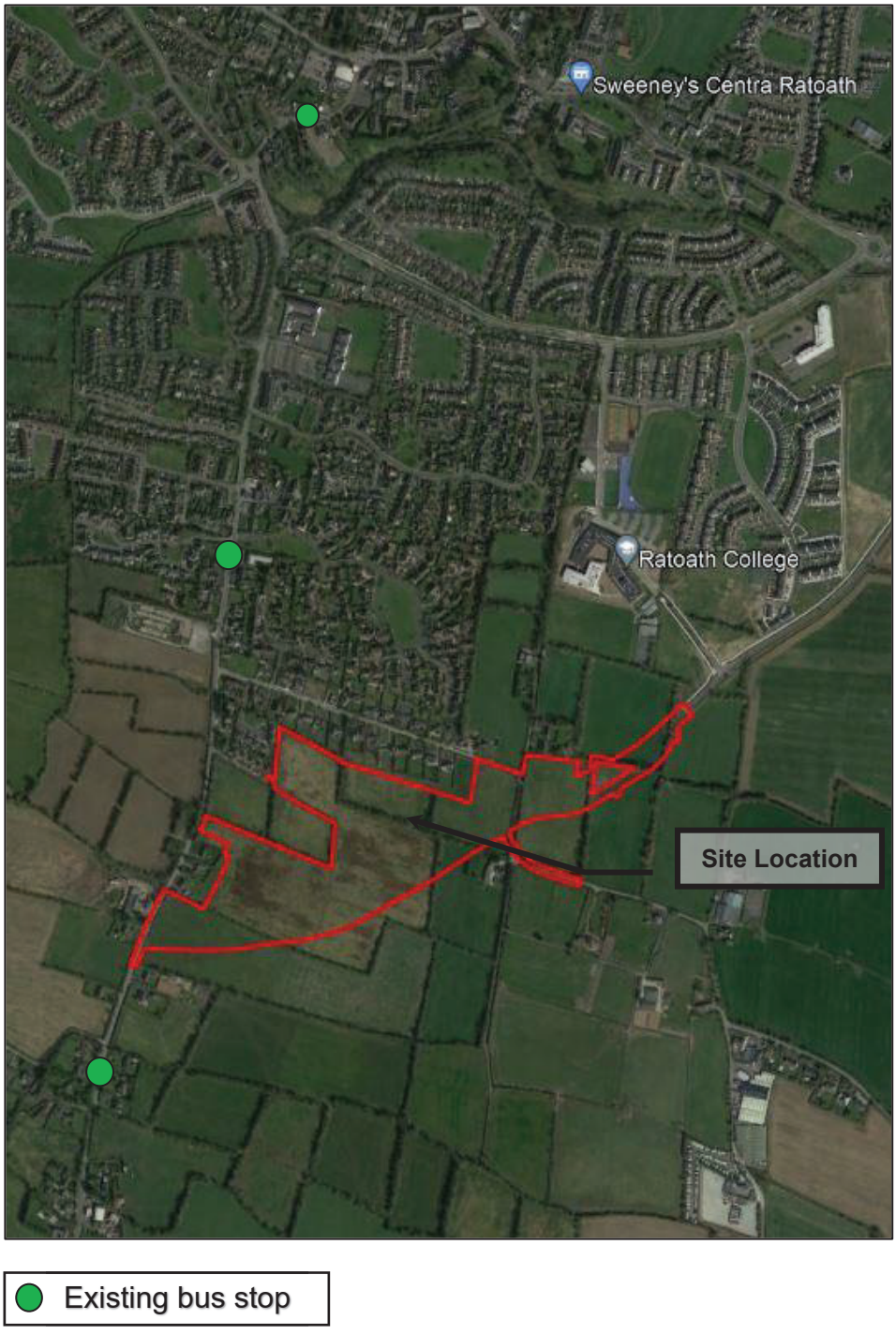


Figure 11-4: Existing Bus Stops:

The key routes serving the bus stop within a short walk of the development site are summarised in **Error! Reference source not found.** below.

Table 11-4: Local Bus Services

Route	Description
Route 103	Dublin – Tayto Park via Ratoath
Route 105	Drogheda – Blanchardstown via Ratoath
Route 105X	Fairyhouse Road – Ratoath - Dublin
Route 109	Dublin – Kells via Ratoath

Both existing bus routes are operated by Bus Eireann. More details of these bus services can be found at *www.buseireann.ie .*

As can be seen from the above Table 11.4, the bus routes operating in close proximity of the proposed SHD development provide the bus services which link the development site to town within County Meath (i.e. Ashbourne) and outside County Meath (i.e. Drogheda and Dublin.). It is expected that the future residents can utilise the existing bus routes to travel to these major town or city areas.

More details of bus service can be found at www.buseireann.ie.

Rail

The 105-bus route service, links the proposed development to the Dunboyne Rail Station which provides access to the following rail service:

- Dublin – Maynooth, Longford and M3 Parkway services.

The bus route from the proposed development to the Dunboyne Rail Station is shown in Figure 11-5Figure 11-5 overleaf.

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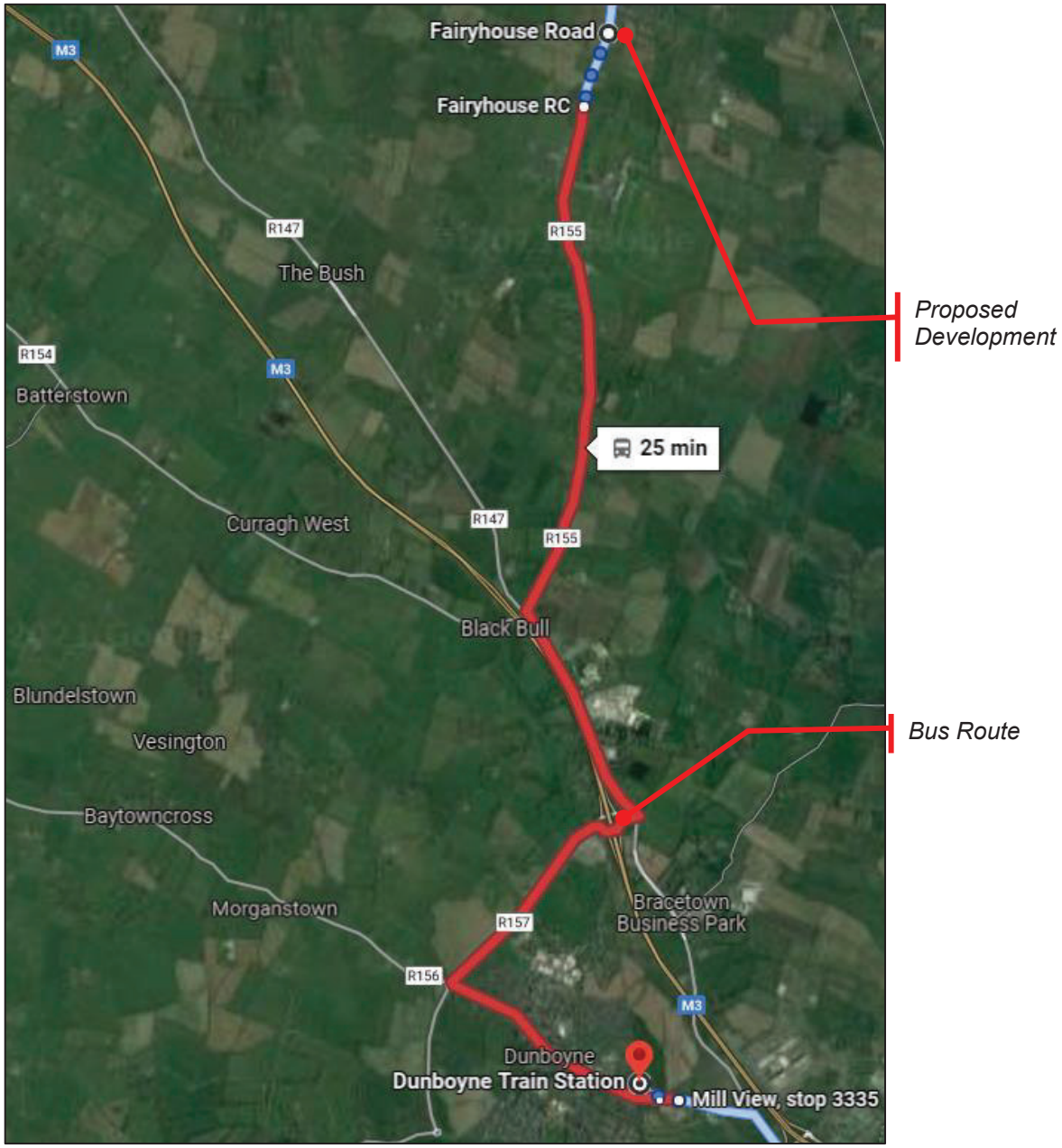

Figure 11-5: 105 Bus Route to Dunboyne Rail Station

More details of these rail services can be found at www.irishrail.ie

CYCLE

The cyclists are allowed to cycle in the road, together with other road users in local areas. Relative to the development site, the nearest cycle infrastructure is an existing dedicated cycle lane running along Meadowbank Hill and The Avenue, as outlined in green Figure 11-6 overleaf.

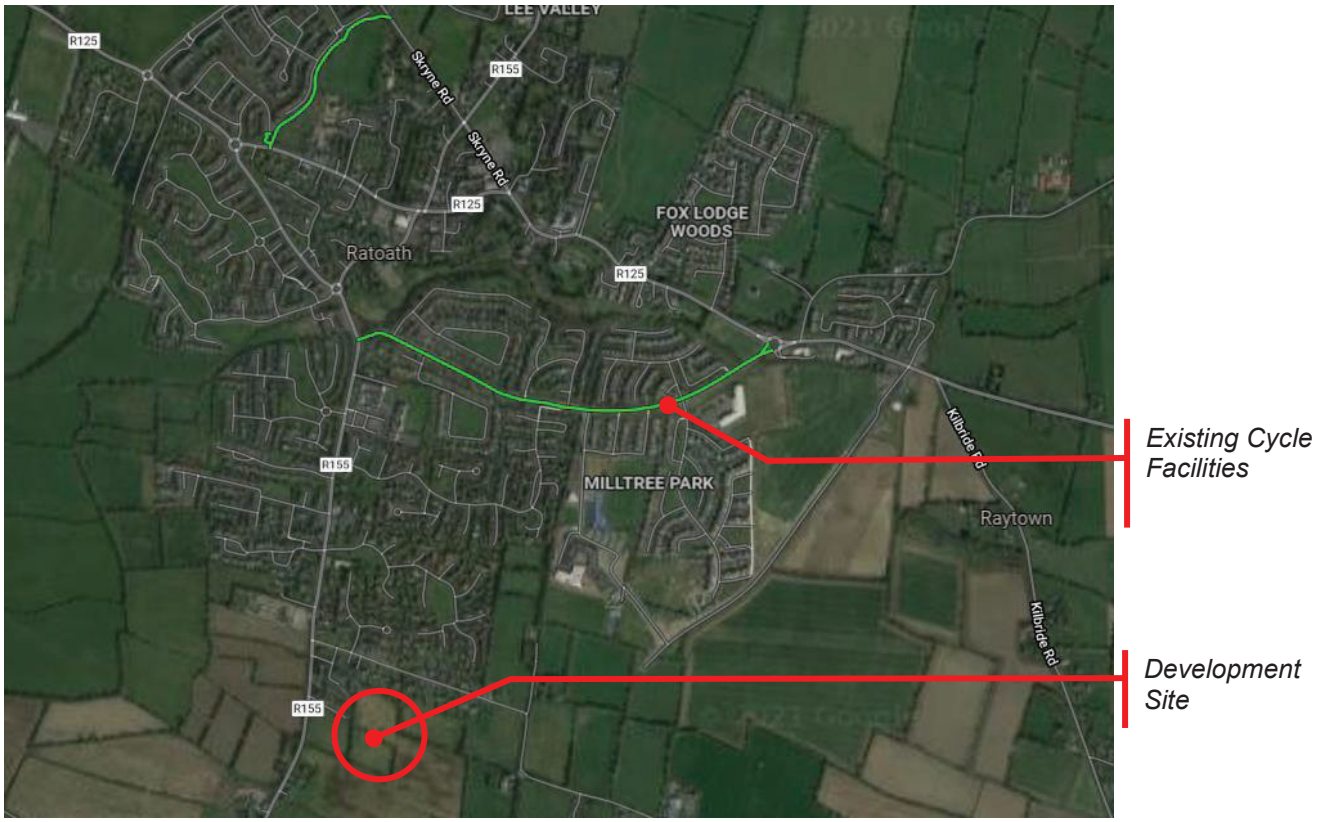

Figure 11-6: Existing Cycle Facilities in Local

Meath County Council has lodged a Part 8 planning development, which will connect Ratoath Town Centre to the RORR via a shared cyclist and pedestrian facility along the R155. It is therefore expected that the future visitors and staff will consider cycling as an attractive travel option to/from the development site.

Published by the National Transport Authority (NTA) in December 2013, this cycle network plan sets out a number of additional cycle route proposals which focus on improvement and extension of the cycle network across Dublin. The proposals for the local area are shown overleaf.

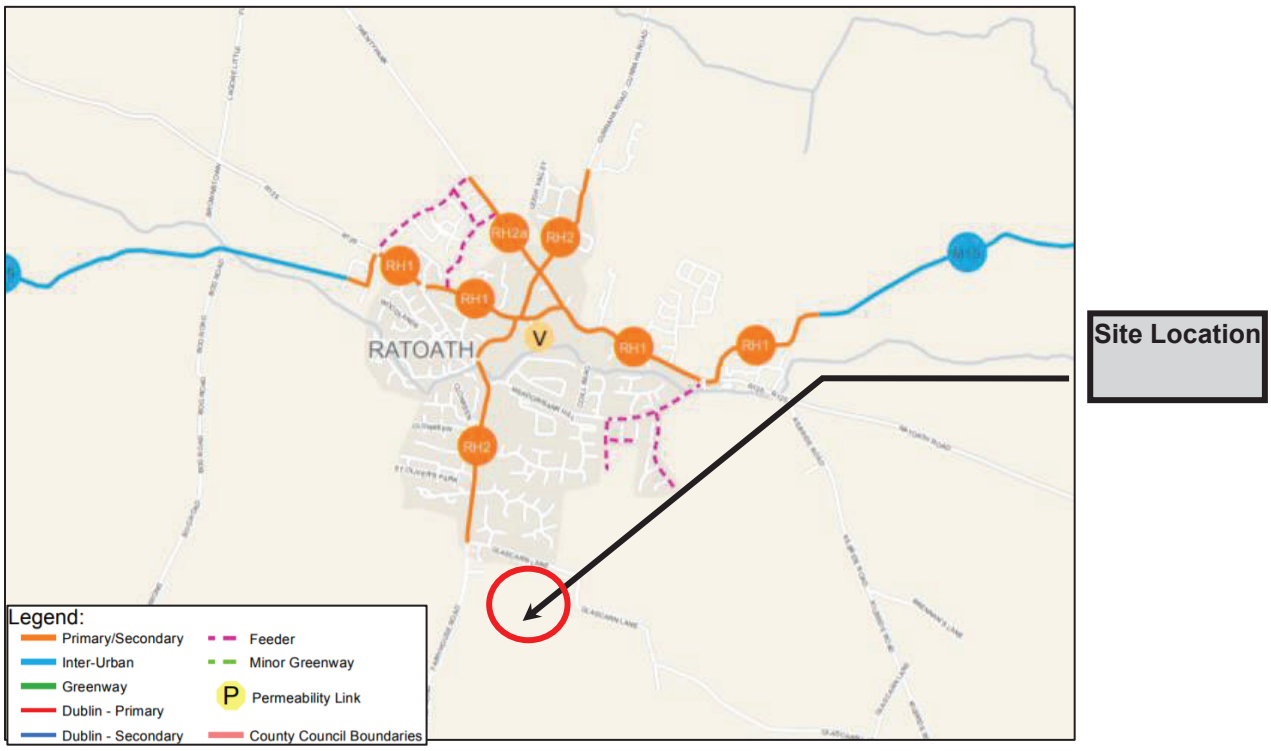

Figure 11-7: Future Cycle Facilities

As part of GDA cycle networks, the provision of the additional cycle facilities in Ratoath Town, particularly Primary / Secondary route RH2 is proposed along Fairyhouse Road, to the north of the development which offers a convenient and safer access to the town centre, even enable the future residents to travel further afield without the use of private car in future.

As mentioned Meath County Council are currently working on Part 8 planning development, which will connect Ratoath Town Centre to the RORR via the new and high-quality cycle tracks and footpath along the R155, this has been lodged for planning.

Moreover, it is proposed to provide a dedicated two way cycle facility along the new Ratoath Outer Relief Road, which is located adjacent to the development site, as shown in overleaf in Figure 11-8.

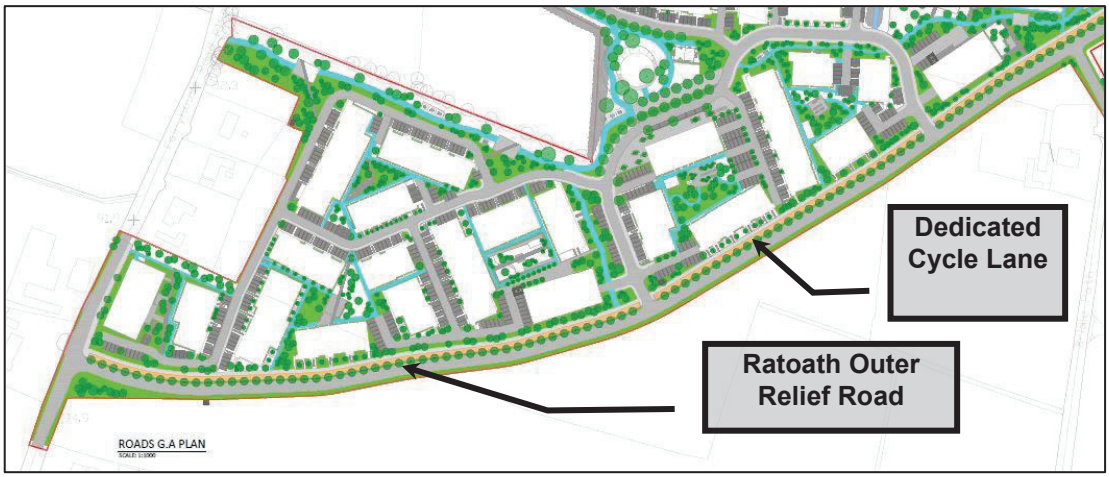

Figure 11-8: Additional Cycle Facilities on Ratoath Outer Relief Road

This new cycle facility will significantly improve the local cycle network and make the cycling as attractive option for the future residents to travel to/from the development site. Overall, it is expected that the future cycle facilities will provide a more convenient and safer cycle network within the local areas. The development also includes a 3m wide greenway running through the site linking to the various existing boundaries of the site promoting continuity.

PEDESTRIAN

Given that the proposed development is located within 1km (15 minutes) walking distance of Ratoath Town Centre, where have a large number of areas of retail and employment. It is expected that the future residents will consider to travel on foot from/to the proposed development to/from the Ratoath Town Centre. In term of pedestrian access, the existing footpath that surrounds the proposed development is considered as a good quality public access, which enable the future residents to the nearby bus stops and town centre.

The existing pedestrian facilities located along the R155 can be seen in the figure below. As mentioned earlier, Meath County Council are currently working on a Part 8 planning development to connect Ratoath Town Centre to the RORR via cycle tracks & footpath along the R155.

Figure 11-9: Existing Pedestrian Facilities

11.4 Predicted Impacts

The proposed layout is shown in Figure 11-10.

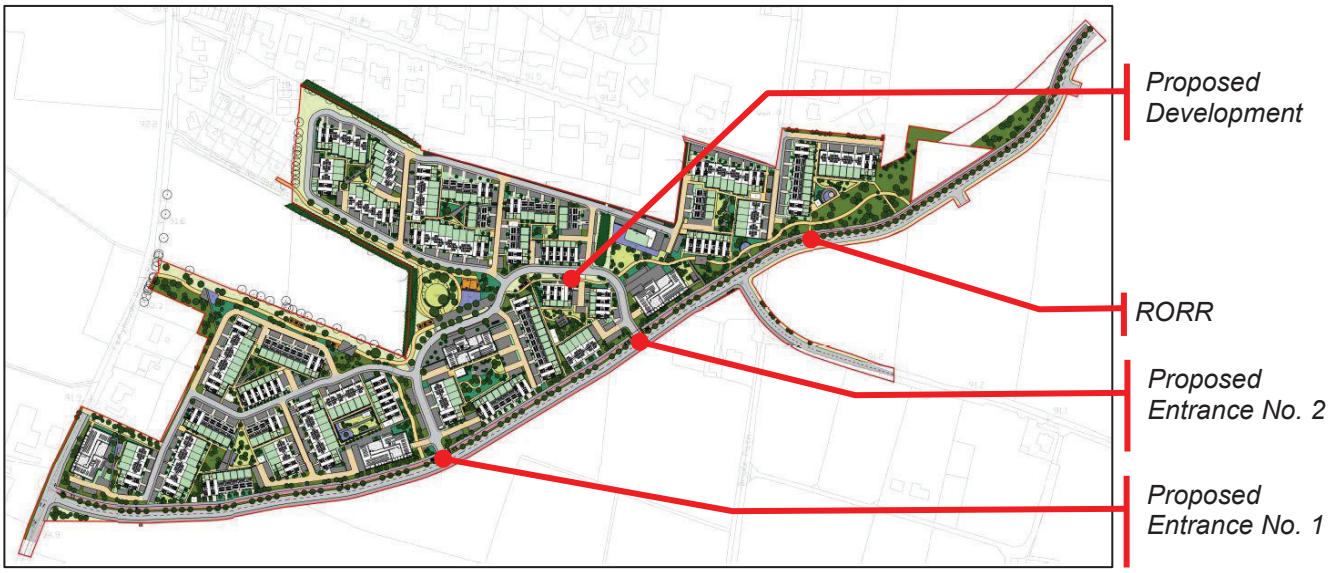

Figure 11-10: Proposed Site Layout

As shown in Figure 11-10 above, the proposed Ratoath Outer Relief Road (RORR), forms a southern bypass for Ratoath and links the R125 Ashbourne Road to the R155 Fairyhouse Road. The 1100m section of the proposed route, commences at the R155, immediately east of the Fairyhouse Road – R155 and continues to the development boundary linking to the existing RORR.

Figure 11-11: Proposed Signalised Junction Layout on R155

The new junction on Fairyhouse Road functions as a 3-arm signalised junction with dedicated turning lanes to cater for the additional traffic as a result of the proposed development.

In order to ensure a robust analysis, the new R155/Moulden Bridge junction is included as part of this assessment, which was previously approved to operate as a 4-arm signalised junction in the future, with multi-lane approaches on each arm joining with the new RORR link road, shown in Figure 11-12 overleaf

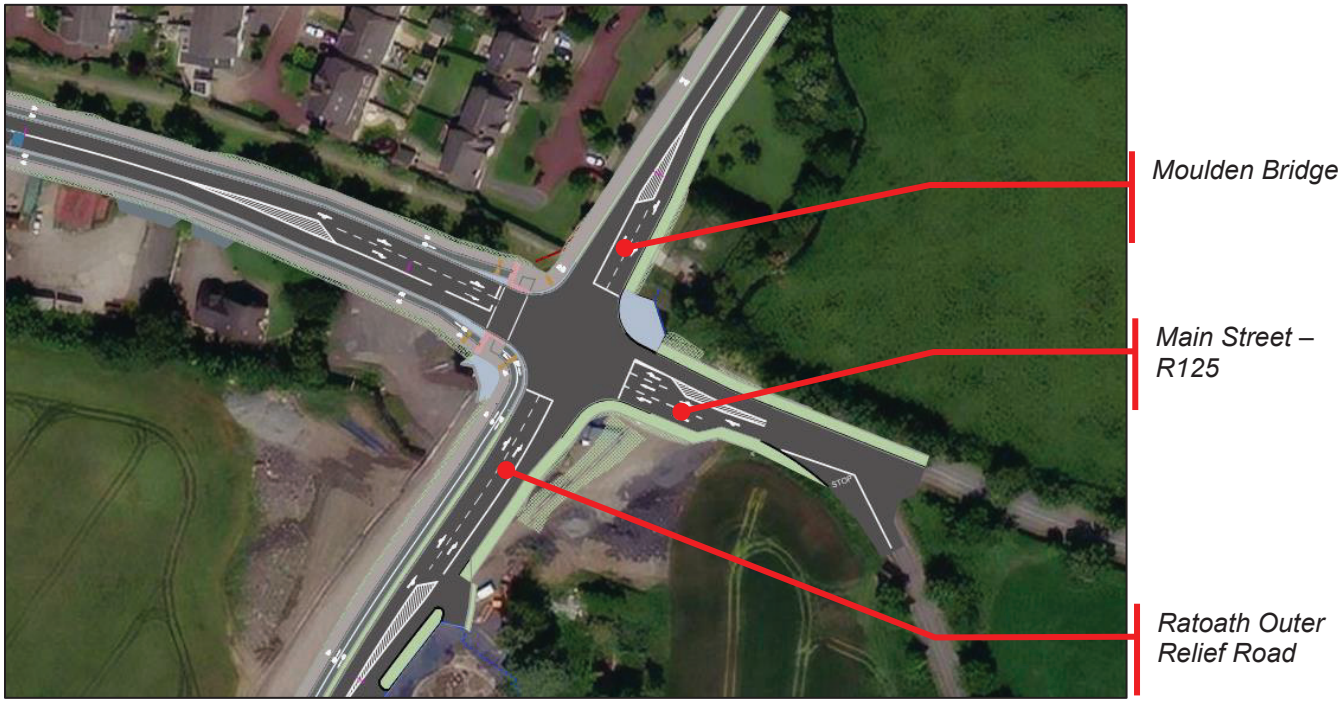

Figure 11-12: Proposed Signalised Junction Layout on R125

Trip Generation

The residential units of the proposed development are expected to be the primary trip generator and form the basis of the development trip generation estimates. The ancillary crèche element is not expected to be primary trip generators and is instead expected to mainly serve residents at the development site. As a result, they have not been included in this assessment from a trip generation perspective.

The traffic generation potential of the proposed development has been estimated using the Trics software modelling database which is an industry standard tool. When developing traffic generation estimates for any development, a number of surveys are selected from the database based on a range of factors including development type, size, location, public transport etc. The results are then used to establish trip rates for the development in question which are ultimately used to derive estimates for traffic generation. The Trics output files relative to this assessment can be found in *Appendix C* of Traffic Impact Assessment report which is under a separate cover.

Table 11-5: Proposed Development Estimated Trip Generation

Time Range	*Arrivals*	*Departures*
00:00-01:00	0	0
01:00-02:00	0	0
02:00-03:00	0	0

Time Range	*Arrivals*	*Departures*
03:00-04:00	0	0
04:00-05:00	0	0
05:00-06:00	0	0
06:00-07:00	0	0
07:00-08:00	32	123
08:00-09:00	61	169
09:00-10:00	68	85
10:00-11:00	58	69
11:00-12:00	62	69
12:00-13:00	71	70
13:00-14:00	75	75
14:00-15:00	84	91
15:00-16:00	118	83
16:00-17:00	129	75
17:00-18:00	156	79
18:00-19:00	130	79
19:00-20:00	0	0
20:00-21:00	0	0
21:00-22:00	0	0
22:00-23:00	0	0
23:00-24:00	0	0
Daily Trips:	1043	1065

Based on the above, the proposed development is expected to generate approximately 2,108 additional trips per day. Of these, approximately 61 arrivals and 169 departures are expected during the A.M. peak hour (08:00-09:00) while approximately 150 arrivals and 79 departures are expected in the P.M. peak hour (17:15-18:15).

Potential Impact of Development Construction

Relative to the operation stage, the construction period will be temporary in nature. Construction traffic is expected to consist of the following categories:

- Private vehicles owned and driven by site construction staff and by full time site supervisory staff and occasional professional supervisory staff i.e. design team members and supervisory staff from utility companies;
- Materials delivery and removal vehicles.

It is difficult to assess the exact quantum of traffic that will be generated during the construction period as it will vary throughout the construction process as different activities have different associated transportation needs. However, the following points are noted with regard to construction traffic:

- In general, the construction day will begin and end outside of peak travel hours. As a result, the majority of workers travelling to and from the site will arrive before the a.m. peak hour and depart after the p.m. peak hour;
- No on-site parking will be provided for use by critical staff only with the remainder of staff encouraged to travel by the numerous public transport options serving the locality;
- Adequate on-site compounding will be provided to prevent any potential overflow onto the local transport network;
- The potential for construction staff to be brought to the site in vans/minibuses will be investigated;
- Excavation and materials delivery vehicles travelling to and from the site will be spread across the course of the working day meaning the number of HGV's travelling during the peak hours will be relatively low.

Overall it is expected that the level of traffic generated by the construction works will be less than that generated by the operational phase of the development during the peak traffic hours. As a result, a detailed analysis of this stage has not been deemed necessary and the impact is considered to be negligible.

Prior to construction, it is expected that a detailed Construction Management Plan will be submitted by the appointed contractor to the Local Authority for agreement prior to the commencement of construction, giving details on the following:

- Daily and weekly working hours;
- Agreed haul routes for incoming materials;
- Licensed hauliers to be used;
- Disposal sites;
- Travel arrangements for construction personnel;
- Appropriate on-site parking arrangements for construction personnel to prevent overspill parking on the local road network;
- Temporary construction entrances to be provided;
- Wheel wash facilities if required;

- Road cleaning and sweeping measures to be put in place if required;
- Temporary construction signage to be put in place and maintained;
- Any proposed traffic management measures such as temporary traffic lights and signage on any public roads.

Potential Impact of Development Operation

In order to assess the actual impact of the operational development on the local road network, a number of different scenarios have been analysed as follows:

- *Base Year (2019)* – The current performance of the local road network was initially assessed along with the impact of the proposed development to establish which junctions require more detailed analysis;
- *Year of Opening (2024)* – The performance of the local road network was then assessed for Year of Opening. In order to show the true impact of the proposed development, both the Do Nothing and Do Something scenarios were analysed;
- *Design Year (2039)* – The local road network was analysed for Design Year considering the Do Nothing, Do Something and the Do Maximum scenario.

The junction analysis was carried out using TRANSYT, Junctions 9 and the link capacities for the Year of Opening and the Design Year were assessed based on the same methodology outlined earlier in this report.

BASE YEAR

In order to establish which junctions require more detailed analysis using TRANSYT and Junction 9, the impact of the proposed development relative to the existing traffic flows has been assessed. The criteria used for this scoping exercise is based on the guidance set out in the TII Traffic & Transport Assessment Guidelines (2014) which states that an assessment is required when:

"*Traffic to and from the development exceeds 10% of the traffic flow on the adjoining road*"

or

"*Traffic to and from the Development exceeds 5% of the traffic flow on the adjoining road where congestion exists or the location is sensitive*"

or

"*Residential development in excess of 200 dwellings"*

With regard to the scope of the assessment, the guidelines state:

"*In general, the study area should include all road links and associated junctions where traffic to and from the development may be expected to exceed 10% of the existing traffic movements, or 5% in congested or other sensitive locations, including junctions with national roads. Where two or more of the supplementary criteria as indicated in Table 2.3 apply in relation to any of the adjoining links or junctions, then those links and junctions should also be considered for inclusion in the study area*"

The referenced Table 2.3 contains a series of sub-thresholds for when a Traffic & Transport Assessment should take place. These are summarised as follows:

- The character and total number of trips in / out combined per day are such that as to cause concern;
- The site is not consistent with national guidance or local plan policy or accessibility criteria contained in the Development Plan;
- The development is part of incremental development that will have significant transport implications;
- The development may generate traffic at peak times in a heavily trafficked/ congested area or near a junction with a main traffic route;
- The development may generate traffic, particularly heavy vehicles in a residential area;
- There are concerns over the development's potential effects on road safety;
- The development is in a tourist area with potential to cause congestion;
- The planning authority considers that the proposal will result in a material change in trips patterns or raises other significant transport implications.

Given the nature and estimated traffic generation potential of the proposed development, it is concluded that it does not meet any of the above thresholds.

As a result, the percentage increase in traffic has been used as the scoping basis for this assessment, as shown as part of the Traffic Impact Assessment:

The study indicates that the increase in traffic as a result of the proposed development is over 5% at the majority of junctions within the study area, therefore all junctions required further consideration.

In order to ensure an accurate assessment, the models for each junction has first been calibrated by comparing its output results for queues against those recorded on-site during the traffic surveys. This allows the model to be adjusted accordingly as part of an iterative process until an acceptable level of correlation is achieved.

YEAR OF OPENING

As noted previously, the assessment considers the Do Nothing, Do Something and Do Maximum scenarios. The Do Something scenarios are established by adding the traffic estimated to be generated by the proposed development and approved third party developments to the local network.

Prior to the analysis of the individual junctions, the main links in the network have been assessed for the year of opening Do-Something scenario, with the results shown in *Table 11.6.*

Table 11-6: 2024 Do Something Link RFC Values

Link	Width (m)	Link Capacity (veh/hr)	A.M. Peak (veh/hr)	RFC (%)	P.M. Peak (veh/hr)	RFC (%)
Fairyhouse Road	6.75	1,260	599	48%	798	63%
Meadowbank Hill / The Avenue	6.1	900	655	73%	618	69%
R155	6.75	1,260	812	64%	1088	86%
RORR	6.1	900	169	19%	150	17%
Main Street	7.3	1,470	1041	71%	1118	76%

Table 11-7: Do Maximum Link RFC Values

Link	Width (m)	Link Capacity (veh/hr)	A.M. Peak (veh/hr)	RFC (%)	P.M. Peak (veh/hr)	RFC (%)
Fairyhouse Road	6.75	1,260	623	49%	815	65%
Meadowbank Hill / The Avenue	6.1	900	393	44%	298	33%
R155	6.75	1,260	831	66%	853	68%

RORR	6.1	900	362	40%	528	59%
Main Street	7.3	1,470	1070	73%	1140	78%

As can be seen, the local links continue to operate with reserve capacity with RFC values remaining below 78% in each instance despite the increased traffic levels.

DESIGN YEAR

As before, the Do Something traffic flows are established by adding the traffic estimated to be generated by the proposed SHD developments to the local network at the design year. The Do Maximum Scenarios are established by adding the additional development on the lands to the west of the development site and potential traffic distribution on the proposed Ratoath Outer Relief Road (RORR).

Prior to the analysis of the individual junctions, the main links in the network have been assessed for the year of opening Do Something and Do Maximum scenarios, with the results shown following.

Table 11-8: 2039 Do Something Scenario Link RFC Values

Link	Width (m)	Link Capacity (veh/hr)	A.M. Peak (veh/hr)	RFC (%)	P.M. Peak (veh/hr)	RFC (%)
Fairyhouse Road	6.75	1,260	672	53%	893	71%
Meadowbank Hill / The Avenue	6.1	900	744	83%	706	78%
R155	6.75	1,260	936	74%	1234	98%
RORR	6.1	900	169	19%	150	17%
Main Street	7.3	1,470	1182	80%	1272	87%

Table 11-9: 2039 Do Maximum Scenario Link RFC Values

Link	Width (m)	Link Capacity (veh/hr)	A.M. Peak (veh/hr)	RFC (%)	P.M. Peak (veh/hr)	RFC (%)
Fairyhouse Road	6.75	1,260	668	53%	885	70%
Meadowbank Hill / The Avenue	6.1	900	465	52%	354	39%
R155	6.75	1,260	940	75%	977	78%
RORR	6.1	900	377	42%	578	64%
Main Street	7.3	1,470	1203	82%	1290	88%

As showcased above, the local links continue to operate below normal capacity limits for the Do Something and Do Maximum Scenario. The results show the RFC values of some major links are

reduced during both peak hours in the Do Maximum Scenario, due to the introduction of the Ratoath Outer Relief Road.

Further modelling results for the Year of Opening and Design Year Do Something Scenario, are discussed in the submitted Traffic Impact Assessment report.

11.5 Potential Cumulative Impact

The traffic study conducted, indicates that the additional traffic flows generated by the proposed development will not have a major impact on the operation of local traffic network with relatively minor to no impact on RFC values despite the conservative assessment with respect to trip generation estimates. In addition, most of existing junctions have been shown to be significantly improved due to the introduction of the Ratoath Outer Relief Road by reassignment of existing traffic patterns through Ratoath Town Centre, particularly the existing junction which located in Ratoath Town Centre.

In addition, consideration has also been given to the two approved third-party SHD development lands adjoining the proposed development site, the future potential Phase 1 masterplan on White Lands, located on the south of the proposed development site and future 100 no. residential units development, located on the north of the proposed development. These developments are considered to generate a significant traffic volume in the local transportation network. Although both potential future developments do not form part of this application, they have been considered within this assessment to ensure a robust and detailed analysis. It is noted that the future additional developments and fully completed RORR are assessed in Do Something and Do Maximum scenario, as described in previous section of this chapter.

To determine the potential cumulative impact of these future additional developments, the trip generation estimates have been produced and shown in the table below for the future additional developments.

Table 11-10: Approved Third Party Developments Estimated Trip Generation

Time Range	*Arrivals*	*Departures*
00:00-01:00	0	0
01:00-02:00	0	0
02:00-03:00	0	0
03:00-04:00	0	0
04:00-05:00	0	0
05:00-06:00	0	0
06:00-07:00	0	0
07:00-08:00	24	93
08:00-09:00	46	127

Time Range	*Arrivals*	*Departures*
09:00-10:00	51	64
10:00-11:00	44	52
11:00-12:00	47	52
12:00-13:00	53	53
13:00-14:00	56	57
14:00-15:00	64	68
15:00-16:00	89	63
16:00-17:00	98	57
17:00-18:00	118	59
18:00-19:00	98	59
19:00-20:00	0	0
20:00-21:00	0	0
21:00-22:00	0	0
22:00-23:00	0	0
23:00-24:00	0	0
Daily Trips:	787	804

Based on the above, the approved third party developments are expected to generate approximately 1,590 additional trips per day. Of these, approximately 46 arrivals and 127 departures are expected during the A.M. peak hour (08:00-09:00) while approximately 113 arrivals and 59 departures are expected in the P.M. peak hour (17:15-18:15).

Table 11-11: : Future Residential Developments Estimated Trip Generation

Time Range	*Arrivals*	*Departures*
00:00-01:00	0	0
01:00-02:00	0	0
02:00-03:00	0	0
03:00-04:00	0	0
04:00-05:00	0	0
05:00-06:00	0	0
06:00-07:00	0	0
07:00-08:00	7	27
08:00-09:00	13	37
09:00-10:00	15	19
10:00-11:00	13	15
11:00-12:00	14	15
12:00-13:00	15	15
13:00-14:00	16	16
14:00-15:00	18	20
15:00-16:00	26	18
16:00-17:00	28	16
17:00-18:00	34	17
18:00-19:00	28	17
19:00-20:00	0	0
20:00-21:00	0	0
21:00-22:00	0	0
22:00-23:00	0	0
23:00-24:00	0	0
Daily Trips:	227	232

Based on the above, the two approved SHD development lands adjoining the proposed development to the west is expected to generate approximately 458 additional trips per day. Of these, approximately 13 arrivals and 37 departures are expected during the A.M. peak hour (08:00-09:00) while approximately 33 arrivals and 17 departures are expected in the P.M. peak hour (17:15-18:15).

Table 11-12: Future Phase 1 Masterplan Developments Estimated Trip Generation

Time Range	*Arrivals*	*Departures*
00:00-01:00	0	0
01:00-02:00	0	0
02:00-03:00	0	0
03:00-04:00	0	0
04:00-05:00	0	0
05:00-06:00	0	0
06:00-07:00	0	0
07:00-08:00	149	73
08:00-09:00	224	87
09:00-10:00	146	73
10:00-11:00	70	57
11:00-12:00	58	80
12:00-13:00	69	87
13:00-14:00	87	72
14:00-15:00	81	86
15:00-16:00	75	113
16:00-17:00	64	148
17:00-18:00	77	187
18:00-19:00	80	136
19:00-20:00	39	31
20:00-21:00	39	35
21:00-22:00	30	27
22:00-23:00	5	5
23:00-24:00	0	0
Daily Trips:	1293	1297

Based on the above, the future phase 1 masterplan development is expected to generate approximately 2,591 additional trips per day. Of these, approximately 224 arrivals and 87 departures are expected during the A.M. peak hour (08:00-09:00) while approximately 78 arrivals and 174 departures are expected in the P.M. peak hour (17:15-18:15).

The additional traffic was assigned to the study area based on existing traffic flows in the area combined with an assessment of the local network layout.

As outlined previously, an origin-destination survey was also carried out to understand the total vehicles travelling between Fairyhouse Road – R155 to Main Street – R125. The impact of the proposed Ratoath Outer Relief Road (RORR) was analysed by surveying the existing traffic volumes from Fairyhouse Road (R125) to Main Street - R125 via Ratoath Town Centre during the peak hour. The proposed new Ratoath Outer Relief Road (RORR) will make the journey from the R155 to the R125 faster and shorter by bypassing Ratoath Town Centre, it is expected that a large proportion of vehicles would instead travel from the R155 to the R125 via the RORR. This diverted traffic was then assigned to the study area based on existing traffic flows in the area combined with an assessment of the local network layout.

In addition, the existing traffic volumes from/to Fairyhouse Road to/from Main Street – R125 are expected to be reduced via Ratoath Town Centre during the peak hour, which represent the other existing junctions in Ratoath Town Centre will operate a lower level of traffic volumes once the RORR is fully operated, as indicated in the detailed analysis results in the later section of this report.

The results of the overall assessment showed that the proposed development will not have a major or significant impact on the operation of the links and junctions in the local network with relatively minor to no impact on RFC values despite the conservative assessment with respect to trip generation estimates. As discussed in the submitted Traffic Impact Assessment report, Junction 5 has been shown experience capacity issues in the Design Year, even without the development.

The introduction of the Ratoath Outer Relief Road has been shown to improve the most of the existing junctions by the redistribution of existing traffic patterns on these junctions. The existing roundabout (Junction 4) and existing cross road junction (Junction 3) on the R155 and R125 are shown in the Do Nothing Scenario is exceed acceptable levels of RFC for a priority junction (generally accepted as 85%), however, the introduction of the Ratoath Outer Relief Road has been shown to improve both junctions in Do Something and Do Maximum scenario by reallocating a significant proportion of traffic volumes on this junction.

The introduction of the signalised junction on the Main Street – R125 will improve the safety and experience of pedestrians through the junction, dedicated pedestrian crossings are proposed on all arms. As demonstrated in the submitted TIA report that the introduction of the signalised junction layout will improve the overall capacity of this junction.

Based on the statement above, the potential cumulative impacts are considered to be negligible.

11.6 Do Nothing Scenario

The Do Nothing scenario would involve leaving the subject site in its current underdeveloped state. This would have a negative impact on the overall development of the area while simultaneously showing no real benefit in transportation terms.

The Do Nothing scenario would result in the Ratoath Outer Relief Road not being constructed, this new link road has been shown to improve the capacity of the major junctions.

The local transport network has been shown to experience no notable negative impact as a result of a development of the type planned.

11.7 Risks to Human Health

There is a potential interaction with human health during the Construction Phase due to noise, dust, air quality and visual impacts which are discussed in the relevant chapter of this EIAR. As mentioned earlier, it is expected that the level of traffic generated by the construction works will be less than that generated by the operational phase of the development during the peak traffic hours. As a result, a detailed analysis of this stage has not been deemed necessary and the impact is considered to be negligible. An outline construction and environmental management plan will be submitted as part of this planning application under a separate cover, however, the detailed Construction Management Plan will be submitted by the appointed contractor to the Local Authority for agreement prior to the commencement of construction as mentioned earlier to ensure the risks to human health to be maximally reduced in construction stage

As outlined previously, the development proposals include the provision of dedicated cycle lane and pedestrian facilities along the Ratoath Outer Relief Road. The proposed link roads and streets together with the junctions, footpaths and cycle facilities have been designed in accordance with requirements of the Design Manual for Urban Roads and Streets (DMURS) and the National Cycle Manual (NCM). DMURS is the design philosophy used in the design of all new residential roads and urban streets and the key objective of DMURS is to achieve safe, attractive and vibrant streets by balancing the needs of all users, and prioritising alternatives to car journeys. The subject site is fully consistent with this recommended approach and achieves a sense of place and residential amenity whilst also facilitating efficient and secure internal movement. The site layout encourages permeability through the site, connecting to the wider area via pedestrian links and cycleways and seeks to prioritise pedestrian and cyclists in accordance with the policies set out in DMURS.

All footpaths provided will be a minimum of 1.8m in line with DMURS. Proposed footpath along RORR will be 2.5m wide. New footpath links will be constructed to enhance connectivity. The cycle facilities proposed are a combination of dedicated 3.0m two way off road cycle tracks along the RORR and a dedicated greenway 3.0m wide. In addition there will be on-road cycle facilities which are shared with vehicular traffic and acceptable for low traffic speed urban environments. The New cycle facilities that will be constructed along the RORR will connect to a future Meath County Council Part 8 scheme that aims to connect Ratoath Town Centre to the RORR via pedestrian & cyclist infrastructure. Both entrance

junctions are priority junctions with pedestrian and cycle crossings where required. The RORR will connect to the R155 Fairyhouse Road via a signalised crossing with pedestrian crossings. All crossings to have appropriate tactile paving to aid vulnerable road users. Visibility standards maintained at all junctions. The internal development horizontal and vertical visibility to be maintained at all junctions and crossings in line with the 30 kph Design Speed. The RORR will be design in accordance with a 50kph DMURS Design Speed.

Hence, it is considered that there is no major risk to human health once the development site is in operation based on the provision of additional facilities in the local.

11.8 Mitigation Measures

Mitigation has been identified as potentially being required at Junction 3 and Junction 4 regardless of the proposed development being in place or not.

In order to minimise the public human health during the construction stage, the following mitigation measures will be implemented as set out below, the Construction and Environmental Management Plan (CEMP) which is under a separate cover as part of this planning application.

Construction Phase

1. Fencing

Perimeter fencing will be provided around the different phases of the site and along the public road so as to prevent unauthorised access to the site. Controlled access points will also be provided. Fencing will be maintained to a high standard and painted or covered as appropriate.

Temporary fencing will be provided as necessary within the site as safety restrictions to prevent public access. The locations of this temporary fencing will vary as work progresses across the site.

2. Works on the Public Road

Access to the site will be from the proposed site entrance via the Fairyhouse Road.

All works on the public road Works, including the proposed junction and mixed use facility will be carried out subject to, and in accordance with, a Road Opening Licences with Meath County Council and all works will be carried out in accordance with MCC and HSA guidelines for working on public roads.

3. Construction Traffic Mitigation Measures

The appointed contractor will put in place measures to keep public roads free of muck and debris. This will include providing a wheel wash on site and undertaking regular road sweeping by mechanical sweeper.

