McGarrell Reilly Homes

Proposed development of lands in
Newtownmoyaghy,
Kilcock, Co. Meath.

VOLUME II
ENVIRONMENTAL IMPACT ASSESSMENT REPORT

DECEMBER 2019

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CHAPTER 1
INTRODUCTION

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1 Introduction

McGarrell Reilly Homes is applying for permission for a residential development on lands at Newtownmoyaghy, Kilcock, Co. Meath on a site area of approximately 24.24 hectares see **Figure 1.1**.

The proposed development will provide for 575 No. residential dwellings on a site that is under the ownership of McGarrell Reilly Homes who are actively developing the adjoining lands at Millerstown.

The proposed development is located within the Metropolitan Area as identified in the Regional Spatial and Economic Strategy reflecting Kilcock's role as a commuter town and is also located within the Kilcock Development Area Boundary as detailed in the Meath County Development Plan (2013-2019). Residential development will only take place on lands zoned for residential use and these lands account for approximately 14.45 hectares of the site. The proposed layout works will integrate with the contours and gradient of the site and will create a high-quality, well-connected and sustainable residential development in close proximity to Kilcock Town centre.

FIGURE 1-1 SITE LOCATION

The proposed development will provide for the construction of 575 No. residential units comprised of 388 No. 2-bedroom, 3-bedroom, and 4-bedroom housing units in the form of detached, semi-detached and terraced dwellings, 121 No. duplex units and 66 No. apartments and all associated residential services and facilities. In addition, the scheme will include for the construction of a 623sq.m creche facility to provide for 119 No. children, the provision of new GAA changing room facilities and associated entrance road and car-park, the provision of 314 No. bicycle parking

spaces, 1,019 No. car-parking spaces, new boundary walls, fences, open space, internal site roads, pavements, public lighting and all associated works.

A detailed description of the development is provided in **Chapter 2** of this Environmental Impact Assessment Report. The accompanying planning application drawings provide further details of the proposed development.

1.1 The Applicant

McGarrell Reilly Homes business address is Charter House, 5 Pembroke Row, Dublin 2. They have considerable experience in the provision of large residential and complementary mixed-use developments that include Millerstown in Kilcock, Co. Meath, Steeplechase in Ratoath, Co. Meath and Marlmount in Dundalk, Co. Louth. McGarrell Reily have a reputation for providing high-quality residential dwellings finished to a high standard and are keen to bring the site forward for development as quickly as possible.

1.2 Requirement for EIAR

Environmental Impact Assessment (EIA) requirements derive from EU Directives. Council Directive 2014/52/EU amended Directive 2011/92/EU and is transposed into Irish Law by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.

Proposed developments which falls within one of the categories of development specified in Schedule 5 of the Planning and Development Regulations 2001, as amended, which equals or exceeds, a limit, quantity or threshold prescribed for that class of development must be accompanied by an EIAR.

The subject development does not fall within development classes set out in Part 1 of Schedule 5.

It does however fall within development classes set out in Part 2 of Schedule 5 and the applicable categories are;

10b)

(i) Construction of more than 500 dwellings

The proposed development incorporates 575 No. residential units and as this exceeds the 500 No. threshold an EIAR has been prepared.

1.3 Purpose of Environmental Impact Assessment

The objective of the Directive (Directive 2011/92/EU), as amended by Directive 2014/52/EU, is to ensure a high level of protection of the environment and human health, through the establishment of minimum requirements for Environmental Impact Assessment (EIA), prior to development consent being given, of public and private developments that are likely to have significant effects on the environment.

The 2014 Directive for the first time provides a definition of EIA and this is now defined by Section 171A of the Planning and Development Act, 2000 (as inserted by Regulation 16 of the 2018 Regulations).

It is defined as 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 definition of EIA thus provides for a clear distinction between the process of environmental impact assessment to be carried out by the competent authority and the preparation by the developer of an Environmental Impact Assessment Report (EIAR).