4. Noise Control

Measures will be implemented to minimise the impact of noise emissions at sensitive locations during the construction phase. Such measures will include the following:

- Construction contractors will be required to comply with the requirements of the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations and the Safety, Health and Welfare at Work (Control of Noise at Work) Regulations;
- All plant items used during the construction phase should comply with standards outlined in the 'Safety, Health and Welfare at Work (Control of Noise at Work) Regulations' and the 'European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations'. Reference will be made to BS 5228: Part 1: 2009 (Noise Control on Construction and Open Sites - Part 1. Code of Practice for Basic Information and Procedures for Noise Control) and will include the following mitigation measures:
    - Training of site staff in the proper use and maintenance of tools and equipment;
    - The positioning of machinery on site to reduce the emission of noise and to site personnel;
    - Sources of significant noise will be enclosed where practicable;
    - Machines that could be in intermittent use will be shut down between work periods or will be throttled down to a minimum;
    - Plant known to emit noise strongly in one direction will, when possible, be orientated so that the noise is directed away from noise sensitive areas; and
    - Plant and/or methods of work causing significant levels of vibration at sensitive premises will be replaced by other less intrusive plant and/or methods of working where practicable.
- Inherently quiet plant will be selected where appropriate;
- Screening and enclosures will be utilised in areas where construction works are continuing in one area for a long period of time or around items such as generators or high duty compressors. For maximum effectiveness, a screen will be positioned as close as possible to either the noise source or receiver. The screen will be constructed of material with a mass of >7kg/m^2 and should have no gaps or joints in the barrier material. This can be used to limit noise impact to any noise sensitive receptors;
- Operators of all mobile equipment will be instructed to avoid unnecessary revving of machinery and mobile equipment will be throttled down or switched off when not in use;
- Accordingly, where possible all construction traffic to be used on site will have effective well-maintained silencers; and
- All mobile plant will be maintained to a high standard to reduce any tonal or impulsive sounds.

5. Dust Control

The main activities that may give rise to dust emissions during construction include the following:

- Materials handling and storage; and
- Movement of vehicles (particularly HGV's) and mobile plant.

The following mitigation measures will be implemented on site during the construction phase, as required:

- Vehicles exiting site will use a wheelwash to ensure dust emissions are not generated from tyres. It will also prevent vehicles from carrying excess material onto public roads;
- Site roads shall be regularly cleaned and maintained as appropriate;
- Hard surface roads shall be swept to remove mud and aggregate materials from their surface as a result of the development works;
- Any un-surfaced roads shall be restricted to essential site traffic only;
- Any road that has the potential to give rise to fugitive dust may be regularly watered, as appropriate, during extended dry and/or windy conditions;
- On-site speed limits will be stipulated to prevent unnecessary generation of fugitive dust emissions;
- Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind;
- A complaints register will be maintained on-site and any complaints relating to dust emissions will be immediately dealt with;
- In periods of dry weather when dust emissions would be greatest, a road sweeper, which would also dampen the road, will be employed in order to prevent the generation of dust;
- Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods; and
- If appropriate, dust monitoring will be carried out during the construction phase of the scheme. If the level of dust is found to exceed 350mg/m^2/day in the vicinity of the site, further mitigation measures will be incorporated into the construction of the proposed scheme

6. Control of Substances Hazardous to Health

The strategy for controlling all substances and all work processes that may generate hazardous substances will have to be addresses and control measures put in place. Some of the control measures to be employed include the following:

- All fuel and chemicals to be stored in designated areas, with deliveries of hazardous materials supervised.
- Storage tanks and container facilities will be appropriately bunded.
- In the case of spills or discharges, remedial action will be taken as soon as possible in accordance with company procedures.
- Personal protective equipment (PPE) suitable to the pertaining conditions will be used by all site personnel.

Please refer to the Construction and Environmental Management Plan report which is included under a separate for further details of mitigation measures during construction stage. Again, the detailed

Construction Management Plan will be submitted by the appointed contractor to the Local Authority for agreement prior to the commencement of construction.

Operational Phase

In order to reduce the risks to human health during operational stage, the proposed link roads and streets together with the junctions, footpaths and cycle facilities have been designed in accordance with requirements of the Design Manual for Urban Roads and Streets (DMURS) and the National Cycle Manual (NCM). DMURS is the design philosophy used in the design of all new residential roads and urban streets and the key objective of DMURS is to achieve safe, attractive, and vibrant streets by balancing the needs of all users, and prioritising alternatives to car journeys.

The access roads linking to the RORR are implemented with a 6m cross section and the remaining local streets a width of 5m. This is accompanied by variations in the horizontal alignment of the access road providing a natural traffic calming effect in both a physical and psychological sense, which will assist in self-regulating vehicular speeds.

There are several shared surface roads that implement a raised rounded imprinted median and road markings to further promote low vehicle speeds to reduce the risks to the pedestrian within the development.

In addition, gradients proposed minimise the need for revving of engines and associated noise and emissions, while appropriate landscaping will absorb excessive sound. Pedestrian priority will be provided at some internal junctions in the form of raised entry treatments which also serve as a traffic calming measure. The location of the site will promote the use of public transport (Bus Eireann) thus contributing to reduced air emissions.

11.9 Residual Impacts

There is no residual impacts since no mitigation measures are required to facilitate the proposed development.

11.10 Monitoring

While it has been demonstrated that the proposed development can be accommodated, it is nevertheless recommended that the local area should be monitored in terms of transportation efficiencies into the future.

11.11 Difficulties Encountered

There were no difficulties encountered.

11.12 References

In carrying out the above, this chapter has given due consideration to the relevant guidelines including:

- *Traffic & Transport Assessment Guidelines (2014)* as published by the former National Roads Authority (NRA) now Transport Infrastructure Ireland (TII);
- *Guidelines for Traffic Impact Assessment (1997)* as published by the Chartered Institute of Highways & Transportation;
- *Meath Development Plan 2021-*2027.
- Project Appraisal Guidelines for National Roads – Unit 5.3 Travel Demand Projections Link-Based Growth Rate; Annual Growth Factors.
- Design Manual for Urban Roads and Streets (DMURS)

12. Material Assets: Resource & Waste Management

12.1 Introduction

This Chapter was completed by O'Connor Sutton Cronin and Associates Limited and assesses the likely and significant impacts associated with the proposed mixed-use development on through Resource and Waste Management on the environment.

The following topics will be assessed in this chapter of the EIAR:

- Construction and Demolition Wast Management
- Operational Waste Management

This chapter provides a description of the project (in connection with resource and waste management); the baseline for waste for the Proposed Development and a statement of significant impacts associated with both the Construction and operational phases of the Proposed Development. A 'do-nothing' scenario has also been considered. Mitigation measures are proposed in the form of avoidance, prevention, reduction, offsetting, and reinstatement or remedial measures and recommendations for monitoring are included where appropriate. Predicted residual effects are also described. This section on Waste has been prepared by O'Connor Sutton Cronin (OCSC) with supporting information provided by AWN Consulting Limited.

Assessments for the Site are detailed in this Chapter with relevant technical information included in the following standalone reports:

- OCSC (2022) Construction and Demolition Waste Management Report
- AWN (2022) Operational Waste Management Report

12.1.1 Author Information

This chapter was prepared by Anthony Horan (Chartered Engineer) and Joshua Tia (M.Sc. Eng, MIEI) and reviewed by Lizmary Alfirs (Chartered Engineer) and approved by Anthony Horan Chartered Engineer (MIEI) and FCONSEI.

12.1.2 Proposed Development

This application relates to a proposed primarily residential development on a 14.166ha site located in Newtown, Ratoath, Co. Meath as shown in Figure 12.1. A full description of the proposed development is set out in Chapter 1 (Introduction) of this EIAR.

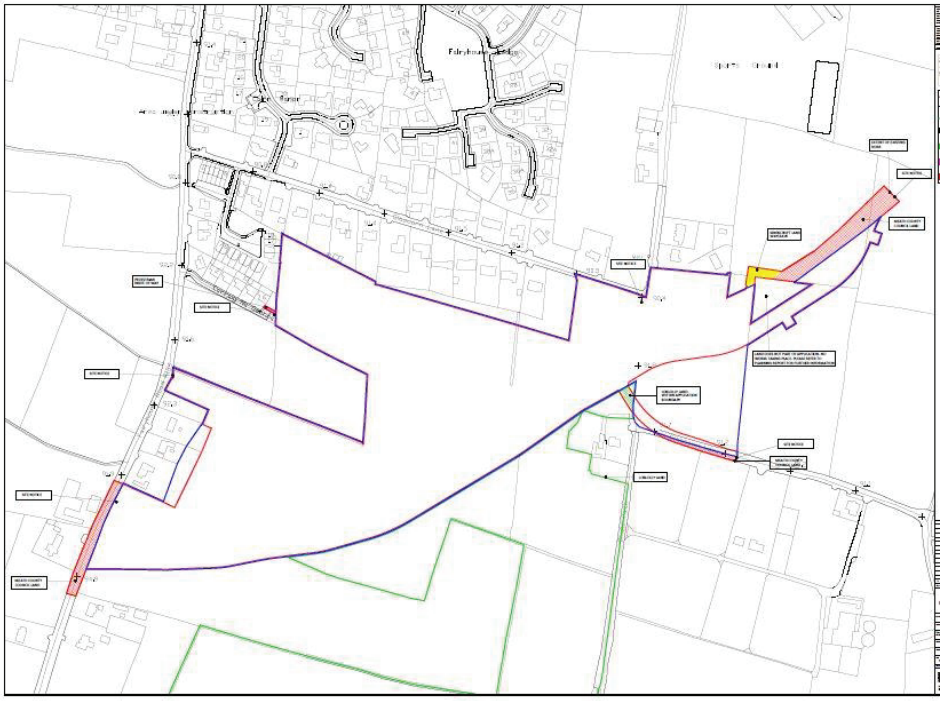

Figure 12-1 Site Boundary

Source: RKD Architects for Beo Properties Limited.

Permission is sought by Beo Properties Ltd. for a Strategic Housing Development in Newtown, Ratoath, Co. Meath. The 14.166ha site is bounded by agricultural lands to the south; detached houses and Glascarn Lane to the north; agricultural lands and an existing house to the east; and Fairyhouse Road, detached houses, and agricultural land to the west.

The development will consist of the construction of 452 no. residential units which are in 12 neighbourhoods. Building heights range across the site from 2- and 3-storey terraced houses, through to 4-storey maisonette buildings, and 6-storey apartment blocks. Private open space associated with the residential units is provided in the form of rear gardens, balconies, terraces and winter gardens. The development includes a crèche with associated outdoor play areas at ground floor and at roof level; 4 no. commercial/retail units; a landscaped public open space which includes a civic plaza; communal open space in the form of communal courtyards for each neighbourhood; associated car and cycle parking serving the full development and uses therein; green roofs at various locations; solar PV panels; a second phase of the Ratoath Outer Relief Road (RORR), that will run along the southern boundary of the application site, with 2 no. multi-modal entrances; a series of pedestrian and cycle connections from the Fairyhouse Road (R155), Cairn Court, Glascarn Lane and the new RORR; internal road and shared surface networks including pedestrian and cycle paths; public lighting and all associated site development and infrastructural works, services provision, ESB substations, foul and surface water drainage, extension to the foul network, access roads/footpaths, lighting, landscaping and boundary treatment works and all ancillary works necessary to facilitate the development. The proposed site layout is shown in Figure 12.2.

The entrance to the scheme will be from the Fairyhouse Road to the west of the site and from Glascarn Lane to the east via a new access from this road.

The scheme will link the currently existing section of the Outer Relief Road at Ratoath College to the R155 – Fairyhouse Road. The road layout to the proposed residential development will be designed as a Home Zone / Shared Street led concept, where streets are intended for a range of activities and are primarily places for people, not places for vehicles. The provision of the RORR is an objective of the Ratoath Local Area Plan 2009 – 2015 (LAP) and will link the R125 Swords-Ratoath-Dunshaughlin

Regional Road with the R155 Fairyhouse- Ratoath-Primatestown Regional Road on the southeast side of the town. The Ratoath Outer Relief Road with have full pedestrian and cycle crossing facilities.

A 3.0m wide Greenway will be constructed through the development and will be located away from the RORR.

12.1.2.1 Waste Management Facilities to be provided in the proposed scheme

The Location of all Waste Storage Areas (WSAs) can be viewed on the drawings submitted with the planning application under separate cover.

Residential Block A	One (1 no.) shared communal WSA has been allocated within the development design for this residential apartment block. This has been strategically located at ground floor level, near the cores.
Residential Block C	One (1 no.) shared communal WSA has been allocated within the development design for this residential apartment block. This has been strategically located at ground floor level, near the cores.
Residential Block H	One (1 no.) shared communal WSA has been allocated within the development design for this residential apartment block. This has been strategically located at ground floor level, near the cores.
Residential Block K	One (1 no.) shared communal WSA has been allocated within the development design for this residential apartment block. This has been strategically located at ground floor level, near the cores.
Maisonettes & Houses	Maisonettes and House will have their own individual WSAs allocated at the rear of their home where external access to the rear yard is possible. Where external access to the rear of the property is unavailable, bins will be stored at the front of the unit, in a screened area, shielded from view of the road.
Retail Block H	One (1 no.) shared communal WSA has been allocated within the development design for the commercial units in block H to share. This has been strategically located at ground floor level, near the cores.
Crèche	One (1 no.) individual WSA has been allocated within the development design for the crèche unit. This has been strategically located at ground floor level in an external location, near the cores. Using the estimated waste generation volumes in Tables 4.1, above, the waste receptacle requirements for MNR, DMR, organic waste and glass have been established for the WSA. It is envisaged that all waste types will be collected on a weekly basis. The WSA has been appropriately sized to accommodate the weekly waste requirements for waste receptacles.

Table 12-1 Location of WSAs

12.1.3 Waste Storage Requirements

Estimated waste storage requirements for the operational phase of the proposed development are detailed in Table 12.2, below.

Area/Use	Bins Required			
	MNR[1]	DMR[2]	Glass	Organic
Residential WSA Block A (Shared)	2 no. 1100 L	4 no. 1100 L	1 no. 240 L	2 no. 240 L
Residential WSA Block C (Shared)	2 no. 1100 L	4 no. 1100 L	1 no. 240 L	2 no. 240 L
Residential WSA Block H (Shared)	2 no. 1100 L	4 no. 1100 L	1 no. 240 L	2 no. 240 L
Residential WSA Block K (Shared)	2 no. 1100 L	4 no. 1100 L	1 no. 240 L	2 no. 240 L
Maisonette / House WSA (Individual)	1 no. 240 L	1 no. 240 L	Bottle Bank	1 no. 120 L
Retail WSA Block H (Shared)	3 no. 1100 L	5 no. 1100 L	1 no. 240 L	4 no. 240 L
Crèche WSA (Shared)	3 no. 1100 L	5 no. 1100 L	1 no. 240 L	4 no. 240 L

Table 12-2 Bin Requirements

Note: 1 = Mixed Non-Recyclables

2 = Dry Mixed Recyclables

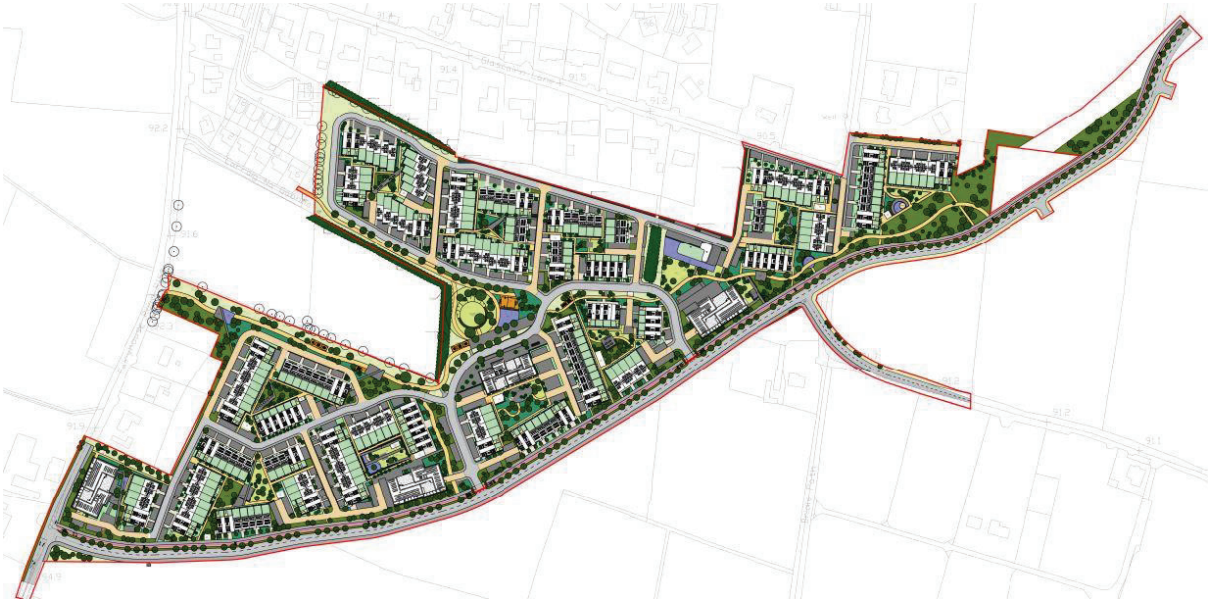

Figure 12-2 Site Layout

12.1.4 Aspects Relevant to this Chapter

The activities associated with the project which have the potential for impact are detailed in Table12.3

Phase	Activity	Description
Construction	Demolition of existing boundary structures	Run-off percolating to the ground at the construction site.
	Earthworks: Excavation of Superficial Deposits	Limited excavation will take place at the Site for the provision of building foundations and the installation of services.
	Storage of Hazardous Material	Fuel for re-fuelling on-site machines and chemical storage (such as for concrete curing) during the construction phase.
	Import/Export of Materials	All suitable surplus subsoil, if any exists, will be exported for reuse off-Site to a reuse site subject to the requirements under the Waste Management Act (e.g., Article 27 or 28). Where material cannot be reused, it will be recovered or disposed of by the Waste Hierarchy and Waste Management Act. Limited excavation will take place at the Site for the provision of building foundations, installation of services, and construction of roads. Aggregates will be required for sub-base under roads and buildings. All sub-base materials must meet the relevant engineering

		specifications. The use of recycled or secondary aggregates should be considered as a replacement for primary aggregates.
Construction and Operation	Construction of sub-surface structures	Excavations will be undertaken to facilitate the implementation of services. It is not considered that the construction at the required depths will impede groundwater flow.
	Infilling	A degree of fill will occur during the works which will require the importation of concrete, 6F2 stone, topsoil, and class 2 material. Construction materials that contain recycled/recovered content should be considered as part of the procurement stage.
Operation /Unplanned Events	Operational Waste Storage and Collection	All waste stored and presented for collection will do so in a manner consistent with the 2018 MCC Waste Management Byelaws.
	Storage of hazardous materials	No fuel oil storage is required for the operational phase. All heating will be provided by air to water heat exchangers or similarly efficient systems.

Table 12-3 Aspects

12.2 Methodology

12.2.1 Approach

The assessment of waste is a desktop study, to identify properties, and the generation of waste materials that may arise from the Proposed Development and consultation with Local Authorities and the relevant utility providers. The assessment followed a phased approach as outlined in Chapter 4.4 of the Environmental Protection Authority's (**EPA**) *Guidelines on Information to be contained in Environmental Impact Assessment Reports* (EPA, 2022).

An initial assessment was carried out which defined the Proposed Development in terms of location, type and scale; established the baseline conditions; established the type of wastes on-site and generated during the Operational Phase; established the activities associated with the Proposed Development and initial assessment and impact determination. This assessment identified any likely Source-Pathway-Receptor (**SPR**) linkages relating to the site of the Proposed Development.

The information sources that were utilised to establish the baseline conditions for the Site and all available information was compiled in accordance with:

- *Guidelines on Information to be contained in Environmental Impact Assessment Reports* (EPA, 2022);
- Advice Notes for preparing Environmental Impact Statements DRAFT (EPA, September 2015);
- Guidelines on information to be contained in Environmental Impact Statements (EPA, 2002);
- Advice Notes on Current Practice in the preparation of Environmental Impact Statements (EPA, 2003);
- The classification of impacts / effects in this Chapter follows the definitions provided in the Guidelines (EPA, 2022);

- Guidelines *for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (Department of the Environment, Community and Local Government, 2013);
- *Additional* guidance and EIA definitions are contained in NRA Guidelines (NRA, 2009).
- The *Construction* and Demolition Waste Management Plan for the Proposed Development (OCSC);
- Protection *of* the Environment Act 2003 as amended;
- The Construction Environmental Management Plan (**CEMP**) for the Proposed *Development* incorporating the Operational Phase Waste Management Plan (**OWMP**) for the Proposed Development;
- *The Eastern Midlands (**EMR**) Waste Management Plan (WMP) 2015-2021*; (EMRWMP 2015-2021)
- EPA *National* Waste (Database) Reports;
- *The Meath County Development Plan* (**DCDP**) 2021-2027;
- Waste *Management* Act 1996 (No. 10 of 1996) as amended 2001 (No. 36 of 2001), 2003 (No. 27 of 2003) and 2011 (No. 20 of 2011) Sub-ordinate and associated legislation;
- *Environmental* Protection Act 1992 (S.I. No. 7 of 1992) as amended;
- Litter Pollution Act 1997 (Act No. 12 of 1997) as amended and Planning, and *Development* Act 2000 (S.I. No. 30 of 2000) as amended;
- *EPA* 'Waste Classification – *List of Waste & Determining if Waste is Hazardous or Non-Hazardous';*
- *BS5906*:2005 Waste Management in Buildings – Code of Practice; and
- *DEHLG*, *Sustainable* Urban Housing: *Design Standards for New Apartments, Guidelines for Planning Authorities (2018)*.
- *Meath County Council Waste Management (Storage, Presentation and Segregation of Household and Commercial Waste) Byelaws (2018)*

Additional information was obtained from the following sources:

- *Department* of the Environment, Community & Local Government, (**DECLG**);
- *EPA*; and
- *Irish Waste* Management Association (**IWMA**).

Quality	Definition
Positive Effects	A change which improves the quality of the environment
Neutral Effects	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
Negative / adverse Effects	A change which reduces the quality of the environment

Table 12-4 Definition of Quality Effects

In line with the EPA Guidelines (EPA, 2022), the following terms are defined when quantifying the significance of impacts, see Table 12-5 below.

Significance	Definition
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 baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters 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.

Table 12-5 Definition of Significance of Effects

In line with the EPA Guidelines (EPA, 2022), the following terms are defined when quantifying duration and frequency of effects, see Table 12-6 below.

Quality	Definition
Momentary Effects	Effects lasting from seconds to minutes
Brief Effects	Effects lasting less than a day
Temporary Effects	Effects lasting less than a year
Short-term Effects	Effects lasting one to seven years

Medium-term Effects	Effects lasting seven to fifteen years
Long-term Effects	Effects lasting fifteen to sixty years
Permanent Effects	Effects lasting over sixty years
Reversible Effects	Effects that can be undone, for example through remediation or restoration

Table 12-6 Definition of Duration of Effects

12.2.1.1 Assumptions and Limitations

The description of existing conditions is based on the available desktop study (May 2019) and on current available public service records information as well as site walks in April 2022 and October 2021. Given the site history and site activities it is not envisaged that any significant contaminated ground (including contaminated waste) exists within the site of the Proposed Development.

12.3 The Existing Receiving Environment

12.3.1 Sourcing Baseline Information

The site of the Proposed Development is in the Local Authority area of Meath County Councill (MCC). The receiving environment in the MCC area is governed by the requirements set out in the Eastern-Midlands Region Waste Management Plan 2015-2021 (EMRWMP 2015-2021) (EMWRO 2015). The EMRWMP 2015-2021 provides a framework for the prevention and management of waste in a sustainable manner in 12 local authority areas.

Details of waste collection permits (granted, pending and withdrawn) for the region are available from the National Waste Collection Permit Office (**NWCPO**).

12.3.2 Topography and Setting

The site is currently greenfield and used for agricultural purposes and can be accessed from Glascarn Lane to the east and Fairyhouse Road to the west of the site.

Ground levels across the site fall generally from south-west to north-east towards Glascarn Lane. Levels along the public road forming the south-western boundary of the site are approximately 93.5 mAOD and these fall to approximately 90.5 mAOD along the north-eastern boundaries of the site. There are two local high points of 92.8 mAOD in a small area in the centre of the site surrounded by a plateau area at 92.8 mAOD. A detailed topographical survey has been carried out of the site and this has informed the EIAR and design. The general site topography can be seen on Figure 12.3.

12.3.3 Receiving Environment

Figure 12-3 Existing Site Levels

The site is bound by the R155 to the west, existing and in construction residential development to the north and northeast and the newly proposed completion of the Ratoath Outer Relief Road will form a boundary to the existing agricultural land (zoned for masterplan) to the south.

12.3.4 Receiving Environment

There are three no. municipal solid waste landfills in currently in operation in Leinster and all are operated by the private sector. There are two no. existing thermal treatment facilities, one in Duleek, Co. Meath and a second facility in Poolbeg in Dublin.

There is several other licensed and permitted facilities in operation in the region including waste transfer stations, hazardous waste facilities, soil waste and integrated waste management facilities.

The MCC Bring Centre is in the Mullaghboy Industrial Estate, Navan located c. 22.km northwest of the site. There is also a bring bank located c. 2.23km northeast of the proposed development at Raystown Industrial Estate, Ratoath, where glass and aluminium cans can be deposited.

12.4 Predicted Impacts

12.4.1 Construction Phase

Most of the waste arising during the Construction Phase will comprise soil and stone material associated with basement, foundations and the surface water outfall route. There will be some construction waste associated with the tying in of the proposed services and road to their respective networks as shown on the drawings, noting specifically the tie-in to the existing R155, the tie-in to the RORR and the foul and potable water connections.

Preliminary site investigations indicate that the material to be excavated is clean inert material (waste that does not undergo any significant physical, chemical or biological transformations) which may be suitable for off-site reuse.

The waste streams that will be generated by Construction and Demolition (**C&D**) activities are as follows. It is noted that all materials will be segregated in line with the below classifications:

- Soil, stones (52,628m^3)
- Concrete; bricks; tiles and ceramics (5t)
- Wood, glass and plastics (10t)
- Bituminous mixtures, coal tar and tarred products (160m^3)
- Metals (including their alloys) (10t)
- Insulation materials and asbestos-containing materials (1t)
- Gypsum-based construction material. (1t)

These wastes are as defined in the Construction and Demolition Waste Management Plan **(CDWMP**). As set out inter alia in the CEMP incorporating the CDWMP all waste generated during the Construction Phase process will be segregated and removed off site. As there is limited space available on the Site there will not be any accumulations of waste. Wastes will be removed from the Site on a regular basis as managed by the appointed Contractor. A waste storage and collection area will be segregated on site in line with the specimen example in the overleaf schematic Fig 12.2.4. Where appropriate waste will be taken off site in a mixed format and be segregated in a waste segregation yard. There will be a slight, negative and short-term impact. Note the impact of transportation during the Construction Phase has been considered and is dealt with in Section 12.1 (Traffic) of this EIAR.

It is noted that there will be small amounts of domestic waste generated by workers present on the site during the construction phase. This will be managed in accordance with the DCC byelaws on waste and in accordance with the principles set out in the CEMP and OWMP. All wastes generated from the work force on site will be managed and disposed of in accordance with the principles of segregation and will be removed from site by a provider with appropriate licensing.

Figure 12-4: Location of Waste Facilities within Proximity of the Site (Source: EPA)

12.4.2 Operational Phase

There are several elements associated with the Operational Phase of the Proposed Development which have the potential to impact on the environment with respect to waste.

The typical wastes that will be generated during the Operational Phase of the Proposed Development will include the following:

- Dry Mixed Recyclables (**DMR**) - includes wastepaper (including newspapers, magazines, brochures, catalogues, leaflets), cardboard and plastic packaging, metal cans, plastic bottles, aluminium cans, tins and Tetra Pak cartons. These materials could potentially catch fire, and this would be a significant local effect with a short-term impact. Mitigation noted in Mitigation Section.

- Organic waste – food waste and green waste generated from internal plants / flowers. These materials could attract vermin if it is not appropriately stored, and the stores maintained. Mitigation noted in Mitigation Section.

- Glass: No significant environmental concerns have been identified for the storage of domestic glass waste at the Proposed Development.

- Mixed Non-Recyclable (**MNR**) / General Waste. These materials could attract vermin if it is not appropriately stored, and the stores maintained. Mitigation noted in Mitigation Section.

The estimated waste generation in cubic metres per week is contained in the Table 12-11 below.

Area/Use	Waste Volume (m^3 / week)				
	MNR[1]	DMR[2]	Glass	Organic	**TOTAL**
Residential Block A (Combined)	0.51	3.65	0.1	1.92	**6.18**
Residential Block C (Combined)	0.51	3.65	0.1	1.92	**6.18**
Residential Block H (Combined)	0.51	3.65	0.1	1.92	**6.18**
Residential Block K (Combined)	0.51	3.65	0.1	1.92	**6.18**
Maisonette – 1 Bed (Individual)	0.01	0.08	0.0	0.05	**0.14**
Maisonette / House – 3 Bed (Individual)	0.02	0.13	0.0	0.08	**0.23**
Retail Units (Combined)	0.17	3.34	0.1	1.39	**5.00**
Crèche WSA (Shared)	0.05	1.68	0.01	0.92	**2.65**

Table 12-7 Operational Waste Volumes

In addition to the typical waste materials that will be generated at the Proposed Development daily, there will be some additional waste types generated in small quantities which will need to be managed separately including:

- Green / garden waste may be generated from internal plants or external landscaping;
- Batteries (both hazardous and non-hazardous);
- Waste electrical and electronic equipment (**WEEE**) (both hazardous and non-hazardous);
- Printer cartridges / toners;
- Chemicals (paints, adhesives, resins, detergents, etc.); and
- Light bulbs (Fluorescent Tubes, Long Life, LED and Filament bulbs).

Further details in relation to the waste management can be found in the Operational Waste Management Plan (**OWMP**). This has been prepared by AWN Consulting Ltd. specifically for the Proposed Development.

12.5 Potential Cumulative Impact

The cumulative impacts consider the combined effects of the proposed development and other proposed projects in the surrounding area. Cumulative impacts occur as a result of actions taking place in the same area and within the same timeframe as the proposed development.

This cumulative assessment assumes that the following extant planning permissions will be completed:

- (MCC reg. ref. RA150993) for a housing development (128 dwellings) and ancillary works including the construction of a portion of an Outer Relief Road at Jamestown, Ratoath & Tankardstown Townlands situated approximately 0.62km northeast of the Site.
- (MCC reg. ref. SHD0009/20) for an amendment to the link road junction accessing Ratoath College on that portion of the Ratoath Outer Relief Road as approved under planning permission Ref. No. PL17.247003/ RA150993. The amendment a proposed seeks to modify the approved but not yet constructed roundabout to now be a T-junction, including all associated ancillary site development works, all within the townlands of Jamestown, Ratoath, and Tankardstown and situated approximately 0.62km northeast of the Site.
- (MCC reg. ref. RA160101) for the demolition 3 no. detached houses and development of 19 new homes and associated site development works at The Milk Tree, Ratoath situated approximately 0.9km north of the Site.
- (MCC reg. ref. DA101258) for the change of house type from that previously granted under Register Reference No. DA/50537 to 3 No., three bed, detached dwellings and all associated site development works at Fox Lodge, Ratoath situated approximately 1.2km north of the Site
- (MCC reg. ref. DA120765) for the extension of duration of planning permission Ref. No. DA/70037 - housing development (286 dwellings) and ancillary site development works from that previously granted under Register Reference No. DA/50537 to 3 No., three bed, detached dwellings and all associated site development works at Jamestown, Raystown, and Tankardstown, Ratoath situated approximately 0.5km northeast of the Site.
- MCC reg. ref. 3051965) for the development comprising of 228 No. Residential Units, a childcare facility and all other ancillary site development works at Jamestown, Ratoath situated 0.6km northeast of the Site.

The residual impact from these developments on was determined to be negative, imperceptible, and permanent.

12.6 Do Nothing Scenario

12.6.1 Do Nothing Scenario of Predicted Impacts

In the 'Do Nothing' scenario, if the construction of the development at the Ratoath site does not take place, the existing baseline conditions will remain within the subject site and there would be no resulting additional impacts on resource and waste management.

12.6.2 6.6.2. 'Do Nothing' Scenario for Human Health

A ‘do-nothing’ scenario is not considered valid as the lands are currently zoned as A2 - New Residential - under Meath County Councils Development Plan 2021-2027. However, if a do-nothing scenario were to occur, the lands would not be developed, and there would be no adverse impacts to human health. If the proposed project does not proceed, the lands would remain in their current condition in the short-term or until alternative development proposals are granted planning permission.

12.6.3 'Do Nothing' Scenario of Residual Impacts

If the development does not progress, there would be no resulting additional impacts on the environment in the area of the project site from a resource and waste management perspective.

12.7 Risks to Human Health

The new development will provide new housing for both the locals and in line with the expected rise in the Irish population. No potential significant impacts on human health are predicted.

12.7.1 Construction Phase Risks

Construction phase risks to human health are primarily associated with the accidents associated with handling and transporting earthworks and wastes. However, control measures undertaken during the site development will be implemented to ensure that handling and transportation occurs in accordance with a managed and planned manner controlled by a Project Supervisor Construction Stage.

12.7.2 Operation Phase Risks

No operational phase risks to human health are anticipated. All the development will be appropriately supplied with bins suitable for the end users and a collection regime will occur in line with the requirements of the MCC Byelaws on Waste Collection (2018).

12.8 Mitigation Measures

12.8.1 Construction Phase

As outlined in the OCEMP for the Site, it is proposed to ensure the highest possible levels of waste reduction, waste reuse and waste recycling are achieved for the Proposed Development. Specifically, the OCEMP aims to achieve waste prevention, maximum recycling and recovery of waste. The plan has as a central tenet, the diversion of waste from landfill wherever possible.

The OCEMP describes the applicable legal and policy framework for C&D waste management in Ireland (both nationally and regionally), it also estimates the category and quantity of waste generated by the Proposed Development and makes recommendations for the bespoke management of the various waste streams. The OCEMP also provides guidance on collection and transport of waste to prevent issues associated with litter or more serious environmental pollution (e.g., contamination of soil or water resources).

Any soil removed off-site will be carried out by contractors licensed under the Waste Management Acts 1996 - 2008, the Waste Management (Collection Permit) Regulations 2007 and Amendments and the Waste Management (Facility Permit & Registration) Regulations 2007 and Amendments.

It will be the role of an appointed Waste Manager to try to find alternative options for demolition waste before sending it to landfill. It is preferable, where possible, to retain the soil on site for reuse rate than soil leaving the Site. Some wastes may be transported to another site for reuse on that site. All waste will be documented prior to leaving the Site. Waste will be weighed by the contractor, either by weighing mechanism on the truck or at the receiving facility.

The Waste Manager will be in contact with other sites to ensure that as much waste is reused as possible, such as concrete for fill purposes etc. All wastes leaving the Site will be placed in appropriate containers. Any concrete, soil, gravel, or broken stone transported off site will be covered to prevent dust or particle emissions from the load.

12.8.2 Operational Phase

The typical wastes that will be generated during the Operational Phase of the Proposed Development will include the following:

- Dry Mixed Recyclables (**DMR**) - These materials could potentially catch fire, and this would be a significant local effect with a short-term impact. This is mitigated by the risk being considered by the Fire consultant in the production of their strategy for the scheme.

- Organic waste – These materials could attract vermin if it is not appropriately stored, and the stores maintained. As mitigation there will be appropriately designed and managed WCAs for all common waste areas in the development.

- Glass – No significant environmental concerns have been identified for the storage of domestic glass waste at the Proposed Development.

- Mixed Non-Recyclable (**MNR**) / General Waste – These materials could attract vermin if it is not appropriately stored, and the stores maintained. As mitigation there will be appropriately designed and managed WCAs for all common waste areas in the development.

More detail is provided in the Operational Waste & Storage Management Plan prepared by AWN Consulting Limited and included with the submission.

Alternative Designs Considered

There have been no other alternative designs considered for waste as all proposed designs are constrained by existing infrastructure and to be implemented as directed by local service providers and the local authority in accordance with best practice and local byelaws.

12.9 Residual Impacts

12.9.1 Construction Stage

It is considered that once the mitigation measures discussed above are employed, there will be a slight negative imperceptible, permanent impact since the development will require some material to be taken on-site to an appropriate waste facility. However, it is noted that the lands are zoned for residential and as such an alternative development would be provided for on the subject site in the future.

12.9.2 Operational Stage

It is considered that once the mitigation measures discussed above are employed, there will not be residual impacts on the environment in relation to waste as a result of the Proposed Development. The residual impact is assessed to be a slight negative, imperceptible, permanent impact.

12.10 Monitoring

A OCEMP has been prepared in advance of any works starting on site. The appointed Contractor will author a Construction Environmental Management Plan (CEMP) document considering their approach and any additional requirements of the Design Team or Planning Regulator and the measures set out in the OCEMP. The Contractor will also update the CEMP prior to that start and through the construction process.

The CEMP sets out the overarching strategy for ensuring that construction of the Proposed Development will be managed in a safe and organised manner by the Contractor with the oversight of the Developer. The CEMP is a living document, and it will go through several iterations before works commence and during the works. It will set out requirements and standards which must be met during the Construction Phase and will include the relevant mitigation measures outlined in this EIAR and any

subsequent conditions relevant to the Proposed Development. The OCEMP and the OCDWMP are included in the planning application submission. Monitoring shall be carried out for compliance with these plans.

12.10.1 Interactions

These impacts also relate to and interact with other Chapters within the EIAR such as:

- Chapter 4, Population & Human Health
  - The proper management of wastes during construction stage and operation phase is required to ensure that waste does not pose a hazard to human health. This has been considered in the mitigation measures outlined above.
- Chapter 5, Biodiversity: Flora and Fauna
  - The proper management of wastes during construction stage and operation phase is required to ensure that waste does not pose a hazard to flora and fauna. This has been considered in the mitigation measures outlined above.
- Chapter 6, Lands, Soils & Geology
  - The excavation and removal of soil is also discussed in the Land, Soils and Geology chapter.
- Chapter 7, Hydrology, Water and Hydrogeology
  - The management of runoff during the construction phase is also discussed in this chapter.
- Chapter 8, Air Quality & Climate
  - The management of dust during the construction phase in accordance with the OCEMP will be an interaction with this chapter.
- Chapter 9, Noise and Vibration
  - The Management of construction stage noise is dealt with in the OCEMP.
- Chapter 11, Materials Assets (Transportation)
  - The management of the removal of waste from the site has been considered in the Materials Assets Transportation chapter.
- Chapter 13, Cultural, Archaeological and Architectural Heritage
  - The discovery of archaeological finds can take place during earthworks.

12.11 Difficulties Encountered

No exceptional difficulties were experienced in compiling this EIAR.

12.12 References

Waste Management Act 1996 (S.I. No. 10 of 1996) as amended 2001 (S.I. No. 36 of

2001), 2003 (S.I. No. 27 of 2003) and 2011 (S.I. No. 20 of 2011). Sub-ordinate and associated legislation;

Environmental Protection Act 1992 (Act No. 7 of 1992) as amended;

Litter Pollution Act 1997 (Act No. 12 of 1997) as amended;

Eastern-Midlands Waste Region, Eastern-Midlands Region (EMR) *Waste Management Plan 2015 – 2021* (2015);

Meath County Council (DCC) Dublin City Council (Storage, Presentation and Segregation of Household and Commercial Waste) Byelaws (2018);

Department of Environment and Local Government (DoELG) Waste Management – Changing *Our Ways, A Policy Statement* (1998);

Department of Environment, Heritage and Local Government (DoEHLG) *Preventing and Recycling Waste - Delivering Change* (2002);

DoELG, *Making Ireland's Development Sustainable – Review, Assessment and Future Action* (World Summit on Sustainable Development) (2002);

DoEHLG, *Taking Stock and Moving Forward* (2004);

DoECLG, *A Resource Opportunity - Waste Management Policy in Ireland* (2012);

Environmental Protection Agency (EPA), National Waste Database Reports 1998 – 2012;

MCC, Meath County *Development Plan 2021 – 2027* (2016) Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended 2010 (S.I. No. 30 of 2010) and 2015 (S.I. No. 310 of 2015);

European Waste Catalogue - Council Decision 94/3/EC (as per Council Directive 75/442/EC);

Hazardous Waste List - Council Decision 94/904/EC (as per Council Directive 91/689/EEC);

EPA, European Waste Catalogue and Hazardous Waste List (2002);

EPA, Waste Classification – List of Waste & Determining if Waste is Hazardous or

Non-Hazardous (2015);

BS 5906:2005 Waste Management in Buildings – Code of Practice;

DoEHLG, *Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities* (2018).

13. Cultural Heritage

13.1 Introduction

This chapter presents the findings of an archaeological and cultural heritage impact assessment on the site of the proposed development on lands at Ratoath, Co. Meath (ITM 701928, 750512; Figure 13.1). The main purpose of this section is to assess the impact of the proposed development on the existing archaeological and cultural heritage environment.

The site was subject to a number of archaeological assessments (Figure 13.4, Figure 13.5) carried out in relation to the site, both invasive and non-invasive. These include Geophysical Survey (20R0026; Russell, Breen, 2020), test trenching (21E0511; Cosgrove, 2021) and Archaeological Assessment (Lyne, 2021)

This chapter encompasses the results of all archaeological investigations undertaken in order to assess the site and allow appropriate mitigation measures to be employed.

The proposals for the site comprise of a residential development, the Ratoath South SHD located on the lands immediately to the south of the existing built area of Ratoath in County Meath. A full project description is presented in Chapter 1 of this EIAR.

This chapter has been carried out by Donald Murphy and Magda Lyne of Archaeological Consultancy Services Unit Ltd. Donald holds a Master's Degree in Archaeology from University College Dublin (NFQ Level 9). He is a Member of the Institute of Archaeologists of Ireland. Donald is the founder and Managing Director of Archaeological Consultancy Services Unit Ltd. He has over 30 years post-graduation experience carrying out Environmental Impact Assessments, archaeological assessments and excavations. He has also completed excavations on behalf of the National Monuments Service at Knowth, the Hill of Tara, Clonmacnoise, Mellifont Abbey and Newgrange. As Project Manager/Senior Archaeologist, Donald has managed the archaeological aspect of some of the largest infrastructural schemes undertaken in Ireland, including road projects such as the N52 Nenagh Bypass Link Road (2000); M1 Northern Motorway Project (2001–2002); N22 Ballincollig Bypass (2001); M4 Kinnegad–Enfield–Kilcock Motorway (2001–2004); N25 Waterford Bypass (2003–2007); M3 Clonee to North of Kells Motorway (2005–2010); M7/M8 Motorway (2005–2008) and the N5 Westport to Turlough Road Scheme (2015–2020).

Magda holds a Master's Degree in Archaeology from the University of Adam Mickiewicz in Poznan, Poland (NFQ Level 9). She is a member of the Institute of Archaeologists of Ireland and is excavation licence eligible since 2019. She has over 12 years of post-graduation experience working in Poland, Ireland, Denmark and Norway. She excavated sites on a variety of large scale infrastructure projects (e.g. M3, N9/10, N18 and N22 road projects in Ireland, Copenhagen Metro Project, Kriegers Flak Project in Denmark). She has worked with ACSU since 2019 and specialises in archaeological desktop assessments and Environmental Impact Assessment Reports

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13.2 Assessment Methodology

13.3 Documentary Sources

For the purposes of this report, archaeology, architectural and cultural heritage is considered to include the following elements:

- Sites listed in the Sites and Monuments Record (SMR)
- Record of Monuments and Places (RMP)
- National Monuments in State Care
- Topographical files of the National Museum of Ireland
- Archaeological sites listed on the National Monuments Service website
- Cartographic sources and Aerial Imagery

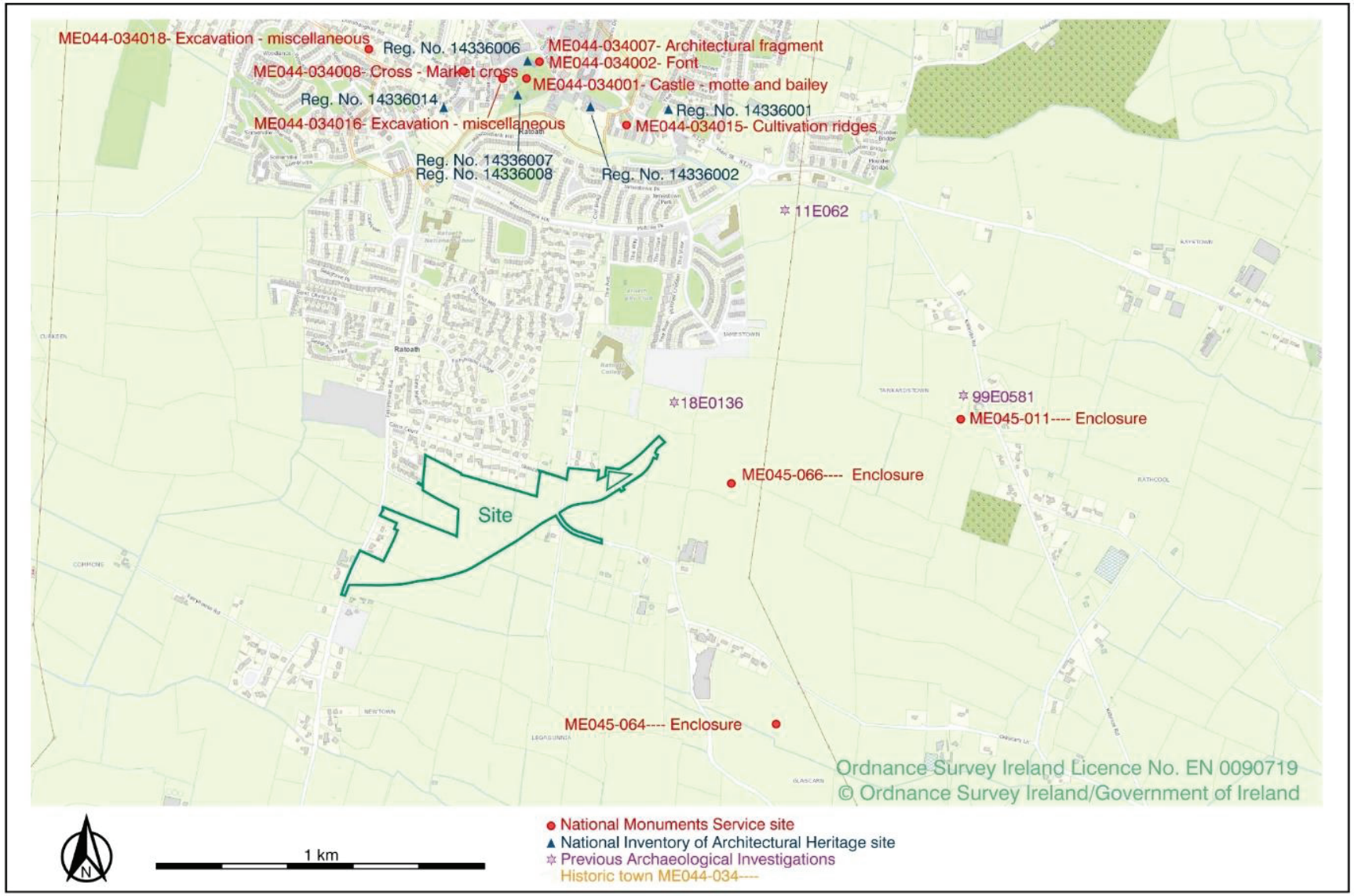

Figure 13.1: Location of site and nearby Recorded Monuments, Excavations, Protected Structures, National Inventory of Architectural Heritage sites.

Figure 13.2: Extract from Down Survey map of County Meath, Barony of Ratoath (1654–56), showing approximate location of site.

- Sites reported in the Excavations Database
- Tangible Cultural Heritage Sites and Features
- A list of protected monuments
- List of architectural heritage structures – the National Inventory of Architectural Heritage (NIAH)
- List of protected structures (Meath County Development Plan 2021-2027)
- Reports on archaeological assessment of the site carried out to date
- Irish placename database
- Traditions or historical figures associated with the site.

Sites and Monuments Record (SMR) and Record of Monuments and Places (RMP)

A primary cartographic source for baseline data for the assessment was the consultation of the Sites and Monuments Record (SMR) and Record of Monuments and Places (RMP) for County Meath (Figure 13.1). All known recorded archaeological monuments are indicated on 6-inch Ordnance Survey (OS) maps and are listed in this record. The SMR/RMP is not a complete record of all monuments as newly discovered sites may not appear in the list or accompanying maps. In conjunction with the consultation of the SMR and RMP the electronic database of recorded monuments which may be accessed on the National Monuments Service website (www.archaeology.ie), was also consulted.

National monuments in State Care Database

List of National Monuments in state care, including in the ownership/guardianship of the Minister for Housing, Local Government and Heritage.

National Monuments in the ownership/guardianship of the Minister for Housing, Local Government and Heritage are listed on the Department's website by county (www.archaeology.ie/national-monuments/search-by-county). The list for County Meath was reviewed.

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.

Excavation Database

The excavations database (www.excavations.ie) is an annual account of all excavations carried out under license. The database includes excavations from 1970 to the present. This database was consulted as part of the desktop research for this assessment to establish if any archaeological excavations had been carried out on or near to the proposed development area.

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 from the 1920s. While many of these find spots are not recorded monuments, they can provide an indication of archaeological activity in a townland and consequently add to the archaeological potential of an area.

Cartographic sources and aerial imagery

A number of cartographic sources were also consulted as part of the assessment, namely the Down Survey map of County Meath, Barony and Parish of Ratoath (1654–56), Taylor and Skinner's Maps of 1777, the first (1835) and second edition (1909) OS maps.

Potential archaeological or cultural heritage features are marked on such maps and provide a useful resource in identifying sites particularly if they no longer have any above-ground remains.

Aerial photographs dating between 1995 and 2013 from the Ordnance Survey of Ireland and in addition, Google Earth imagery dating between 2009 and 2022 were examined.

Unrecorded archaeological sites can often be identified in aerial photographs as cropmarks or differential growth in a field.

Tangible Cultural Heritage Sites and Features

Cultural heritage is a broad term encompassing aspects of archaeology as well as architecture. Both elements can be expressed in landscape and can relate to designated landscapes, historic places, monuments, and settlements, including buildings and structures.

Townland boundaries are considered tangible cultural heritage features. The townland system is of Gaelic origin, pre-dating the Norman invasion, and many townlands have names of Irish Gaelic origin. Some townland names and boundaries, however, come from Norman manors, plantation divisions, or later creations of the Ordnance Survey when many Irish names were translated into English. The confiscations of the mid-17th century saw the townland boundaries first recorded and described in the surveys. The townland boundaries were first depicted on the Down Survey Map of 1656-58, and the work of the Ordnance Survey saw them depicted on the mapping in more detail. Townland boundaries recorded for the first edition Ordnance Survey mapping of the nineteenth century were then utilised as formal administrative units for the census and as the basic framework for Griffith's Valuation. These are often laid along wet ditches, rivers, streams, roads, walls or topographical features. The boundaries can take a variety of forms and may consist of hedgerows and/or trees, earthen and stone banks, and/or ditches, stone walls.

Protected Structures

The Meath County Development Plan 2021-2027 was consulted as it contains the list of Architectural Conservation Areas and the Record of Protected Structures. These contain a list of Architectural Conservation Areas and a Record of Protected Structures for the County. The Record of Protected Structures lists cultural heritage sites, buildings of historic, architectural, -cultural, scientific and/or artistic interest (https://consult.meath.ie/en/system/files/materials/7447/Appendix%206%20%20-Record%20of%20Protected%20Structures.pdf).

These are protected by the Planning and Development Act 2000 (Part IV Architectural Heritage).

Architectural Heritage Sites

The National Inventory of Architectural Heritage (NIAH) (www.buildingsofireland.ie) database for Meath was consulted.

The National Inventory of Architectural Heritage for County Meath was consulted to determine if any architectural heritage sites were present within the proposed development site. It contains a record and evaluation of the post-1700 architectural heritage of Ireland as an aid in the protection and conservation of the built heritage. It provides the basis for recommendations of the Minister for Housing, Local Government and Heritage to the planning authorities for the inclusion of particular structures in their Record of Protected Structures (RPS).

Archaeological Assessment 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:

- Report on Geophysical Survey of lands at Jamestown, Commons, Newtown, Legagunnia, Ratoath, Co. Meath (Licence Number 20R0026) (by ACSU (Russell, Breen, 2020);

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 (in this case Licence Number 20R0026 was granted on the 29th of January 2020 to Ian Russell). 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 (in this case, the report was submitted in April 2020).

- Archaeological Assessment (Test Trenching) at Commons, Ratoath, Co. Meath (21E0511) (Licence Number 21E0511) by ACSU (Cosgrove, 2021);

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 (IN THIS CASE LICENCE NUMBER 21E0511 WAS GRANTED ON THE 29TH OF JULY 2021 TO CAROLINE COSGROVE). 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 (IN THIS CASE, THE REPORT WAS SUBMITTED IN OCTOBER 2021).

- Archaeological Impact Assessment for a proposed Residential Development on lands at Jamestown and Commons, Ratoath, Co. Meath by ACSU (Lyne, 2021);

The Archaeological Assessment Report includes the results of non-intrusive desktop research and site inspection, with the results designed to identify at an early stage any potential constraints to the development and the impact that the proposal will have on the cultural heritage. It includes the results of all other assessments carried out to date (in this case the results of geophysical survey and test trenching carried out), and offers recommendations for the mitigation of any potential impacts.

Irish Placename Database

Irish Placename Database (https://www.logainm.ie/en/) was consulted for the meaning of the placenames within and surrounding the proposed development site. The 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. The vast majority 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 carried out largely in the 19th century and recorded in the Ordnance Survey's work.

Field Survey

In addition, and as a part of previously carried out assessments of the site, a field survey was carried out; its results are included in the Archaeological Assessment (Lyne, 2021). The purpose of the field

survey is to assess whether or not the site contained any evidence for the presence of any previously unrecorded areas or features of historical or archaeological significance.

13.3.1 Policies, Standards and Guidelines

This chapter has been prepared in compliance with all relevant EIAR legislation and guidance.

This chapter's methodology is guided by a legislative framework that governs how aspects of archaeological, cultural and architectural heritage are protected.

The management and protection of cultural heritage in Ireland is achieved through a framework of national laws and policies which are in accordance with the provisions of the Valetta Treaty (1995) (formally the European Convention on the Protection of the Archaeological Heritage, 1992) ratified by Ireland in 1997; the European Convention on the Protection of Architectural Heritage (Granada Convention, 1985), ratified by Ireland in 1997; and the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, 2003, ratified by Ireland in 2015. These three are the key international conventions aiming to protect cultural heritage. The provisions made in these have been transcribed into Irish law through the National Monuments Acts 1930-2014, the Heritage Act 1995, The Cultural Institutions Act 1997, the Architectural Heritage (National Inventory) and Historic Monuments (and its provisions) Act 1999 and Planning and Development Regulations 2000-2013. These legal frameworks and national policies combined are the primary means of governing how cultural heritage in Ireland is protected and managed.

Legislative protection afforded to the archaeological and architectural heritage resources is considered here and is defined by the statutory guidelines. The following is a list of standards and guidelines considered and consulted for the purpose of this chapter.

- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 2000;
- DAHGI (now DHLGH) (1999), Policy and Guidelines on Archaeological Excavation.
- Department of Arts Heritage and the Gaeltacht (DAHG) (now DHLGH) (2011), Architectural Heritage Protection Guidelines for Planning Authorities;
- Department of Arts, Heritage, Gaeltacht and Islands (DAHGI) (now DHLGH) (1999), Framework and Principles for the Protection of the Archaeological Heritage;
- Department of Housing, Planning and Local Government (now Department of Housing, Local Government and Heritage DHLGH) (2018) Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment;
- Directive 2014/52/EU;
- Directive 2011/92/EU;
- Environmental Protection Agency (EPA) (2017) Guidelines on the information to be contained in environmental impact assessment reports, (Draft);
- EPA (2015), Revised Guidelines on the information to be contained in Environmental Impact Statements, Draft September 2015;
- EPA (2015), Advice Notes for preparing Environmental Impact Statements Draft September 2015;
- EPA (2002), Guidelines on the information to be contained in Environmental Impact Statements;
- Joint ICOMOS – TICCIH Principles for the Conservation of Industrial Heritage Sites, Structures, Areas and Landscapes 2011;
- EPA (2003), Advice Notes on Current Practice (in preparation of Environmental Impact Statements);
- Local Government (Planning and Development) Act 2000 (as amended);
- National Monuments Act, as amended;
- National Roads Authority (now TII) (2006), Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes;
- NRA (now TII) (2006), Guidelines for the Assessment of Architectural Heritage Impacts of National Road Schemes;

- Planning and Development Act, 2000, as amended;
- Planning and Development Regulations 2001-2021;
- The Architectural Heritage and Historic Properties Act, 1999;
- The Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999;
- The Heritage Act, 1995
- The Heritage Council (2010), Proposals for Irelands Landscapes;
- The Heritage Council (2013), Historic Landscape Characterisation in Ireland: Best Practice Guidance;
- Transport Infrastructure Ireland (TII) (2021), Project Management Guidelines;

Policies in relation to Archaeological and Architectural Heritage are set out in Chapter 8, Cultural and Natural Heritage Strategy of the Meath County Development Plan 2021-2027. The Meath County Development Plan 2021-2027, contains a list of recorded archaeological monuments (sites listed in Record of Monuments and Places and Sites and Monuments Record), the Record of Protected Structures (RPS) for the county and a list of Architectural Conservation Areas (ACA).

Significance Criteria

The following significance criteria have been taken from Appendix 2 of the Guidelines for the Assessment of Archaeological Impact of National Road Schemes 2006. These guidelines are being currently revised, and the revisions were also consulted.

They are not presented in any ranking order and can be used to evaluate the significance of an archaeological site, monument or complex. They should not, however, be regarded as definitive but rather as an indicator that contributes to a wider judgment based on the individual circumstances of each feature.

Existing Status

The level of protection associated with a monument or complex is an important consideration.

Condition/Preservation

The survival of a monument's archaeological potential both above and below ground is an important consideration and should be assessed in relation to its present condition and surviving features. Well-preserved sites should be highlighted; this assessment can only be based on a field inspection.

Documentation/Historical Significance

The significance of a monument may be enhanced by the existence of records of previous investigations or contemporary documentation supported by written evidence or historic maps. Sites with a definite historical association or an example of a notable event or person should be highlighted.

Group Value

The value of a single monument may be greatly enhanced by its association with related contemporary monuments or with monuments from different periods indicating an extended time presence in any specific area. In some cases, it may be preferable to protect the complete group, including associated and adjacent land, rather than to protect isolated monuments within that group.

Rarity

The rarity of some monument types can be a central factor affecting response strategies for development, whatever the condition of the individual feature.

Visibility in Landscape

It is important to recognise sites that have a limited distribution. Monuments that are highly visible in the landscape have a heightened physical presence. The intervisibility between monuments may also be explored in this category.

Fragility/Vulnerability

It is important to assess the level of threat to archaeological monuments from erosion, natural degradation, agricultural activity, land clearance, neglect, careless treatment or development.

Amenity Value

The nature of the archaeological evidence cannot always be specified precisely, but it may still be possible to document reasons to justify the significance of the feature. This category relates to the probability of monuments producing material of archaeological significance as a result of future investigative work. Regard should be taken of the existing and potential amenity value of a monument.

Impact Characterisation

Cultural heritage sites (encompassing archaeological, architectural and cultural heritage) are a non-renewable resource and are commonly considered to be location receptive. Consequently, any change to their environment, including works associated with any development, have an impact on these if such are present within the site or in its immediate environs.

Three categories of predicted/potential impact include:

- Direct physical impact – any activities associated with the development that will cause direct damage; encountered mainly during the construction phase;
- Indirect physical impact – any activities associated with the development that will trigger damage;
- Impact on setting – changes to the environs of archaeological, architectural, and cultural heritage sites and features; for example visual, might be positive or negative; encountered at all stages.

In addition, two types of impacts are listed in the Environmental Protection Agency (EPA) (2017) Draft Guidelines on the information to be contained in environmental impact assessment reports:

- Indirect impacts are referred to as secondary impacts; these occur as a consequence of the project; in the Draft EPA (2017); these are defined as 'Impacts on the environment, which are not a direct result of the project, often produced away' from (the site) or as a result of a complex pathway.'
- Cumulative impacts – the addition of many minor or significant impacts (including other projects) to create larger, more significant impacts.

The quality of impacts of the proposed development on archaeological, architectural and cultural heritage can be described in terms of:

- Positive – a change that improves the quality of the cultural heritage environment (e.g. increasing amenity value of a site in terms of managed access, signage, presentation etc. or high-quality conservation/restoration and re-use of an otherwise vulnerable derelict structure).
- Neutral – no change or impacts that are imperceptible, within the normal bounds of variation for the cultural heritage environment.
- Negative – a change that reduces the quality of the cultural heritage resource (e.g. visual intrusion on the setting of an asset, physical intrusion on features/setting of a site etc.)

The significance of these can be described as imperceptible, not significant, slight, moderate, significant, very significant and profound. It necessitates an assessment of the value of Cultural Heritage Assets specified in ICOMOS 2011 as very high, high, medium, low and negligible.

13.4 Baseline Environment

The existing receiving environment is considered a baseline situation. Archaeology is considered here to include all recorded monuments listed in the Record of Monuments and Places (RMP), National Monuments (i.e. those in the ownership/guardianship of the state), previously unrecorded sites, sites reported in the Excavations Database if not included in the RMP and find spots or sites listed in the Topographical Files.

13.4.1 Archaeological and Historical Background

The proposed development extends across c. 14.166 hectares, incorporating land within the townlands of Jamestown and Commons in the Barony and Civil Parish of Ratoath. The site lies to the south of the town of Ratoath in County Meath,

Prehistoric period

The wider environs of the site are well represented in the archaeological record, containing evidence for some prehistoric, early medieval and medieval remains. For example, two ring-ditches were excavated c. 1km to the north (Licence no. 03E1781), ring-ditch (SMR No. ME044-043) identified as a cropmark on a 2018 aerial image lies c. 2.1km to the southeast of the site. Further examples are located to the southeast (ME045-013) and southwest (ME044-041) (see Figure 2). These monuments represent places of burial, ceremony and ritual practices that can date from the Neolithic to the Iron Age but also continue in use into the early medieval period. Towards the end of the Neolithic and the beginning of the Bronze Age, features known as 'barrows' emerged, and these can be defined as earthen or earth/stone construction mounds with a surrounding ditch or ditches, sometimes with a low external bank, typically less than 30 metres in diameter and most commonly associated with cremation burials (O'Sullivan and Downey 2012). In 2002, in advance of the gas pipeline works from North Dublin to Limerick, ring-ditches/barrows were excavated at Flemingtown, Co. Meath, Dalystown 1, Co. Westmeath, Knockuregare, Co. Limerick and Rath, Co. Dublin (Grogan et al. 2007). All of these sites had substantial ditches, the largest having an external diameter of 38.75m. The excavations provide evidence for this type of funerary site occurring throughout the Bronze Age (2450–800 BC) and highlighted the significance of liminal space for death and burial in the form of ceremonial enclosures. McGarry (2009) states that of all the barrows excavated in Ireland, about half of them have produced the remains of a single person, most commonly found under the mound and central to the barrow. Almost all sites, however, produce cremated human remains spread throughout the fill of the barrow ditches. This can be seen at sites such as Ballybeen, Co. Antrim (Mallory 1984) and Ballydribbeen, Co. Kerry (Dunne 2003). Another interesting feature of barrows is the presence or absence of an 'entrance' or break in the ditch. This feature provided a causeway into the monument. Entrances are present in a number of ring-ditches and ring-barrows, and although the entrance may be orientated in any direction, there is a clear preference for them facing either east or southeast. However, it must be noted that there are also many instances where entrances are not present, such as Donacarney, Co. Meath (Stirland 2017). In 2003, two ring-ditches excavated to the north of the site in advance of a large-scale residential development were set c. 5.5m apart, with one measuring 15m in internal diameter and the other 6m (Licence no. 03E1781; Wallace 2003a). The fragmentary remains of one cremation burial were identified in the fill of one ditch, but the other did not contain any burial evidence.

Some burnt pits and spreads/fulachtaí fia located to the north of the site were also discovered as a result of archaeological assessments (Licence nos 03E1300, 03E1632, 03E1781). Fulachtaí fia comprise the most commonly discovered evidence for prehistoric settlement across Ireland and represent the use of pyrolithic technology to boil water, with those noted in close proximity to a trough generally interpreted as cooking/industrial sites (Hawkes 2018). These sites generally consist of a low mound of charcoal-enriched soil mixed with an abundance of heat-shattered stones, commonly forming a horseshoe shape in proximity to a trough, and are found in low-lying marshy areas or close to streams. Often these sites have been ploughed out and survive as a spread of heat-shattered stones in charcoal-rich soil with no surface expression. Field systems are also recorded in the environs of the site, such as that in Warrenstown to the southwest (ME044-024), and these features can also date from Neolithic times onwards, although they are more likely to be early medieval or medieval in date. Artefacts

recorded by the National Museum of Ireland also demonstrate prehistoric occupation of the area, such as a fragment of a stone axehead (E551:1294) found in Grange townland, which probably represents Neolithic activity, and an unusual funerary vessel (NMI X192), described as a double 'sepulchral vessel', found in 1864 in a cist during the excavation of a ditch in Ratoath and most likely dating to the Bronze Age (Waddell 1974; 1990, 129).

Early medieval period

The landscape of the area under study also contains a high distribution of early medieval settlement (c. AD 400–1100), as indicated by the presence of enclosures, ringforts and agricultural features, including field systems and cultivation ridges. This was a time when settlement occurred as dispersed defended homesteads on lakes and across the wider landscape (O'Sullivan et al. 2013). Souterrains dating from the same period are often found in association with settlements such as ringforts. The term 'souterrain' derives from the French sous terrain, meaning 'underground'. In archaeological terms, souterrains are artificial underground structures cut into bedrock or, more commonly, built into dug-out trenches with drystone walling and large stone lintels. The primary function of souterrains seems to have been food storage as they maintain constant temperatures (c.10°c). The less well defined 'enclosures' are also generally accepted as being from the same period and may be the remnants of destroyed ringforts or similar associated sites, although the possibility of prehistoric origins cannot be ruled out. Four enclosures are present in the environs of the development area, SMR No. ME045-066 located c. 180m to the east of the site, SMR No. ME045-064 located c. 0.9km to the southeast, RMP No. ME045-011 c. 0.9km to the east, RMP No. ME044-025 c. 2.4km to the south.

ME045-066 represents a circular enclosure defined by a fosse with diameter c.30m with a small, c.7m diameter enclosure attached to its northwest extent. The monument is not marked on any of the Ordnance Survey maps. Both ME045-066 and ME045-064 were identified in the form of cropmarks via aerial imagery, from 2017 and 2018, respectively, while ME044-025 was marked as a 'Fort' on the first edition Ordnance Survey (OS) 6-inch map. Furthermore, previous disturbance of enclosure ME044-025 produced human remains, suggesting the area is highly archaeologically sensitive and has significant potential for further human remains.

To the east of Ratoath town, in advance of the M2 Finglas-Ashbourne road scheme, a number of important archaeological discoveries were made. Most significant was a large and multi-phased early medieval archaeological complex that was excavated at Raystown (Licence 03E1229). It comprised enclosures, souterrains, a cemetery, kilns, mills and a mill race complex (Seaver 2005; 2016). A number of excavations have also taken place in recent years in relation to residential developments in the environs, mostly concentrated within the northern and north-western part of the Ratoath town.

Medieval period

The archaeological remains at Ratoath would suggest that the area was settled sometime during the medieval period. The arrival of the Anglo-Normans in Meath in c. 1170 changed the social and political structures in this area. The area of Ratoath was incorporated into Ratoath manor that was part of the de Lacy Lordship, and it was retained as a signorial manor of the Earl after the subinfeudation of Meath in the late 12th century (Graham 1975). The most predominant feature at the centre of the town is the motte and bailey (ME044-034001), which is of Anglo-Norman construction. A timber and earthen castle/motte was constructed at Ratoath in the late 12/early 13th century. The motte consists of a flat-topped earthen mound with a diameter of 20m. The base is much wider and measures 62m in diameter, with the mound itself measuring 11m in height. Remains of a fosse are evident, and a rectangular bailey is visible to the southeast. Ratoath was incorporated as a borough most likely in the early 13th century. This was mentioned in the inquisition of 1333. Ratoath was the site of a manor court and a hundred court (Orpen 1921). Within the town, there is the site of an early church, on which now stands the remains of a 19th-century church. Reference to the early church is made in Bishop Dopping's Visitation Book of 1682–85 (Ellison 1971, 37–8). A late 13th or early 14th-century effigy (Hunt 1974, 213) and a 17th-century cross are to be found in the present graveyard attached to the Church of Ireland, built in 1818. The original medieval church was among the possessions of St Thomas' Augustinian abbey in Dublin, but no traces of it remains within the graveyard, apart from some dressed pieces of windows suggesting a 16th-century date. A graveslab of knight with Lombardic letters dates that slab to the 13th

or early 14th century (Hunt 1974). Ratoath was classed among the borough towns of County Meath during the reign of Henry VI (15th century).

Post-Medieval Period

In 1795, a turnpike road was built between Curragha and Ratoath (Andrews 1964). A suitable infrastructure was needed, and the introduction of toll roads was the result of economic prosperity under the Protestant Anglo-Irish. These toll roads are easily recognised as they run in straight lines. Lewis (1837) mentions an abbey dedicated to St Mary Magdalene in Ratoath. He also notes the manufacture of sacking and the weaving of linen carried out on a small extent and remarks that the land is profitable cultivation and stone of good quality quarried. Corballis Esq had his principal seat at the Manor House in town, which is an example of a Protected Structure (RPS ID. 91453), as listed in the Meath County Development Plan 2021-2027.

Fairyhouse Racecourse, located to the south of the site, is noted for the first time on the third edition OS 25-inch map, where a Grand Stand, Pavilion and Flagstaff are all depicted. The first race at Fairyhouse Racecourse was held in 1848, with the Irish Grand National steeplechase held since 1870.

*A structure, was identified within the site on the 1835 map (*Figure 13.11*), CHA1 was identified during this assessment as a result of the examination of cartographical imagery and appears to consist of a structure/building with a plot, probably a house and garden. The structures gable faces the road, now Fairyhouse Road. The structure and the plot were no longer depicted by the time of the 1909 map suggesting both were removed.*

The term 'vernacular structures' is used to describe a structure built between 1650 and 1850; however, some structures of the early 20th century can be included. The structures represent mostly houses, usually built by occupants with the help of family and neighbours. They were known as ernhaus (hearth house) and had a main cooking hearth, were rectangular in shape, usually single-story, one room, with a loft; if more rooms were present these would be entered from adjoining rooms. Door(s) and windows were placed along long walls with a fireplace set in the middle of the cross walls (O'Reilly 2011). Campbell (1937) identified two house types in Ireland, one with a central hearth and one with a gable hearth. The vernacular structures varied regionally and locally.

13.4.2 National Monuments in State Care

No National Monuments are located on or within immediate environs to the proposed development site. A National Monument (Guardianship) is located c. 5.1 kilometres (km) to the northwest, in Dunshaughlin town centre and consists of a monument registered as a Church with carved door lintel (Nat. Mon. No. 400, SMR ME044-033002).

13.4.3 Recorded Monuments

No recorded archaeological monuments, as listed in the Record of Monuments and Places (RMP) and shown on the associated maps, are located within the proposed development site boundary.

There are three monuments located within a 1km radius of the edge of the site. These include three enclosures ME045-066, ME045-064----, ME045-011----, a field system ME044-034015- and the south edge of the zone of archaeological potential associated with Ratoath Historic town ME044-034. The nearest of these is enclosure ME045-066, located c. 180m to the east of the site. This monument is scheduled for inclusion in the next revision of the Record of Monuments and Places. This enclosure has no above ground presence recorded but is clearly visible on aerial photographs as a cropmark.

The surrounding landscape is also rich in recorded monuments, ranging in date from the prehistoric period to post-medieval times. The following is a list of the recorded monuments located within the environs of the site. These descriptions are derived from the published Archaeological Inventory of

County Meath (Moore 1987). In certain instances, the entries have been revised and updated in the light of recent research and are available in the National Monuments Service Archaeological Survey Database (http://maps.archaeology.ie/historicenvironment/).

Table 13.1 Recorded Monuments

RMP No./ SMR No.	Class/Site Type	Townland	Description
ME045-066----	**Enclosure**	**Jamestown**	**Circular area measuring c. 30m in diameter, no surface expression. Described in SMR file as: *Located on a slight N-facing slope. The faint cropmark of a circular enclosure (diam. c. 30m E-W) defined by a slight fosse W-N-E is visible on Google Earth (07/05/2017). A small enclosure (diam. c. 7m) defined by a fosse is attached to the NW.***
ME045-064----	Enclosure	Glascarn	Sub rectangular area measuring 55m in diameter, no surface expression. Described in SMR file as: *Located on a fairly level landscape. The cropmark of a subrectangular enclosure (dims c. 55m NE–SW: c. 50–55m NW–SE) defined by fosse or drain features is visible on Google Earth (07/05/2017; 24/06/2018). It is bisected by the cropmark of a N–S drain, and was first reported by Jean-Charles Caillére.*
ME044-043----	Ring-ditch	Mullinam	Circular area measuring c. 8m in diameter, no surface expression. Described in SMR file as: *Situated on a slight NW-facing slope in a fairly level landscape. The cropmark of a small circular feature (diam. c. 8m) defined by a single continuous ditch feature is visible on Google Earth (24/06/2019). It is also visible on Digital Globe (2017). It was first reported by Jean-Charles Caillére.*
ME044-025----	Enclosure	Ennistown (Ratoath By.)	Oval area measuring c. 73m by 30m, some surface remains. Described in SMR file as: *Located on a low NW-SE ridge. This monument is depicted as a D-shaped embanked enclosure backing onto the townland boundary with Mullinam at E and S, and with an internal oval quarry pit on the 1836 edition of the OS 6-inch map where it is described as a 'Fort'. It is represented as a D-shaped hachured feature backing onto the townland boundary on the 1908 edition. The N and W boundaries were removed in the 1960s when bones were said to have been found. It was described in 1969 (SMR file) as a subrectangular area (dims c. 73m NW-SE; c. 30m NE-SW) that was stony at its N edge. A house had been built on it by 1995 (OSIAP).*
ME044-041----	Ring-ditch	Warrenstown (Ratoath By.)	Circular area measuring c. 9m in diameter, no surface expression. Described in SMR file as: *Situated on a fairly level landscape. The cropmark of a small circular enclosure (int. diam. c. 7m) defined by a single continuous fosse feature is visible on Google Earth (24/06/2018). It was first reported by Anthony Murphy.*
ME045-013----	Ring-ditch	Glascarn	Circular area measuring c.20m in diameter, no surface expression. Described in SMR file as:

			Cropmark ring (diam. c. 20m) (Cambridge University Collection of Aerial Photographs Ref.: AVF 41). It is also visible on Ordnance Survey Ireland Aerial Photographs (2005).
ME044-024----	Field system	Warrenstown (Ratoath By.)	Rectangular fields, defined by scarps (dims. up to 30m by 20m) covering c. 8 acres. Described in SMR file as: *Located on a S-facing slope at the E extremity of what might have been the medieval extent of Ratoath. It might also be on the grounds of the Manor House, an eighteenth century mansion just to the NW. The Manor House is probably on the site of the medieval manor house, which was described in an inquisition of 1333 as half an acre surrounded by a square ditch (Orpen 1921) and was probably a moated site. Archaeological testing (01E0359) by J. Ó Neill in a green area of about 4 acres (c. 1.5 ha) identified cultivation ridges (Wth c. 1m) which produced medieval pottery, while medieval pottery was also recovered from the topsoil (excavations.ie 2001: 1041). The furrows survived best at the bottom of the slope close to W-E Broad Meadow River but not on the flat ground immediately adjacent to it. In the same area there were also deeper ditches (Wth c. 0.6-3m) placed c. 12m apart cut into the subsoil and dividing the area into plots. No house structures or evidence of settlement was recorded in the area. (O'Neill 2001)* *Further monitoring (02E1454) by M. Fitzpatrick recovered more medieval and post-medieval pottery from the topsoil and identified further N-S or NW-SE linear cut features (Wth 1.4m ; D 0.5m) (excavations.ie 2002:1515). These were placed c. 10-15m apart with some slighter E-W cuts (Wth 0.5m; D 0.01m) off-set from them. The latter are probably furrows but the former are probably boundaries delineating burgher plots from the medieval settlement. No house sites were identified. The area was subsequently developed for modern housing. (Fitzpatrick 2001)*
ME045-011----	Enclosure	Tankardstown (Ratoath By.)	Circular area defined by fosse (diam. c. 60m). Described in SMR file as: *Situated on a rise in a fairly level landscape. This is depicted as a circular embanked enclosure (ext. diam. c. 50m) and described as a 'Fort' in gothic lettering on the 1836 edition of the OS 6-inch map. It is depicted as a D-shaped enclosure (ext. dims c. 60m NNE-SSW; c. 60m WNW-ESE) defined by a ditch or drain on the 1908 edition. The monument was planted with wheat in 1970 but the yellow clay of what had probably been an inner bank was then visible (SMR file), and it was probably a rath. A subrectangular enclosure (dims c. 50m NNW-SSE; c. 50m WNW-ESE) defined by a wide and curving fosse (Wth c. 4-5m) is visible on Google Earth (21/07/2021). (Feeley 2001, 62, No. 66)*
ME044-034----	Historic town	Ratoath	Only the very south extent of the zone is within the 1km of the site. The zone of archaeological potential incorporates 18 recorded monuments, including a motte and bailey (ME044-034001-); a

			font (ME044-034002-); a church (ME044-034003-); architectural fragments (ME044-034004- & 007-), an effigial tomb (ME044-034005-); a churchyard cross (ME044-034006-); a market cross (ME044-034008-), a cistern (ME044-034011-); cultivation ridges (ME044-034015-); a graveyard (ME044-034017-); and miscellaneous sites uncovered as a result of excavations (ME044-034009-, 010-, 012-, 013-, 014-, 016 & 018-).

ME044-034---- Described in SMR file as:

Ratoath is situated on a locally prominent hill with a W-E section of the Broad Meadow River just to the S. The name, signifying the 'fort of Thó' or what is more likely 'O thuaidh (North)', is the only indication of a pre-Anglo-Norman presence and a rath may be incorporated into the base of the motte. This area was retained by Hugh de Lacy in the Anglo-Norman settlement of Meath after 1171. He granted the churches of Dunshaughlin and Ratoath to St Thomas' Augustinian abbey (DU018-020051-) before 1183, and the rectory of Ratoath was still amongst the possessions of St Thomas' at its suppression in 1540 (White 1943, 35). On Hugh's death in 1186 Meath was inherited by his son Walter who granted the baronies of Morgallion and Ratoath to his brother Hugh before 1198. The younger Hugh probably built the motte and bailey, and he may have granted a charter to Ratoath c. 1200. This Hugh became the first Earl of Ulster in 1205 after he had taken over the de Courcy lordship (Orpen 1921, 69).

The castle (i.e. motte) of Ratour or Ratouth is referred to frequently in the thirteenth century. The manor was forfeited by Hugh in 1210 but it was returned to Walter de Lacy in 1215. The lands and castles in Walter's charge including Ratoath were seized by the King again in 1224 but they were returned to Hugh de Lacy in 1227, when the right to hold a fair lasting thirteen days at Ratoath was also granted. David FitzWilliam, the baron of Naas, had an interest in Ratoath in 1244 through his wife, Matilda, a daughter of Hugh de Lacy. In 1283 Sir Roger de Clifford, a Welsh baron, sold the manor of Ratoath to Queen Eleanor, the wife of King Edward I. Ratoath had probably been granted to Roger by King Edward to help Roger raise some ransom money as he was held captive in Wales, and Eleanor almost immediately granted the manor to Richard de Burgh, Earl of Ulster, known as the Red Earl. The manor had passed to the Duke of York with the liberty of Trim before 1449 when it was granted the right to hold weekly markets on Monday, and two fairs, each of two days duration, during the year. (Bradley and King 1985, 123)

An inquisition in 1333 found William de Burgh, a grandson of the Red Earl, possessed of the manor of Ratoath at his death, and he had held it in capite from the King. The manor had no buildings but its site is described as half an acre surrounded by a square ditch, and this suggests that not only the motte and bailey but even this moated site were abandoned as the manorial centre, although two carucates (townlands) and 100 acres were in the demesne. The burghers of Ratoath paid over £6 in yearly rent (Orpen1921, 76), indicating that the settlement may have had over a hundred heads of households. It also had a manorial court and there was a mill. About 160 acres are described as Betaghsland, meaning the native Irish settlement, which could be Baytown in Kilbride parish. About thirty five free tenants are named, amongst whom the names Cruys, Tuyt, Cusack, de Bathe, and FitzLeon recur, but the most common name is Bereford. Many of the townlands in the barony can be identified by name. (Orpen 1921)

According to the Civil Survey (1654) in 1641 Ratoath townland had 21 proprietors, but only four of these lived there. However, 82 lettings described as tenements or messuages are dependent on them, and the town had a portreeve or mayor and a sergeant (Simington 1940, 106-07). There was a corn mill in repair on the river called the Gore Water, according to the terrier or commentary on the Down Survey (1656-8) parish map. This was probably on the S side of the river where a mill is depicted on the 1835 edition of the OS 6-inch map. The terrier says that the market for provisions and linen was on Mondays. It describe the motte as at the S edge of the town, and the map shows the 62 acres of the town on the N side of the river. Ratoath had a population of 166 c. 1659 (Pender 1939, 487). However, it maintained its status as an incorporated town into the eighteenth century as it continued to send two members to

the Irish Parliament up to its dissolution in 1800. The electors appear to have been the adult males of the manor or parish. By this time the Corballis family were the largest landowners and lived in the Manor House, a seven bay, two storey house which was built c. 1780 and is now a nursing home. It is located c. 170m ESE of the motte, and is possibly on the site of the old moated site that was the centre of the medieval manor.

Apart from the motte and bailey, the site of the medieval church is known as well as the location of the market where the Market cross once stood. The burgage plots as depicted on the 1835 edition of the OS 6-inch map are on either side of the Dunshaughlin Road. There are also plots extending S from Main Street and the sinuous Fairyhouse Road to the W-E Broad Meadow River that is c. 70m S of the motte and bailey.

The town had no defensive wall but this does not preclude an earthwork boundary consisting of an earthen bank and external ditch. Such a ditch (ME044-034012-) was found in archaeological testing of a sewage pipe on the Kentstown road as well as a medieval roadway, a cistern and cut drains that are probably property boundaries. Archaeological monitoring (02E1563) by B. Shanahan of a services trench (D 0.6-0.9m) outside the perimeter of the grounds of the Roman Catholic church NW-NE and west as far as the site of the market cross identified but did not excavate three pits and three ditches of likely medieval date beneath more modern features (excavations.ie 2002: 1516), and other boundaries between plots have been discovered in other excavations within the town.

13.4.4 *Previous Archaeological Investigations*

An area to the northeast of the site was subject to archaeological monitoring carried out under licence 18E0136 in advance of the Ratoath Outer Relief Road, exposing nothing of archaeological significance. As a part of the archaeological assessment of the site, both non-invasive and invasive archaeological investigation was undertaken in 2020 and 2021 in relation to the Proposed Strategic Housing Development on lands to the Immediate South of Ratoath, Co. Meath. These included geophysical survey (non-invasive) and test trenching (invasive). The geophysical survey was carried out under licence 20R0026, while test trenching was carried out under licence 21E0511 (both were issued by the Department of Housing, Local Government and Heritage in consultation with the National Museum of Ireland). Below is a brief description of the findings.

Geophysical Survey (Licence Number 20R0026)

The geophysical survey (20R0026) of a larger area that the site is a part of was carried out by Ian Russell of Archaeological Consultancy Services Unit Ltd (ACSU). This was carried out between February and March 2020. Fields 1 - 6 and 21 were subject to geophysical survey, while Fields 7 - 9 were not (Figure 13.3). The geophsycial survey included a full detailed gradiometer survey and was undertaken throughout the application area using a Bartington GRAD 601-2 dual sensor fluxgate gradiometer system. A detailed survey was conducted with a sample interval of 0.25m and a traverse interval of 1m for all the survey areas within the site of the proposed development with variations in the magnetic field (between -100nT to +107.834nT).

No definitive signs of an archaeological site were identified; however, some of the field boundaries visible on the Ordnance Survey mapping have been detected (Figure 13.4). Also, an anomaly that may represent an old trackway or ‘boreen’ (Anomaly E), or possibly the remnants of ridge and furrow ploughing, is visible extending east-west across the northern half of the large field in the north-east part. Additional possible anomalies (Anomalies F, G & H) were interpreted as possibly representing areas of archaeological activity, perhaps in the form of burning or pits. There were no anomalies within the northwest corner of Field 6.

The report prepared (Russell, 2020) recommended targeted archaeological assessment in the form of test trenching to be carried out in order to assess the nature and extent of the identified anomalies, in particular the nature of the strongest linear anomalies as well as a number of the stronger magnetic anomalies identified elsewhere in order to ascertain their archaeological significance. More general

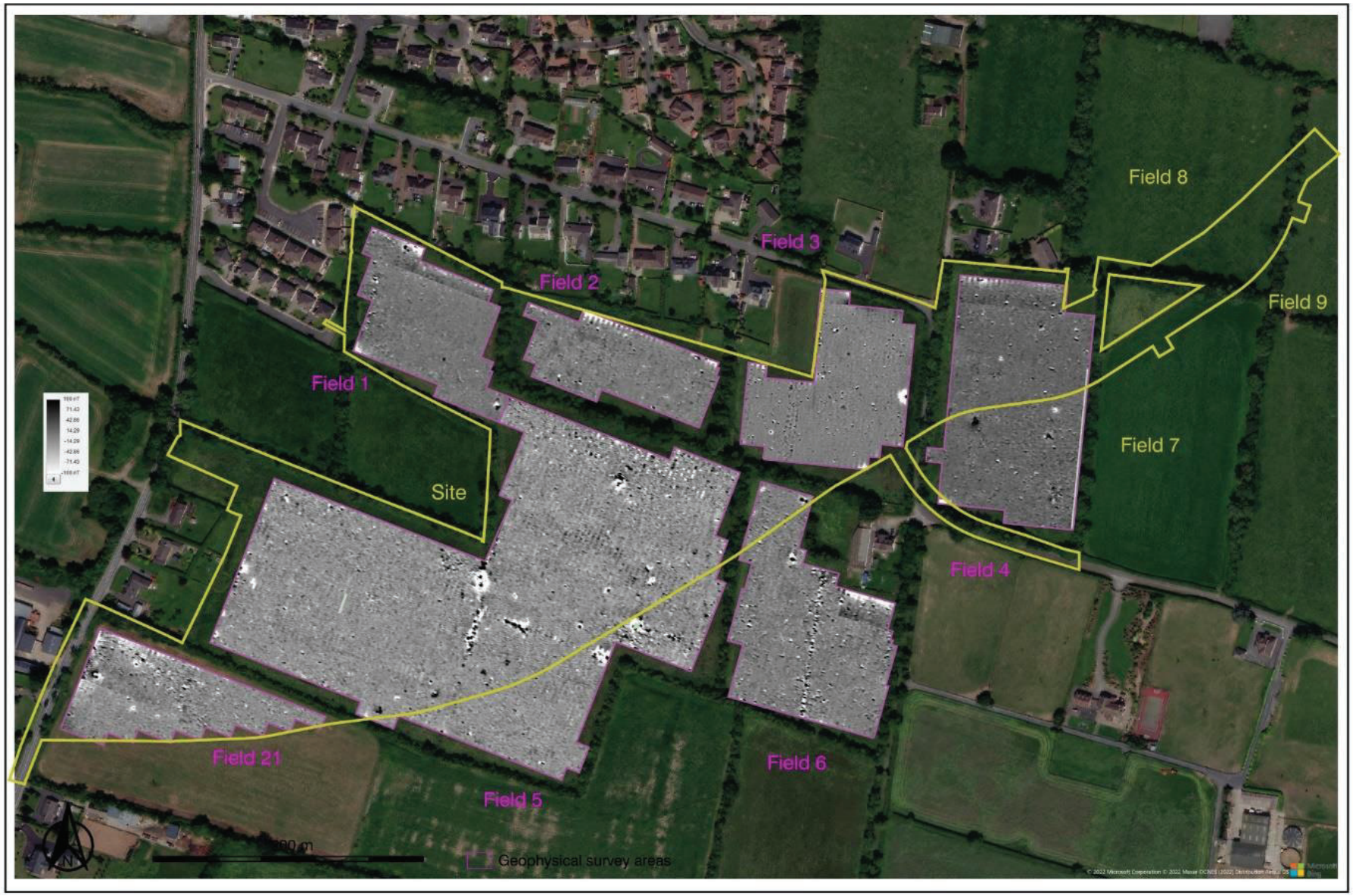

Figure 13.3: Geophysical survey results (grey scale images), showing fields 1 to 6 and field 21 and extent of site.

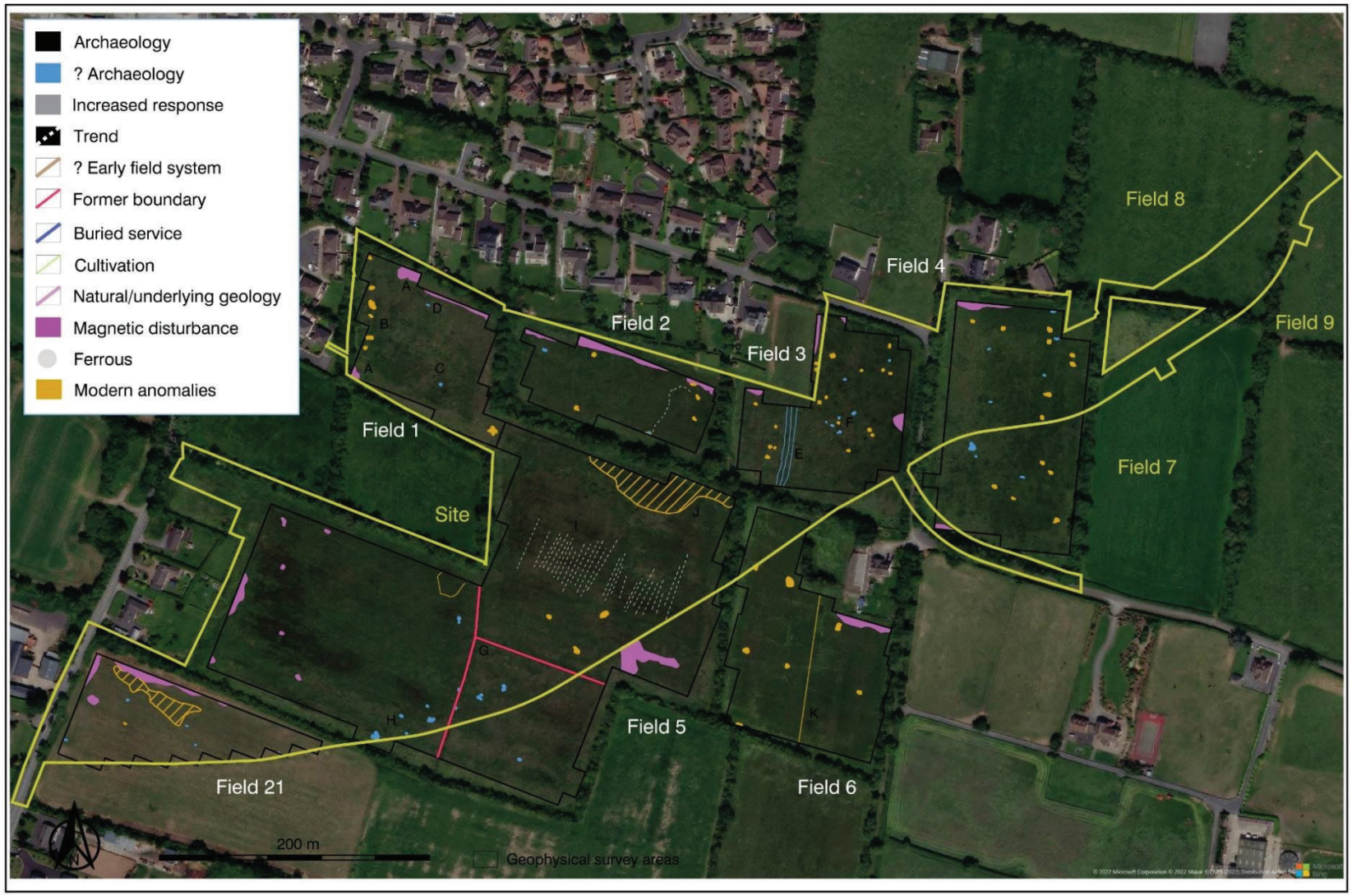

Figure 13.4: Geophysical survey interpretation, showing fields 1 to 6 and field 21 and extent of site

testing of the subject area was also recommended in advance of any proposed development of the site to confirm the geophysical survey results.

Below is an extract from the geophysical survey report prepared by Russell & Breen (2020), detailing the results of the survey for relevant fields (Figure 13.3 and Figure 13.4).

Field 1 *is located in the northwest corner of the development area; formerly cultivated or grazed it now lies abandoned. Long grasses as well as a mixture of new trees and shrubs have taken over. The field is flanked by housing estates along its northern and western edges.*

High magnetic disturbance is present along the northern perimeter of the field as well as the southwest corner (A). This is likely the result of modern ferrous structures such as fencing and or gateways. A number of dipolar anomalies (B) identified along the western portion of the field are also likely to be the result of modern ferrous objects that may be scattered throughout the subsoil. Two small irregular shaped positive anomalies (C) and (D), may represent cut features and may be archaeological in nature. However, given the lack of a definitive archaeological site with which they may be associated they may also prove to be non-archaeological tree bowls or depressions in the ground. Another dipolar anomaly (E) was identified in the southeast portion of the field. This is likely to be another modern ferrous anomaly within the subsoil.

Field 2 *is enclosed by deep field boundaries and was accessed from field 3 to the east. A number of properties run along the northern edge of this field.*

High magnetic disturbance was identified along the northern boundary as a result of the enclosing fence. One positive anomaly was identified in the western portion of the field and may represent a cut feature of archaeological significance. A number of bipolar anomalies were also identified scattered across the field and may represent modern ferrous anomalies in the topsoil or subsoil. A faint curvilinear identified running north-south through the field may be the result of weak magnetic variations in the subsoil and is likely to be natural in origin such as a dried up stream.

Field 3 *is located in the northeast of the development area along a corner of the Glascarn Lane which runs along its northern and eastern edges. Currently the field serves as pasture land.*

A number of tightly compact positive and negative linear anomalies (E) were identified to the southwest of the field. These may of archaeological origin or may be the result of ploughing activity such as ridge and furrow which would have resulted in a series of cut depressions each flanked by a bank made up of the removed material. The anomaly was not identified in field 6 immediately south on the far side of the field boundary. The anomaly may also be the result of a drain or disturbed ground terminating in the field boundary to the south.

A number of positive anomalies (F) were identified towards the middle of field 3 and may represent cut features such as refuse or storage pits, or may be natural in origin. A number of negative and or bipolar anomalies identified are likely to be the result of modern ferrous debris scattered in the subsoil e.g. plough remains, horse shoes, fencing materials etc.