Section 2 of the 2000 Act has been amended to define an EIAR as *'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 Content of Environmental Impact Assessment Report

This EIAR addresses the matters detailed in Article 5(1) (a - f) of the Directive, including:

a) A description of the project comprising information on the site, design, size and any 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 options chosen, taking into account the effects of the project on the environment;
e) A non-technical summary; and,
f) Any additional information specified in Annex IV of the Directive/Schedule 6 to the 2001 Regulations, as amended, relevant to the specific characteristics of the project and to the environmental features likely to be affected.

As is required by Annex IV of the 2014 Directive, this EIAR addresses matters including proposed demolition works, risks to human health, major accidents / disasters, biodiversity, climate change and cumulative effects with other existing and / or approved projects.

1.5 Competency

It is a requirement that the EIAR must be prepared by competent experts. For the preparation of this EIAR, McGarrell Reilly Homes engaged McCutcheon Halley to direct and coordinate the preparation of the EIAR and a team of qualified specialists were engaged to prepare individual chapters, the consultant firms and lead authors are listed in **Table 1.1**. Details of competency, qualifications and experience of the lead author of each discipline is outlined in the individual chapters.

1.6 Format and Structure of the EIAR

This EIAR is prepared according to the 'Grouped Format Structure' as described in the Guidelines on Information to be Contained in an EIS (EPA, 2002). This means that each topic is considered as a separate section. The advantages of using this format are that it is easy to investigate a single topic and it facilitates easy cross-reference to specialist studies.

This EIAR is sub divided into 3 No. volumes as follows:

- Volume I Non-Technical Summary;
- Volume II Environmental Impact Assessment Report; and,
- Volume III Appendices to Environmental Impact Assessment Report.

Volume II is presented in 15 No. chapters as shown in **Table 1.1**.

Chapter	Aspect	Consultant	Lead Consultant
1	Introduction	McCutcheon Halley Chartered Planning Consultants	Adrian Toolan
2	Project Description	McCutcheon Halley Chartered Planning Consultants	Adrian Toolan
3	Alternatives Considered	McCutcheon Halley Chartered Planning Consultants / Conroy Crowe Kelly Architects	Adrian Toolan, Paul McVeigh
4	Population and Human Health	McCutcheon Halley Chartered Planning Consultants	Adrian Toolan
5	Landscape & Visual	Murray & Associates	Mark Boyle
6	Material Assets: Traffic	DBFL Consulting Engineers	Brendan Manning
7	Material Assets: Built Services	DBFL Consulting Engineers	Brendan Manning
8	Land and Soils	DBFL Consulting Engineers	Brendan Manning
9	Water and Hydrology	DBFL Consulting Engineers	Brendan Manning
10	Biodiversity	Openfield Ecological Services / Wildlife Surverys Ireland	Padraic Fogarty, Brian Keeley
11	Noise and Vibration	AWN Consulting	Dermot Blunnie, Claire Flynn
12	Air Quality	AWN Consulting	Dermot Blunnie, Claire Flynn
13	Cultural Heritage	Archer Heritage	Ciaran McGuinness
14	Interactions of the Foregoing	McCutcheon Halley Chartered Planning Consultants	Adrian Toolan
15	Summary of Mitigation Measures	McCutcheon Halley Chartered Planning Consultants	Adrian Toolan

TABLE 1-1 CHAPTERS OF EIAR & CONTRIBUTORS

In preparing the EIAR the following regulations and guidelines were considered:

- The requirements of applicable EU Directives and implementing Irish Regulations regarding Environmental Impact Assessment;
- Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – DRAFT (Environmental Protection Agency, August 2017); and

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government, 2018).

In addition, specialist disciplines have had regard to other relevant guidelines, and where relevant these are noted in individual chapters of the EIAR.

1.7 Scoping

The purpose of scoping is to identify the information to be contained in an EIAR and the methodology to be used in gathering and assessing that information. Applicants are not required to seek a Scoping Opinion.