Field 4 *is located in the northeast corner of the survey area and currently serves as pasture land. No definitive signs of archaeology were identified. A number of positive anomalies that may represent cut features such as pits or troughs should be investigated during any future testing of the site. A number of bipolar anomalies scattered throughout the survey area are likely the result of modern ferrous debris within the subsoil or topsoil and so are unlikely to be of archaeological significance.*

Field 5 *continues from the southwest corner of Field 1. Much of the survey area is overgrown with a mixture of long grasses and new young trees and heavy shrubs. Two historic field boundaries were identified (G). One field boundary aligned north-south divides the lower portion of the field while the second field boundary runs perpendicular to the other and continues eastwards into the current field boundary. Both of these field boundaries are visible in the cartographic evidence on OSI 6" and 25"*

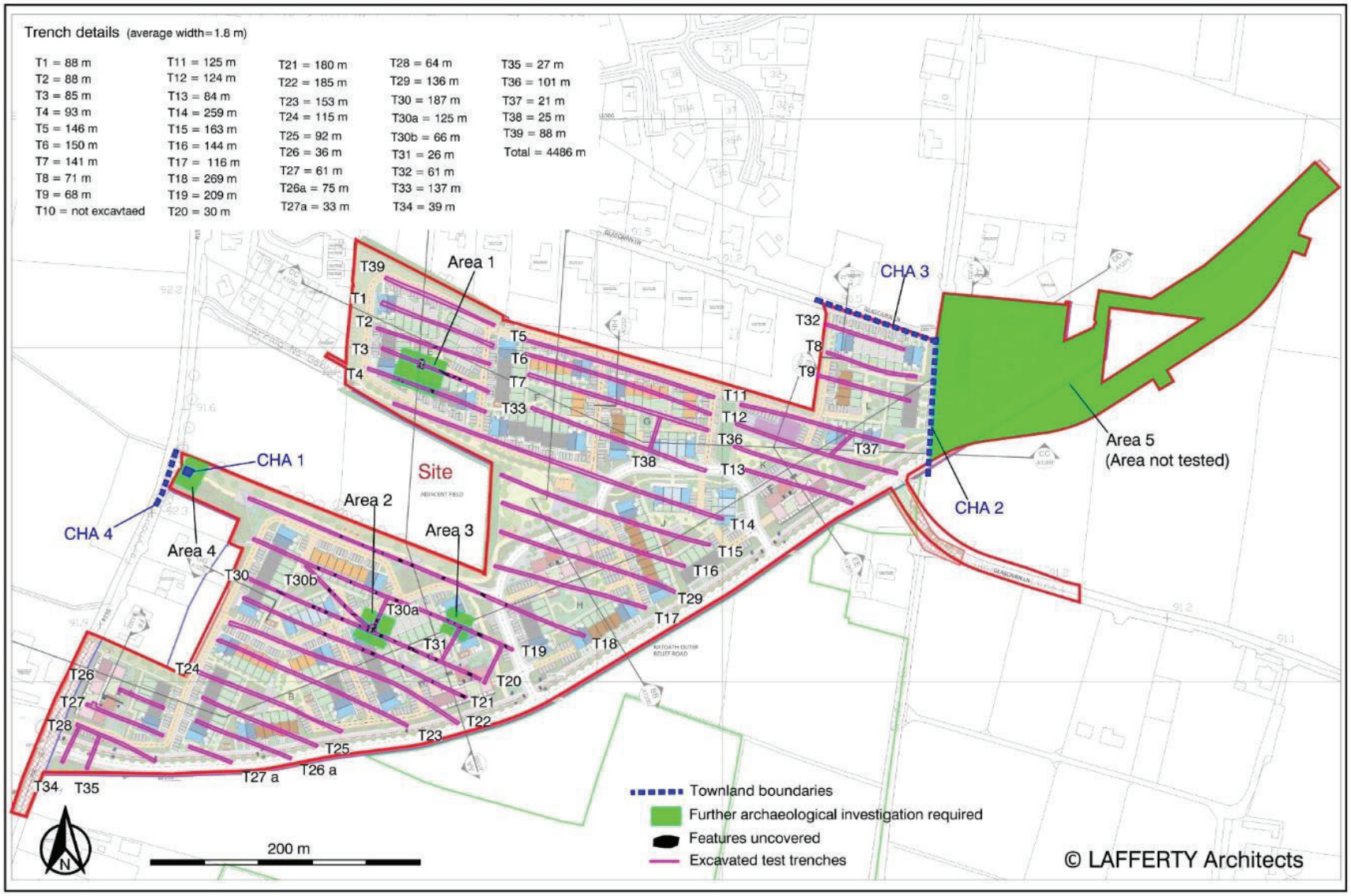

Figure 13.5: Details of site development, showing location of excavated test trenches (21E0511), townland boundaries, CHA and further investigation areas.

editions. Both of these field boundaries should be archaeologically tested in order to assess their nature, depths and true age.A series of positive anomalies running southwest to northeast from the southern boundary of field 5 were identified (H). These are likely the result of cut features and may represent a linear series of pits.

A series of weak linear anomalies aligned north-south (I) in the northeast portion of field 5 may represent further evidence of ridge and furrow activity.

The northeast corner of the field produced an area of high magnetic disturbance which may be the result of churned ground, rubble or modern ferrous anomalies such as scattered fencing (J).

***Field 21** is located south of Field 5 directly east of the Fairyhouse Rd R155 from which the field is accessed. Areas of high magnetic disturbance were identified along the northern perimeter as a result of a metallic fence along the hedgerow. A large irregular band of magnetic disturbance was also produced across the northern end of the area. This may indicate disturbed ground or the heavy use of farming machinery in the area near the field entrance.*

This band of magnetic disturbance along with the small number of positive anomalies identified should be targeted during any testing phase of the project in order to ascertain their archaeological potential.

Test Trenching (Licence Number 21E0511)

The test trenching (21E0511) of the site was carried out by Caroline Cosgrove of Archaeological Consultancy Services Unit Ltd (ACSU). This was carried out in August 2021. Test trenches were arranged in order to target anomalies identified during the geophysical survey (20R0026) and the site overall (Figure 13.5).

A total of 42 test trenches were excavated, totaling 4,486m of linear trench. Each trench measured 1.8m in width. In general, the topsoil was a dark brown silty clay that measured between c. 0.3m–0.58m in depth. The natural, varied from an orange-brown boulder clay exposed in the south most part of the site) to a mottled orange and grey clay in the remaining part of the site.

Archaeological test trenching identified three areas of archaeological activity: one in Field 1 and two in Field 5. The features exposed comprise ploughed out pits, post-holes and spreads, likely associated with a prehistoric activity. These features were exposed in Trenches 3, 4 (Figure 13.6, Figure 13.9 and Figure 13.10).

Trenches 30, 30a and the eastern part of Trench 19 (Figure 13.7: Details of archaeological features uncovered in Trenches 18-21 (Area 2) and Trenches 30-31 (Area 3).

and Figure 13.8). Furthermore, a number of linears were exposed; these were found to represent field ditches and drains. Field boundaries exposed in Field 5 account for Anomaly G identified during geophysical survey also visible above the ground and are marked on all Ordnance Survey maps (1835, 1909 and 1958). The anomalies identified during the geophysical survey were found to relate to modern agricultural activity.

The report prepared (Cosgrove, 2021) recommended that the features identified be preserved by record (excavated). The three areas shall be stripped of topsoil, and any archaeological features exposed be preserved by record (excavated). All excavation should be carried out by a licence eligible archaeologist at the pre-construction phase in order to mitigate the impact of the proposed development on archaeological features and deposits.

Below is an extract from the test trenching report prepared by Cosgrove (2021) listing the exposed archaeological features (Figure 13.5).

Field 1. In Trench 4, three pits, C71, C73 and C99 were identified. To the north, in Trench 3, pits C79, C81, C83 and C95, possible gully C77 and post-holes C85, C87, C89 C91 and C93 were uncovered (Figure 13.6, Figure 13.9 and Figure 13.10).

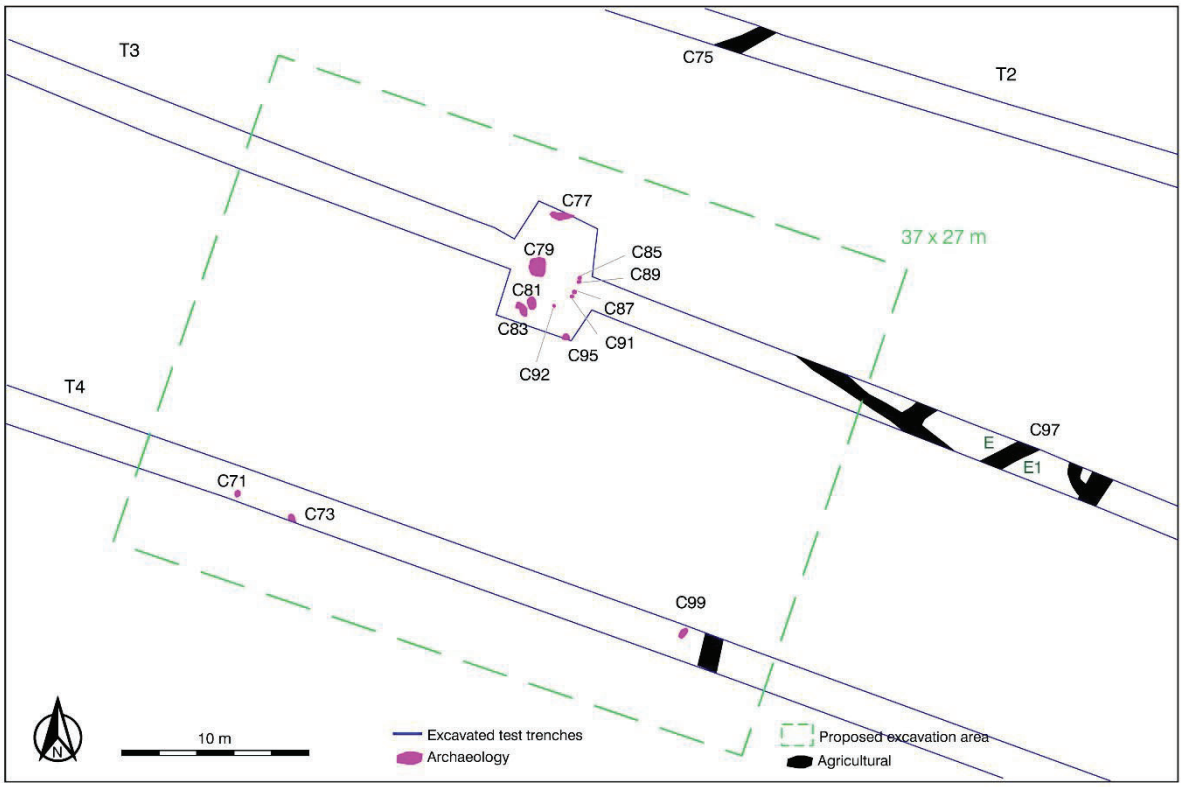

Figure 13.6: Details of archaeological features uncovered in Trenches 2, 3 and 4 (Area 1)

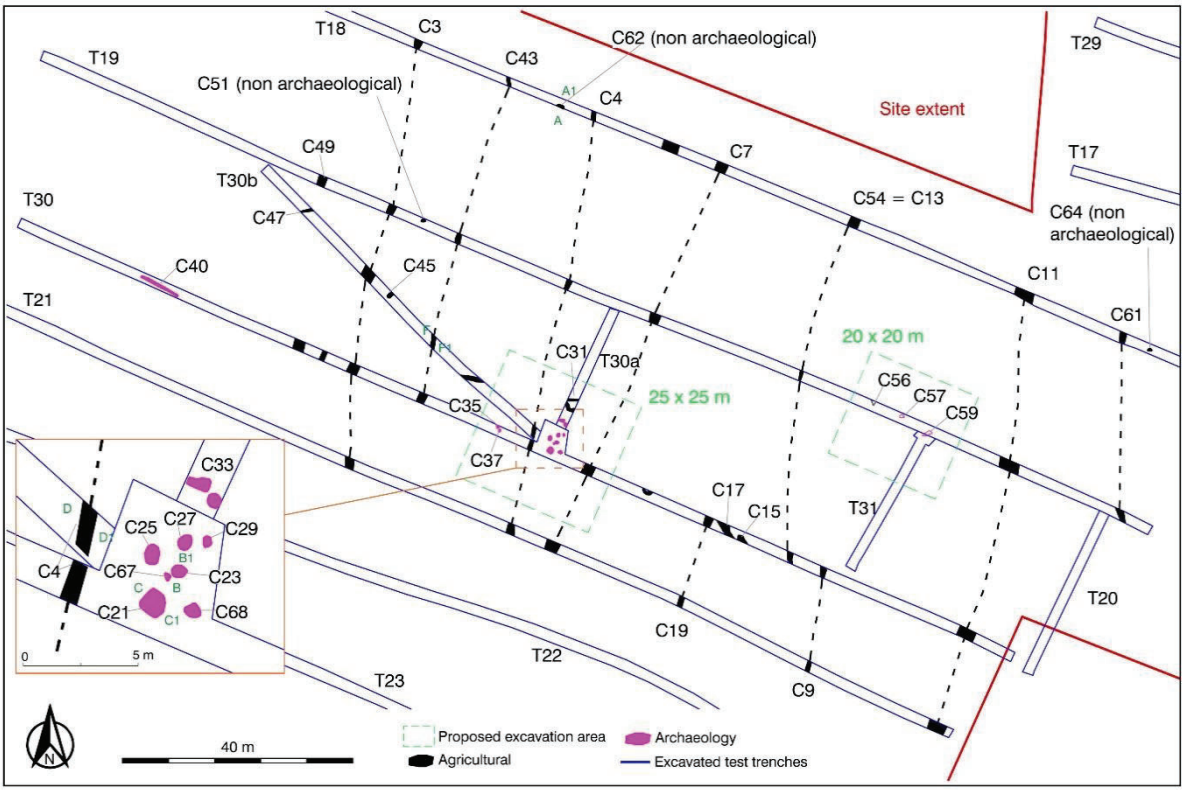

Figure 13.7: Details of archaeological features uncovered in Trenches 18-21 (Area 2) and Trenches 30-31 (Area 3).

Figure 13.8: Field 5, Trenches 30, 30a (Area 2): pits C21, C23, C25, C27, C29, C33, C66, C68 facing north.

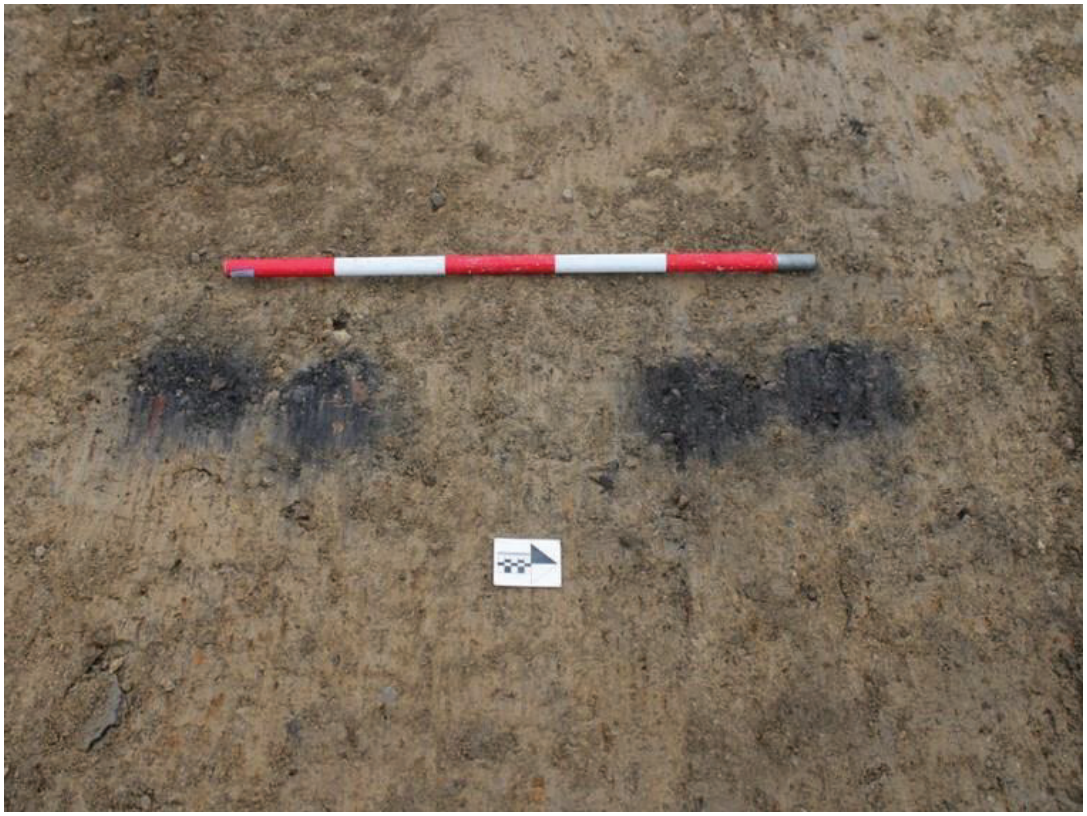

Figure 13.9: Field 1, Trench 3 (Area 1): postholes C85, C89, C87, C91, facing west.

Figure 13.10: Field 1, Trench 3 (Area 1): pits 81 and C83, facing north.

Field 5. In Trenches 30 and 30a a number of burnt pits (C21, C23, C28 and C26) pits (C29, C33, C67 and C69) and possible features (C35, C37 and C41) were uncovered. To the northeast in Trench 19, burnt pit C59 and possible pit C57 to the east were identified (Figure 13.7: Details of archaeological features uncovered in Trenches 18-21 (Area 2) and Trenches 30-31 (Area 3).

and Figure 13.8).

13.4.5 Topographical Files

The Topographical Files of the National Museum of Ireland were consulted. These list no finds for the townlands of Commons or Jamestown that the site is located within.

13.4.6 Placename Evidence

The database of Irish placenames (www.logainm.ie) was consulted for the meaning of the placenames within and surrounding the proposed development site. It can reveal important information about the natural and cultural heritage of an area. For example, Commons townland (An Coimín) was first mentioned and depicted the 'Comons of Ratooth' on the Down Survey Map of County Meath, Barony of Ratoath (1654-56), and can be translated as commonage, common land; little hollow, glen. Jamestown was first mentioned in 1836 as Jamestown and was noted by John O'Donovan in 1836 (Ordnance Survey Parish Namebooks).

Ratoath gives its name to a town, a townland, a parish and to a barony. The derivation or meaning of the word is, however, uncertain. Gaelicised forms of the name are Rat-tógh and Rath-tachatacta. These placenames occur in Irish manuscripts, and scholars say that the writers were referring to Ratoath. Evidently, they were trying to give a phonetic rendering of a name that was unfamiliar to them. Mruigtuaithe occurs in the Book of Armagh as the name of one of these places in Meath where St Patrick founded a church, and Eoin MacNeill identifies it as Ratoath. If this is correct it would seem that

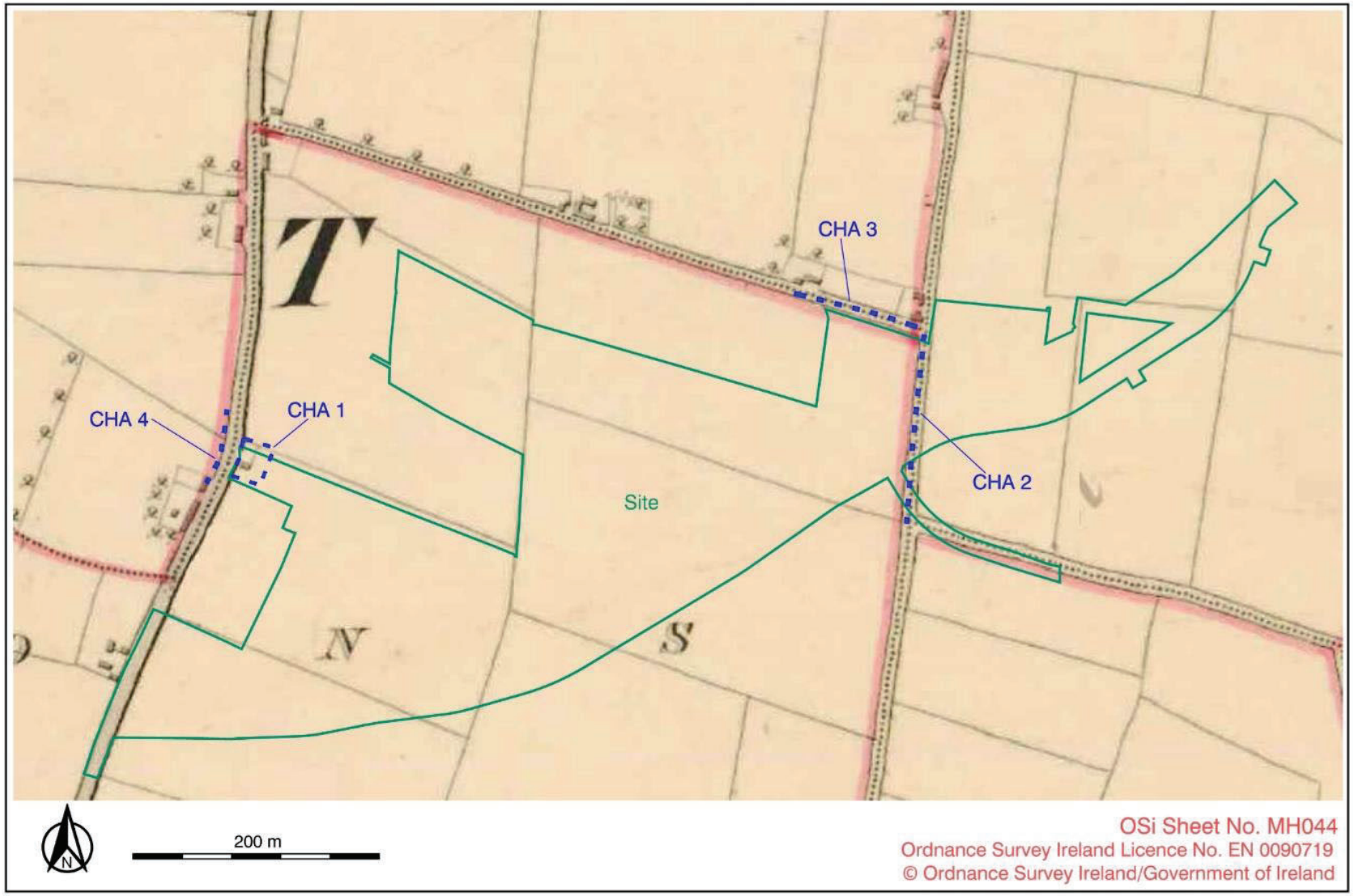

Figure 13.11: Extract from 1st edition Ordnance Survey (OS) 6-inch map (surveyed 1835 - published 1837), showing location of site and CHA.

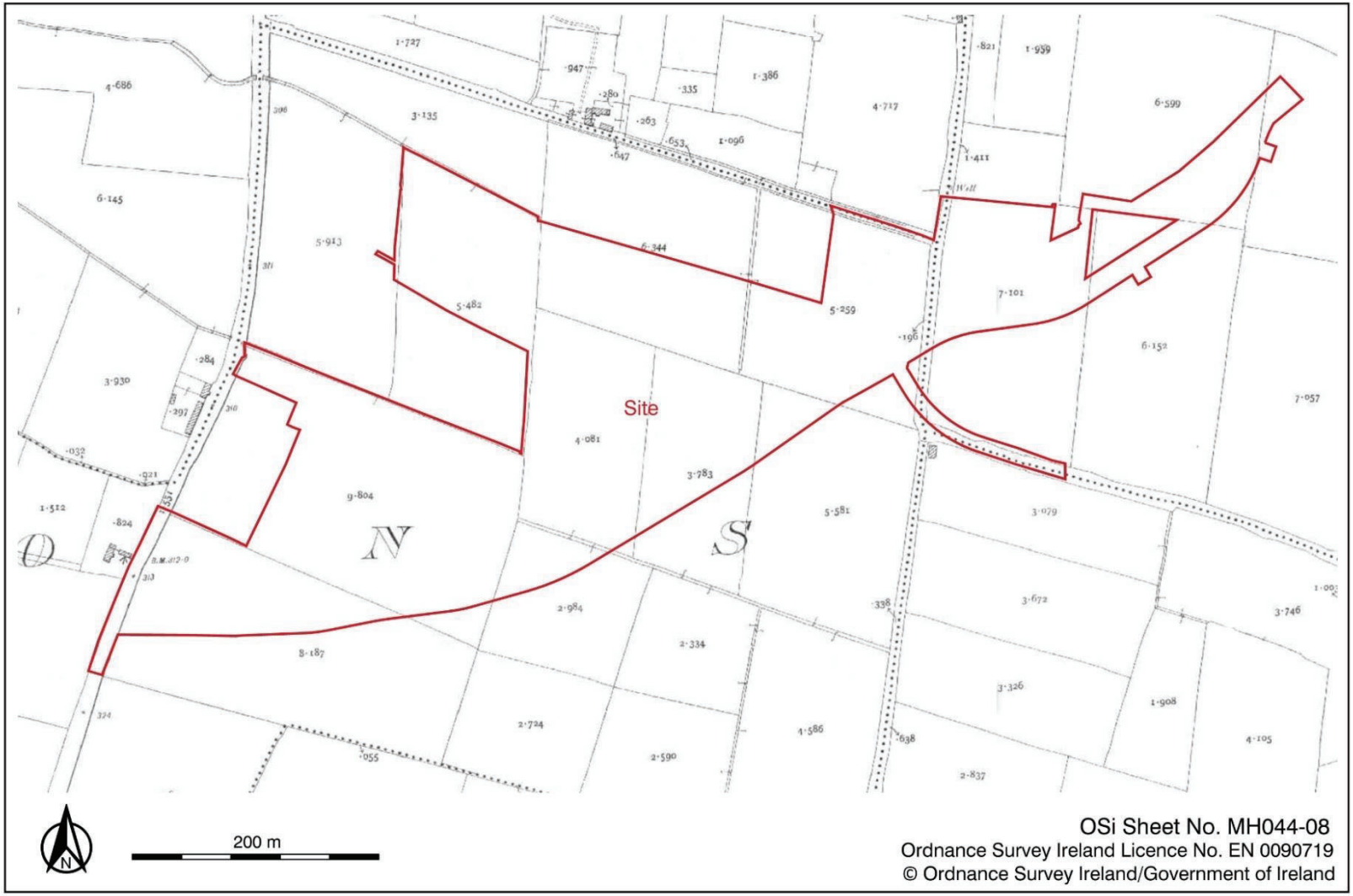

Figure 13.12: Extract from 3rd edition Ordnance Survey (OS) 25-inch map (surveyed 1909 – published 1911), showing location of site

the second portion of the word comes from the Gaelic word 'tuath', which means a territory belonging to a family or sept. 'Mruig' means a grazing plain. The first part of the word 'Ratoath' may be derived from the Gaelic word 'Rath', which means a fort or fortification, but this is unlikely, as the place name probably existed before the Normans erected the 'moat', unless they built it on top of a rath already in existence (Orpen 1921).

13.4.7 Cartographic Sources and Aerial Photography

As a part of the assessment relevant cartographic sources and available aerial photography imagery was reviewed. Potential archaeological or cultural heritage features are marked on such maps and provide a useful resource in identifying sites particularly if they no longer have any above-ground remains. Monuments with no surface expression can be seen as cropmarks on aerial imagery.

Cartographic Review

A review of available historic mapping for the area was carried out and included the Down Survey map of Ireland 1654-56, Taylor and Skinner's Maps of 1777, as well as first (1835), third (1909) and Cassini (1958) editions of the Ordnance Survey (OS) maps.

On the Down Survey of Ireland 1654-56 the barony is depicted as 'Barony of Rattoth'. The map depicts the site within '*The Commons to Rattooth town'*; while Jamestown appears to be located within an area labelled as the property of '*Widow Angeirs, ppriety prot'* meaning property of protestant (

Figure 13.2), however it does not offer any more detail in relation to the site. Taylor and Skinner's Maps of the Roads of Ireland (1777) offers little insight to the site, although Ratoath town is depicted, as is Fairyhouse Road with a row of mature trees on its eastern side.

Ordnance Survey (OS) maps of the area were also examined to identify any possible archaeological features and trace the site's development during the 19th and early 20th centuries (Figure 13.11 and Figure 13.12). These are far more detailed than the earlier maps.

One building is depicted within the site on the first edition OS map (surveyed 1835, published 1837). This is located along Fairyhouse Rd (R155) within the north-western part of the site. It was gone by the time of the 25-inch map in 1909. A road currently known as Glascarn Lane (L5020) is also depicted, it is also forming a townland boundary between Commons with Jamestown and Ratoath townlands. It should be noted that the boundaries between '*The Commons to Rattooth town*' now Commons and lands of '*Widow Angeirs ppriety prot*' that is now a part of (Jamestown and Ratoath townlands) are depicted since the Down Survey Map (Figure 13.2) and correspond roughly with the townland boundaries of Commons and Jamestown depicted on the 1835 map suggesting Glascarn Lane might have been used since at least the 17th century. Furthermore, a small portion of the sites west boundary adjacent to the road is also a townland boundary between Commons and Ratoath (Figure 13.11). Overall, it appears as if the nature of the lands has not changed significantly since the 19th century, with the site still comprising large fields primarily used for tillage and pasture.

By the time of the third edition OS 25-inch map (surveyed 1909, published 1911), one of the fields within the site appears to have been divided into two smaller fields with a north-south running boundary. Also, within the northern part of the site, a wet ditch running in a north-south direction was added within a large rectangular field. An examination of the Cassini edition of the 6-inch map (1958) shows little difference within the site from the 25-inch map.

Aerial Photography Review

In addition to examining the various editions of the OS maps, aerial photographs from the Geological Survey of Ireland, dating from between 1995 and 2013, and the google aerial imagery dating between 1995 and 2019 were consulted.

A cropmark was noted on a google aerial photograph outside of the site (c. 180m to the east of the sites very east extremity). The discovery of this site has been notified to the National Monuments Service. Since, the monument was registered as SMR No. ME045-066----and is scheduled for inclusion in the next revision of the Record of Monuments and Places. Such cropmarks likely indicate the presence of an archaeological site where the above ground remains may be largely or completely destroyed. The site is visible on an aerial photograph dated 7 May 2017, which shows two conjoined circular enclosures. The larger, eastern enclosure measures c. 30m in diameter, while adjacent the north-western side is the smaller feature, measuring c. 7m in diameter, perhaps suggesting the presence of a ring-ditch. This monument is the nearest to the site, and it will not be impacted by the current development. In addition, linear cropmarks corresponding with former field boundaries depicted on both Ordnance Survey maps (1835, 1909) are visible. No additional cropmarks were noted within the area to be developed.

13.4.8 *Tangible Cultural Heritage Sites/Features*

The Down Survey Map (1654-56) of County Meath; barony, parish maps, and Ordnance Survey Maps of the area, were examined in order to identify boundaries/field divisions of significance and any Cultural Heritage Areas (CHA).

One building (CHA1) is depicted on the examined mapping, it consists of a small rectangular structure, with gable fronting onto Fairyhouse Road. The structure is shown within a small plot, in the west extent of the site; Field 5 (

Figure 13.2, Figure 13.5 and Figure 13.11). The house or the plot are no longer depicted by the time of the 1909 map.

There is one townland boundary depicted on the Ordnance Survey mapping (Figure 13.11); that is located within the current site's extent (CHA2). This boundary runs north to south, and is formed by a road known currently as Glascarn Lane, as shown on the 1835 map, the boundary is illustrated as running within the lane's footprint. In addition, a minor portion of Commons and Ratoath townland boundary (CHA3), running east to west, forms part of the site's north boundary. It is shown along the east to west aligned portion of Glascarn Lane on the 1835 map within the lane's footprint. As noted in Section 0, the boundaries between 'The Commons to Rattooth town'' (now Commons) and lands of 'Widow Angeirs ppriety prot' (now part of Jamestown, Ratoath townlands) are depicted since the Down Survey Map (Figure 13.2) and correspond roughly with the townland boundaries of Commons with Jamestown and Ratoath depicted on the 1835 map suggesting Glascarn Lane might have been used since at least the 17th century.

It should also be mentioned that a minor portion of the site's west boundary, running roughly north to south and formed by the Fairyhouse Road is the townland boundary between Commons and Ratoath (CHA4). The road is also depicted since the Down Survey Map 1654-56, and the boundary is illustrated within the roads footprint on both Ordnance Survey maps.

13.4.9 *Record of Protected Structures*

The Meath County Development Plan 2021-2027 was consulted as it contains the Record of Protected Structures for County Meath. A protected structure, Ratoath Manor (RPS ID 91453) is located c. 1km to the north of the site. There is a concentration of protected structures within Ratoath town, these are all on the north side of the Broadmeadow River that runs through Ratoath. None will be impacted either directly or indirectly by the proposed development.

13.4.10 National Inventory of Architectural Heritage sites

The National Inventory of Architectural Heritage (NIAH) for County Meath database was consulted as it contains additional sites of architectural heritage. There are no such sites within the site, and the above-mentioned Ratoath Manor is also recorded as NIAH Reg. No. 14336002.

13.4.11 Site Inspection

A site inspection was carried out as part of the Archaeological Impact Assessment (Lyne 2021). The site consists of parts of 10 fields (Fields 1-9 21), with only the very northwest corner of Field 9 within the site. It is bounded by Fairyhouse road from the west, residential houses to the north and agricultural fields to the south. The field boundaries consist of mature trees and hedges. The site is in use largely as greenfield, with some areas tilled, others overgrown and rough pasture. The site contains no visible surface evidence of any archaeological features.

Figure 13.13: Overview of the study area, with Ratoath town adjacent to the north (drone imagery courtesy of Future Analytics, January 2020)

13.4.12 Characteristics of the Proposed Development

The proposed development area is located in Commons and Jamestown townlands, within a large agricultural landscape bounded to the west by the R155 (Fairyhouse Road).

The development of the site will include the construction of residential housing adjacent and north of the proposed Ratoath bypass and south of Ratoath urban area.

Please refer to the development description within the statutory notices for a complete description of the proposed development.

13.5 Predicted Impacts

13.5.1 Direct Impacts on Recorded Archaeological Monuments

There will be no direct impacts on recorded archaeological monuments as no recorded monuments are located within the proposed development site. There is a monument located in the immediate environs of the site, enclosure ME045-066 located c. 180m to the east of the site, and it will not be impacted in any way.

13.5.2 Direct Impacts on Protected Structures and National Inventory of Architectural Heritage sites

There will be no direct impacts on architectural heritage as no Protected Structures or sites listed within the National Inventory of Architectural Heritage (NIAH) are located within the proposed development site.

Protected Structure, Ratoath Manor (RPS ID 91453) that is also a National Inventory of Architectural Heritage Site (NIAH Reg. 14336002) is located c. 1km to the north of the site and will not be impacted in any way.

13.5.3 Direct Impacts on Known and Potential Archaeological Features

The proposed development will have a direct impact on three areas of archaeological activity (one in Field 2 and 2 in Field 5) identified as a result of archaeological assessment of the site in the form of test trenching (21E0511). The features exposed consist of ploughed out pits, post-holes and spreads, likely associated with prehistoric activity while a number of linears exposed, indicated by the geophysical survey results (20R0026) were found to represent field ditches and drains relating to modern agricultural activity.

Furthermore, the northeast portion of the site, Area 5 (Figure 13.5), consisting of Fields 7-9, was not subject to test trenching carried out previously. A potential impact on the archaeological resource lies in the uncovering of sub-surface archaeological features during topsoil removal and other groundworks associated with the construction of the proposed buildings and associated infrastructure within this area. Ground disturbance associated with the proposed development within this area, has the potential to uncover some minor monuments and associated artefacts. Further investigations, including test trenching and/or monitoring will be carried out.

The development of the site for the current proposal will involve preservation by record of the three areas (Areas 1-3) of archaeological significance identified (21E0511; Figure 13.5).

13.5.4 Direct Impacts on Tangible Cultural Heritage.

The proposed development will have a direct impact on the townland boundary between Commons and Jamestown (CHA2), and the structure/building depicted on the 1835 map (CHA1) should it have any sub surface remains (Figure 13.5). The townland boundary between Commons and Jamestown and Ratoath townlands was depicted along the west and south of Glascarn Lane on the 1835 map respectively, and within the lanes footprint on the 1909 map. A north to south portion of Glascarn Lane will be realigned to the west. The structure depicted on the 1835 map represents a pre 19th century building, which would give any remains if present, a vernacular status.

Prior to development of the site a photographic and measured survey (including written description, and photographic record) will be carried out on the townland boundary between Commons and Jamestown (CHA2) that is to be removed, the townland boundary between Commons and Ratoath and further archaeological investigations, including monitoring of topsoil stripping (Area 4) and excavation of remains if identified will be carried out in relation to the area where a building is depicted on the 1835 map (CHA1).

13.5.5 Indirect Impacts

Indirect impacts here are those which may have a negative (or positive) effect on the archaeological landscape after the construction phase of the development (i.e. operational). Indirect impacts may include the visual impact on the surrounding archaeological landscape. The nearest monuments to the site comprise enclosure ME045-066 located c. 180m to the east of the site. The monument has no surface expression. While the development will see the continued preservation of two townland boundaries between Commons and Ratoath (CHA3 and CHA4), a photographic and measured survey (including written description, photographic record) prior to development commencing will be carried out.

The introduction of the proposed development to the area will not result in a major change to the general setting of any of the monuments listed. This is due to the fact that the enclosure is located within a greenfield and outside of the site, and with no surface expression, its immediate setting will remain unchanged.

13.6 Potential Cumulative Impact

In terms of cumulative impacts, the large developments in the immediate environs of the site of similar settings were considered (SHD 305196, DA120765, RA150993 amongst others); there are no surface remains of any monuments within these areas and therefore there are no cumulative impacts on the cultural heritage or archaeological resource.

13.7 Do Nothing Scenario

A ‘Do Nothing Scenario’ will see the continued preservation of the townland boundary between Commons and Jamestown townland/Glascarn Lane (CHA2), the preservation in situ of the three areas of archaeological activity identified during previous test trenching (21E0511); and of any potential remains of the house/structure depicted on the 1835 map (CHA1) if present.

13.8 Risks to Human Health

There will be no risk to human health. Features identified are inert, cut into natural boulder clay and pose not treat to human health. These features will be excavated by hand by archaeologists.

13.9 Mitigation Measures

The site was subject to a number of archaeological assessments carried out in relation to the site, both invasive and non-invasive. These include Geophysical Survey (20R0026; Russell and Breen, 2020), test trenching (21E0511; Cosgrove, 2021) and Archaeological Impact Assessment (Lyne, 2021).

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.

- Three areas of archaeological activity (Areas 1-3) identified during test trenching (21E0511) will be preserved by record (excavated). At the locations of the features identified, in Field 1 an area measuring 37m by 27m and in Field 5 two areas measuring 25m by 25m and 20m by 20m will be stripped of topsoil (Figure 13.5; Figure 13.6 and Figure 13.7: Details of archaeological features uncovered in Trenches 18-21 (Area 2) and Trenches 30-31 (Area 3).
-), features identified including any features associated that might be exposed, will be preserved by record. This will be carried out under licence from the National Monuments Service of the DHLGH by a suitably qualified archaeologist. The appointed archaeologist shall consult with the Licensing Section of the NMS regarding the methodology to be employed in the resolution of all sites. This will be carried out prior to construction works commencing.
- Archaeological investigations (test trenching and/or monitoring) of Area 5 (Figure 13.5) within the northeast portion of the site will be carried out. Should archaeological features be identified further mitigation including preservation in situ (if feasible) or by record (excavation) will be required. This will be carried out under licence from the National Monuments Service of the DHLGH by a suitably qualified archaeologist. The appointed archaeologist shall consult with the Licensing Section of the NMS regarding the methodology to be employed in the resolution of all sites. This will be carried out prior to construction works commencing.
- Prior to development of the site a photographic and measured survey (including written description, photographic record) will be carried out of Cultural Heritage Area CHA2 – townland boundary between Commons and Jamestown, as well as CHA3 and CHA4 townland boundaries between Commons and Ratoath (Figure 13.5).
- Prior to development of the site, an area measuring 20m by 25m around the location of Cultural Heritage Area CHA1 shall be stripped of topsoil to establish if any remains of the structure are present (Figure 13.5). Further archaeological investigation may be required depending on the results, including a full archaeological excavation of any features and deposits identified, by a licensed archaeologist in accordance with a methodology to be agreed with the National Monuments Service.
- 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 full report including all post-excavation analysis will be submitted to the relevant authorities within 12 months of the completion of the archaeological excavations.

13.10 Residual Impacts

The residual impacts are likely to be low or negligible if the recommended mitigation measures are implemented. Table 13.2 below summarises the residual impacts of the proposed development on the archaeological landscape. Residual impacts are defined as the overall impact of the development on archaeology on the basis of implementing the mitigation measures recommended in this report.

Table 13.2 Summary of Residual Impacts

Potential impacts	Mitigation strategy	Residual impacts
Construction impacts		
Permanent direct negative impact to three areas of archaeological activity (Areas 1-3) identified (21E0511)	Full archaeological excavation of features and deposits identified, including any features associated that might be exposed by a licensed archaeologist in accordance with a methodology to be agreed with the National Monuments Service.	None

Potential impacts	Mitigation strategy	Residual impacts
Construction impacts		
Permanent direct negative impact on archaeological features and deposits should these be present within the northeast portion of the site (Area 5) that was not subject to test trenching previously.	Archaeological investigation (test trenching and/or monitoring) of northeast portion of the site that was not subject to test trenching previously. Should archaeological features be identified further mitigation including preservation in situ (if feasible) or by record (excavation) will be required. This will be carried by a licensed archaeologist in accordance with a methodology to be agreed with the National Monuments Service.	None
Permanent direct negative impact to the townland boundary between Commons and Jamestown (CHA2) formed by the north to south aligned Glascarn Lane.	Full photographic and measured survey (including written description, photographic record) of CHA2.	None
Permanent direct negative impact on structure depicted on the 1835 map (CHA1)	Monitoring of topsoil stripping at the location of CHA1 to establish if any remains of the structure are present. Further archaeological investigations may be required depending on the results, including a full archaeological excavation of any features and deposits identified, by a licensed archaeologist in accordance with a methodology to be agreed with the National Monuments Service.	None
Impact on townland boundaries between Commons and Ratoath CHA3 and CHA4 that are to be retained.	A photographic and measured survey (including written description, photographic record) will be carried out prior to works commencing.	None

13.11 Interactions

No interactions in relation to the Cultural Heritage Resource are anticipated with other environmental factors assessed within this EIAR.

13.12 Monitoring

No monitoring is necessary.

13.13 Difficulties Encountered

No difficulties were encountered during the compilation of this chapter.

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13.14.1 Other Sources

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14. Landscape

14.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) provides an assessment of the likely effects of a Proposed Development (known as Ratoath South SHD) located to the south of Ratoath, County Meath, on the landscape and visual aspects of the environment. The Landscape and Visual Impact Assessment, is supported by a series of Photomontages prepared from the surrounding areas and included as Volume 3 of the EIAR.

The assessment was carried out by Thomas Burns, B.Agr.Sc. (Landscape), Dip. EIA Mgmt.; Ad Dip. En. & Plan. Law; MILI, MIELA. Thomas is a Landscape Architect, Environmental Planner and Partner with Brady Shipman Martin, environmental, landscape and planning consultants.

14.2 Methodology

14.2.1 Study Area

The study area includes the site of the Proposed Development and surrounding areas including the existing developed primarily residential (zoned A1) and community (zoned G1) edge of Ratoath to the north; new residential lands (zoned A2) to the east; rural (zoned RA) and strategic lands (zoned WL) to the southeast and south and undeveloped general enterprise and employment lands (zoned E2) to the west of the R155 Fairyhouse Road.

14.2.2 Relevant Legislation, Policy and Guidelines

The assessment has been carried out with reference to the following legislation, policy and guidelines of relevance to the landscape and visual assessment.

Legislation

- Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the EIA Directive).
- Planning and Development Act 2000, as amended.
- Planning and Development Regulations 2001, as amended.
- European Landscape Convention 2000.

Policy

- Meath County Development Plan 2021 – 2027.

Guidelines

- Guidelines on the Information to be contained in Environmental Impact Assessment Reports (hereafter the 'EPA Guidelines') (EPA 2022).
- Guidelines for Landscape and Visual Impact Assessment (hereafter the 'GLVIA') 3rd edition (Landscape Institute and the Institute of Environmental Management and Assessment [IEMA] 2013).
- Technical Information Note 05/2017 (Revised 2018) on Landscape Character Assessment (hereafter the 'TCA') (Landscape Institute 2018).
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (hereafter the 'GEIA') (Department of Housing, Planning and Local Government DHPLG 2018).

- Landscape Institute Technical Guidance Note 06/2019 on Visual Representation of Development Proposals (hereafter the 'VRDP') (Landscape Institute 2019).

While the EPA Guidelines (EPA 2017) provide a general methodology, impact ratings and assessment structure applicable across all environmental factors, the GLVIA (Landscape Institute and IEMA 2013) provides specific guidance for landscape and visual impact assessments. The TCA (Landscape Institute 2018) is a resource for the application of landscape character assessment to landscapes. Therefore, in this assessment, a combination of the approaches outlined in the EPA Guidelines (EPA 2017) and in the GLVIA (Landscape Institute and IEMA 2013), supported by the TCA (Landscape Institute 2018) and the professional experience and expertise of the assessor, is utilised in the landscape and visual assessment.

14.2.3 Key Definitions

The following key definitions are relevant to the methodology for the landscape and visual impact assessment: -

- **Landscape** means an area, as perceived by people, whose character is the result of the action and interaction of natural and / or human factors' (European Landscape Convention 2000).

- **Landscape Character Assessment** is the process of identifying and describing variation in the character of the landscape. It seeks to identify and explain the unique combination of elements and features (characteristics) that make landscapes distinctive' (Natural England 2014).

- **Landscape and Visual Impact Assessment** is a tool used to identify and assess the significance of and the effects of change resulting from development on both the landscape as an environmental resource in its own right, and on people's views and visual amenity' (Landscape Institute and IEMA 2013).

- **Landscape Impact vs. Landscape Effect** 'Impact' is defined as the action been taken, whilst 'effect' is defined as result (change or changes) of that action, e.g. the 'impact' of the Proposed Development on the woodland has a significant 'effect' on the character of the landscape.

14.2.4 Data Collection and Collation

Data collection and collation is based on initial desk studies, supported by site full walkovers and augmented by further specific site reviews, within the Study Area, together with the selection and preparation of verified Photomontages of the Proposed Development.

Desk studies, which allow for identification of designated and potential significant / sensitive areas, involved a review of: -

- Meath County Development Plan 2021 – 2027.

- Historical and current mapping and aerial photography (e.g. ordnance survey Ireland, google earth, google maps).

- Mapping of the Proposed Development.

- Other reports and documents relating to the receiving environment.

Site-based studies, which allow for verification of desk study findings and for analysis of current conditions in the baseline environment, involved: -

- Full walkover surveys of the site and the area surrounding of the Proposed Development.

- Further field surveys to verify conditions at specific locations of the Proposed Development.

- Selection of locations for verified Photomontages of the Proposed Development.

14.2.5 Assessment of Landscape and Visual Impacts

Assessment of potential effects involves: -

- Classifying the sensitivity of the receiving landscape and visual environment.
- Describing and classifying the magnitude of change in the landscape and visual environment resulting from the Proposed Development.

These factors are combined to provide a classification of significance of impacts of the Proposed Development.

14.2.6 Sensitivity of Landscape and Visual Environment

The sensitivity of the landscape and visual environment is a function of its existing land use, existing and emerging patterns and its scale, enclosure, visual characteristics and values. The nature and scale of the Proposed Project is taken into account, as are trends of change and relevant policy framework. Four categories are used to classify sensitivity, as set out in Table 14.1.

14.2.7 Magnitude of Change in Landscape and Visual Environment

The magnitude of change is a factor of the scale, extent and degree of change imposed on the landscape and visual environment by the Proposed Project, with reference to its key elements, features and characteristics and the affected surrounding character areas. Four categories are used to classify magnitude of change, as set out in Table 14.1.

Table 14.1 Rating of Landscape / Visual Sensitivity and Magnitude of Change

Description of Baseline Sensitivity	Rating	Description of Magnitude of change arising from Proposed Development
Landscapes / views that are recognised in policy or otherwise designated as being of national value. The composition, character and quality of the landscape / view are such that its capacity to accommodate change is very low. The principle management objective for the landscape / view is its protection from change that reduces landscape value / visual amenity.	High	Change that is large in extent, resulting in the loss of or major alteration to key elements, features or characteristics of the townscape / view, and / or introduction of large elements considered totally uncharacteristic in the context. Such development results in fundamental change in the landscape/view.
Landscapes / views that may not have features or characteristics that are of particular value, but have no major detracting elements, and which thus provide some landscape value / visual amenity. These landscapes / views may have capacity for appropriate change and the principle management objective is to facilitate change to the composition that does not detract from landscape value / visual amenity, or which enhances them.	Medium	Change that is moderate in extent, resulting in partial loss or alteration to key elements, features or characteristics of the landscape / view, and / or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the landscape / view.
Landscapes / views that have no valued feature or characteristic, and where the composition and character are such that there is capacity for change. This category includes landscapes / views experienced by people involved in activities with no particular focus on the landscape. For such landscapes / views	Low	Change that is moderate or limited in scale, resulting in minor alteration to key elements, features or characteristics of the landscape / view, and / or introduction of elements that are not uncharacteristic in the context. Such

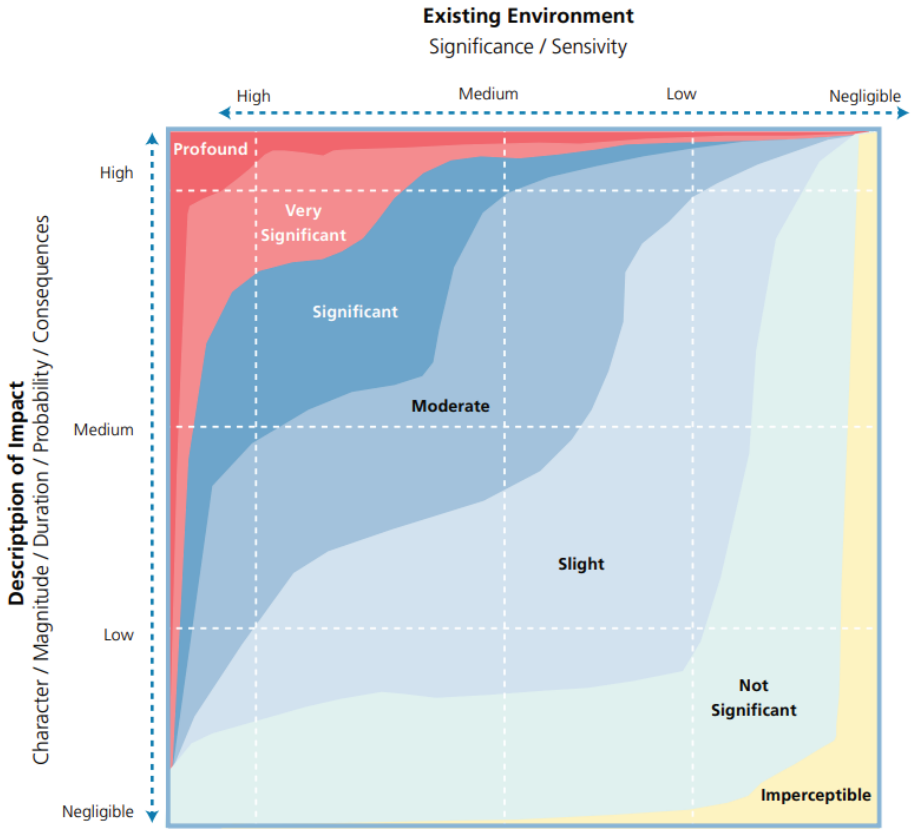
the principle management objective is to facilitate change that does not detract from landscape value / visual amenity or enhances them		development results in minor change to the landscape/view.
Landscapes / views that have no valued feature or characteristic, or in which the composition may be unsightly (e.g. in derelict landscapes). For such landscapes / views the principle management objective is to facilitate change that repairs, restores or enhances landscape value / visual amenity.	Negligible	Change that is limited in scale, resulting in no alteration to key elements features or characteristics of the landscape / view, and / or introduction of elements that are characteristic of the context. Such development results in no change to the landscape / view.

14.2.8 Significance of Effects on Landscape and Visual Environment

In classifying the significance of effects the magnitude of change is measured against the sensitivity of the landscape / view based on the guidance in the EPA Guidelines (EPA 2022) and presented in Figure 3.5 of the Guidelines, as adapted and included in Table 14.2 in this Chapter of the EIAR.

Determining significance of effects that are rational and justifiable is also based on the professional judgement, expertise and experience of the author.

Table 14.2 Classifications of the significance of impacts (Figure 3.4, EPA Guidelines 2022)



14.2.9 Quality, Duration and Frequency of Landscape and Visual Effects

Consideration of quality (i.e. positive, neutral, negative), duration (i.e. temporary (lasting up to 1 year); short-term (lasting 1 to 7 years); medium-term (lasting 7 to 15 years); long-term (lasting 15 to 60 years); or permanent (lasting over 60 years)) and frequency of effects, is as described in Table 3.3 of the EPA Guidelines (EPA 2017).

14.2.10 Photomontage Methodology

The methodology for the preparation of Photomontages has regard to the Landscape Institute Technical Guidance Note 06/19 Visual Representation of Development Proposals (Landscape Institute 2019), and is further informed by experience in photomontage production. The Photomontages are prepared as accurate verified photo-realistic views following five main steps: -

- Photography.
- Survey.
- 3D Modelling and Camera Matching.
- Rendering and Finishing of Photomontages.
- Presentation.

Photomontages are presented, in 'as existing' and 'as proposed' versions, on A3 pages in landscape format in Volume 3 of the EIAR.

14.3 Baseline Environment

14.3.1 Site Context and Description

The site comprises all or part of circa nine agricultural / former agricultural fields located to south of the established developed edge of Ratoath town. Existing one and two-storey residential development lies to the north of the site at Carraig na Gabhna, Cairn Court and along Glascarn Lane. Ratoath College is located to the northeast of the site (refer to Figure 14.1). The site lies circa 800m north of Fairyhouse Racecourse and circa 600m northeast of Tattersalls Ireland Fairyhouse facility.

The southern boundary of the site is defined by the proposed alignment of the Ratoath Outer Relief Road (RORR), which will eventually run from the R125 Ashbourne Road on the eastern side of the town, south and west to the R155 Fairyhouse Road on the southern edge of the town. New residential development together with a section of the Ratoath Outer Relief Road has been permitted at Jamestown (An Bord Pleanála ref.: 305196-19) to the east of the site (Refer to Figure 14.1). This section of the relief road is partly completed / under construction. Lands to the south of the Ratoath Outer Relief Road are currently in agricultural use but are zoned as strategic white lands in the Meath County Development Plan 2021-2027.

Figure 14.1 Site Context (Application site outlined in solid red line)

The area is suburban / suburban edge in character and the site is visually flat with fields divided by tall hedgerows with associated drainage ditches. The northern and western boundary of the site backs on to the rear of residential properties off R155 Faiyhouse Road, Cairn Court and Glascarn Lane and open space along the eastern side of properties at Carraig na Gabhna. Boundaries with these properties are a mix of walls, fences, trimmed hedges and field hedgerows. Views and visibility are limited and constrained by the flat nature of the site and surrounding lands and by the network of interlocking hedgerows and tree-lines in the landscape.

Vegetation on the site comprises a variety of roadside and field hedgerows (refer to Figure 14.2) principally as follows:

- Circa 175m of hedgerow (2 sections) along the R155 Fairyhouse Road;
- Circa 730m of field hedgerows (9 sections) on boundaries with third party lands and residential properties (R155 Fairyhouse Road, Carraig na Gabhna, Cairn Court and part of Glascarn Lane) to the northwest of the site;
- Circa 320m of hedgerow (3 sections) on the section of Glascarn Lane on and within the site boundary; and
- Circa 620m of field boundaries / part of field boundaries (5no.) within the site.

The hedgerows predominately comprise Hawthorn with other species such as Elder and Privet present in smaller qualities. Undergrowth is dominated by Bramble and Dogrose scrub which is encroaching out from the hedgerows due to lapsed management of the lands. Ash is the main tree species along with some Sycamore, Crab Apple and Poplar and these are dispersed along the hedgerows either as individuals or in short groups / lines. The bulk of the Ash shows evidence of infection by Ash Dieback (*Hymenoscyphus Fraxineus*) and this is likely to impact on their long-term potential. As a result, the Ash trees have been given a Category 'C' grade (low quality / value) – refer to the Arboricultural Assessment (Arborist Associates Ltd., April 2022).

The Arboricultural Assessment notes that none of the trees are Category 'A' (high quality / value). Only one tree (no. 1904) is considered to be Category 'B' (moderate quality / value); while the remaining are

79no. Category 'C' (low quality / value) and 7no. Category 'U' (poor quality). The assessment also identifies tree-lines and hedgerows all of which are Category 'C' (low quality / value).

Figure 14.2 Hedgerows on Site (Application site outlined in solid red line)

14.3.2 Landscape and Visual Planning Aspects

There are no landscape or visual designations, *i.e.* no protected views or prospects, scenic routes, amenity areas or tree preservation objectives in the Meath County Development Plan 2021-2027 pertaining to the site or its immediate surrounds. The following objectives in the Ratoath Settlement Chapter of the Development Plan (Volume 2) are relevant:

It is an objective of the Meath County Development Plan to:

- RA OBJ 7: To facilitate the development of the Ratoath Outer Relief route in tandem with development;
- RA OBJ 11: To promote a high standard of architectural design, and quality of materials utilised throughout the Development Framework area, that is appropriate in scale, and form to its location.
- RA OBJ 12: To require that development proposals are prepared in accordance with a Masterplan which includes an urban design and landscape design statement.

14.3.3 Overview and Landscape and Visual Significance and Sensitivity

The existing landscape is relatively and visually flat comprising agricultural / former agricultural lands with mature hedgerows bounded by existing residential development and roads to the west and north, by permitted residential development to the east / north-east and by agricultural lands to the south and southeast. The lands are zoned for residential land use and there is an objective to provide for a section of the proposed Ratoath Outer Relief Road (RORR) along the southern boundary of the residential lands. Views to the site are generally limited to glimpses from adjoining roads, (*i.e.* short sections of R155 Fairyhouse Road and Glascarn Lane) where views are generally well-screened by roadside

hedgerows and from residential properties bounding the site (i.e. of R155 Fairyhouse Road, Carriag na Gabhna, Manor Court, and Glascarn Lane) – though some have mature boundaries with the site.

Therefore, the **existing landscape and visual environment is of low to medium significance** and the most sensitive landscape and visual aspects of the existing environment are:

- Views from immediately adjoining residential properties; and
- Existing hedgerows on the boundary of the site and within the site.

14.4 Predicted Impacts

14.4.1 Characteristics of the Proposed Development

Overview

The Proposed Development on a site of circa 14.166 hectares provides for:

- the construction of 452 no. residential units which are located in 12 neighbourhoods.
- building heights range across the site from 2- and 3-storey terraced houses, through to 3- and 4-storey duplex buildings, and 6-storey apartment blocks.
- private open space associated with the residential units is provided in the form of rear gardens, balconies, terraces and winter gardens.
- a crèche with associated outdoor play areas at ground floor and at roof level;
- 4 no. commercial / local retail units;
- a landscaped public open space, which includes a civic plaza; communal open space in the form of communal courtyards for each neighbourhood;
- associated car and cycle parking serving the full development and uses therein;
- green roofs at various locations;
- solar PV panels;
- a second phase of the Ratoath Outer Relief Road (RORR), that will run along the southern boundary of the application site, with 2 no. multi-modal entrances;
- a series of pedestrian and cycle connections from the Fairyhouse Road (R155), Carraig na Gabhna, Glascarn Lane and the new RORR;
- internal road and shared surface networks including pedestrian and cycle paths;
- public lighting and all associated site development and infrastructural works, services provision, ESB substations, foul and surface water drainage, extension to the foul network, access roads / footpaths, lighting, landscaping and boundary treatment works; and
- all ancillary works necessary to facilitate the development.

A detailed description of the Proposed Development is set out in Chapter 1 (Introduction) of this EIAR.

Construction Stage

The Construction Stage of the Proposed Development will involve:

- Temporary fencing for security and for protection of retained hedgerows / tree-lines.

- Provision of a temporary site compound(s);
- Topsoil stripping and temporary storage for re-use;
- Subsoil excavation and removal from site;
- Removal of sections of existing hedgerow for provision of the development, connecting roads, services, footpaths and cycleways;
- Grading and preparation of the site for construction works;
- General construction activity associated with the provision of roads, residential and other development, installation of services, *etc*;
- The use of cranes and construction at higher levels, particularly for construction of taller elements of the Proposed Development;
- The use of construction site lighting, notably at either end of the working days during winter months;
- Construction of the central open space – a public space provided for the overall residential development;
- Construction of other open spaces, communal spaces and associated footpaths, cycleways, services and amenities;
- Construction of the section of the Ratoath Outer Relief Road, including junctions with the R155 Fairyhouse Road and Glascarn Lane, contiguous with the boundary of the development area; and
- Completion of the overall development.

The Proposed Development will be constructed on a phased basis over a number of years.

Operational Stage

The Operational Stage of the Proposed Development will see occupation and establishment of a new residential development up to 6-storeys in height with associated public open spaces and parks, lighting and associated section of the proposed Ratoath Outer Relief Road (RORR), with road lighting, to the south of existing developed lands and west of permitted residential areas on the southern edge of Ratoath.

In effect the Operational Stage of the Proposed Development will complete the southern extent of envisaged development on residential zoned lands extending south to the Ratoath Outer Relief Road.

14.4.2 Predicted Impacts Construction Stage

The existing landscape is relatively and visually flat comprising agricultural / former agricultural lands bounded by existing residential development and roads to the west and north, by permitted residential development to the east / north-east and by agricultural lands to the south and southeast. The lands are zoned for residential land use and there is an objective to provide for a section of the proposed Ratoath Outer Relief Road (RORR) along the southern boundary of the residential lands. Therefore, the **existing landscape character of the site is of low to medium significance**.

The Construction Phase of the Proposed Development will see the removal of sections of hedgerow, site works, earthworks, construction activity, including operation lighting, and the phased delivery of the proposed scheme. The **magnitude of change in the landscape will be medium to high**. Therefore the Construction Phase of the Proposed Development will result in a **moderate negative short-term impact on the landscape**.

As set out in the Arboricultural Assessment (Arborist Associates Ltd., April 2022), in terms of landscape features, the Construction Phase of the Proposed Development will result in the removal of circa 850m of roadside hedgerows and the majority of internal hedgerows / treelines (refer to Figure 14.3) including:

- Circa 160m of hedgerow (2 sections) along the R155 Fairyhouse Road for the RORR junction and pedestrian link to the west of the site;
- Circa 15m of field hedgerow (1 sections) on the boundary with Carraig na Gabhna, for provision of a pedestrian / cycle link to the northwest of the site;
- Circa 290m of hedgerow and treelines along the section of Glascarn Lane on and within the site boundary; and
- Circa 385m of field boundaries / part of field boundaries within the site.

Over 700m of roadside and site boundary hedgerows / tree-lines and circa 50m of internal hedgerow / treelines will be retained during the construction of the Proposed Development (refer to Figure 14.3).

The Construction Phase of the Proposed Development – and specifically the construction of the proposed section of the RORR, will impact on an existing section of Glascarn Lane, creating a cul-de-sac on the retained section of Glascarn Lane north of the alignment of the RORR and providing for a new junction to the proposed RORR for the section of Glascarn Lane south of the RORR. This will involve removal of a circa 200m section of the existing lane and associated roadside hedgerows.

The construction of the proposed section of the RORR will provide for a new junction with the R155 Fairyhouse Road on the western boundary of the site. This will require removal of circa 145m of the existing eastern roadside hedgerow for provision of the junction and for associated sightlines.

Two pedestrian openings through existing boundary hedgerows will be provided to the R155 Fairyhouse Road and via Carriag na Gabhna on the western boundary of the site.

The nature of existing landscape features is of **low significance** and the **magnitude of change is medium / high**. The construction of the Proposed Development will result in a **moderate negative short-term impact on landscape features.**

Figure 14.3 Hedgerow Removal (Yellow) and Retention (Green) (Application site outlined in solid red line)

The Construction Phase of the Proposed Development, including site development, general construction activity, the gradual emergence of structures of up to 6 storeys, site lighting, *etc*. will result in considerable visual disturbance and visual intrusion on views from surrounding properties and roads (*i.e.* sections of R155 Fairyhouse Road and Glascarn Lane) adjoining and overlooking areas of the site. This includes residential properties located along the R155 Fairyhouse Road west of the site; within Carraig na Gabhna, Carin Court and along Glascarn Lane to the north of the site; and along sections of Glascarn Lane northeast and southeast of the site. Given the flat landscape and the interlocking nature of field boundaries viewing to and visibility of construction works will be increasingly limited with distance from the site boundaries. Nevertheless, the use of cranes and the construction of taller elements of the Proposed Development will be visible from the surrounding areas, including from developed estates at Cairn Manor, Fairyhouse Lodge, and around Ratoath College, as well as from within the permitted (not constructed) development at Jamestown to the east of the site. Construction of the Proposed Development will also be visible from the agricultural lands to the south of the site and from lands and properties immediately west of the R155 Fairyhouse Road.

The nature of existing views and visual characteristics is of **low to medium significance** and the **magnitude of change is high**. Therefore, the construction of the Proposed Development will result in a **significant negative short-term impact on views from immediately surrounding lands and properties.**

14.4.3 Predicted Impacts Operation Stage

The Operational Phase of the Proposed Development will see delivery of a residential development, with public, communal and private open space, and an associated section of proposed Ratoath Outer Relief Road (RORR) on the existing developed southern edge of Ratoath Town. The lands are zoned for residential land use and the provision of the RORR is a stated objective of the Meath County Development Plan 2021-2027. Similar residential, open space and infrastructure development has also been recently permitted on adjoining lands to the east of the Proposed Development (ABP ref.: 305196-19).

The Proposed Development is arranged around 12 residential courtyards (A to H, J to M) located along a connected linear park and central public park (refer to Figure 14.4). Taller 6 storey building elements are setback from properties on adjoining lands and a neighbourhood centre with fronting public plaza area is provided within Courtyard H to the south of the central park. Nevertheless, the density and varying height, up to 6 storeys, of the proposed development represents a notable change in character from the more traditional 1 and 2 storey nature of the immediately surrounding residential areas.

The development positively fronts the section of proposed RORR to the south and provides for pedestrian and cycle permeability to the surrounding roads and to the RORR. The Proposed Development (refer to Figure 14.4) includes for a connected network of public linear parks, a central public open space, and communal and semi-private courtyards. The public open spaces are laid out in grass and semi-natural meadowgrass with extensive tree and shrub planting and include for pedestrian footpaths and cycleways and for provision of exercise and play equipment.

The **existing landscape character of the site is of low to medium significance**. The **magnitude of change in the landscape will be medium**. The Operation Phase of the Proposed Development will result in a **moderate neutral short-term impact on the landscape**.

The nature of existing views and visual characteristics is of **low to medium significance** and the **magnitude of change is medium to high**. Therefore, the construction of the Proposed Development will result in **moderate negative short-term** and **moderate neutral medium and longer-term impact on views from immediately surrounding lands and properties.**

Figure 14.4 Proposed Development (Application site outlined in solid red line)

14.5 Potential Cumulative Impact

As previously noted similar residential, open space and infrastructure development has been recently permitted on adjoining lands to the east of the Proposed Development (ABP ref.: 305196-19). However, as with the Proposed Development, this permitted development is similar located on residential zoned lands and will deliver an associated section of the proposed Ratoath Outer Relief Road (RORR). Therefore, while concurrent or immediately consecutive construction phases would result in **slight negative short-term visual impacts, no negative impacts would remain post construction**.

14.6 Do Nothing Scenario

The Ratoath Outer Relief Road is an objective of the Meath County Development Plan 2021-2027 and the lands are zoned for new residential and associated open space development. Therefore, should this development not proceed in a do-nothing scenario, it is envisaged that given the existing land use zoning, the section of proposed Ratoath Outer Relief Road together with a residential development of a nature broadly similar to that proposed will proceed on these lands at some stage. In any such instance any similar development would also be likely to result in broadly similar landscape and visual impacts.

14.7 Risks to Human Health

No identified risks to human health arise as a result of the landscape and visual assessment.

14.8 Mitigation Measures

14.8.1 Construction Stage

Mitigation measures are proposed to avoid, reduce or remediate, wherever possible potentially significant negative landscape and visual effects of the construction phase of the Proposed Development.

In addition to the operation and management of all construction works in accordance to best accepted methodologies and practice, that following measures are proposed for the mitigation of landscape / townscape and visual impacts: -

- Construction works will be guided by a Construction Environmental Management Plan (CEMP), which will provide the environmental management framework to be adhered to and monitored during the pre-commencement and construction stages of the Proposed Development. The CEMP will incorporate all mitigating principles required to ensure that the work is carried out in a manner that minimises the potential for environmental impacts to occur.

- Construction compounds and material storage will not be located adjacent to boundaries with existing residential properties or within the root protection area of trees or hedgerows to be retained. Compounds will be enclosed by solid hoarding and will be decommissioned and reinstated at the end of the construction phase.

- Trees, hedgerows and vegetation to be retained within and adjoining the works area will be protected in accordance with '*BS 5837:2012 Trees in relation to in relation to design, demolition and construction. Recommendations*'. Works required within the root protection area (RPA) of trees, hedgerows to be retained will follow a project specific arboricultural methodology for such works, prepared / approved by a professional qualified arborist. Proposals for retention and protection measures are set out in detail in the Arboricultural Assessment report and associated Tree Protection Plans (RORR002 – Part 1 & RORR002 – Part 2), prepared by Arborist Associates Ltd.

- Trees and vegetation identified for removal will be removed in accordance with '*BS 3998:2010 Tree Work – Recommendations*' and best arboricultural practices as detailed and monitored by a professional qualified arborist. Tree and hedgerow removal will avoid the bird nesting season – *i.e.* 1 March to 31 August inclusive.

- The site of the Proposed Development – or active phase of development as appropriate will be enclosed and secured. Construction traffic accessing the Site will follow agreed routes and public roads will be maintained in a clean and safe manner.

Mitigation of landscape and visual impacts during the construction phase is focused on ensuring protection of elements to be retained (*e.g.* mature hedgerows) and providing for a degree of visual screening of particular aspects of the works (e.g. the construction compounds).

14.8.2 Operational Stage

The Operational Stage of the Proposed Development will not give rise to significant landscape and visual effects and therefore measures for the mitigation of significant landscape and visual impacts are not required. Nevertheless, the Proposed Development includes a number of measures which will ensure integration within its setting. The Proposed Development includes:

- Provision of a high-quality of architectural design, character and finish for the proposed buildings and development.
- Provision of significant areas of new and connected open space and parkland with play facilities as amenity and recreation for the new communities. The open space network provides for retention and incorporation of boundary hedgerows.
- Planting of new trees along the proposed section of the RORR, streetscapes and within open spaces. Species selected will be appropriate to the street environment and to the characteristics of the location.
- Provision of a high-quality of design and finish for landscape areas within the Proposed Scheme.
- Landscape areas will be maintained for twelve months during which any defective or dead material will be replaced.
- The public open space network, including the central public open space will be offered for taking-in-charge.

14.9 Residual Impacts

14.9.1 Construction Stage

Any development will give rise to some degree of landscape and visual impact. The greatest impacts tend to occur during the temporary / short-term construction stage when initial site disturbance associated with the stripping of soils and movement of machinery will be unfamiliar and will draw particular visual attention to the site and the works.

The Construction Phase will involve removal of sections of hedgerows for provision of the development, roads, footpaths, cycleways and services connections. Existing hedgerows to be retained will be protected within proposed linear parks and on boundaries.

The site for the Proposed Development is zoned A2 for delivery of new residential development, and brings forward a further extent of the proposed Ratoath Outer Relief Road. The Proposed Development is located west of and adjoins similar recently permitted residential development at Jamestown.

Nevertheless, the construction stage of the Proposed Development will result in a considerable degree of change to the rural / town edge character of the landscape of the site and a substantial change to views of the lands from adjoining residential and other properties located along the R155 Fairyhouse Road (west of and adjoining the site); at Carraig na Gabhna, Cairn Court and Glascarn Lane to the northwest and north of the site; and from the residential property on Glascarn Lane located immediately south of the proposed Ratoath Outer Relief Road.

While mitigation measures are proposed, they will not and cannot address all of the landscape and visual changes that arise during the Construction Phase of the Proposed Development. Therefore, the overall residual landscape and visual impact of the Construction Stage is assessed as being of **moderate negative short-term significance**.

14.9.2 Operation Stage

On completion of the construction stage a new development will establish its presence on the environmental, physical and visual character of its environs. In this regard landscape and visual impacts must also be considered within the context of existing, planned, emerging and likely future development

proposals for the area. The Ratoath Outer Relief Road is proposed infrastructure and sections have already being constructed or are under construction to the east of the site. The site is zoned A2 for new residential development and new residential development has been recently permitted on similar A2 zoned lands to the immediate east of the site. In this regard the Proposed Development can be considered to be consistent with the emerging and planned land uses for the area as set out in the Meath County Development Plan 2021-2027.

It is considered that the Proposed Development is appropriately sited, designed and laid out so as to be capable of being integrated into the new emerging residential character of the southern extent of Ratoath. This integration is underpinned by the proposed delivery of a contiguous section of the Ratoath Outer Relief Road and by the architectural and landscape approach for the Proposed Development that envisages diverse and integrated communities with connected public and communal open spaces.

Therefore, while the Proposed Development will give rise to localised visual impacts the overall development will have a positive residual impact on the emerging local character, and will not adversely impact sensitive landscape characteristics or views to and from the wider landscape. It is considered that the operational stage of the development will make a continued positive contribution to the emerging residential community of the wider area.

The residual landscape and visual impact of the Operation Phase of the Proposed Development is assessed as being of **moderate positive medium to long-term significance**.

Photomontages

A series of verified photomontages (refer to Volume 3 of the EIAR) have been prepared by Digital Dimensions to assist in illustrating the physical and visual nature of the Proposed Development as viewed in the surrounding landscape. Views, which are presented in 'Existing' and 'Proposed' formats have been produced from nine locations (refer to View Location Map in Volume 3 of the EIAR).

The views illustrate the considerable screening of the Proposed Development from public areas provided by existing vegetation and development, including existing residential development. Nevertheless, it is also clear from the views that properties adjoining or close to the boundary of the site will experience considerable change in existing views, albeit the impact will be mitigated through the retention of boundary hedgerows and treelines, proposed planting and the architectural quality of the Proposed Development.

14.10 Monitoring

14.10.1 Construction Stage

Landscape and visual mitigation measures will be monitored during the construction stage. This will include siting of the construction compound; protection of trees / hedgerows to be retained; stripping and storage of topsoil; reinstatement of landscape / soil areas; and completion of landscape works.

All landscape areas disturbed by construction works will be reinstated prior to the completion of construction works. Any materials or plants which fail within a twelve month post-construction aftercare period will be replaced.

14.10.2 Operational Stage

No monitoring other than management of landscape areas will be required during the operational stage.

Any landscape materials, plants or areas which fail during the on-going operational stage will be replaced.

14.11 Difficulties Encountered

No specific difficulties were encountered in the preparation of this chapter of the EIAR.

14.12 References

BS 5837:2012 Trees in relation to in relation to design, demolition and construction. Recommendations'

BS 3998:2010 Tree Work – Recommendations

Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the EIA Directive).

Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA 2022).

European Landscape Convention 2000.

Guidelines for Landscape and Visual Impact Assessment 3rd edition (Landscape Institute and the Institute of Environmental Management and Assessment [IEMA] 2013).

Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government DHPLG 2018).

Landscape Institute Technical Guidance Note 06/2019 on Visual Representation of Development Proposals (Landscape Institute 2019).

Meath County Development Plan 2021 – 2027.

Planning and Development Acts 2000-2022.

Planning and Development Regulations 2001-2022.

Technical Information Note 05/2017 (Revised 2018) on Landscape Character Assessment (Landscape Institute 2018).

15. Summary of Interactions Measures

15.1 Introduction

This chapter deals with likely interactions between effects predicted as a result of the proposed development. The chapter has been prepared by KPMG Future Analytics in accordance with the requirements set out within the Planning and Development Regulations 2001 to 2020 and the EPA's Draft Guidelines on *Information to Be Contained in Environmental Impact Assessment Reports* (2017) to summarize the interactions and interrelationships between key factors identified and assessed.

15.2 Definitions

Article 3(1) of the amended EIA Directive requires environmental impact assessments to include interactions of key effects assessed. The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

a) population and human health;

b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;

c) land, soil, water, air and climate;

d) material assets, cultural heritage and the landscape;

e) the interaction between the factors referred to in points (a) to (d).

Accordingly, this EIAR seeks to identify all potential impacts of the subject scheme, and this chapter has been compiled to list in one location all of the interactions identified in the assessment of impacts set out in Chapters 5 to 14.

Impact interactions and inter-relationships have been considered throughout in the preparation of the individual, topic specific chapters so that it can take into account the broader picture of how the proposed scheme may affect the various environmental media. All environmental topics are interlinked to a degree such that interrelationships exist on numerous levels. It is general practice to evaluate interaction of effects as a matrix between effects and key factors assessed, accompanied by brief text describing the interactions identified.

15.3 Interaction of Effects

Table 15.1 Table showing interaction between key factors assessed

Some interaction ✔ No interaction x	Population & Human Health		Biodiversity		Land and Soils		Water		Air & Climate		Noise & Vibration		Material Assets: Built Services		Traffic & Transport		Material Assets: Waste Management		Cultural Heritage		Landscape	
	Con.	Ope.	Con.	Ope.	Con.	Ope.	Con.	Ope.	Con.	Ope.	Con.	Ope.	Con.	Ope.	Con.	Ope.	Con.	Ope.	Con.	Ope.	Con.	Ope.
Population and Human Health			x	x		x	x	x	✔	x	✔	x	x		✔	✔			x	x	x	✔
Biodiversity		x			✔	x	✔	✔	x	x	✔	x	x	x	✔	✔	✔	x	x	x	✔	✔
Land and Soils	✔	x	x	x			x	x	x	x	✔	x	x	x	✔	x	✔	x	x	x	x	x
Water	x	x	x	x	✔	x			✔	✔	x	x	✔	✔	✔	x	✔	x	x	x	x	x
Air & Climate	x	x	x	x	✔	x	x	x			x	x	x	x	✔	✔	✔	x	x	x	x	x
Noise & Vibration	✔	x	x	x	✔	✔	x	x	x	x			x	x	✔	✔	x	x	x	x	x	x
Material Assets: Built Services		x	x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	x	x	x
Traffic & Transport	✔	✔	x	x	x	x	x	✔	x	x	✔	x	x	x			x	x	x	x	x	x
Material Assets: Waste Management	x	x	x	x	x	x	x	✔	x	x	✔	x	x	x	x	x			x	x	x	x
Cultural Heritage	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x
Landscape	x	x	x	x	✔	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		

Interactions identified in Table 16.1 are discussed below within individual factors identified.

15.3.1 Population and Human Health

The main interactions Population and Human Health and other topics are set out below: -

- Air and Climate;
- Noise and Vibration;
- Traffic and Transport; and
- Landscape

15.3.2 Biodiversity

The biodiversity elements of this EIAR have involved consultation with a wide section of the Project Team particularly in relation to the construction management, design, drainage, lighting and landscape elements of the proposed Project. There are numerous inter-related environmental topics described in detail throughout this EIAR document which are of relevance to the biodiversity chapter. There is potential for interaction between the biodiversity and other chapters outlined in the EIAR, during construction and operation. The mitigation measures that will be put in place for the proposed development will ensure that the impact on biodiversity would be minor adverse not significant following the implementation of mitigation measures.

15.3.3 Land and Soils

The main interactions Population and Human Health and other topics are set out below: -

- Population and Human Health;
- Noise and Vibration;
- Traffic and Transport; and
- Material Assets: Waste Management

15.3.4 Water

During the construction phase, the following aspects would interact with water and hydrology and, in the absence of mitigation, may give rise to likely significant effects;

Material Assets Built Services: The construction of the proposed services (water supply, drainage, etc.) may affect the local hydrological and hydrogeological environment as there is a risk of suspended solids runoff.

Land & Soils: Site preparatory works (i.e. site clearance, re-profiling, etc.) during the construction stage have the potential to impact the hydrology and hydrogeology due to accidental spills, suspended solids becoming entrained in surface water runoff, etc. During the operational phase, the potential interactions are;

Material Assets Built Services: There will be an increased demand on potable water supply and on the municipal drainage system.

The potential significant impacts on water and hydrology arising from these interactions have been considered within the relevant discipline and mitigation measures outlined, where required. With mitigation measures in place, no significant, permanent, residual, negative impacts will occur.

15.3.5 Air & Climate

The main interactions with Air & Climate and other topics are set out below.

- Land and Soils;
- Traffic and Transport; and
- Material Assets: Waste Management

15.3.6 Noise & Vibration

The main interactions with Noise & Vibration and other topics are set out below.

- Population and Human Health; and
- Traffic and Transport

15.3.7 Material Assets - Built Services

There are no interactions arising from this Chapter and other chapters.

15.3.8 Traffic and Transport

The main interactions identified in the Material Assets – Traffic and Transport chapter and other topics are set out below.

- Population and Human Health;
- Water; and
- Noise & Vibration

15.3.9 Material Assets – Resource & Waste Management

The main interactions identified in the Resource and Waste Management chapter and other topics are set out below.

- Water; and
- Noise & Vibration

15.3.10 Cultural Heritage

The main interactions with Cultural Heritage and other topics are set out below.

15.3.11 Landscape

The main interactions with Landscape and Visual and other topics are set out below.

- Land and Soils

15.4 Other effects

Schedule 6 Item 2(e) of the Planning and Development Regulations, 2001 as Amended requires that an EIAR contains a description of the likely significant effects (including direct, indirect, secondary,

cumulative, transboundary, short, medium and long-term, permanent and temporary, positive and negative) of the project on the environment resulting from the following:-

• *the Use of Natural Resources*

As the proposed development will not require the use of natural resources that are in short supply no likely significant effects on the environment are expected to arise from the use of natural resources in the construction / operation of the project

• *the emission of pollutants, the creation of nuisances and the disposal and recovery of waste*.

No likely significant effects on the environment are expected to arise from the emission of pollutants, the creation of nuisances or the elimination of waste associated with this project, as the relevant assessments included in this EIAR set out.

• *the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)*

The likely significant effects of risks due to major accidents or disasters are described in Chapter 1 of this EIAR and in the Assessment Chapters, where relevant.

• *The technologies and the substances used.*

This is an urban residential development and there are no technologies or substances associated with the project which would significantly or adversely affect the environment.

15.5 References

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency, May 2022)
- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency, Draft August 2017)
- Advice Notes for Preparing Environmental Impact Statements, Draft September 2017
- Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002)
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2002)

16. Summary of Mitigation Measures and Residual Impacts

16.1 Introduction

This chapter provides a complete summary of mitigation measures proposed in Chapters 4-16. The appointed contractor is required to adhere to the mitigation measures provided here to avoid or reduce significant effects and ensure sustainable development.

16.2 Mitigation Measures

The EPA Guidelines on information to be contained in EIARs (2022) established four main strategies for mitigation of effects avoidance, prevention, reduction, and offsetting.

16.2.1 Biodiversity

Construction Stage

Storage/Use of Materials, Plant & Equipment

- Materials, plant and equipment shall be stored in the proposed site compound location;
- Plant and equipment will be parked in areas remote from any sensitive locations, including the watercourses, ponds and drainage ditches, at the end of the working day;
- Hazardous liquid materials or materials with potential to generate runoff shall be stored in areas remote from any sensitive locations;
- All hazardous liquid materials shall be stored in a bunded area and spill containment measures will be in place;
- All oils, fuels and other hazardous liquid materials shall be clearly labelled and stored in an upright position in an enclosed bunded area within the proposed development site compound. The capacity of the bunded area shall conform with EPA Guidelines – hold 110% of the contents or 110% of the largest container whichever is greater;
- Fuel may be stored in the designated bunded area or in fuel bowsers located in the proposed compound location. Fuel bowsers shall be double skinned and equipped with certificates of conformity or integrity tested,
- in good condition and have no signs of leaks or spillages;
- Smaller quantities of fuel may be carried/stored in clearly labelled metal jerry cans. Green for diesel and red for petrol and mixes. The Jeri cans shall be in good condition and have secure lockable lids. The Jeri cans shall be stored in a drip tray when not in use. They will not be stored within 50m[14] of watercourses or drains that lead to watercourses or ponds;
- Drip trays will be turned upside down if not in use to prevent the collection of rainwater;
- Waters collected in drip trays must be assessed prior to discharge. If classified as contaminated, they shall be disposed by a permitted waste contractor in accordance with current waste management legal and regulatory requirements;
- Plant and equipment to be used during works, will be in good working order, fit for purpose, regularly serviced/maintained and have no evidence of leaks or drips;

[14] Standard Operation Procedures for TII are to ensure that "Oil storage tank(s) and the associated filling area and distribution pipe work should be at least 10m distant from surface watercourses (rivers, lakes, streams, field drains) and 50m from wells or boreholes. As a precaution 50m has been selected in this instance. https://www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Crossing-of-Watercourses-during-the-Construction-of-National-Road-Schemes.pdf

- No plant used shall cause a public nuisance due to fumes, noise, and leakage or by causing an obstruction;
- Re-fuelling of machinery, plant or equipment will be carried out in the site compound as per the appointed Construction Contractor re-fuelling controls;

- The appointed Construction Contractor EERP will be implemented in the event of a material spillage;
- All persons working will receive work specific induction in relation to material storage arrangements and actions to be taken in the event of an accidental spillage. Daily environmental toolbox talks / briefing sessions will be conducted for all persons working to outline the relevant environmental control measures and to identify any environment risk areas/works.

Surface Water Mitigation

Sufficient onsite cleaning of vehicles prior to leaving the site and on nearby roads, will be carried out, particularly during groundworks.

The Site Manager will be responsible for the pollution prevention programme and will ensure that at least daily checks are carried out to ensure compliance. A record of these checks will be maintained.

The site compound will include a dedicated bund for the storage of dangerous substances including fuels, oils etc. Refuelling of vehicles/machinery will only be carried out within the bunded area.

A project ecologist will be appointed and be consulted in relation to all onsite drainage during construction works. Consultation with the project ecologist will not involve the formulation of new mitigation measures for the purposes of protecting any European Site, and relate only to the implementation of those mitigation measures already stated in the submission or the formulation of mitigation for other purposes.

Dewatering of excavations may be necessary. Appropriate monitoring of groundwater levels during site works will be undertaken. Standard construction phase filtering of surface water for suspended solids will be carried out. Unfiltered surface water discharges or runoff are not permitted from the site.

Proposals to connect up onsite drainage during construction to the pond shall be carried out under the guidance of the project ecologist.

Concrete trucks, cement mixers or drums/bins are only permitted to wash out in designated wash out area greater than 50m from sensitive receptors including drains and drainage ditches.

Spill containment equipment shall be available for use in the event of an emergency. The spill containment equipment shall be replenished if used and shall be checked on a scheduled basis.

All site personnel will be trained in the importance of good environmental practices including reporting to the site manager when pollution, or the potential for pollution, is suspected. All persons working on-site will receive work specific induction in relation to surface water management and run off controls. Daily environmental toolbox talks / briefing sessions will be conducted to outline the relevant environmental control measures and to identify any environment risk areas/works.

Air & Dust

Site Management

- Regular inspections of the site and boundary should be carried out to monitor dust, records and notes on these inspections should be logged.
- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.

Monitoring

- Undertake daily on-site and off-site inspection, where receptors are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces within 100 m of site boundary, integrity of the silt control measures, with cleaning and / or repair to be provided if necessary.

Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Fully enclose specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.
- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.
- Any road that has the potential to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions.

Waste Management

- Avoid bonfires and burning of waste materials.

Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.
- During dry and windy periods, and when there is a likelihood of dust nuisance, a bowser will operate to ensure moisture content is high enough to increase the stability of the soil and thus suppress dust.

The Contractor will be required to consult with an ecologist prior to the beginning of works to identify any additional measures that may be appropriate and/or required.

Storage/Use of Materials, Plant & Equipment

- Materials, plant and equipment shall be stored in the proposed site compound location;
- All oils, fuels and other hazardous liquid materials shall be clearly labelled and stored in an upright position in an enclosed bunded area within the proposed development site compound. The capacity of the bunded area shall conform with EPA Guidelines – hold 110% of the contents or 110% of the largest container whichever is greater;
- Fuel may be stored in the designated bunded area or in fuel bowsers located in the proposed compound location. Fuel bowsers shall be double skinned and equipped with certificates of conformity or integrity tested, in good condition and have no signs of leaks or spillages;
- Smaller quantities of fuel may be carried/stored in clearly labelled metal Jeri cans. Green for diesel and red for petrol and mixes. The Jeri cans shall be in good condition and have secure lockable lids.
- All hazardous liquid materials shall be stored in a bunded area and spill containment measures will be in place;
- Drip trays will be turned upside down if not in use to prevent the collection of rainwater;
- Waters collected in drip trays must be assessed prior to discharge. If classified as contaminated, they shall be disposed by a permitted waste contractor in accordance with current waste management legal and regulatory requirements;

- Plant and equipment to be used during works, will be in good working order, fit for purpose, regularly serviced/maintained and have no evidence of leaks or drips;
- No plant used shall cause a public nuisance due to fumes, noise, and leakage or by causing an obstruction;
- Re-fuelling of machinery, plant or equipment will be carried out in the site compound as per the appointed Construction Contractor re-fuelling controls;

Mitigation For Birds

Relevant guidelines and legislation (Section 40 of the Wildlife Acts, 1976 to 2012) in relation to the removal of trees and timing of nesting birds will be followed e.g. trees or shrubs will not be removed during the nesting season (1st March to 31st August).

Mitigation is required in the form of the provision of a biodiversity pack for each house on site to include one bird box and two native trees to provide nesting and foraging potential for birds. Three swift nesting boxes will be places on each apartment building.

Mitigation for Mammals/Amphibians

A preconstruction mammal/amphibian inspection will be carried out to ensure mammals and amphibians of conservation importance are not on site prior to construction.

Mitigation for Flora

Mitigation is required in the form of the provision of a biodiversity pack for each house on site to include two native trees.

Mitigation for bats

As outlined in Appendix 5.1 *"Mitigation is required in the form of a pre construction inspection of trees to be felled, the provision of 8 bat boxes and a post construction light spill assessment."*

Operational Stage

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

16.2.2 Land & Soils

Construction Stage

To reduce the impacts on the soils, geology, and the hydrogeological environment, a number of mitigation measures will be adopted as part of the construction works on the Site. The measures will address the main activities of potential impact which include:

- Control of Soil Excavation and Export from Site;
- Sources of fill and aggregates for the project;
- Fuel and chemical handling, transport, and storage; and
- Control of water during construction.

In advance of the commencement of Site works, the works Contractor will provide a Construction Methodology document detailing their proposed construction methods and any additional requirements of the Design Team or Planning Regulator. The Contractor will also prepare a Construction Management Plan (CMP) and Environmental Plan.

Operational Stage

During the operational phase of the Ratoath development, any excavations have the potential for an unavoidable impact on the geological environment of the area. However, as there will be no basements associated with the development, these excavations will be shallow and unlikely to cause significant impact requiring mitigation. The proposed scheme will have a heating system which will be fuelled by electrically powered heat pumps; therefore, there is no requirement for fuel oil storage thereby removing any potential contamination source.

16.2.3 Water

Construction Stage

All excavated materials shall be sorted and separated into stockpiles. The stockpiles will be kept remote from the adjacent Ratoath Stream, Fairyhouse Stream, and Broadmeadow River. Stockpile areas shall be designed with appropriate drainage and erosion protection to prevent the creation of soil bearing runoff and mixing of materials.

If contaminated soils are found on site, they will be excavated and disposed of off-site in accordance with the Waste Management Acts 1996-2001 and associated regulations and guidance provided in the TII's Guidelines for the Management of Waste from National Road Construction Projects.

Bunded areas for oil storage tanks and oil separators will be installed at fuel filling points to protect from accidental spills during the construction phase. Oil-absorbent materials shall be provided as an emergency measure in the event of a fuel spill.

The site-specific Waste Construction & Environmental Management Plan will be approved by the Local Authority prior to the commencement of construction.

The Surface Water Management Plan will be implemented to ensure surface water storage in excavations will be directed to on-site settlement ponds, where silt removal will occur before discharge off site at a controlled rate. Periodic testing of the surface water discharge will be undertaken as required.

Any concrete mixing plant shall be sited in a designated area with an impervious surface.

All oils, solvents, and paints used during construction will be stored within temporary bunded areas or chemical storage containers to minimise any impact on the water environment from material spillages. Any construction phase discharge to the wastewater sewerage infrastructure shall comply with the conditions of a Discharge Licence from Irish Water. New sewers will be pressure tested and CCTV surveyed to detect defective or leaking sewers. Such defects, if they arise, would be repaired prior to the connection of any future development to the sewers.

Operational Stage

Water sewerage system treatment (such as silt traps and interceptors) will be implemented following conditions of a discharge licence from Irish Water.

Sustainable drainage systems, trapped gullies and silt-trap manholes will decrease the amount of debris discharging into the surface water system and, eventually, to the public combined sewer network.

Pervious paving, green roofs, filter drains, trapped road gullies, underground pipe network, silt traps, oil separator, concrete storage systems, and flow control devices will reduce runoff volume and improve water quality.

Best management drainage policies, in accordance with CIRIA 753 – The SuDS Manual - will be implemented and incorporated into the design and management of the surface water drainage system. All surface water drains and sewers/ wastewater drains and sewers will be tested and surveyed prior to connection to the public sewers to minimise the risk of uncontrolled groundwater penetration or leakage of foul water to groundwater on the site.

During the operational phase, the surface water network (drains, gullies, manholes, AJs, SuDS devices, and attenuation system) will need to be regularly maintained and cleaned, where required. A suitable maintenance regime of inspecting and cleaning should be incorporated into the safety file/maintenance manual for the development.

16.2.4 Air & Climate

Construction Stage

Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.

Any road that has the potential to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions.

Vehicles exiting the site shall make use of a wheel wash facility prior to entering onto public roads.

Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph.

Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary.

Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.

During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.

Operational Stage

The impact of the operational traffic associated with proposed development on air quality and climate is predicted to be imperceptible with respect to the operational phase in the long term. Therefore, no

site specific mitigation measures are required other than those set out in Section 8.4.2 in relation to operational phase energy usage.

16.2.5 Noise & Vibration

Construction Stage

No plant used on site will be permitted to cause an ongoing public nuisance due to noise

The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations

All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract

Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers

Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use

Any plant, such as generators or pumps that is required to operate before 07:00hrs or after 19:00hrs will be surrounded by an acoustic enclosure or portable screen

Operational Stage

As is the case in most buildings, the glazed elements of the building envelope are typically the weakest element from a sound insulation perspective. In general, all wall constructions (i.e. blockwork or concrete and spandrel elements) offer a high degree of sound insulation, much greater than that offered by the glazing systems. Therefore, noise intrusion via the wall construction will be minimal. It's also noted that the ventilation strategy will be for Mechanical Ventilation Heat Recovery units which are expected to provide strong sound insulation to external noise, hence ingress of noise through the ventilation systems is considered to be negligible for this assessment. The performance values set out below are to provide the range of the overall Rw values required. As part of the detailed design, the specifics in terms of octave band SRI performances will be established to take account of the finalised room layouts, room volumes and glazing dimensions.

It is important to note that the acoustic performance specifications detailed herein are minimum requirements which apply to the overall glazing system. In the context of the acoustic performance specification the 'glazing system' is understood to include any and all of the component parts that form part of the glazing element of the façade, i.e. glass, frames, seals, openable elements etc.

As noted above, as part of the detailed design of the residential blocks, the specifics in terms of octave band SRI performances will be established to take account of the finalised room layouts, room volumes and glazing dimensions.

16.2.6 Material Assets: Built Services

Construction Stage

There are no mitigation measures proposed during the construction phase of development.

Operational Stage

As the time frames for planned outages is required to be planned the ESB will be engaged at an early stage to ensure any potential issues with utility connections are reviewed and mitigated as early in the process as possible. ESB will not engage with design process until such time as planning has been approved, and an application for power has been made with the scheme name and numbering has been approve by the local County Council.

As the time frames for planned outages is required to be planned Bord Gais will be engaged at an early stage to ensure any potential issues with utility connections are reviewed and mitigated as early in the process as possible. Bord Gais will not engage with design process until such time as planning has been approved, and an application for Gas has been made with the scheme name and numbering has been approve by the local County Council.

As the time frames for planned outages is required to be planned by Virgin, Eir, Siro will be engaged at an early stage to ensure any potential issues with utility connections are reviewed and mitigated as early in the process as possible. The Utility Companies will not engage with design process until such time as planning has been approved, and an application for Fibre and/or other communication fixed wiring systems has been made with the scheme name and numbering has been approve by the local County Council

16.2.7 Traffic and Transportation

Construction Stage

1. Fencing

Perimeter fencing will be provided around the different phases of the site and along the public road so as to prevent unauthorised access to the site. Controlled access points will also be provided. Fencing will be maintained to a high standard and painted or covered as appropriate.

Temporary fencing will be provided as necessary within the site as safety restrictions to prevent public access. The locations of this temporary fencing will vary as work progresses across the site.

2. Works on the Public Road

Access to the site will be from the proposed site entrance via the Fairyhouse Road.
All works on the public road Works, including the proposed junction and mixed use facility will be carried out subject to, and in accordance with, a Road Opening Licences with Meath County Council and all works will be carried out in accordance with MCC and HSA guidelines for working on public roads.

3. Construction Traffic Mitigation Measures

The appointed contractor will put in place measures to keep public roads free of muck and debris. This will include providing a wheel wash on site and undertaking regular road sweeping by mechanical sweeper.

4. Noise Control

Measures will be implemented to minimise the impact of noise emissions at sensitive locations during the construction phase. Such measures will include the following:

- Construction contractors will be required to comply with the requirements of the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations and the Safety, Health and Welfare at Work (Control of Noise at Work) Regulations;
- All plant items used during the construction phase should comply with standards outlined in the ‘Safety, Health and Welfare at Work (Control of Noise at Work) Regulations’ and the ‘European

Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations'. Reference will be made to BS 5228: Part 1: 2009 (Noise Control on Construction and Open Sites - Part 1. Code of Practice for Basic Information and Procedures for Noise Control) and will include the following mitigation measures:

- Training of site staff in the proper use and maintenance of tools and equipment;
- The positioning of machinery on site to reduce the emission of noise and to site personnel;
- Sources of significant noise will be enclosed where practicable;
- Machines that could be in intermittent use will be shut down between work periods or will be throttled down to a minimum;
- Plant known to emit noise strongly in one direction will, when possible, be orientated so that the noise is directed away from noise sensitive areas; and
- Plant and/or methods of work causing significant levels of vibration at sensitive premises will be replaced by other less intrusive plant and/or methods of working where practicable.

- Inherently quiet plant will be selected where appropriate;
- Screening and enclosures will be utilised in areas where construction works are continuing in one area for a long period of time or around items such as generators or high duty compressors. For maximum effectiveness, a screen will be positioned as close as possible to either the noise source or receiver. The screen will be constructed of material with a mass of >7kg/m^2 and should have no gaps or joints in the barrier material. This can be used to limit noise impact to any noise sensitive receptors;
- Operators of all mobile equipment will be instructed to avoid unnecessary revving of machinery and mobile equipment will be throttled down or switched off when not in use;
- Accordingly, where possible all construction traffic to be used on site will have effective well-maintained silencers; and
- All mobile plant will be maintained to a high standard to reduce any tonal or impulsive sounds.

5. Dust Control

The main activities that may give rise to dust emissions during construction include the following:

- Materials handling and storage; and
- Movement of vehicles (particularly HGV's) and mobile plant.

The following mitigation measures will be implemented on site during the construction phase, as required:

- Vehicles exiting site will use a wheelwash to ensure dust emissions are not generated from tyres. It will also prevent vehicles from carrying excess material onto public roads;
- Site roads shall be regularly cleaned and maintained as appropriate;
- Hard surface roads shall be swept to remove mud and aggregate materials from their surface as a result of the development works;
- Any un-surfaced roads shall be restricted to essential site traffic only;
- Any road that has the potential to give rise to fugitive dust may be regularly watered, as appropriate, during extended dry and/or windy conditions;
- On-site speed limits will be stipulated to prevent unnecessary generation of fugitive dust emissions;
- Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind;
- A complaints register will be maintained on-site and any complaints relating to dust emissions will be immediately dealt with;
- In periods of dry weather when dust emissions would be greatest, a road sweeper, which would also dampen the road, will be employed in order to prevent the generation of dust;

- Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods; and
- If appropriate, dust monitoring will be carried out during the construction phase of the scheme. If the level of dust is found to exceed 350mg/m^2/day in the vicinity of the site, further mitigation measures will be incorporated into the construction of the proposed scheme

6. Control of Substances Hazardous to Health

The strategy for controlling all substances and all work processes that may generate hazardous substances will have to be addresses and control measures put in place. Some of the control measures to be employed include the following:

- All fuel and chemicals to be stored in designated areas, with deliveries of hazardous materials supervised.
- Storage tanks and container facilities will be appropriately bunded.
- In the case of spills or discharges, remedial action will be taken as soon as possible in accordance with company procedures.
- Personal protective equipment (PPE) suitable to the pertaining conditions will be used by all site personnel.

Please refer to the Construction and Environmental Management Plan report which is included under a separate for further details of mitigation measures during construction stage. Again, the detailed Construction Management Plan will be submitted by the appointed contractor to the Local Authority for agreement prior to the commencement of construction.

Operational Stage

In order to reduce the risks to human health during operational stage, the proposed link roads and streets together with the junctions, footpaths and cycle facilities have been designed in accordance with requirements of the Design Manual for Urban Roads and Streets (DMURS) and the National Cycle Manual (NCM). DMURS is the design philosophy used in the design of all new residential roads and urban streets and the key objective of DMURS is to achieve safe, attractive, and vibrant streets by balancing the needs of all users, and prioritising alternatives to car journeys.

The access roads linking to the RORR are implemented with a 6m cross section and the remaining local streets a width of 5m. This is accompanied by variations in the horizontal alignment of the access road providing a natural traffic calming effect in both a physical and psychological sense, which will assist in self-regulating vehicular speeds.

There are several shared surface roads that implement a raised rounded imprinted median and road markings to further promote low vehicle speeds to reduce the risks to the pedestrian within the development.

In addition, gradients proposed minimise the need for revving of engines and associated noise and emissions, while appropriate landscaping will absorb excessive sound. Pedestrian priority will be provided at some internal junctions in the form of raised entry treatments which also serve as a traffic calming measure. The location of the site will promote the use of public transport (Bus Eireann) thus contributing to reduced air emissions.

16.2.8 Material Assets: Resource and Waste Management

Construction Stage

As outlined in the OCEMP for the Site, it is proposed to ensure the highest possible levels of waste reduction, waste reuse and waste recycling are achieved for the Proposed Development. Specifically, the OCEMP aims to achieve waste prevention, maximum recycling and recovery of waste. The plan has as a central tenet, the diversion of waste from landfill wherever possible.

The OCEMP describes the applicable legal and policy framework for C&D waste management in Ireland (both nationally and regionally), it also estimates the category and quantity of waste generated by the Proposed Development and makes recommendations for the bespoke management of the various waste streams. The OCEMP also provides guidance on collection and transport of waste to prevent issues associated with litter or more serious environmental pollution (e.g., contamination of soil or water resources).

Any soil removed off-site will be carried out by contractors licensed under the Waste Management Acts 1996 - 2008, the Waste Management (Collection Permit) Regulations 2007 and Amendments and the Waste Management (Facility Permit & Registration) Regulations 2007 and Amendments.

It will be the role of an appointed Waste Manager to try to find alternative options for demolition waste before sending it to landfill. It is preferable, where possible, to retain the soil on site for reuse rate than soil leaving the Site. Some wastes may be transported to another site for reuse on that site. All waste will be documented prior to leaving the Site. Waste will be weighed by the contractor, either by weighing mechanism on the truck or at the receiving facility.

The Waste Manager will be in contact with other sites to ensure that as much waste is reused as possible, such as concrete for fill purposes etc. All wastes leaving the Site will be placed in appropriate containers. Any concrete, soil, gravel, or broken stone transported off site will be covered to prevent dust or particle emissions from the load.

Operational Stage

The typical wastes that will be generated during the Operational Phase of the Proposed Development will include the following:

- Dry Mixed Recyclables (**DMR**) - These materials could potentially catch fire, and this would be a significant local effect with a short-term impact. This is mitigated by the risk being considered by the Fire consultant in the production of their strategy for the scheme.
- Organic waste – These materials could attract vermin if it is not appropriately stored, and the stores maintained. As mitigation there will be appropriately designed and managed WCAs for all common waste areas in the development.
- Glass – No significant environmental concerns have been identified for the storage of domestic glass waste at the Proposed Development.
- Mixed Non-Recyclable (**MNR**) / General Waste – These materials could attract vermin if it is not appropriately stored, and the stores maintained. As mitigation there will be appropriately designed and managed WCAs for all common waste areas in the development.

16.2.1 Cultural Heritage

Construction Stage

- Three areas of archaeological activity (Areas 1-3) identified during test trenching (21E0511) will be preserved by record (excavated). At the locations of the features identified, in Field 1 an area measuring 37m by 27m and in Field 5 two areas measuring 25m by 25m and 20m by 20m will be stripped of, features identified including any features associated that might be exposed, will be preserved by record. This will be carried out under licence from the National Monuments Service of the DHLGH by a suitably qualified archaeologist. The appointed archaeologist shall consult with the Licensing Section of the NMS regarding the methodology to be employed in the resolution of all sites. This will be carried out prior to construction works commencing.

- Archaeological investigations (test trenching and/or monitoring) of Area 5 within the northeast portion of the site will be carried out. Should archaeological features be identified further mitigation including preservation in situ (if feasible) or by record (excavation) will be required. This will be carried out under licence from the National Monuments Service of the DHLGH by a suitably qualified archaeologist. The appointed archaeologist shall consult with the Licensing Section of the NMS regarding the methodology to be employed in the resolution of all sites. This will be carried out prior to construction works commencing.
- Prior to development of the site a photographic and measured survey (including written description, photographic record) will be carried out of Cultural Heritage Area CHA2 – townland boundary between Commons and Jamestown, as well as CHA3 and CHA4 townland boundaries between Commons and Ratoath
- Prior to development of the site, an area measuring 20m by 25m around the location of Cultural Heritage Area CHA1 shall be stripped of topsoil to establish if any remains of the structure are present (Figure 13.5). Further archaeological investigation may be required depending on the results, including a full archaeological excavation of any features and deposits identified, by a licensed archaeologist in accordance with a methodology to be agreed with the National Monuments Service.
- 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 full report including all post-excavation analysis will be submitted to the relevant authorities within 12 months of the completion of the archaeological excavations.

Operational Stage

There are no mitigation measures proposed during the operational phase of development.

16.2.2 Landscape

Construction Stage

- Construction works will be guided by a Construction Environmental Management Plan (CEMP), which will provide the environmental management framework to be adhered to and monitored during the pre-commencement and construction stages of the Proposed Development. The CEMP will incorporate all mitigating principles required to ensure that the work is carried out in a manner that minimises the potential for environmental impacts to occur.

- Construction compounds and material storage will not be located adjacent to boundaries with existing residential properties or within the root protection area of trees or hedgerows to be retained. Compounds will be enclosed by solid hoarding and will be decommissioned and reinstated at the end of the construction phase.

- Trees, hedgerows and vegetation to be retained within and adjoining the works area will be protected in accordance with '*BS 5837:2012 Trees in relation to in relation to design, demolition and construction. Recommendations*'. Works required within the root protection area (RPA) of trees, hedgerows to be retained will follow a project specific arboricultural methodology for such works, prepared / approved by a professional qualified arborist. Proposals for retention and protection

measures are set out in detail in the Arboricultural Assessment report and associated Tree Protection Plans (RORR002 – Part 1 & RORR002 – Part 2), prepared by Arborist Associates Ltd.

- Trees and vegetation identified for removal will be removed in accordance with '*BS 3998:2010 Tree Work – Recommendations*' and best arboricultural practices as detailed and monitored by a professional qualified arborist. Tree and hedgerow removal will avoid the bird nesting season – *i.e.* 1 March to 31 August inclusive.

- The site of the Proposed Development – or active phase of development as appropriate will be enclosed and secured. Construction traffic accessing the Site will follow agreed routes and public roads will be maintained in a clean and safe manner.

Operational Stage

- Provision of a high-quality of architectural design, character and finish for the proposed buildings and development.

- Provision of significant areas of new and connected open space and parkland with play facilities as amenity and recreation for the new communities. The open space network provides for retention and incorporation of boundary hedgerows.

- Planting of new trees along the proposed section of the RORR, streetscapes and within open spaces. Species selected will be appropriate to the street environment and to the characteristics of the location.

- Provision of a high-quality of design and finish for landscape areas within the Proposed Scheme.

- Landscape areas will be maintained for twelve months during which any defective or dead material will be replaced.

- The public open space network, including the central public open space will be offered for taking-in-charge.

16.3 Residual Impacts

This section collates the predicted residual impacts on the environment as identified in Chapters 5 to 14 arising from the Proposed Development, during Construction and Operational Phases. Residual Impacts, according to the Draft EPA Guidelines (2017, p.3) are: - "*The final or intended effects which occur after the proposed mitigation measures have been implemented.*"

16.3.1 Biodiversity

The successful implementation of the mitigation measures outlined in this chapter of the EIAR would be seen as important elements to the successful mitigation of the loss of biodiversity on-site in addition to ensuring that works do not impact on the downstream aquatic ecology. The application of the mitigation measures outlined in this EIAR will help reduce the impact on biodiversity ecology such significant impacts do not arise. It is considered that, where possible, biodiversity enhancement measures have been incorporated into the design for the benefit of the overall biodiversity value of the site and offset the loss of biodiversity on site. The overall residual impact of the proposed Project on biodiversity will be a minor adverse, long-term, site, not significant impact. This is primarily as a result of the loss of terrestrial habitats on-site, supported by the creation of additional terrestrial biodiversity features, mitigation measures and landscaping strategy.

16.3.2 Land and Soils

Construction Stage

The predicted impacts of the construction phase are described in Table 6.5 in terms of quality, significance, extent, likelihood, and duration. The relevant mitigation measures are detailed, and the residual impacts are determined, taking into account the mitigation measures.

The primary residual impacts from the construction phase are the land take/change of use and the removal of soil to facilitate the development. These impacts are unavoidable given the nature, requirement, and design of the proposed development. The construction impact is assessed to be a slight, negative, short-term impact.

Operational Stage

During the Operational Phase of the Ratoath development, there will be no predicted impact on the geological environment of the area. There is no requirement for any fuel oil stores as all heating will be fuelled by electrically powered heat pumps. The residual impact is assessed to be a slight negative, imperceptible, permanent impact.

16.3.3 Water

Provided the sustainable drainage systems and all mitigation measures are fully implemented as part of the proposed works, the predicted environmental impacts on the downstream receiving drainage infrastructure should reduce from Moderate to Slight. This should include any mitigation measures proposed in respect of flora and fauna, which is dealt with separately in this EIAR.

The impact from the proposed development on the public drainage systems will be an increase in the quantity and rate of discharge of wastewater from the site to the existing public sewer system, with the contributing flows coming mainly from the site office and welfare facilities.

There will be a minor water supply demand for site offices and facilities during the construction phase.

There will be minor traffic disruption in the vicinity of the Site when excavation works are being carried out.

Operational Stage

In the absence of mitigation measures, there are numerous potential impacts associated with the proposed development. For example, an increase in surface water run-off could impact on processes of erosion, sedimentation, and potentially salinity.

However, surface water discharge from the site will be restricted by means of attenuation to restrict the surface water runoff to less than the greenfield runoff equivalent. There has been no history of flooding in the area; therefore, no adverse impact in respect of flooding downstream is envisaged as a result of the proposed development.

The surface water design has been prepared in accordance with best practice incorporating significant sustainable drainage systems, which include the installation of pervious paving, green roofs, filter drains, trapped road gullies, underground pipe network, silt traps, oil separator, concrete storage systems, and flow control devices. The integrated sustainable drainage system will reduce runoff volume and improve water quality prior to discharging to the public combined sewer network.

The impact of the proposed development on the existing wastewater / combined sewer drainage network at Ratoath Outer Relief Road will result in an increase in the of discharge of wastewater from the site. These increased flows can be accommodated, as confirmed by Irish Water as part of the Pre-Connection Enquiry process.

The proposed development will result in an increase in water demand on the water distribution network. This increase in demand can be accommodated by the connection of the existing network to the watermains, as noted by Irish Water in the Confirmation of Feasibility letter.

16.3.4 Air & Climate

Construction Stage

Air Quality

Once the dust minimisation measures outlined in Section 8.8 and Appendix 8.2 are implemented, the impact of the proposed development in terms of dust soiling will be short-term, negative, localised and imperceptible at nearby receptors.

Climate

According to the IAQM guidance (2014) site traffic, plant and machinery are unlikely to have a significant impact on climate. Therefore, the predicted impact is short-term, neutral and imperceptible.

Operational Stage

Air Quality

Air dispersion modelling of operational traffic emissions associated with the proposed development was carried out using the UK DMRB model. The modelling assessment determined that the change in emissions of NO_2 at nearby sensitive receptors as a result of the proposed development will be imperceptible. Therefore, the operational phase impact to air quality is long-term, localised, negative and imperceptible.

Climate

Modelling of operational phase CO_2 emissions as a result of the traffic associated with the proposed development was carried out to determine the impact to climate. It was found that emissions of CO_2 will increase by an imperceptible amount as a result of the proposed development and are significantly below the EU 2024 and 2030 GHG targets. The operational phase impact to climate is long-term, negative and imperceptible. In addition, the proposed development has been designed to reduce the impact to climate where possible during operation

16.3.5 Noise & Vibration

Construction Noise

It is predicted that when works take place at less than 50m distance to the receptors a moderate to significant impact will occur, hence the impacts are predicted to be:

Quality	Significance	Duration
Negative	Moderate - Significant	Short-Term

It should be noted that the assessment can be considered “worst case” and it is unlikely that all items of plant assessed will be in operational simultaneously.

Construction Vibration

Impacts are predicted as:

Quality	Significance	Duration
Negative	Slight	Short-Term

Outward Noise Impact – Road Traffic Noise

Impacts as a result of the operation of the RORR and additional traffic on existing roads are predicted as:

Quality	Significance	Duration
Negative	Not Significant	Long Term

Outward Noise Impact – Plant and Mechanical Noise

Following mitigation measures implemented at design stage the impacts are predicted to be:

Quality	Significance	Duration
Negative	Not Significant	Long Term

16.3.6 Material Assets: Built Services

ESB Infrastructure

Potential impacts for ESB are impacts on existing network capacity and potential issues with current harmonics if heat pumps are selected as energy source.

The proposed development has been designed in accordance with the ESB Networks requirements. The predicted impacts on power and electrical supply will be long-term, neutral and imperceptible.
It is noted in the CRU "Tomorrow's Energy Scenarios 2019 Ireland System Needs Assessment Planning our Energy Future" outlines the impact of power in the Dublin Region and the Eirgrid requirement to ensure that sustainable energy is provided.

Telecoms Infrastructure

Potential impact for telecoms is considered to be negligible as the broadband capacity of the additional 457nr dwellings will not, on a diversity basis, exceed the current networks of Virgin, Eir and Siro fibre networks to be exceeded.

On a simple diversified basis 700GB/s would be required, if all units are streaming large files at the same time, in practical terms the network switches for development of this size would equal a large office building housing 1,400 persons which typically requires 2 nr 10GB fibre connections to meet the demand of the building, as this is a Housing Estate then road sides kiosks will house any other switch as required (for example 24 port Switches are typically 50mm high by 450mm deep and 437mm wide, number of kisoks will be advised by the utility upon planning permission approval).

16.3.7 Traffic and Transportation

There are no residual impacts since no mitigation measures are required to facilitate the proposed development.

16.3.8 Resource and Waste Management

Construction Stage

It is considered that once the mitigation measures discussed above are employed, there will be a slight negative imperceptible, permanent impact since the development will require some material to be taken on-site to an appropriate waste facility. However, it is noted that the lands are zoned for residential and as such an alternative development would be provided for on the subject site in the future.

Operational Stage

It is considered that once the mitigation measures discussed above are employed, there will not be residual impacts on the environment in relation to waste as a result of the Proposed Development. The residual impact is assessed to be a slight negative, imperceptible, permanent impact.

16.3.9 Cultural Heritage

There are no residual impacts arising from this chapter.

16.3.10 Landscape

Construction Stage

Any development will give rise to some degree of landscape and visual impact. The greatest impacts tend to occur during the temporary / short-term construction stage when initial site disturbance associated with the stripping of soils and movement of machinery will be unfamiliar and will draw particular visual attention to the site and the works.

The Construction Phase will involve removal of sections of hedgerows for provision of the development, roads, footpaths, cycleways and services connections. Existing hedgerows to be retained will be protected within proposed linear parks and on boundaries.

The site for the Proposed Development is zoned A2 for delivery of new residential development, and brings forward a further extent of the proposed Ratoath Outer Relief Road. The Proposed Development is located west of and adjoins similar recently permitted residential development at Jamestown.

Nevertheless, the construction stage of the Proposed Development will result in a considerable degree of change to the rural / town edge character of the landscape of the site and a substantial change to views of the lands from adjoining residential and other properties located along the R155 Fairyhouse Road (west of and adjoining the site); at Carraig na Gabhna, Cairn Court and Glascarn Lane to the northwest and north of the site; and from the residential property on Glascarn Lane located immediately south of the proposed Ratoath Outer Relief Road.

While mitigation measures are proposed, they will not and cannot address all of the landscape and visual changes that arise during the Construction Phase of the Proposed Development. Therefore, the overall residual landscape and visual impact of the Construction Stage is assessed as being of **moderate negative short-term significance**.

Operational Stage

On completion of the construction stage a new development will establish its presence on the environmental, physical and visual character of its environs. In this regard landscape and visual impacts must also be considered within the context of existing, planned, emerging and likely future development proposals for the area. The Ratoath Outer Relief Road is proposed infrastructure and sections have already being constructed or are under construction to the east of the site. The site is zoned A2 for new residential development and new residential development has been recently permitted on similar A2 zoned lands to the immediate east of the site. In this regard the Proposed Development can be considered to be consistent with the emerging and planned land uses for the area as set out in the Meath County Development Plan 2021-2027.

It is considered that the Proposed Development is appropriately sited, designed and laid out so as to be capable of being integrated into the new emerging residential character of the southern extent of Ratoath. This integration is underpinned by the proposed delivery of a contiguous section of the Ratoath Outer Relief Road and by the architectural and landscape approach for the Proposed Development that envisages diverse and integrated communities with connected public and communal open spaces.

Therefore, while the Proposed Development will give rise to localised visual impacts the overall development will have a positive residual impact on the emerging local character, and will not adversely impact sensitive landscape characteristics or views to and from the wider landscape. It is considered that the operational stage of the development will make a continued positive contribution to the emerging residential community of the wider area.

The residual landscape and visual impact of the Operation Phase of the Proposed Development is assessed as being of **moderate positive medium to long-term significance**.

A series of verified photomontages (refer Volume 3 of the EIAR) have been prepared by Digital Dimensions to assist in illustrating the physical and visual nature of the Proposed Development as viewed in the surrounding landscape. Views, which are presented in ‘Existing’ and ‘Proposed’ formats have been produced from nine locations (refer to View Location Map in Volume 3 of the EIAR).

The views illustrate the considerable screening of the Proposed Development from public areas provided by existing vegetation and development, including existing residential development. Nevertheless, it is also clear from the views that properties adjoining or close to the boundary of the site will experience considerable change in existing views, albeit the impact will be mitigated through the retention of boundary hedgerows and treelines, proposed planting and the architectural quality of the Proposed Development.

APPENDIX 5.1 –
BAT FAUNA ASSESSMENT

ALTEMAR

Marine & Environmental Consultancy

Appendix I. Bat fauna impact assessment for a Proposed Strategic Housing Development (SHD) at Ratoath South, Co. Meath

20th May 2022

Prepared by: Bryan Deegan (MCIEEM) of Altemar Ltd.
On behalf of: Beo Properties Ltd.

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Document Control Sheet			
Client	Beo Properties Ltd.		
Project	Bat fauna impact assessment for a Proposed Strategic Housing Development at Ratoath South, Co. Meath		
Report	Bat Fauna Assessment		
Date	20th May 2022		
Version	Author	Reviewed	Date
01	Bryan Deegan		20th May 2022

SUMMARY

Structure:	The site is currently in use as agricultural grassland. There are some mature hedgerow boundaries defining each field
Location:	Ratoath South, Co. Meath
Bat species present:	A single soprano pipistrelle was observed emerging from a large ash tree that is covered in ivy in the central/western portion of the site. This tree and the corresponding hedgerow are to be retained. Foraging activity of soprano pipistrelle, common pipistrelle and Leisler's bats were noted along the hedgerows on site.
Proposed work:	The development will consist of the construction of 452 no. residential units which are located in 12 neighbourhoods. Building heights range across the site from 2- and 3-storey terraced houses, through to 4-storey maisonette buildings, and 6-storey apartment blocks.
Impact on bats:	The removal of hedgerows will result in the removal of foraging areas and an increase in lighting would be expected to reduce foraging on site. Impacts: Minor adverse, negative, long term, site, not significant. Mitigation is required in the form of a pre construction inspection of trees to be felled, the provision of bat boxes and a post construction light spill assessment.
Survey by:	Bryan Deegan MCIEEM
Survey dates:	24th May 2020 and 30th August 2021

Description of the Proposed Project

Beo Properties Limited, intend to apply to An Bord Pleanála for permission for a strategic housing development at this site (c.14.166 ha), on existing agricultural lands located immediately to the south of the existing built area of Ratoath in County Meath. The site is generally bound to the north by Glascarn Lane, the rear of houses at Glascarn Lane, further existing residential dwellings and a permitted strategic housing development (Reg Ref: TA17/305196); to the east and south by existing agricultural fields and by Glascarn Lane; and to the west by Fairyhouse Road (R155), the rear of houses at Fairyhouse Road, the Carraig Na Gabhna and Cairn Court developments, and existing agricultural fields. The subject site is located on lands within the following town lands (in part): Legagunia, Commons, Jamestown, Glascarn and Newtown.

The proposed development will principally consist of the construction of 452 no. residential units and all associated ancillary accommodation, open space and site and development works. The total gross floorspace (GFA) of the overall development is c.55,714.4 (c.59,177 with ancillary uses included) of which c.54,175 is residential and c.1,539.4 is non-residential uses. The proposed development will principally consist of the 150 no. semi-detached and terraced dwelling houses (3-bed - with option to convert attic in 89 no. units, thereby creating 4-bed houses), 182 no. maisonettes (15 no. 1-bed & 167 no. 3-bed) and 120 no. apartments (100 no. 2-bed and 20 no. 3-bed)(with balconies/terraces across all elevations), with heights ranging from 2-3 storey terraced houses and 3-4-storey duplex buildings (1 storey ground floor units and 2 storey first and second floor units; 2 storey ground and first floor units and 2 storey second and third floor units) and 6-storey apartment blocks. The scheme provides the following house types (as detailed in the application pack materials):61 no. A1 (with the option to provide as A2 given similar appearance), 28 no. A2 (with the option to provide as A1 given similar appearance), 30 no. B1, 31 no. B2, 42 no. M1, 42 no. M2, 34 no. M3, 34 no. M4, 15 no. M5, 15 no. M6, 60 no. D1, 20 no. D2, 20 no. D3, 20 no. D4. The scheme is presented across 12 neighbourhoods (A-H & J-M), each with its own designated central communal open space, car and cycle parking (746 no. car parking spaces and 816 no. cycle parking space) as follows:

Neighbourhood A: consisting of 38 no. units comprising 4 no. 2 storey three-bedroom terraced housing units, 30 no. apartments (25 no. two-bedroom units and 5 no. three-bedroom units), 4 no. 2 storey three-bedroom maisonettes, ancillary accommodation, including lobby (c.53 sq. m), post room (c.13 sq. m), ESB storage (c.11 sq. m), water storage (c.14 sq. m), refuse storage (c.29 sq. m), bike storage (c.135 sq. m), car park (c.702 sq. m) associated private balconies/terraces/rear gardens, communal open space (c.662 sq. m), 51 no. surface and undercroft car parking spaces (42 no. residential and 9 no. visitor) and 92 no. cycle parking spaces.

Neighbourhood B: consisting of 43 no. units comprising 23 no. terraced housing units (10 no. 2 storey three-bedroom units and 13 no. 3 storey three-bedroom units), 20 no. 2 storey three-bedroom maisonettes, ancillary accommodation including, associated private balconies/terraces/rear gardens/winter gardens, communal open space (c.1,753 sq. m), 76 no. car parking spaces (66 no. residential and 10 no. visitor) and 52 no. cycle parking spaces.

Neighbourhood C: consisting of 62 no. units comprising 12 no. 2 storey terraced housing units, 30 no. apartment units (25 no. two-bedroom units and 5 no. three-bedroom units), 20 no. maisonette units (18 no. 2 storey three-bedroom units and 2 no. single storey one-bedroom units), ancillary accommodation, including lobby (c.53 sq. m), post room (c.13 sq. m), ESB storage (c.11 sq. m), water storage (c.14 sq. m), refuse storage (c.29 sq. m), bike storage (c.135 sq. m),), car park (c.702 sq. m), associated private balconies/ terraces/rear gardens, communal open space (c. 1,270 sq. m), 97 no. surface and undercroft car parking spaces (73 no. residential and 23 no. visitor) and 142 no. cycle parking spaces.

Neighbourhood D: consisting of 38 units comprising 14 no. terraced housing units (7 no. 2 storey three-bedroom units and 7 no. 3 storey three-bedroom units), 24 no. maisonettes (20 no. 2 storey three-bedroom units and 4 no. single storey one-bedroom units), ancillary accommodation, including associated private

balconies/terraces/rear gardens, communal open space (c.798 sq. m), 62 no. car parking spaces (52 no. residential and 10 no. visitor), 60 no. cycle parking spaces and an ESB substation (c.14 sq. m).

Neighbourhood E: consisting of 30 units comprising 18 no. 2 storey three-bedroom terraced housing units, 12 no. 2 storey three bedroom maisonettes, ancillary accommodation, including associated private balconies/terraces/rear gardens, communal open space (c.643 sq. m), 56 no. car parking spaces (48 no. residential and 8 no. visitor), 30 no. cycle parking spaces and an ESB substation (c.14 sq. m).

Neighbourhood F: consisting of 36 units comprising 20 no. terraced housing units (12 no. 2 storey three-bedroom units and 8 no. 3 storey three-bedroom units), 16 no. 2 storey three-bedroom maisonettes, ancillary accommodation, including associated private balconies/terraces/rear gardens, communal open space (c.664 sq. m), 64 no. car parking spaces (56 no. residential and 8 no. visitor) and 42 no. cycle parking spaces.

Neighbourhood G: consisting of 29 units comprising 11 no. 3 storey three-bedroom terraced housing units, 18 no. maisonettes (15 no. 2 storey three-bedroom units and 3 no. single storey one-bedroom units), ancillary accommodation, including associated private balconies/terraces/rear gardens/winter gardens, communal open space (c.430 sq.m), 48 no. car parking spaces (40 no. residential and 8 no. visitor), 48 no. cycle parking spaces and an ESB substation (c.14 sq.m).

Neighbourhood H: consisting of 50 units comprising 8 no. terraced housing units (4 no. 2 storey three-bedroom terraced housing units, 4 no. 3 storey three-bedroom terraced housing units), 30 no. apartments units (25 no. two-bedroom units and 5 no. three-bedroom units), 12 no. 2 storey three-bedroom maisonettes, ancillary accommodation, including associated private balconies/terraces/rear gardens/winter gardens, 4 no. commercial/local retail units (c.533.6 sq. m), 4 no. wc (c.44 sq. m), lobby (c.50 sq. m), post room (c.14 sq. m), ESB storage(c.13 sq. m), water storage (c.14 sq. m), refuse storage (c.30 sq. m), communal bins (c.11 sq. m), bike storage (107 sq. m), communal open space (c.1,153 sq. m), 76 no. surface and undercroft car parking spaces (58 no. residential and 18 no. visitor) and 118 no. cycle parking spaces and an ESB substation (c.14 sq. m).

Neighbourhood J: consisting of 37 units comprising 13 no. terraced housing units (5 no. 2 storey three-bedroom units and 8 no. 3 storey three-bedroom units), 24 no. maisonette units (20 no. 2 storey three-bedroom units and 4 no. single storey one-bedroom units, ancillary accommodation, including associated private balconies/terraces/rear gardens/winter gardens, communal open space (c.1,148 sq. m), 56 no. car parking spaces (50 no. residential and 6 no. visitor) and 60 no. cycle parking spaces.

Neighbourhood K: consisting of 30 no. apartment units (25 no. two-bedroom units and 5 no. three-bedroom units), ancillary accommodation, including associated private balconies, ancillary childcare facility (c.1,003 sq. m) with associated play areas (c.727 sq. m), lobby (c.53 sq. m), post room (c.14 sq. m), ESB storage (c.13 sq. m), water storage (c.14 sq. m), refuse storage (c.28 sq. m), bike storage (c.132 sq. m), car park (c.702 sq. m) communal open space (c.200 sq. m), 38 no. surface and undercroft car parking spaces (30 no. residential and 8 no. visitor) and 92 no. cycle parking spaces, in addition to 22 no. car parking spaces for the creche.

Neighbourhood L: consisting of 35 units comprising 15 no. terraced housing units (11 no. 2 storey three-bedroom units and 4 no. 3 storey three-bedroom units), 20 no. maisonettes (18 no. 2 storey three-bedroom units and 2 no. single storey one-bedroom units), ancillary accommodation, including associated private balconies/terraces/rear gardens/winter gardens, communal open space (c.845 sq. m), 57 no. car parking spaces (50 no. residential and 7 no. visitor), 50 no. cycle parking spaces and an ESB substation (c.14 sq. m).

Neighbourhood M: consisting of 24 units comprising 12 no. terraced housing units (6 no. 2 storey three-bedroom units and 6 no. 3 storey three-bedroom units), 12 no. 2 storey three-bedroom maisonettes, ancillary accommodation, including associated balconies/terraces/rear gardens/winter gardens, , communal open space (c.1,017 sq. m), 39 no. car parking spaces (36 no. residential and 3 no. visitor), 30 no. cycle parking spaces and an ESB substation (c.14 sq. m).

Planning permission is also sought for a second phase of the Ratoath Outer Relief Road (RORR) (c. 22,825 sq. m), that will run along the southern boundary of the application site. The section of the RORR proposed as part of this development runs from a new signalised junction on the R155, east for approximately 1100m, to the end of the site boundary. The proposed roadway will provide access for the site in the form of two priority controlled junctions. A series of pedestrian and cycle connections are provided to site from the Fairyhouse Road (R155), Glascarn Lane and the new RORR as well as a pedestrian link to Carraig Na Gabhna. The site provides

permeability through its internal road and shared surface networks, including pedestrian and cycle paths (implementing a segregated pedestrian and cycle path proposed along the RORR) but also within the site. A greenway will be provided across the site that will connect the R155 Fairyhouse Road with Garraig Na Gabhna road and Glascarn Lane. This greenway will provide pedestrian/cyclist connection to the newly proposed pedestrian/cyclist infrastructure along the RORR. All associated site development and infrastructural works, services provision, foul and surface water drainage, an extension to the foul water network, surface water and watermain along the RORR required to facilitate the development, access roads/footpaths, lighting, landscaping and boundary treatment works and all ancillary works necessary to facilitate the development is provided.

The proposed development also includes 2.247 ha of landscaped public open space which includes a civic plaza (0.513 ha), greenway spine (1.087 ha) and parklands (0.301 ha); solar PV Panels in various locations; and public lighting. All associated site development works above and below ground including hard and soft landscaping, roads/footpaths/cycle paths, play areas, boundary treatments, SuDs,

The Proposed site outline and Site location map are seen in Figures 1-2.

Bat survey

This report presents the results of site visits by Bryan Deegan (MCIEEM) on the 24th May 2020 and 30th August 2021.

Survey constraints

Bat surveys were undertaken during the active bat season in compliance with bat mitigation guidelines for Ireland V2 (2022).

Survey methodology

At dusk, bat detector surveys were carried out onsite using a *Batbox Duet* heterodyne/frequency division detector in 2020 and an Echo Plus Touch 2 Pro bat detector in 2021 to determine bat activity. Bats were identified by their ultrasonic calls coupled with behavioural and flight observations. Surveys were carried out having regard to the following guidelines:

- Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016);
- Bat Mitigation Guidelines for Ireland (NPWS, 2006); and,
- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA, 2006).

Competency of Assessor

This report has been prepared by Bryan Deegan MSc, BSc (MCIEEM). Bryan has over 27 years of experience providing ecological consultancy services in Ireland. He has extensive experience in carrying out a wide range of bat surveys including dusk emergence, dawn re-entry and static detector surveys. He also has extensive experience reducing the potential impact of projects that involve external lighting on Bats. Bryan trained with Conor Kelleher author of the Bat Mitigation Guidelines for Ireland (Kelleher and Marnell (2007)) and Bryan is currently providing bat ecology (impact assessment and enhancement) services to Dun Laoghaire Rathdown County Council primarily on the Shanganagh Park Masterplan. The desk and field surveys were carried out having regard to the guidance: Bat Surveys for Professional Ecologists – Good Practice Guidelines 3rd Edition (Collins, J. (Ed.) 2016) and Kelleher and Marnell (2007), Bat Mitigation Guidelines for Ireland.

Legislative Context

Wildlife (Amendment) Act 2000.

Bats in Ireland are protected by the Wildlife (Amendment) Act 2000. Based on this legislation it is an offence to wilfully interfere with or destroy the breeding or resting place of any species of bat. Under this legislation it is an offence to "*Intentionally kill, injure or take a bat, possess or control any live or dead specimen or anything derived from a bat, wilfully interfere with any structure or place used for breeding or resting by a bat, wilfully interfere with a bat while it is occupying a structure or place which it uses for that purpose. "*

Habitats Directive- Council Directive 92/43/EEC 1992 on the conservation of natural habitats and of wild fauna

and flora transposed into Irish Law i.e. European Communities (Natural Habitats) Regulations, 1997 (SI No. 64/1997).

Annex II of the Council Directive 92/43/EEC 1992 on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) lists animal and plant species of Community interest, the conservation of which requires the designation of Special Areas of Conservation (SACs); Annex IV lists animal and plant species of Community interest in need of strict protection. All bat species in Ireland are listed on Annex IV of the Directive, while the Lesser Horseshoe Bat (*Rhinolophus hipposideros*) is protected under Annex II which related to the designation of Special Areas of Conservation for a species.

Under section 23 of SI No. 64/1997 all bats are listed under the first schedule of Section 23 which makes it an offence to:

- deliberately capture a bat
- deliberately disturb a bat,
- damage or destroy a breeding site or resting place of a bat.

Landscape

A Landscape Design Rationale was composed by BSM to outline the proposed landscape design for the development at Ratoath South. The report states that: '*Existing hedgerows are to be retained where possible and augmented where necessary. Necessary paths allowing easy pedestrian movement throughout the site are to be constructed with consideration for the tree roots protection zones where possible. Retained hedges to have 10m buffer zones to protect during the construction. Removed hedges are to be replaced in suitable locations.*

Existing hedgerows to the site boundary are to be retained and augmented where possible. Creating path 10m from the existing hedgerow allows for the buffer area and crated usable space for the habitants. Path with low level lighting and rear gardens entrances are creating safe spaces for the users.

Linear Park with existing hedgerow provides green corridor throughout the site.

Linear Park provides:

- *Improved biodiversity*
- *Animals and insects migration routes*
- *Existing hedgerow retention*
- *Provides drainage though net of existing and proposed SUDs*
- *Provides open spaces*
- *adds privacy*
- *and reduces the hard surface*.'

The proposed Landscape Masterplan is displayed in Figure 3.

Figure 1. *Proposed site outline*

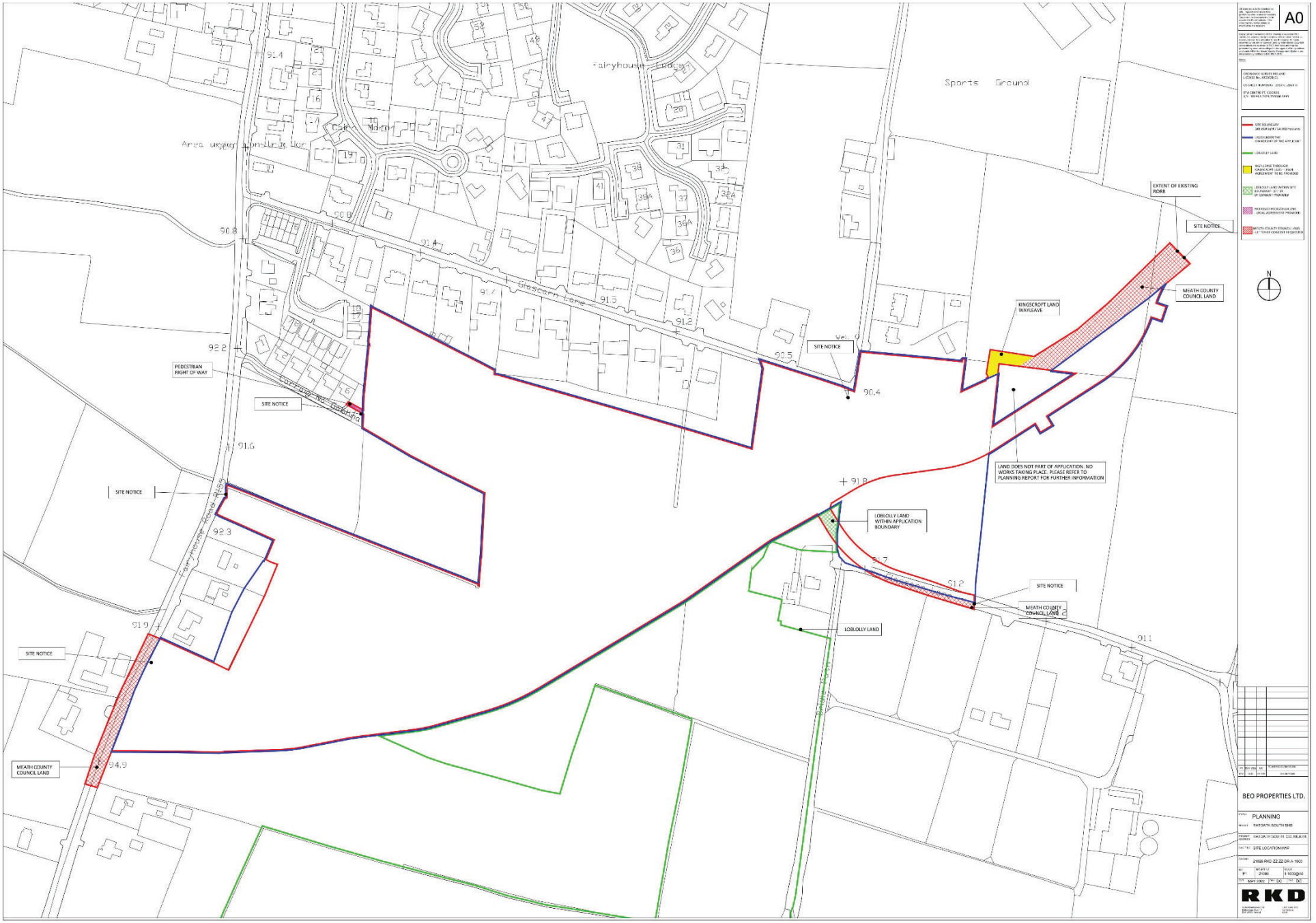


Figure 2. *Site location map*

Figure 4. *Proposed landscape plan*

Arboricultural Assessment

An Arboricultural Assessment of the Tree and Hedge Vegetation on 'SHD Lands' at Ratoath South, Co. Meath was composed by Arborist Associates Ltd. The report sets out to assess the impact of the proposed development on trees on the proposed development site. In summary, the report states that: '*The site area included within this SHD land parcel are currently in agricultural use and are mostly in grass for grazing live stock. This parcel of land is divided up into a number of fields of varying sizes by typical type hedgerows for this area. The bulk of the hedgerows are growing on the sides of drainage ditches that drain these lands.*

The hedges are predominately made up of Hawthorn with other species such as Elder and Privet present in smaller qualities with the undergrowth being dominated by Bramble and Dogrose and these in particular the Bramble is encroaching out of many of the hedgerows due to lapsed management to create broader hedges and scrub areas on either side. Ash is the main tree species protruding up over the hedge heights along with some Sycamore, Crab Apple and Poplar and these are dispersed along the hedges as individuals are in short groups/lines. These trees range in age from seedlings to those of a mature age class. Many of the trees have established themselves from old coppiced stools having been cut down previously as part of the past hedge cutting works and have now been allowed to establish as multiple-stemmed trees, either from base or near ground level. Ivy is also prevalent within the hedgerows and is growing up through the hedge plants and the trees, and in some places is causing suppression of the hedge plants and trees and may leave some of them more vulnerable to wind/storm damage. The bulk of the Ash is showing evidence of infection by Ash Dieback (Hymenoscyphus Fraxineus) and this is likely to impact on their long-term potential and although some trees within their lines/group canopy structures are of some prominence with the landscape, infection or the potential for infection by 'Ash Dieback' is having an impact on their category grading due to the uncertainty associated with the disease and how it will impact on the Ash tree population in the future years. As a result, the Ash trees have been given a category grade of 'C'.

Within the overall site area, 87 No.trees were tagged individually, with 7No.trees, six tree lines and 21No.hedges have been numbered numerically.'

In relation to Tree Pruning, the report states that: *'As part of the initiating works, the crowns of some of the trees are to be pruned to remove dead/unstable growth, as well as the pruning of individual limbs/branches or entire crowns to reduce size due to structural weaknesses or to improve their juxtaposition within the built environment. A preliminary list of these works is given within the condition tree assessment in 'Appendix 2' of this report and these are to be reviewed on site prior to being carried out.*

The hedges being retained in most instances will require trimming to bring them back into active management and to incorporate them into the completed landscaped development. This will involve trimming in of their sides, particularly excessive spread of vegetation especially Bramble and the poorer structured sections will need trimming/pruning to address stability issues. The objective of the trimming of the hedges is to help rejuvenate them with the encouragement of lower growth development and once trimmed back; there will be an opportunity to augment poor quality sections with new hedge planting to create better structured sustainable hedges for the future suitable for their new built urban environment. All tree felling and pruning work should be carried out by qualified and experienced tree surgeons before any construction work commences; all tree work should be in accordance with BS3998 (2010) Tree Work – Recommendations. For the stumps of trees that need to be removed, particularly those which are located within the root zone of trees being retained, these are to be ground out using a mechanical stump grinder taking care not to cause root damage to the trees being retained'

In relation to Tree Management the report states that: '*Within the proposed development, as is the current situation, trees will be positioned within close proximity to buildings and usable surfaces such as roads and neighbouring properties. As a result, it will be necessary to continue to review the condition of these trees on a regular basis and to carry out any necessary remedial tree surgery works required to promote health and safety. This will involve the ongoing monitoring of the Ash trees retained for infection and decline as a result of Ash Dieback and the necessary management will need to be undertaken to address safety. Any new tree planting*

carried out will require maintenance to encourage good growth habits and to alleviate any safety concerns that they may present as they grow in size.'

In relation to Tree Protection, the report states that: '*The tree and hedge vegetation being retained will need to be protected from unnecessary damage during the construction process by effective construction-proof barriers that will define the limits for machinery drivers and other construction staff. Ground protected by the fencing will be known as the 'Work Exclusion Zone' and sturdy protective fencing will need to be erected along the points identified in the Tree Protection Plan (DWG No. RORR002)* ***prior*** *to any soil disturbance and excavation work starting on site. This is essential to prevent any root or branch damage to the retained trees. The British Standard BS5837: Trees in relation to design, demolition and construction (2012) specifies appropriate fencing, see appendix 1 for details. All weather notices should be erected on the fences with words such as: "Tree Protection Fence — Keep Out". When the fencing has been erected, the construction work can commence. The fencing should be inspected on a regular basis during the duration of the construction process and shall remain in place until heavy building and landscaping work have finished and its removal is authorised by the project Arboriculturist*.'

The Tree Constraints Plan- Overall Plan and Tree Protection Plan- Overall Plan is seen in Figures 5-6.

Figure 5. *Tree Constraints Plan – Overall Plan*

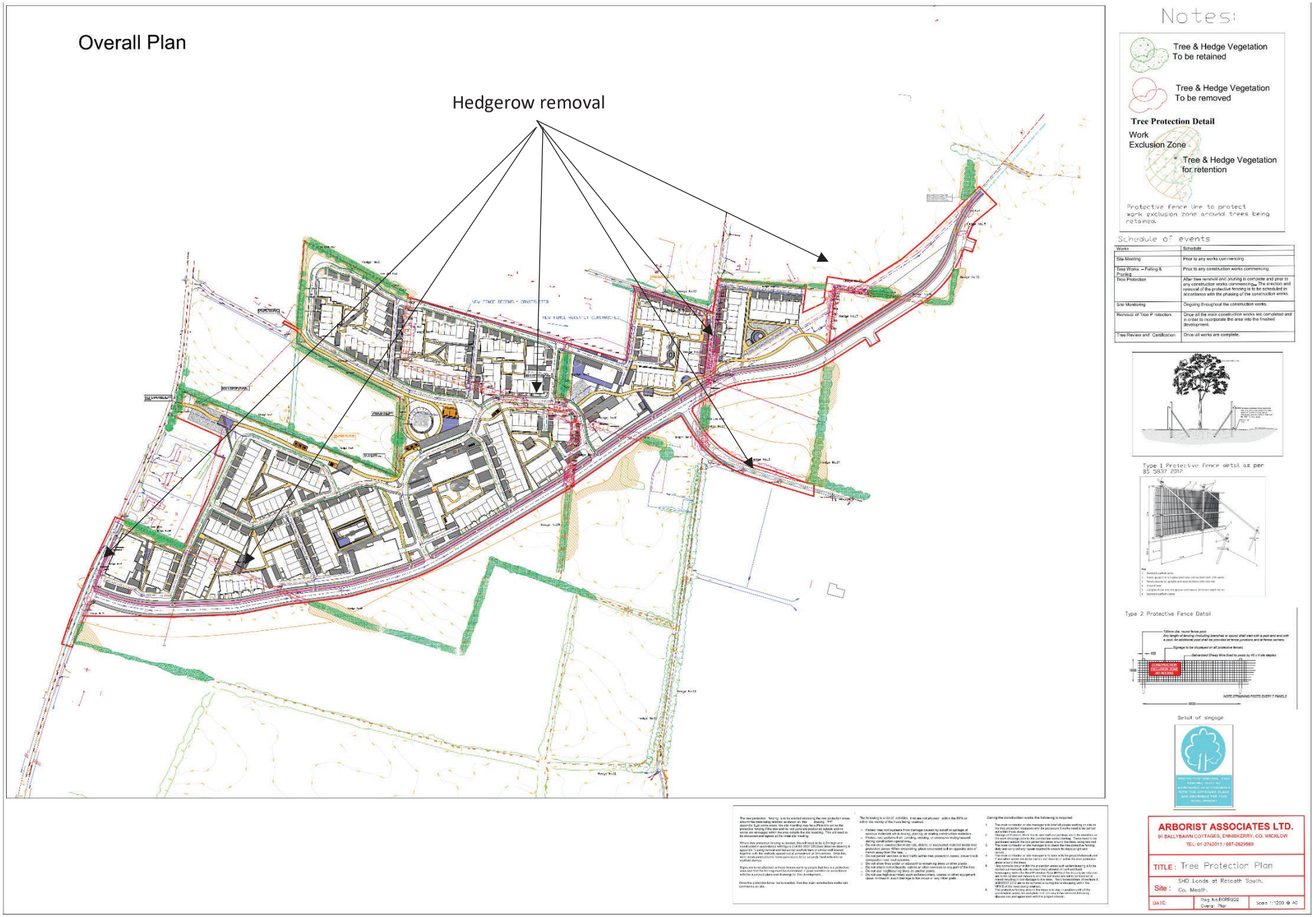


Figure 6. *Tree Protection Plan- Overall Plan*

Lighting

A Lighting Design Report and Specifications was composed by Redmond Analytical Management Services. The report states that:

'***3 Lighting Design***

Using S.R. CEN/TR 13201-1:2014 Table 3 we have determined that designing the lighting on the relief road to comply with I.S. EN 13201-2:2015 C4 is appropriate for this project given its size, location, and usage. The junctions will be illuminated to I.S. EN 13201-2:2015 C3, one class higher than the road.

Using S.R. CEN/TR 13201-1:2014 Table 4 we have determined that designing the lighting within the residential area to comply with I.S. EN 13201-2:2015 P4 is appropriate for this project given its size, location, and usage.

3.1 Dimming

We have designed the lighting to dim by 25% from 00:00 to 06:00 in line with dimming profile U14 on the relief road. The residential area will not dim.

3.4 Lighting Impact

We select the luminaire that uses the lowest energy consumption for the specific application. We utilise the most appropriate lumen package (lumen output and distribution optics) to ensure efficient lighting of the target area and to minimise light spill outside of the area. Our energy consumption calculations are based on the requirements of IS EN 13201-5:2015.

We design using full cut off luminaires to ensure there is no direct upward light. We ensure that threshold increment is included in our calculations so that the luminaires are not a glare source.

We believe our lighting designs utilise the most energy efficient, sustainable luminaires currently available on the market and reflect practises laid out in relevant standards and in guidance notes from the professional bodies of which we are members, the Institution of Lighting Professionals and the Society of Light and Lighting.

We have not utilised an inclination on the luminaires, which reduces the impact of the lighting on the environment. We have used a warm source on the residential section, with a neutral source on the traffic route, in line with Meath County Council's policy.'

'4.2 Correlated Colour Temperature

The light source shall have a correlated colour temperature (CCT) of 4,000 Kelvin on the relief road, and 3,000K within the development.

4.3 Luminaire Selection

We have selected a luminaire based on energy consumption, photometric performance, and general quality.

4.4 Luminaire Variation

While we endeavour to use the smallest number of luminaire variations on our projects, our primary aim is to comply with relevant European lighting standards while minimising energy consumption, minimising light pollution and light spill.

We achieve this by selecting an appropriate lumen package to suit the geometry of the area to be illuminated.

4.5 Design Luminaire

In this instance, we have selected a design based on the stated photometric performance and energy consumption of the Philips LumiStreet range on the relief road, and the ASD Lighting Highway Diamond range within the development.

5 Columns

We have used 8m columns on the relief road. We have used 6m columns throughout the residential section.

We have specified hinged columns in areas where future access by maintenance crews will be difficult. The hinged columns are clearly identified on the accompanying drawing.

5.1 Trees and Landscaping

Trees and tall growth should be pruned back so that they do not cause shadowing. No trees or tall shrubs can be planted within 6m of the column.'

'7 Energy Consumption

The total energy consumption for this project will be 21,791 kW/h per annum, including dimming on the relief road.'

In relation to Lighting Levels, a report was composed by Patrick Redmond, Redmond Analytical Management Services Ltd for the Outer Relief Road. The report states that: 'Lighting on the relief road designed to comply with I.S. EN 13201-2:2015 C4, and on both junctions with I.S. EN 13201-2:2015 C3, with a neutral (4,000K) source, due to the nature of the road. Energy consumption assessed in accordance with I.S. EN 13201-5:2015.

LMF 0.92 x LDF 0.9 x LSF 1 = MF 0.83 at 100,000 hours at 25 degree ambient. Photometry measured at minimum 15 degree ambient.

Luminaire A & D = 35W. Luminaire B = 72W. Luminaire C = 47W. Connected load, averaged for CLO.'

The Horizontal Illuminance (lux) levels for the Outer Relief Road are seen in Figures 7-11.

In relation to Lighting Levels, a report was composed by Patrick Redmond, Redmond Analytical Management Services Ltd for Ratoath SHD, the report states that: 'Lighting designed to comply with I.S. EN 13201-2:2015 P4, with a warm (3,000K) source, within the development and I.S. EN 12464-2: 2007 5.9.1 in the phase 2 carpark. Energy consumption assessed in accordance with I.S. EN 13201-5:2015.

LMF 0.92 x LDF 0.9 x LSF 1 = MF 0.83 at 100,000 hours at 25 degrees ambient. Photometry measured at minimum 15 degree ambient.

Luminaire E = 16W. Luminaire F & I = 9W.

Luminaire G & J = 12W. Luminaire H = 13W. Luminaire K = 15W.

Luminaire L = 11W. Connected load, averaged for CLO.'

The Horizontal Illuminance (lux) levels for Ratoath SHD are seen in Figures 12-18.

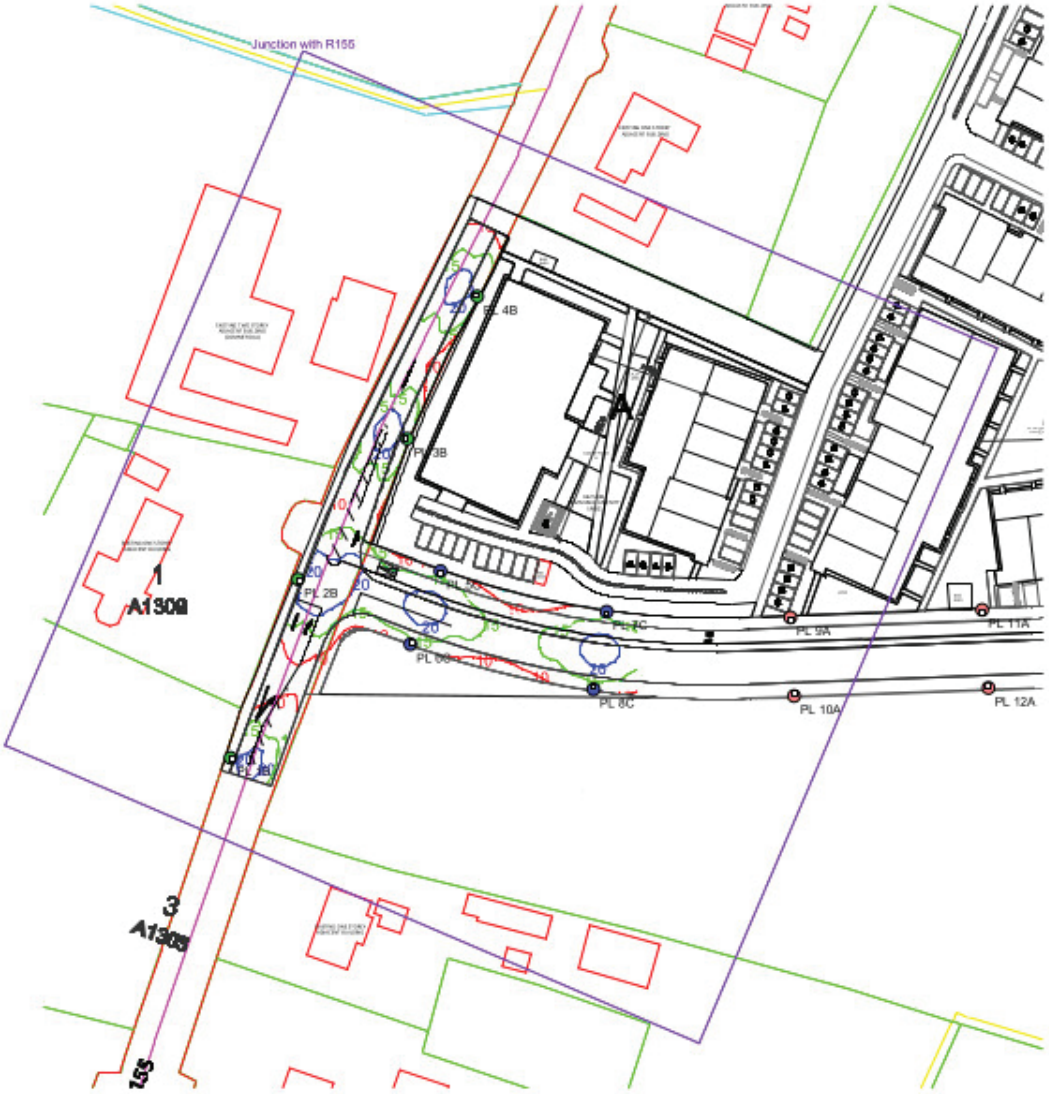
DATE: 17 May 2022 DESIGNER: Patrick Redmond

PROJECT No: 21068 PROJECT NAME: Ratoath South SHD ~ Outer Relief Road REV A

REDMOND ANALYTICAL MANAGEMENT SERVICES

Horizontal Illuminance (lux)

Junction with R155



Results

Eav	15.40
Emin	6.68
Emax	25.92
Emin/Emax	0.26
Emin/Eav	0.43

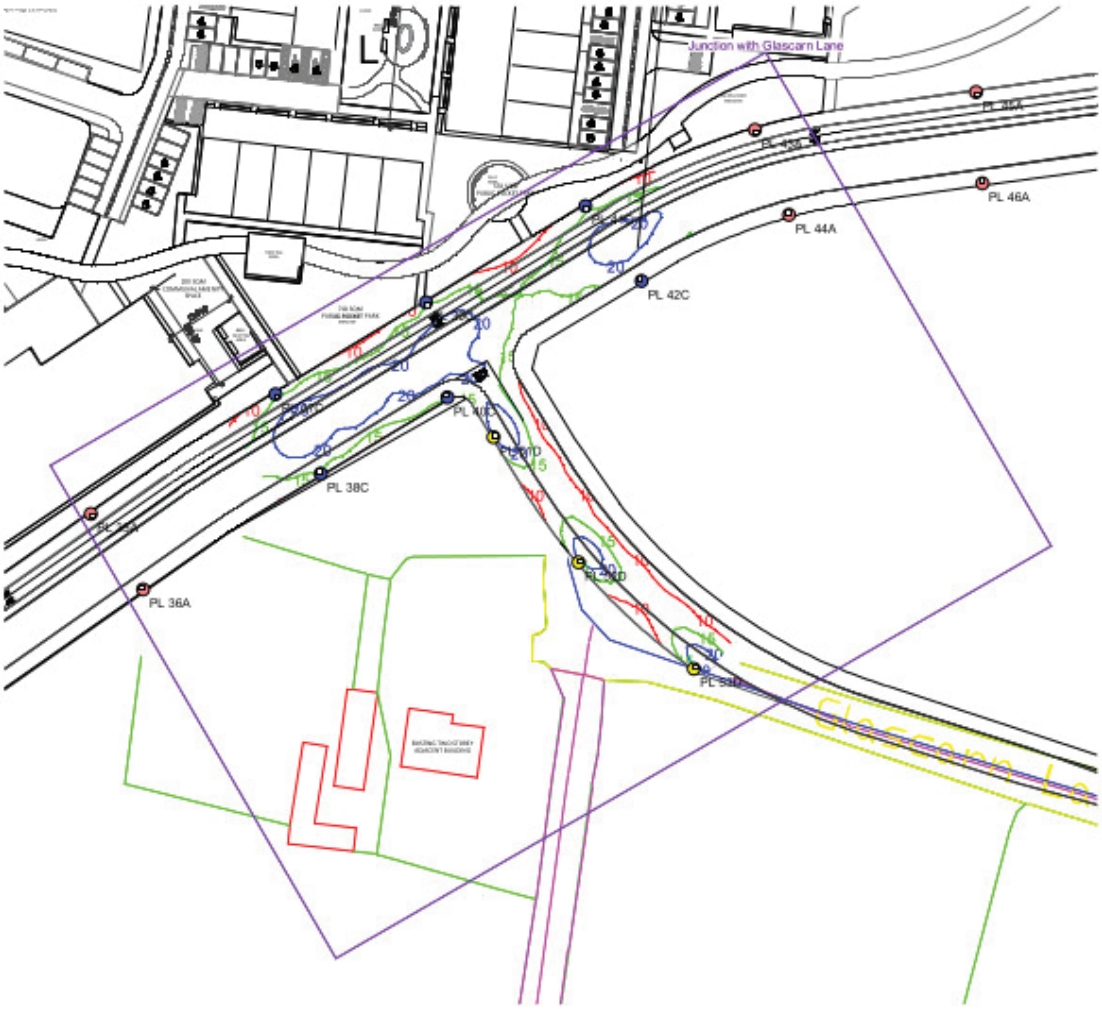
Figure 7. *Horizontal Illuminance (lux) levels for the Outer Relief Road (Sheet 1)*

DATE: 17 May 2022 DESIGNER: Patrick Redmond

PROJECT No: 21068 PROJECT NAME: Ratoath South SHD ~ Outer Relief Road REV A

Horizontal Illuminance (lux)

Junction with Glascarn Lane



Results

Eav	16.42
Emin	6.70
Emax	25.26
Emin/Emax	0.27
Emin/Eav	0.41

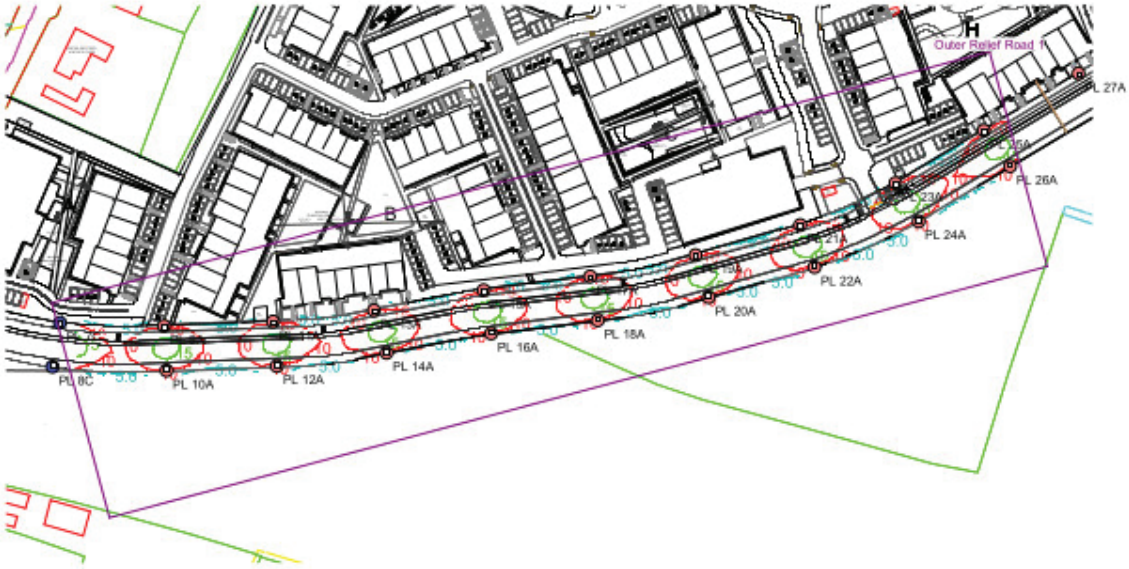
Figure 8. *Horizontal Illuminance (lux) levels for the Outer Relief Road (Sheet 2)*

DATE: 17 May 2022 DESIGNER: Patrick Redmond

PROJECT No: 21068 PROJECT NAME: Ratoath South SHD ~ Outer Relief Road REV A

Horizontal Illuminance (lux)

Outer Relief Road 1



Results

Eav	10.51
Emin	4.35
Emax	18.81
Emin/Emax	0.23
Emin/Eav	0.41

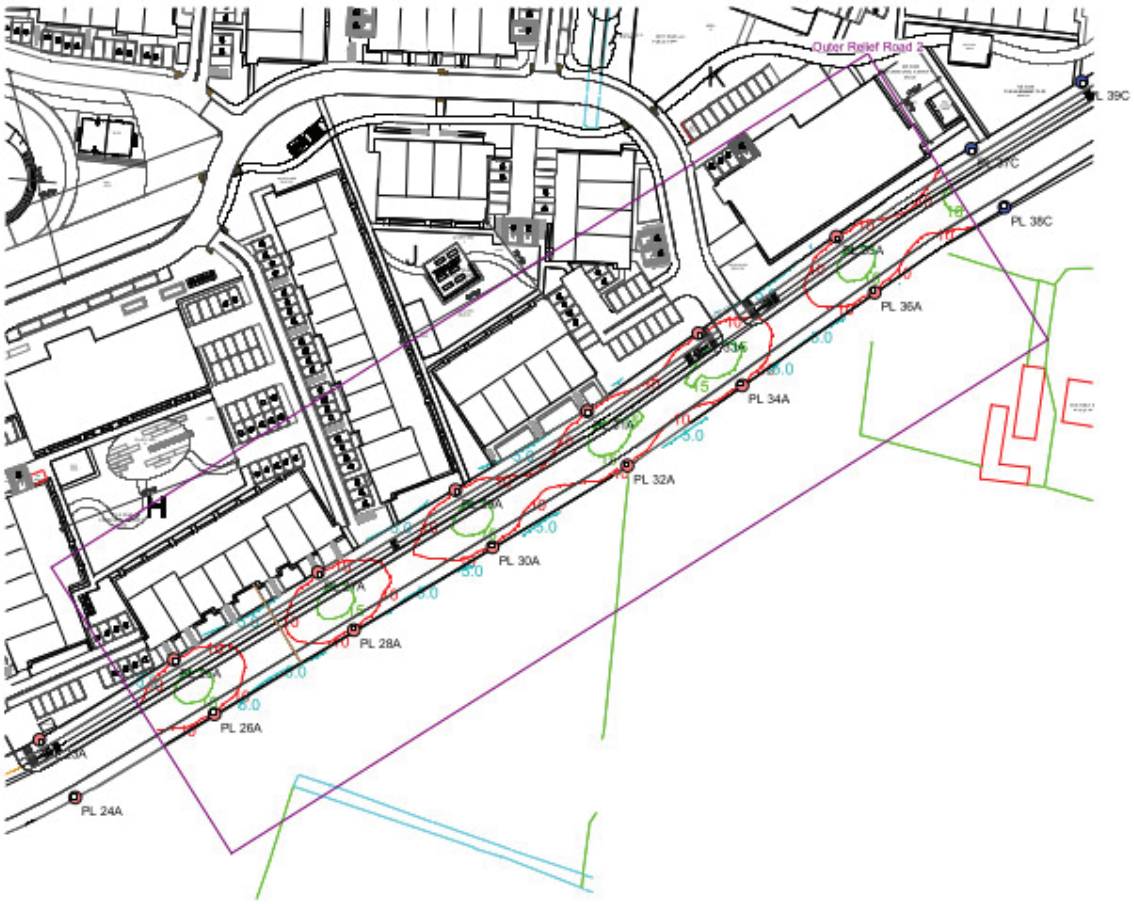
Figure 9. *Horizontal Illuminance (lux) levels for the Outer Relief Road (Sheet 3)*

DATE: 17 May 2022 DESIGNER: Patrick Redmond

PROJECT No: 21068 PROJECT NAME: Ratoath South SHD ~ Outer Relief Road REV A

Horizontal Illuminance (lux)

Outer Relief Road 2



Results

Eav	11.01
Emin	4.50
Emax	17.30
Emin/Emax	0.26
Emin/Eav	0.41

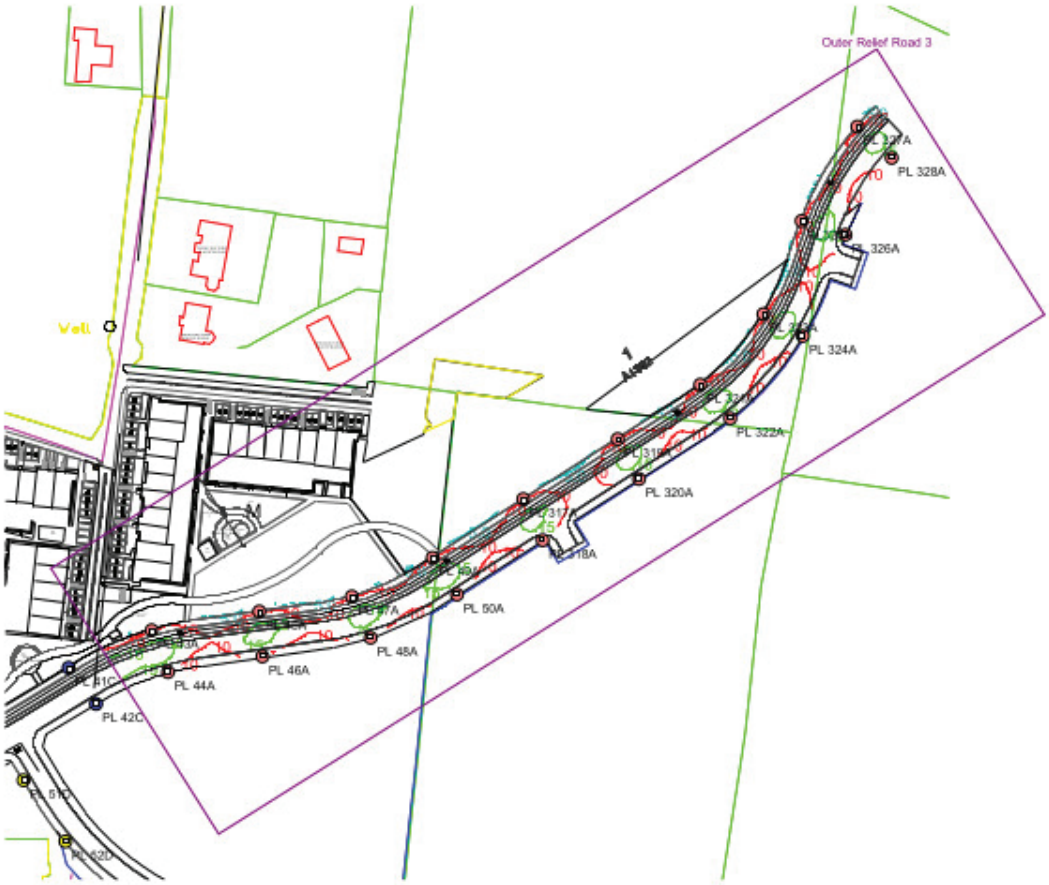
Figure 10. *Horizontal Illuminance (lux) levels for the Outer Relief Road (Sheet 4)*

DATE: 17 May 2022 DESIGNER: Patrick Redmond

PROJECT No: 21068 PROJECT NAME: Ratoath South SHD ~ Outer Relief Road REV A

Horizontal Illuminance (lux)

Outer Relief Road 3



Results

Eav	11.74
Emin	4.78
Emax	18.12
Emin/Emax	0.26
Emin/Eav	0.41

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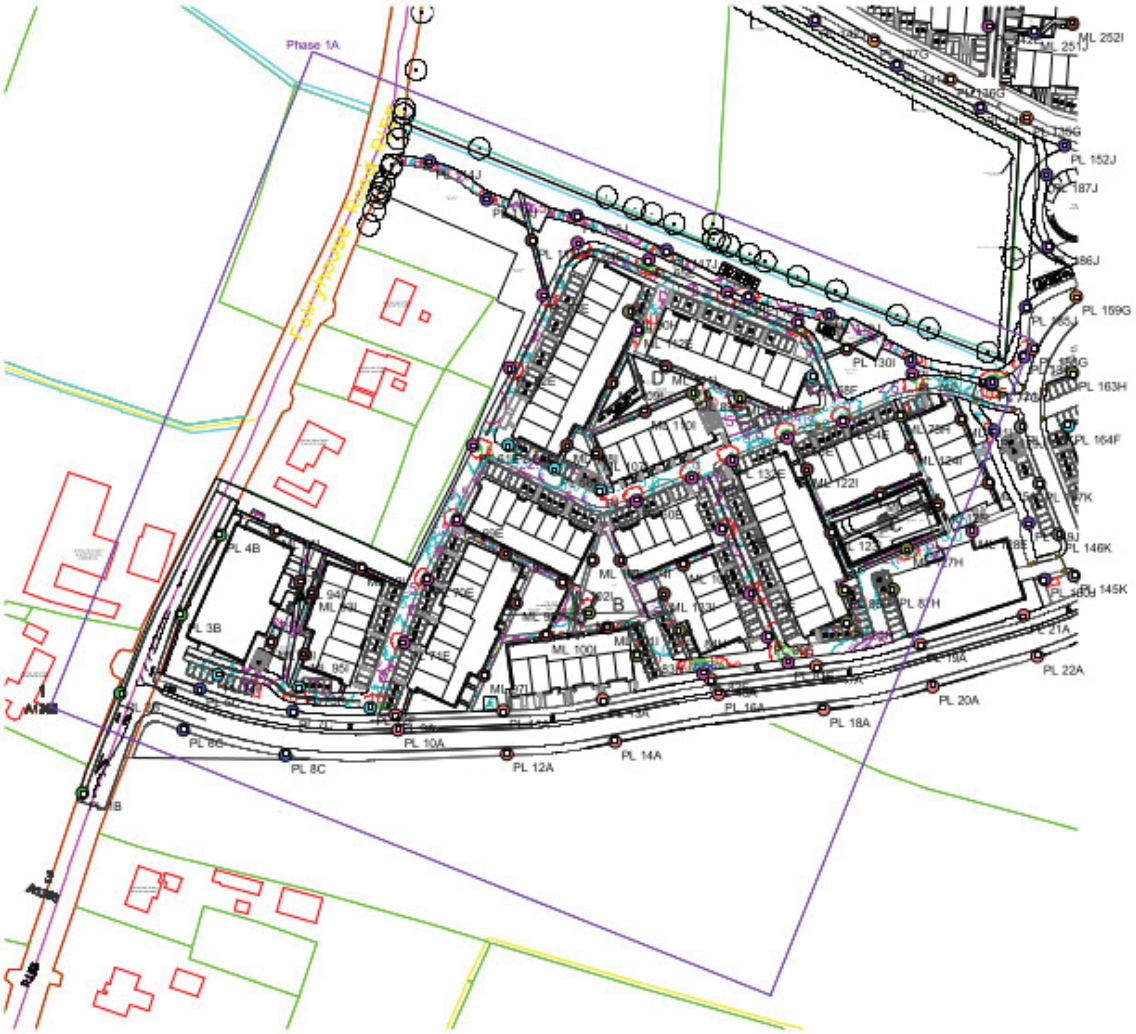
Figure 11. *Horizontal Illuminance (lux) levels for the Outer Relief Road (Sheet 5)*

DATE: 18 May 2022 DESIGNER: Patrick Redmond

PROJECT No: 21068 PROJECT NAME: Ratoath South SHD REV A

Horizontal Illuminance (lux)

Phase 1A



Results

Eav	6.28
Emin	1.23
Emax	24.82
Emin/Emax	0.05
Emin/Eav	0.20

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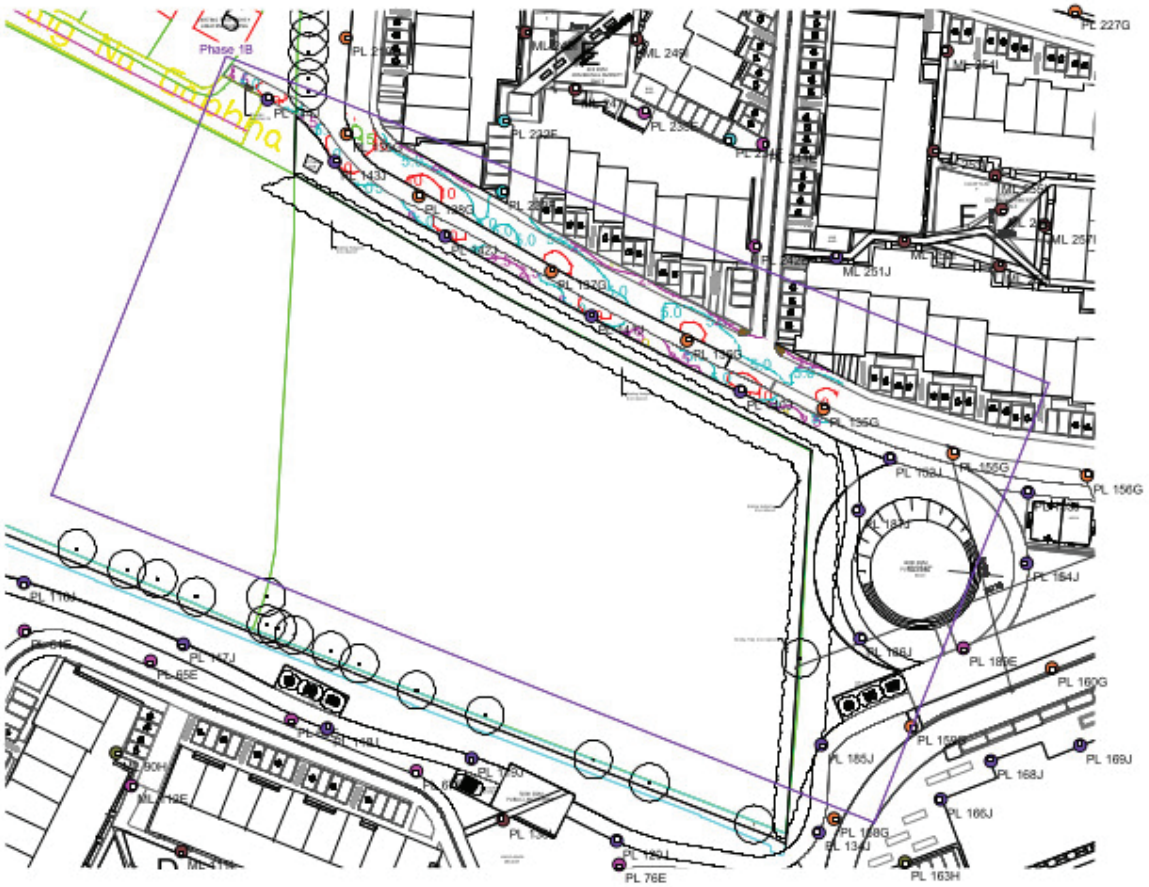
Figure 12. *Horizontal Illuminance (lux) levels for Ratoath SHD (Sheet 1)*

DATE: 18 May 2022 DESIGNER: Patrick Redmond
PROJECT No: 21068 PROJECT NAME: Ratoath South SHD REV A

Horizontal Illuminance (lux)

Phase 1B



Results

Eav	6.34
Emin	1.41
Emax	15.64
Emin/Emax	0.09
Emin/Eav	0.22

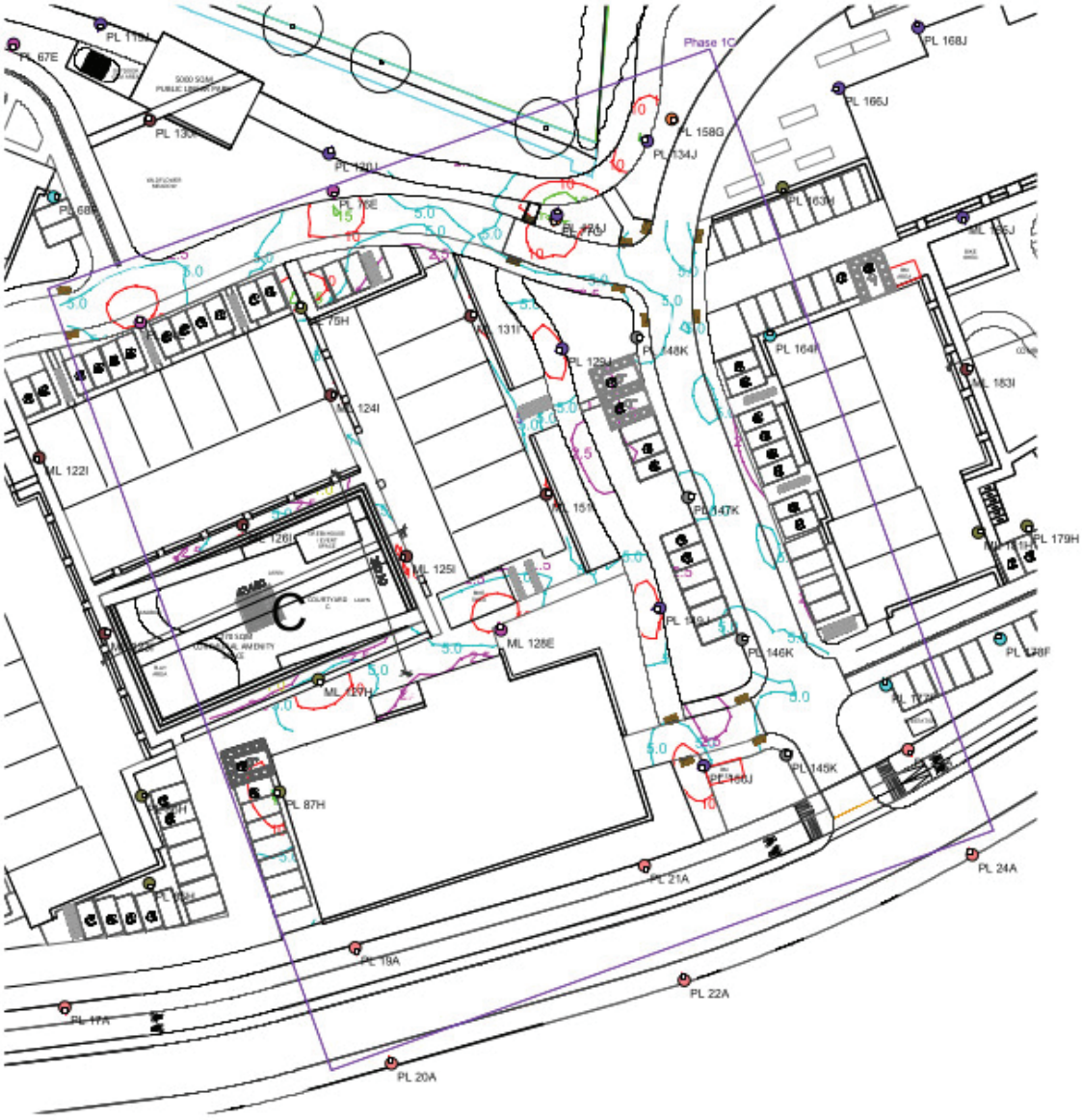
Figure 13. *Horizontal Illuminance (lux) levels for Ratoath SHD (Sheet 2)*

DATE: 18 May 2022 DESIGNER: Patrick Redmond

PROJECT No: 21068 PROJECT NAME: Ratoath South SHD REV A

Horizontal Illuminance (lux)

Phase 1C



Results

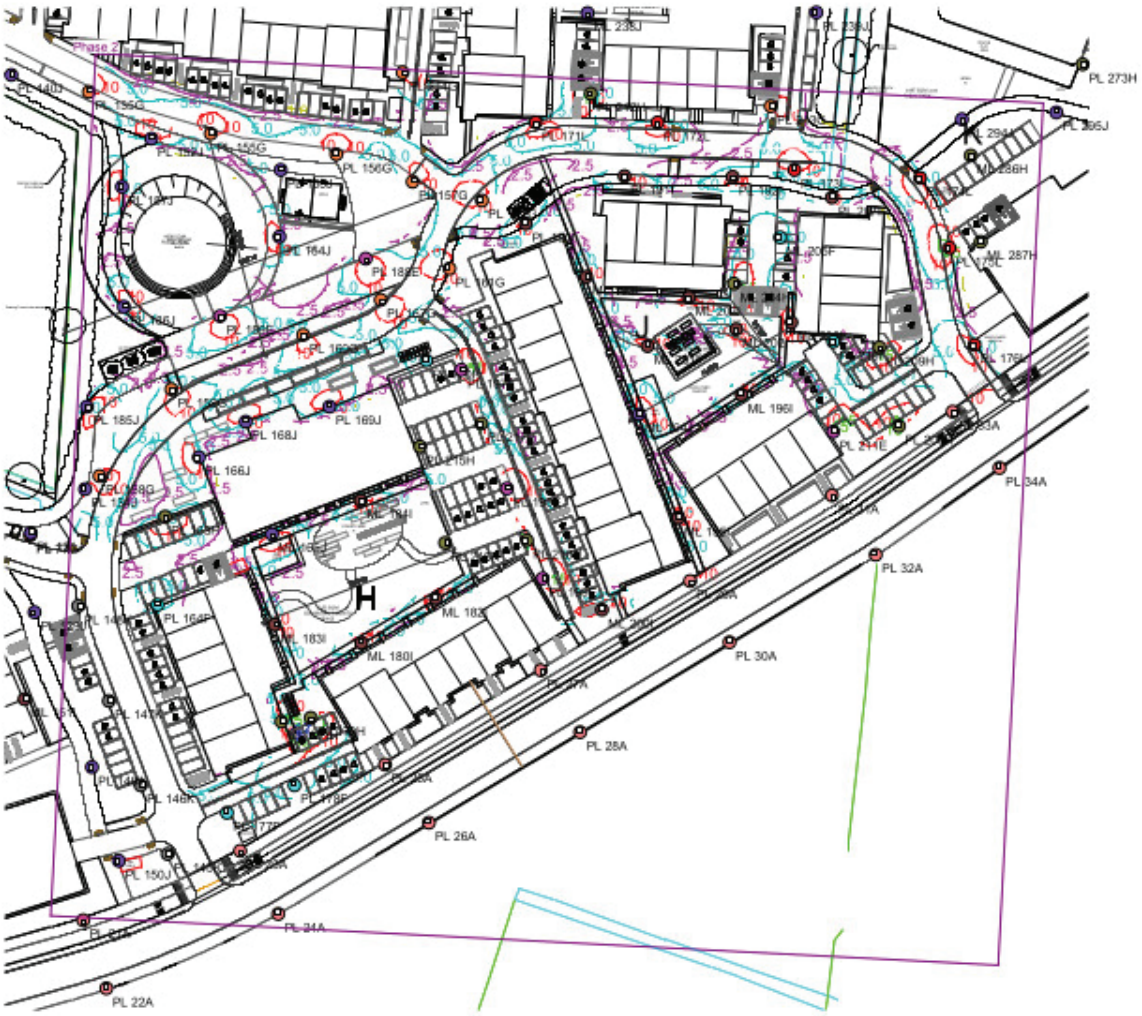
Eav	5.81
Emin	1.47
Emax	16.25
Emin/Emax	0.09
Emin/Eav	0.25

Figure 14. *Horizontal Illuminance (lux) levels for Ratoath SHD (Sheet 3)*

DATE: 18 May 2022 DESIGNER: Patrick Redmond
PROJECT No: 21068 PROJECT NAME: Ratoath South SHD REV A

Horizontal Illuminance (lux)

Phase 2



Results

Eav	6.18
Emin	1.25
Emax	21.24
Emin/Emax	0.06
Emin/Eav	0.20

Figure 15. *Horizontal Illuminance (lux) levels for Ratoath SHD (Sheet 4)*

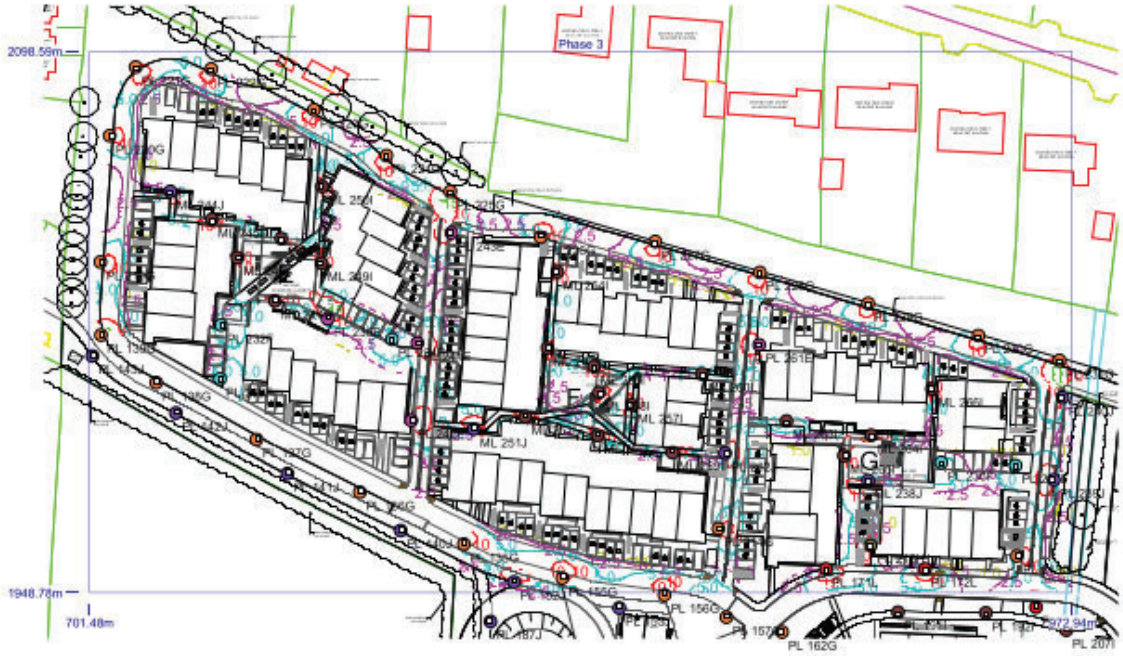
DATE: 18 May 2022 DESIGNER: Patrick Redmond

PROJECT No: 21068 PROJECT NAME: Ratoath South SHD REV A

REDMOND ANALYTICAL MANAGEMENT SERVICES

Horizontal Illuminance (lux)

Phase 3



Results

Eav	5.78
Emin	1.14
Emax	15.77
Emin/Emax	0.07
Emin/Eav	0.20

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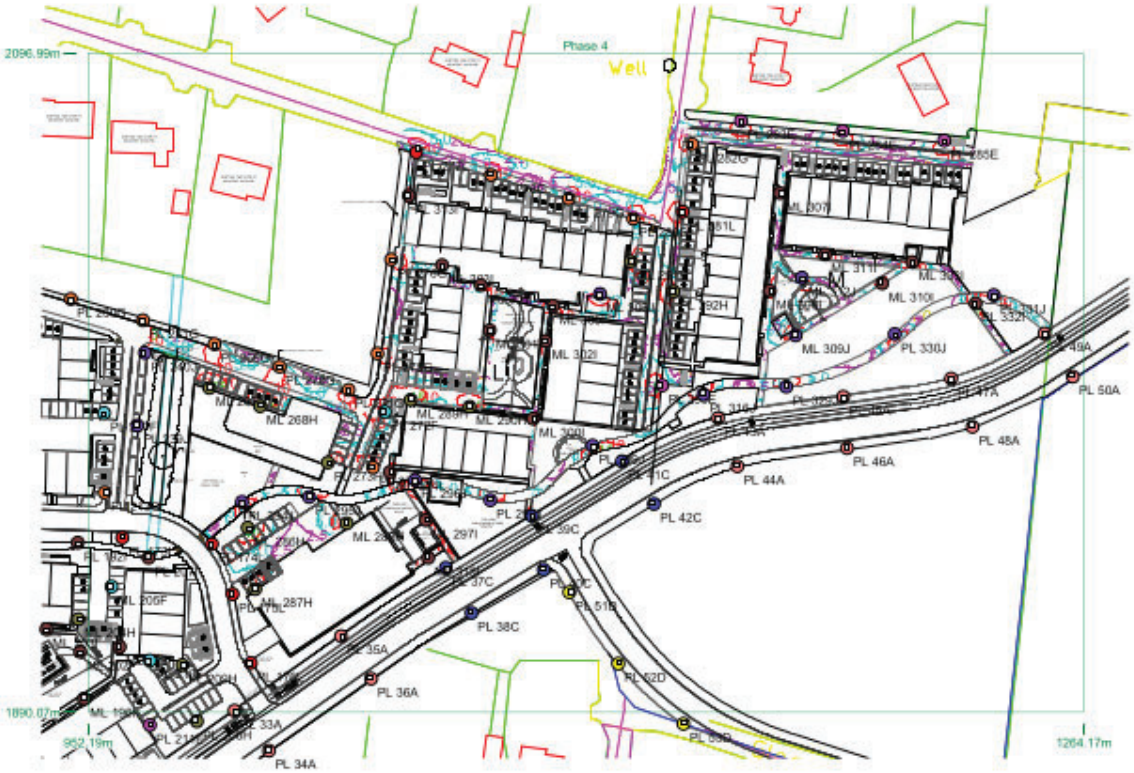
Figure 16. *Horizontal Illuminance (lux) levels for Ratoath SHD (Sheet 5)*

DATE: 18 May 2022 DESIGNER: Patrick Redmond

PROJECT No: 21068 PROJECT NAME: Ratoath South SHD REV A

Horizontal Illuminance (lux)

Phase 4



Results

Eav	6.32
Emin	1.25
Emax	16.39
Emin/Emax	0.08
Emin/Eav	0.20

Figure 17. *Horizontal Illuminance (lux) levels for Ratoath SHD (Sheet 6)*

DATE: 18 May 2022 DESIGNER: Patrick Redmond

PROJECT No: 21068 PROJECT NAME: Ratoath South SHD REV A

REDMOND ANALYTICAL MANAGEMENT SERVICES

Horizontal Illuminance (lux)

Phase 2 Carpark

Results

Eav	6.80
Emin	1.80
Emax	17.22
Emin/Emax	0.10
Emin/Eav	0.27

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Figure 18. *Horizontal Illuminance (lux) levels for Ratoath SHD (Sheet 7)*

Bat Assessment Findings

Review of local bat records

The review of existing bat records (sourced from Bat Conservation Ireland's National Bat Records Database) within a 2km^2 grid. The site is located within two 2km^2 grid references (Reference grid O05A and). The study area reveals that none of the nine known Irish species have been observed locally within Reference grid O05A and two of the nine species were observed within Reference grid O05F (Table 1). The National Biodiversity Data Centre's online viewer was consulted in order to determine whether there have been recorded bat sightings in the wider area. This is visually represented in Figures 29-31 The following species were noted in the wider area: Brown Long-eared Bat (*Plecotus auritus*),Daubenton's Bat (*Myotis daubentonii*), Lesser Noctule (*Nyctalus leisleri*), Soprano Pipistrelle (Pipistrellus pygmaeus), Pipistrelle (*Pipistrellus pipistrellus sensu lato*) and Nathusius's Pipistrelle (*Pipistrellus nathusii*) (Figures 29-31).

Table 1: *Status of bat species within a 2km^2 grid encompassing the subject site (Reference no. O05F)*

Species name	Record count	Date of last record	Note
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	15	15/08/2014	National Bat Database of Ireland
Lesser Noctule (*Nyctalus leisleri)*	3	23/07/2013	National Bat Database of Ireland

Figure 20. Brown Long-eared Bat (*Plecotus auritus*) (yellow), Daubenton's Bat (*Myotis daubentonii*) (purple) and both Brown Long-eared Bat and Daubenton's Bat (orange) (Source:NBDC) (Site – red circle)

Figure 21. Lesser Noctule (*Nyctalus leisleri*) (purple), Soprano Pipistrelle (Pipistrellus pygmaeus) (yellow) and both Lesser Noctule and Soprano Pipistrelle (orange) (Source NBDC) (Site – red circle)

Figure 22. Pipistrelle (*Pipistrellus pipistrellus sensu lato*) (Species Aggregate) (yellow), Nathusius's Pipistrelle (*Pipistrellus nathusii*) (purple) and both Pipistrelle and Nathusius' Pipistrelle (orange) (Source NBDC) (Site – red circle)

Detector survey

Bat detector surveys were carried out on the 24th May 2020 and 30th August 2021. Bat activity on site was not particularly high. A single soprano pipistrelle was observed emerging from a large ash tree that is covered in ivy in the central/western portion of the site (yellow circle Figure 19). This tree and the corresponding hedgerow are to be retained.

Foraging activity of Leisler's bat (Lesser Noctule) (*Nyctalus leisleri*), soprano Pipistrelle (*Pipistrellus pygmaeus*) and common pipistrelle (*Pipistrellus pipistrellus*) were noted on site primarily along the hedgerows on site.

Bat Roosts

The ash tree on site where the soprano pipistrelle was emerged emerging would be seen to be tree of greatest potential for roosting on site. Other trees, primarily the larger ash that are covered in ivy are of low-medium potential for bat roosting, primarily as a result of ivy cover. Many of the ash trees are multi-stemmed which results in smaller thinner trunks of lower bat roosting potential.

Potential impacts of proposed redevelopment on bats

The removal of hedgerows will result in the removal of foraging areas and an increase in lighting would be expected to reduce foraging on site. The bat roost on site is within a hedgerow that is to be retained. This tree has been advised for further assessment in the arborist report. Should this tree (1453) be required to be removed a bat derogation licence will be required from NPWS.

Impacts: ***Minor adverse, negative, long term, site, not significant***.

Mitigation measures

Predicted and residual impact of the proposal

Impacts: ***Minor adverse, negative, long term, site, not significant***.

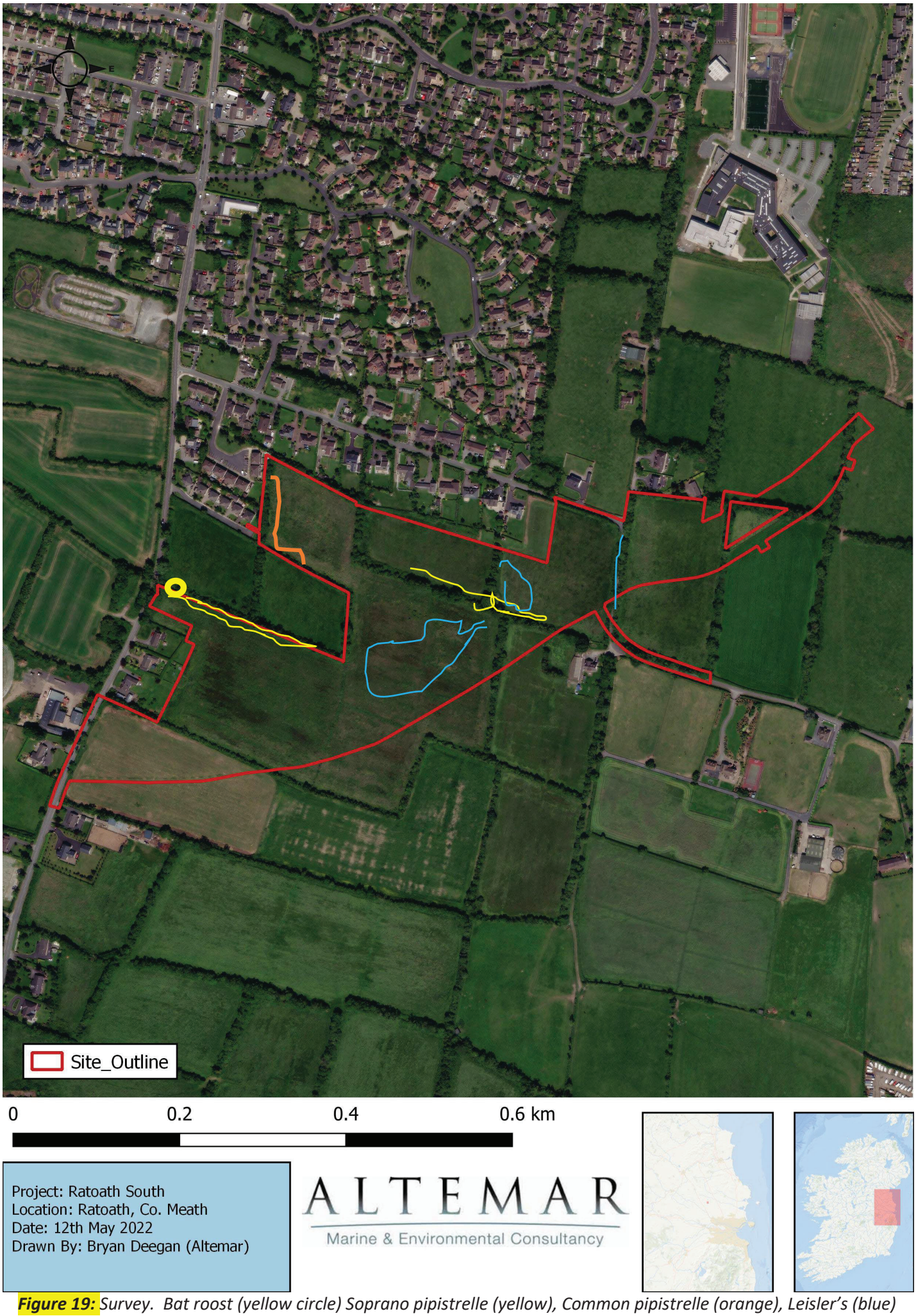

Figure 19: *Survey. Bat roost (yellow circle) Soprano pipistrelle (yellow), Common pipistrelle (orange), Leisler's (blue)*

References

Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) 1982

Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979

EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive) 1992

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Kelleher, C. and Marnell, F. 2007 *Bat Mitigation Guidelines for Ireland – Irish Wildlife Manuals No. 25*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin

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Wildlife Act 1976 and Wildlife Amendment Acts 2000 and 2010. Government of Ireland

Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016)
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https://www.npws.ie/sites/default/files/publications/pdf/IWM25.pdf

Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA, 2006).

https://www.tii.ie/technical-services/environment/planning/Best_Practice_Guidelines_for_the_Conservation_of_Bats_in_the_Planning_of_National_Road_Schemes.pdf

APPENDIX 5.2 –

FAUNA WINTER SURVEY

APPENDIX II-PROPOSED DEVELOPMENTS AT RATOATH CO. MEATH

NON AVIAN FAUNA WINTER SURVEY

Report prepared for

ALTEMAR ENVIRONMENTAL CONSULTANTS

by

Dr. Chris Smal B.Sc. Ph.D. MIEEM

10th June 2021

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CONTENTS

Page no.

1. INTRODUCTION 3

2. SITE SURVEY 4

2.1 SURVEY CONSTRAINTS 4

3. GENERAL DESCRIPTION OF AREA AND HABITATS 4

4. FAUNA 5

4.1 BADGERS 7

4.1.1 Legal status and conservation issues - badgers 8

4.2 OTTERS 8

4.2.1 Legal status and conservation issues - otters 8

4.3 OTHER SPECIES 8

5. EVALUATION 9

6. MITIGATION MEASURES AND RECOMMENDATIONS 10

6.1 PROTECTION OF BADGERS 10

6.1.1 On site works 11

6.2 PROTECTION OF OTTERS 11

6.2.1 Protection of common frogs 11

6.3 PROTECTION OF OTHER FAUNA 12

7. REFERENCES AND BIBLIOGRAPHY 13

8. APPENDICES 16

8.1 APPENDIX: LIST OF VERTEBRATES AND ADJUDGED STATUS 16

8.2 APPENDIX: PHOTOGRAPHIC RECORD 19

1. Introduction

Developments are being proposed for a large area south of Ratoath town in Co. Meath. It is understood that the developments will be primarily residential along with roads and necessary infrastructure. This survey and report was prepared prior to issue of any detailed development proposals for the site.

This report presents the results of a non-avian fauna study (excluding bats) conducted in April 2021.

Figure 1. Aerial photograph, overall site boundary (red) and outline of areas surveyed (grey).

2. Site survey

The survey was conducted over three days on the 13th, 14th and 20th April 2021 in good weather conditions (dry, overcast, sunny, mild, light breezes on all days). The site was searched for badger setts, signs of badger activity, otter signs, and signs or dwellings of other mammals and amphibians.

Survey of fauna was carried out by means of a thorough search within the site. Presence of mammals is indicated principally by their signs, such as dwellings, feeding signs or droppings - though direct observations are also occasionally made.

The nature and type of habitats present are also indicative of the species likely to be present. The field survey was supplemented by evaluation of relevant literature and existing information.

2.1 Survey constraints

Mammal surveys are best conducted in winter months when vegetation has died back (especially so for badgers *Meles meles* and otters *Lutra lutra*). The best period for surveys is in late winter (after frosts have reduced cover of bramble and other vegetation) up to mid April before growth resumes. There were no seasonal constraints for this survey.

However, there was considerable scrub on site – which was largely impenetrable. The areas of scrub were principally alongside hedgerow and treeline boundaries and often quite wide. This scrub resulted in lack of access to the ditches and banks where badger setts might be located and posed a significant constraint for the survey in many parts of the site.

3. General description of area and habitats

The overall development site is approximately 100 ha in extent. Not all of the site area was included in the survey due to access and ownership issues. The area surveyed is shown in Figure 1.

The entire area is quite flat and at an elevation of c. 90m asl. Much of the site is bounded by the R155 road to the west, and by local roads and existing residential areas to the north and north-east. At the far south, the site adjoins the Fairyhouse Race Course.

All of the lands are agricultural in nature. The land use may be considered in three parts:

1. Neglected grasslands at the north: the grass is now rank, and colonising willows are encroaching in part. Bramble scrub is extensive particularly along field hedgerow or treeline boundaries. Some of the fields are wet, with considerable rushes *Juncus sp.*, whilst others also have encroaching gorse.
2. Improved pasture grasslands at the south, grazed by cattle and sheep, and also horses.
3. Arable lands: there are several large arable fields ta the far south-east of the site: these had been recently ploughed at time of survey. There are a further 2 arable fields at the mid-west of the site, with access from the R155. These appear to have been used for root crops the previous year.

The hedgerows and treelines on site are varied in character, height and species composition. Typically, they include hawthorn, ash, sycamore, willow, blackthorn and gorse. Most of the boundaries include ditches which were generally damp or wet and several held running water. There is a small stream along the southern boundary, which flows west to east.

There are numerous trails created by walkers; notably at the north-west where there is access from adjoining residential areas, and also at the far south – where there is access from a laneway and walkers walk field boundaries and cross ditches – as far as the nearby Race Course.

There are no protected areas in the locality.

4. Fauna

The fauna on site is typical of agricultural landscapes in the Irish Midlands. It is not diverse. The principal species noted on site were fox, badger *Vulpes vulpes* and rabbit *Oryctolagus cuniculus*.

Almost all of the rabbit activity observed on site was at the far south, and a large rabbit warren was found there, just off site. Fox signs were distributed around the site.

In total 8 badger setts were found, but it was clear that several more setts would be present in areas that could not be searched due to bramble and scrub cover. One breeding sett was identified at the far south. Badger paths and feeding signs were numerous throughout the site. In addition, 6 badger latrines were found (badgers defecate in pits which also serve as territorial markers, and are know as latrines).

No otter *Lutra lutra* signs were found along the small stream at the south of the site. However, otters have been recorded on this stream in the past not far to the east (1980, ref. Chapman & Chapman (1982)) and there has also been a road fatality of an otter near the same stream several kilometres to the east (2010; biodiversityireland.ie.).

Other common species noted were brown rat *Rattus norvegicus* and fieldmouse *Apodemus sylvaticus.* Other species that will be present include the hedgehog *Erinaceous europaeus* and pygmy shrew *Sorex minutus*. The house mouse *Mus musculus* may be present as it does occur in agricultural areas and in association with residential areas. The Irish hare or its signs *Lepus timidus hibernicus* were not observed on site: a local resident said that there were hares present some years past but he had not seen any more recently.

The habitats on site are not favourable for either red *Sciurus vulgaris* or grey squirrel *Sciurus carolinensis* as there is no woodland on site. Mink signs were not found, and this species is not recorded in this locality.

The common frog *Rana temporaria* does occur on site. Ponds and pools that would serve as breeding sites are few but one such pool was noted at the east of the area. Another species that may occur on site is the common or viviparous lizard *Lacerta vivipara*. The common lizard occurs in many habitats in Ireland and is likely to be present on site.

A list of faunal species expected on site is included in the Appendices. The observations of faunal signs on site are shown on Figure 2 below.

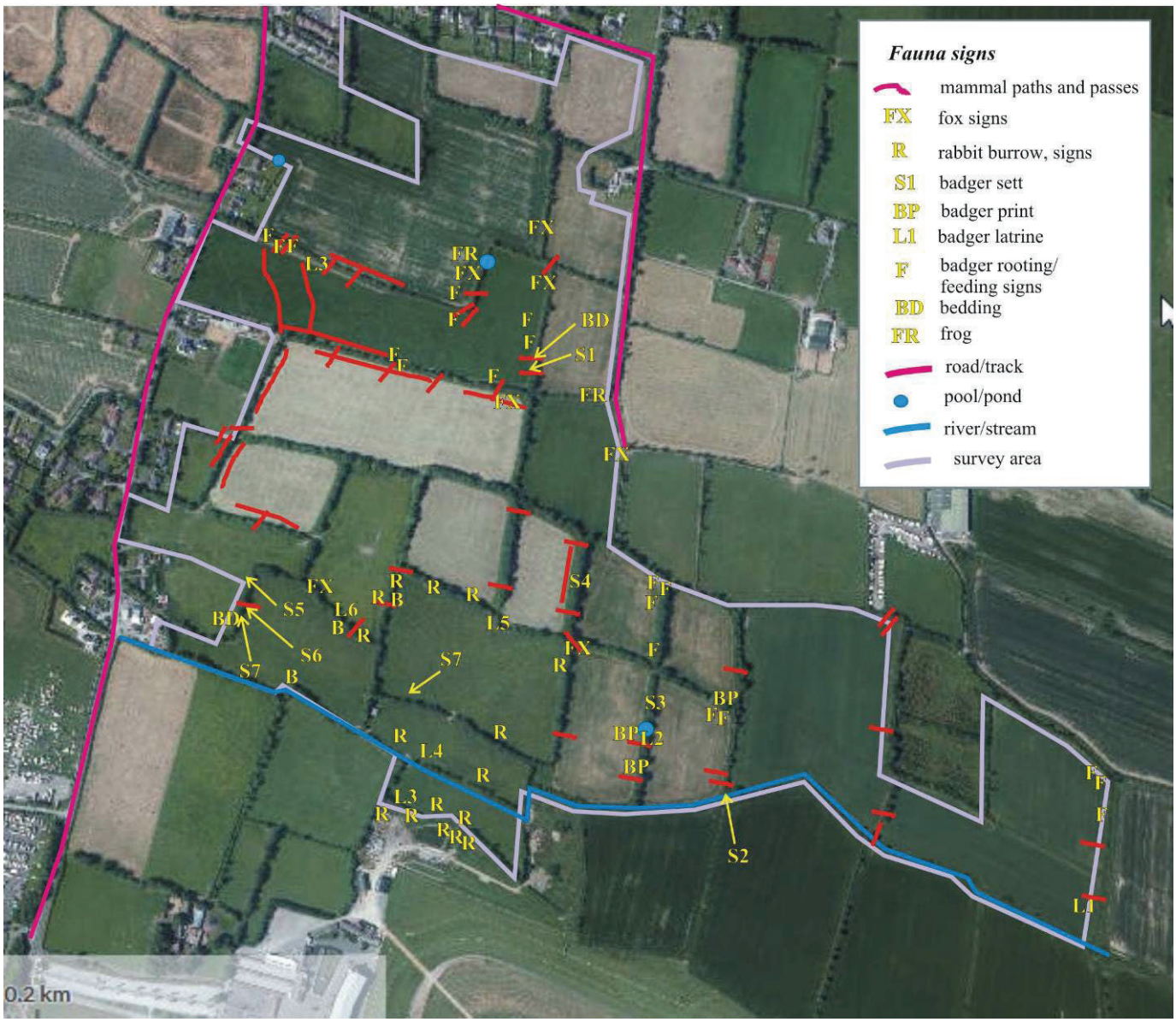

Figure 2. Survey area and mammal signs observed.

4.1 Badgers

The badger setts and the latrine sites are listed in the tables below. The presence of badgers was clear from foraging signs, latrines, and strong badger paths (many of which are marked on Figure 2), and, of course, the badger setts.

A number of the setts were clearly active, but only one was considered to be a main sett (main sett is a breeding sett and focus for the badger group).

It is clear that there is at least one badger group present in the area, but, given the size of the area, it is possible that one more badger group is utilising the site, with its main sett present on site or in adjoining lands. It has been noted earlier that the dense scrub alongside many of the field boundaries did not allow for a thorough search of these areas; it is certain that additional sett are present in the area.

Badgers are widespread in the Irish countryside. Badgers live in social groups and defend territories that may be very extensive (c. 80 to 200 ha). The focus of the social group is the breeding sett (main sett) and other, usually smaller setts, are scattered through the territory. Average badger group size in Ireland is estimated at 4-6 badgers (Smal, 1995) in lowland agricultural areas, but group size may vary from 2 to c.12 or more. The density of badgers in Ireland is *c*. 0.5 social groups per km^2 (Smal, 1995).

Table 1. List of badger setts and description.

Sett or burrow ID on Figure 2	GPS location	Description	Comments
S1	O 02077 50201	Single entrance, bedding (not fresh), small / medium spoil. Open. More bedding nearby at O 02085 50212	Outlier, occasional use
S2	O 02346 49580 approx.	Large sett, bedding, badger prints in mud, 2 entrances (more possible in scrub), one large spoil, 1 small	Main sett, active
S3	O 02148 4980 approx.	Single entrance, little spoil, dry ditch	Outlier/mammal burrow
S4	O 02142 49880	Single entrance, no spoil, open	Outlier/mammal burrow
S5	O 01685 49891	Single entrance, small spoil, open, active, well worn path, no bedding	Outlier, active
S6	O 01674 49852	Single entrance, little spoil, open	Outlier/mammal burrow
S7	O 01660 49846 to O 01658 49837	Three entrance, good paths, no bedding, open. On large spoil, 2 small spoil, bedding	Subsidiary, active
S8	O 01902 49714	Large spoil, open, damp ditch, fresh spoil, 2nd entrance in field 2.5 m distance. Rabbit pellets	Badger sett, may be in use by rabbits presently
B	O 01752 49730	Two entrance, mammal burrows, little spoil	Disused mammal burrow

B	O 01986 49855	Large burrow, single entrance, rabbit pellets but q. large, no bedding, medium spoil	Burrow, possibly sett, in use by rabbits
B	O 01818 49817 approx.	2 entrances, old, disused	Disused mammal burrow

Table 2. List of badger latrines and description.

Latrine site as on Fig 2	GPS location	Description
L1	O 02876 49395	2 small pits, fresh dung
L2	O 02230 49620	Crossing over ditch. 1 pit, very fresh dung, several prints in mud
L3	O 01902 49630	Latrine at bridge. 2 pits. 3 dung, fresh
L4	O 01952 49615	Large latrine, c. 7 pits, 4 with dung, mostly fresh
L5	O 02055 49811	One pit, one fresh dung
L6	O 01818 49817	5 pits, 2 with dung, quite fresh

4.1.1 Legal status and conservation issues - badgers

A number of mammalian species are protected under the Wildlife Act (1976) and Wildlife [Amendment] Acts (2000, 2012).[1]. These include the badger (which is also a Red Data Book species). However, the badger is a relatively common species and ubiquitous through much of the Irish countryside (Smal, 1995) and is present in many urban areas also.

It is standard best practice to make special provisions for badgers affected by development; badgers are notable for their practice of constructing large underground tunnel and chamber systems (setts). Provisions are made for their humane removal or for their conservation on site where feasible or practicable. The Wildlife [Amendment] Act (2000) protects all setts (as resting places).

4.2 Otters

No otter signs were found. The main watercourse on site is at the far south; this is quite a shallow stream. However, otters were recorded as present on this stream in the past. No otter holts were found on site.

4.2.1 Legal status and conservation issues - otters

Otters are protected under the Irish Wildlife Acts and are also listed under Annex II and Annex IV of the EU Habitats Directive. It is now considered as of Least Concern in the Irish Red Mammal List; this species is relatively common and occurs on most rivers and watercourses in Ireland.

4.3 Other species

Observed or potential on site are protected species such as hedgehog, pygmy shrew, Irish stoat

[1] Note that the Wildlife Act (1976) and the Wildlife Amendment Act (2000) allow exemptions for certain types of development [page 32, 2000 Act: "it shall not be an offence for a person - …while constructing a road, or building operation or work of engineering construction, or while constructing or carrying on such other operation or work as may be prescribed, *unintentionally* to kill or injure such an animal or *unintentionally* to destroy or injure the breeding place or resting place of such an animal…"]

Mustela erminea hibernica, Irish hare, common frog, and common lizard.

These species are protected by the Wildlife Acts (1976 to 2012). The mammalian, amphibian and reptilian species known or likely on site are classed as of Least Concern (Marnell *et al* , 2019; King *et al*, 2011). Foxes and rabbits are not protected species.

Those species observed or expected on-site may be considered as generally common species and widespread through much of the Irish countryside. It is an offence to intentionally interfere with or destroy the breeding or resting place of these species, though there are certain exemptions under the Wildlife Acts for road and housing developments and other construction works.

5. Evaluation

The site of c. 100 ha is an agricultural landscape. The land is quite flat, and is comprised of pasture grasslands and arable fields – whilst several of the grassland areas at the north have been neglected and not grazed for some time.

The fauna in the area is of limited ecological interest, and is typical of Irish agricultural landscapes. Present are foxes, rabbits, badgers and frogs. There will be a number of other common species present also. Whilst no otter signs were seen on the stream, otter presence there is considered potential.

Any proposed development of the site would impact on the badger groups present in the area through loss of foraging habitat, disturbance, and loss of setts.

Impacts on otters could arise through loss of or reduction of the river riparian corridor, disturbance through noise or lighting, and impact on otter movements unless appropriate bridges are incorporated.

Otherwise, the nature of the impacts arising from developments on the site are principally local upon vertebrate species utilising the site.

6. Mitigation measures and recommendations

Standard mitigation measures should be adopted in the construction of this development. These include habitat retention where feasible, limiting season of disturbance to trees and vegetation so as to reduce impacts on breeding species, and to provide for habitat replacement and enhancement.

This report was prepared without detailed knowledge of the proposals for the site (residential elements, roads, infrastructure etc.).

6.1 Additional survey in areas not included in the present survey

1 There were portions of the overall site that were not included in survey due to access or ownership issues. These areas require survey at appropriate season.

6.2 Protection of badgers

Several badger setts were found on site. However, dense scrub did not permit search of substantial portions of the site and it is considered that several more setts are present.

1 A pre-construction survey should be conducted to find additional badger setts in the areas of scrub on site. Badgers may also construct new setts in the period between this survey and development proceeding.

2 All scrub clearance should be monitored to ensure that no badger setts are present in areas that could not be searched in this survey and in the pre-construction survey (item above).

3 All badger setts may be considered as resting places of a protected species and are protected under the Wildlife Acts 2000-2012. In the instance of setts requiring removal, standard procedures for evacuation of and removal of setts shall be followed (refer *Guidelines for the treatment of badgers prior to the construction of national road schemes*. National Roads Authority, 2005. [Prepared by C. Smal, author of this report]). The Guidelines also offer advice on how to minimise disturbance to badger setts.

4 A licence from NPWS will be required to evacuate and remove any badger setts in way of development on site or to permit disturbance/works near any of the setts (refer further below).

5 An exclusion zone for machinery (including light machinery, hedge trimmers, scrub cutters etc.) should be established in the vicinity of each of the setts on site with the area marked off with a post and rail fence or similar and appropriate signage erected. This applies to the setts close to grassland areas where works to clear scrub or create amenity grassland might be required. The exclusion zone should be designated by a badger expert, with the zone marked or fenced off within the grassland portion only. The exclusion zone should be 30m from each of the setts, which may be reduced under advice of a badger expert.

6 If any of the setts is considered to be a breeding season (prior to construction) this zone should be increased to 50m during the badger breeding season (1st December to 30th June). A badger expert should, therefore, reassess the setts prior to

construction.

7 In the case of blasting or pile driving, the distance should be increased to 150m during the badger breeding season.

8 Any works to be conducted closer to the sett and within the zones referred to above (30m, 50m and 150m as appropriate) will require a licence from NPWS. Such works would need to be supervised by a suitably qualified badger expert.

6.2.1 On site works

1 Earth or wooden ramps should be put in place in any trenches dug on site – for the full duration of time that any of the trenches are open. Reason: so that any badgers falling into such trenches can escape (specific details can be provided on request).

2 Wooden platforms or earthen bridges should be placed across any open trenches to enable badgers to cross any open trenches present during the construction works.

3 Any works close to the sett should be restricted to daytime hours e.g. 8am to 5pm and completed within as short a time as possible.

6.3 Protection of otters

Otters may forage along the stream at the south of the site.

1 The proposal may include a road crossing(s) of the stream. Impacts on otter movements can be expected – such as those arising from noise disturbance, lighting, pollution etc.

2 Developments should not be permitted within 20m either side of the stream. Riparian vegetation should be retained and additional planting to screen the stream should be adopted.

3 No lighting on any proposed bridge crossings should be permitted and all sources of light in the proposed nearby developments need to be directed away from the stream - in order to limit disturbance to otters and other fauna utilising the watercourse.

4 Any bridge crossing will require ledges to allow free otter access under the bridge. Culverting of the stream is not recommended.

5 The stream corridor should be screened from disturbance during construction – with wooden hoarding or similar. Construction works should only be conducted during daylight hours.

6 For guidelines on how to minimise disturbance to otters, refer *Guidelines for the treatment of otters prior to the construction of national road schemes*. National Roads Authority, 2006. [Prepared by C. Smal, author of this report.

7 Any interference with or disturbance to otter holts on site would require licence from NPWS.

6.3.1 Protection of common frogs

Frogs do breed on site whilst few ponds with frogs were found. The breeding season for frogs is

from late January/February through to June or mid-July. Spawn and tadpoles are present in pools and ponds over this period, sometimes for longer.

1) A pre-construction survey should be conducted to ascertain the sites of frog presence prior to any works commencing.

2) The period of construction at or near affected breeding sites should exclude the frog breeding period.

3) If this is not possible then a licence will be required to remove frogs, spawn and tadpoles from affected pools and ponds, and the frogs etc. translocated to other suitable habitat in the locality. Such translocations require licence from NPWS and need to be conducted by qualified zoologists.

4) The loss of frog breeding sites should be ameliorated by provision of artificial ponds or pools and these should preferably be created at early stages of site development. Frog breeding pools could be created in adjacent grassland or as part of landscaping measures on site.

5) The creation of artificial ponds etc. should be conducted outside of the frog breeding season (to avoid mortality within existing pools and drains on site) and with due care to minimise impacts on both frog foraging habitats and frog breeding sites during their construction. Frog ponds should be created in advance of the frog translocation measures.

6.4 Protection of other fauna

Generally, measures to protect other (common) species, such as hedgehog and pygmy shrew etc. are impractical.

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8. APPENDICES

8.1 Appendix: list of vertebrates and adjudged status

	Species		Status in study area	Comments	Legal status Irish status (Red Lists for Ireland)[2] [3]
Mammals					
Insectivora					
	hedgehog	*Erinaceous europaeus*	Certain	Certain to be present in grassland, arable and scrub areas	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Least concern
	pygmy shrew	*Sorex minutus*	Present	Present, frequent on grasslands; also occurs in woodlands, scrub etc.	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Least concern
	Greater white-toothed shrew	*Crocidura russula*	Absent	Introduced species, absent in this part of the country	Introduced species, not protected.
Lagomorpha					
	rabbit	*Oryctolagus cuniculus*	Present	Signs on site, burrows, scrapes and droppings	None. Not protected
	Irish hare	*Lepus timidus hibernicus*	Potential	No signs found on site	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Open season (RoI): 26 September - 28 February. Least concern

[2] *Ireland Red List no. 12 – Terrestrial mammals.* National Parks & Wildlife Service, Dept. of Environment, Heritage and Local Government (2019).
[3] *Ireland Red List no. 5 – Amphibians, Reptiles and Freshwater Fish.* National Parks & Wildlife Service, Dept. of Environment, Heritage and Local Government (2011).

Rodentia					
	wood mouse/long-tailed field mouse	*Apodemus sylvaticus*	Present	Certain on site. In most terrestrial habitats.	None. Not protected
	house mouse	*Mus domesticus (Mus musculus)*	Potential[4]	Likely to occur in the locality. Usually associated with agriculture or domestic dwellings.	None. Not protected
	brown rat	*Rattus norvegicus*	Present	Present on site. Occurs in many terrestrial habitats.	None. Not protected
	black rat	*Rattus rattus*	Absent	Rare species, absent in this area	None. Not protected Least concern
	bank vole	*Clethrionomys glareolus*	Absent	Range restricted to south-west.	None. Not protected
	red squirrel	*Sciurus vulgaris*	Absent	Poor habitats for this species on site, no coniferous woodland	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Near threatened. Least concern
	grey squirrel	*Sciurus carolinensis*	Potential	Poor habitats for this species on site, limited woodland	None. Not protected
Carnivora					
	fox	*Vulpes vulpes*	Present	Signs present on site	None. Not protected
	badger	*Meles meles*	Present	Setts and numerous signs on site	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Least concern
	pine marten	*Martes martes*	Absent	No suitable habitats for this species	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Least concern
	Irish stoat	*Mustela erminea hibernica*	Potential	Limited habitats for this species on site	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Least concern
	otter	*Lutra lutra*	Potential	No signs found during survey but there are previous records of otters on this stream	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000, EU Habitats Directive [92/43/EEC] Annex II and IV. CITES Appendix 1. Near threatened. Irish status: Least concern.

[4] House mouse is frequent in arable areas and close to dwellings (Fairley & Smal, 1987).

	American mink	*Absent*	Potential	No signs found on site.	Introduced species. Not protected
Artiodactyla					
	red deer	*Cervus elaphus*	Absent	Not known in this area	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Open seasons. Least concern
	sika deer	*Cervus nippon*	Absent	Not known in this area	Introduced species. Open seasons.
	red/sika hybrids	*Cervus elaphus/nippon*	Absent	Not known in this area	Hybrids. Open seasons.
	fallow deer	*Dama dama*	Absent	Not known in this area	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Open seasons. Least concern
	wild feral goat	*Capra hircus*	Absent	Absent in this part of Ireland	Not protected
	Chinese muntjac deer	*Muntiacus reevesi*	Absent	Not known in this area	Introduced species
Amphibians					
	common or smooth newt	*Lissotriton vulgaris (Triturus vulgaris)*	Absent	No suitable habitats found on site	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000 Least concern
	frog	*Rana temporaria*	Present	Adult and spawn present	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000, EU Habitats Directive [92/43/EEC] Annex V Least concern
Reptiles					
	common lizard	*Zootoca vivipara (Lacerta vivipara)*	Potential	Widespread nationally. Occurs in many habitat types. A species hard to observe.	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000 Least concern

8.2 Appendix: Photographic record

Plate 1. Grassland field at far north-west. Rank and ungrazed.

Plate 2. Grassland field at north-west, with *Juncus* and encroaching willow.

Plate 3. Typical hedgerow at north-west with extensive bramble scrub.

Plate 4. Grassland at north, with hedgerow, treeline and extensive scrub adjoining.

Plate 5. Grassland at north, with hedgerow, hawthorn and gorse scrub.

Plate 6. Pond along hedgerow at north. Frogs were observed here.

Plate 7. Sett S1. Single entrance outlier sett, with bedding.

Plate 8. Additional roll of bedding near S1.

Plate 9. Wet ditch and pasture grasslands at mid-south of the area.

Plate 10. Ploughed arable lands at far south-east of the study area.

Plate 11. Ploughed arable lands at far south-east of the study area, with low hedgerow dividing these fields.

Plate 12. Ploughed arable lands at far south-east of the study area, with low hedgerow.

Plate 13. One of the entrances at main sett S2. Very active, with paths, large spoil, bedding and badger prints.

Plate 14. Another entrance at sett S2.

Plate 15. A section of the stream at far south, in an open section.

Plate 16. The stream at the south.

Plate 17. Fields at south, with rank grassland and dock.

Plate 18. A neglected field at the south, with rank grass, *Juncus*; a treeline with extensive bramble to right.

Plate 19. Arable land at north-west.

Plates 20 and 21. Strong badger paths through pasture grassland at north-west.

Plate 22. Small field of ungrazed land at west.

Plate 23. Sett S6. Well worn path, and spoil heap. No bedding.

Plate 24. Improved grassland pasture at south.

Plate 25. Sett s7. large spoil paths, no bedding. Open, occasional use.

Plate 26. The stream at the far south-west.

Plate 27. Access gate and ditch at south. Area of improved pasture grassland.

Plate 28. Pasture grassland at south.

Plate 29. Badger latrine and badger faeces on grass, unusually.

Plate 30. The latrine site is next to this bridged stream crossing at the south.

Plate 31. Pasture grassland at south, with hedgerows.

Plate 32. A raised mound just off site at the south is a large rabbit warren.

Plate 33. The stream at the far south.

Plate 34. Badger latrine at the south.

Plate 35. Sett S8. Small sett at south.

Plate 36. Pool in pasture field at south.

APPENDIX 8.1 – AMBIENT AIR QUALITY STANDARDS

APPENDIX 8.1 - AMBIENT AIR QUALITY STANDARDS

National standards for ambient air pollutants in Ireland have generally ensued from Council Directives enacted in the EU (& previously the EC & EEC). The initial interest in ambient air pollution legislation in the EU dates from the early 1980s and was in response to the most serious pollutant problems at that time which was the issue of acid rain. As a result of this sulphur dioxide, and later nitrogen dioxide, were both the focus of EU legislation. Linked to the acid rain problem was urban smog associated with fuel burning for space heating purposes. Also apparent at this time were the problems caused by leaded petrol and EU legislation was introduced to deal with this problem in the early 1980s.

In recent years the EU has focused on defining a basis strategy across the EU in relation to ambient air quality. In 1996, a Framework Directive, Council Directive 96/62/EC, on ambient air quality assessment and management was enacted. The aims of the Directive are fourfold. Firstly, the Directive's aim is to establish objectives for ambient air quality designed to avoid harmful effects to health. Secondly, the Directive aims to assess ambient air quality on the basis of common methods and criteria throughout the EU. Additionally, it is aimed to make information on air quality available to the public via alert thresholds and fourthly, it aims to maintain air quality where it is good and improve it in other cases.

As part of these measures to improve air quality, the European Commission has adopted proposals for daughter legislation under Directive 96/62/EC. The first of these directives to be enacted, Council Directive 1999/30/EC, has been passed into Irish Law as S.I. No 271 of 2002 (Air Quality Standards Regulations 2002), and has set limit values which came into operation on 17th June 2002. The Air Quality Standards Regulations 2002 detail margins of tolerance, which are trigger levels for certain types of action in the period leading to the attainment date. The margin of tolerance varies from 60% for lead, to 30% for 24-hour limit value for PM_{10}, 40% for the hourly and annual limit value for NO_2 and 26% for hourly SO_2 limit values. The margin of tolerance commenced from June 2002, and started to reduce from 1 January 2003 and every 12 months thereafter by equal annual percentages to reach 0% by the attainment date. A second daughter directive, EU Council Directive 2000/69/EC, has published limit values for both carbon monoxide and benzene in ambient air. This has also been passed into Irish Law under the Air Quality Standards Regulations 2002.

The most recent EU Council Directive on ambient air quality was published on the 11/06/08 which has been transposed into Irish Law as S.I. 180 of 2011. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive and its subsequent daughter directives. Provisions were also made for the inclusion of new ambient limit values relating to $PM_{2.5}$. The margins of tolerance specific to each pollutant were also slightly adjusted from previous directives. In regards to existing ambient air quality standards, it is not proposed to modify the standards but to strengthen existing provisions to ensure that non-compliances are removed. In addition, new ambient standards for $PM_{2.5}$ are included in Directive 2008/50/EC. The approach for $PM_{2.5}$ was to establish a target value of 25 $\mu g/m^3$, as an annual average (to be attained everywhere by 2010) and a limit value of 25 $\mu g/m^3$, as an annual average (to be attained everywhere by 2015), coupled with a target to reduce human exposure generally to $PM_{2.5}$ between 2010 and 2020. This exposure reduction target will range from 0% (for $PM_{2.5}$ concentrations of less than 8.5 $\mu g/m^3$ to 20% of the average exposure indicator (AEI) for concentrations of between 18 - 22 $\mu g/m^3$). Where the AEI is currently greater than 22 $\mu g/m^3$ all appropriate measures should be employed to reduce this level to 18 $\mu g/m^3$ by 2020. The AEI is based on measurements taken in urban background locations averaged over a three year period from 2008 - 2010 and again from 2018-2020. Additionally, an exposure concentration obligation of 20 $\mu g/m^3$ was set to be complied with by 2015 again based on the AEI.

Although the EU Air Quality Limit Values are the basis of legislation, other thresholds outlined by the EU Directives are used which are triggers for particular actions. The Alert Threshold is defined in Council Directive 96/62/EC as "a level beyond which there is a risk to human health from brief exposure

and at which immediate steps shall be taken as laid down in Directive 96/62/EC". These steps include undertaking to ensure that the necessary steps are taken to inform the public (e.g. by means of radio, television and the press).
The Margin of Tolerance is defined in Council Directive 96/62/EC as a concentration which is higher than the limit value when legislation comes into force. It decreases to meet the limit value by the attainment date. The Upper Assessment Threshold is defined in Council Directive 96/62/EC as a concentration above which high quality measurement is mandatory. Data from measurement may be supplemented by information from other sources, including air quality modelling.

An annual average limit for both NO_X (NO and NO_2) is applicable for the protection of vegetation in highly rural areas away from major sources of NO_X such as large conurbations, factories and high road vehicle activity such as a dual carriageway or motorway. Annex VI of EU Directive 1999/30/EC identifies that monitoring to demonstrate compliance with the NO_X limit for the protection of vegetation should be carried out distances greater than:

- 5 km from the nearest motorway or dual carriageway
- 5 km from the nearest major industrial installation
- 20 km from a major urban conurbation
- As a guideline, a monitoring station should be indicative of approximately 1000 km^2 of surrounding area.

Under the terms of EU Framework Directive on Ambient Air Quality (96/62/EC), geographical areas within member states have been classified in terms of zones. The zones have been defined in order to meet the criteria for air quality monitoring, assessment and management as described in the Framework Directive and Daughter Directives. Zone A is defined as Dublin and its environs, Zone B is defined as Cork City, Zone C is defined as 23 urban areas with a population greater than 15,000 and Zone D is defined as the remainder of the country. The Zones were defined based on among other things, population and existing ambient air quality.

EU Council Directive 96/62/EC on ambient air quality and assessment has been adopted into Irish Legislation (S.I. No. 33 of 1999). The act has designated the Environmental Protection Agency (EPA) as the competent authority responsible for the implementation of the Directive and for assessing ambient air quality in the State. Other commonly referenced ambient air quality standards include the World Health Organisation. The WHO guidelines differ from air quality standards in that they are primarily set to protect public health from the effects of air pollution. Air quality standards, however, are air quality guidelines recommended by governments, for which additional factors, such as socio-economic factors, may be considered.

APPENDIX 8.2 –
DUST MANAGEMENT PLAN

APPENDIX 8.2 – DUST MANAGEMENT PLAN

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK (IAQM (2014), BRE (2003), The Scottish Office (1996), UK ODPM (2002)) and the USA (USEPA, 1997). The following measures have been incorporated into the Outline Construction & Demolition Management Plan (OC&DMP) prepared for the site.

Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies.

At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance (see Figure 8.2 for the windrose for Dublin Airport). As the prevailing wind is predominantly westerly to south-westerly, locating construction compounds and storage piles downwind of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed (IAQM, 2014; UK ODPM, 2002). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials (USEPA, 1986). Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods were care will be needed to ensure that dust nuisance does not occur. The following measures shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust impacts and nuisance are minimised;
- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details;
- It is recommended that community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;
- It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein;
- At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. In the event of dust nuisance occurring outside the site boundary,

site activities will be reviewed and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below.

Site Roads / Haulage Routes

Movement of construction trucks along site roads (particularly unpaved roads) can be a significant source of fugitive dust if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80% (UK ODPM, 2002).

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles using unpaved site roads;
- Access gates to the site shall be located at least 10m from sensitive receptors where possible;
- Bowsers or suitable watering equipment will be available during periods of dry weather throughout the construction period. Research has found that watering can reduce dust emissions by 50% (USEPA, 1997). Watering shall be conducted during sustained dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use;
- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.

Land Clearing / Earth Moving

Land clearing / earth-moving works during periods of high winds and dry weather conditions can be a significant source of dust.

- During dry and windy periods, and when there is a likelihood of dust nuisance, watering shall be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust;
- During periods of very high winds (gales), activities likely to generate significant dust emissions should be postponed until the gale has subsided.

Storage Piles

The location and moisture content of storage piles are important factors which determine their potential for dust emissions.

- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the site. Where possible storage piles should be located downwind of sensitive receptors;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust. The regular watering of stockpiles has been found to have an 80% control efficiency (UK ODPM, 2002).
- Where feasible, hoarding will be erected around site boundaries to reduce visual impact. This will also have an added benefit of preventing larger particles from impacting on nearby sensitive receptors.

Site Traffic on Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads should be reduced to a minimum by employing the following measures:

- Vehicles delivering or collecting material with potential for dust emissions shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust;
- At the main site traffic exits, a wheel wash facility shall be installed if feasible. All trucks leaving the site must pass through the wheel wash. In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.

Summary of Dust Mitigation Measures

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. The key features with respect to control of dust will be:

- The specification of a site policy on dust and the identification of the site management responsibilities for dust issues;
- The development of a documented system for managing site practices with regard to dust control;
- The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed; and
- The specification of effective measures to deal with any complaints received.