The scope of this EIAR is informed by the requirements of the Directives 2011/92/EU and 2014/52/EU and the transposing Regulations. It was further informed by advice received from the specialist team engaged to prepare the EIAR and guidance provided by Meath County Council during the Section 247 pre-planning meeting.

1.8 Cumulative Projects and Masterplan

Following a review of the area, it should be noted that there have been 2 No. planning applications granted in close proximity to the development site. These include planning consents An Bord Pleanála case reference PL17.246141 (preceding Meath County Council reference RA150205) Meath County Council reference RA161443 granted permission for 150 No. and 130 No. dwellings respectively. There has been considerable infrastructure works completed by the applicant on the adjoining lands to facilitate the consented developments. These include:

- Infrastructure works and site clearance including flood works complete to allow development of these lands;
- Roundabout on Maynooth Road (R148) completed with pedestrian walkway to Railway Station;
- New junction constructed on R125 linking back to Kilcock Town Centre;
- New link road between R148 and R125 is being completed in stages (from R148) and is due to be completed in Q1 2020.
- Along this link road are the water supply, foul water drainage, and ancillary service networks; and
- The constructed and occupied residential dwellings are currently accessed from the new link road via the R148 roundabout.

There is a potential for cumulative impacts from the construction of the consented projects and the proposed development. The likelihood is that this cumulative impact will for a temporary or short-term duration and will be limited in extent.

The Kilcock Environs Written Statement forms part of the Meath County Development Plan 2013-2019 includes an objective to provide for a primary school in a site of 1.6 hectares and consideration of pedestrian and cyclist connectivity. The proposed school site is identified adjacent to the western most extent of the proposed development boundary and is shown in the Site Layout Plan (drawing no.1829-P-104) and is likely comprise of a school building with 24 class rooms, parking and sports facilities.

This site which is in the ownership of applicant and zoned for development will be the subject of a separate planning application for a primary school. Consequently, this EIAR considers the

cumulative impact of the future requirement of the Meath County Development Plan for the lands provision of a school adjacent to the proposed development.

This provides clarity in terms of the overall masterplan plan for the site and future Section 34 planning applications. As noted the detailed consented planning applications have frontloaded the essential infrastructure for the entire site.

1.9 Impact Assessment Methodology

Each chapter of this EIAR assesses the direct, indirect, cumulative and residual impact of the proposed development for both the construction and operational stage of the proposed development.

The identified quality, significance and duration of effects for each aspect is largely based on the terminology set out in the EPAs *Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports* (2017) as summarised below;

Quality of Effect	
Positive	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	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 reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).
Significance of Effect	
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 Effect	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Effect	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant Effect	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant Effect	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound Effect	An effect which obliterates sensitive characteristics.
Duration of Effects	
Momentary	Seconds to minutes
Brief	Less than 1 day
Temporary	Less than 1 year
Short-term	1-7 years
Medium-term	7-15 years

Long-term	15-60 years
Permanent	Over 60 years
Extent & Context of Effects	
Extent	Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.
Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Probability of Effects	
Likely	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Type of Effects	
Indirect	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
Cumulative	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
Do Nothing	The environment as it would be in the future should the subject project not be carried out.
Worst Case	The effects arising from a project in the case where mitigation measures substantially fail.
Indeterminable	When the full consequences of a change in the environment cannot be described.
Irreversible	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
Residual	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
Synergistic	Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SOx and NOx to produce smog).

TABLE 1-2 IMPACT RATING TERMINOLOGY

1.10 Consultation

A dedicated website for the proposed development is established and all application documents including this EIAR are available at www.newtownmoyaghyshd.ie.

Additionally, prior to lodging this application, the required information has been issued to the Department of Housing, Planning and Local Government's EIA Portal. The purpose of this tool is

to inform the public, in a timely manner, of applications that are accompanied by an EIAR. The portal provides a URL link.

Extensive pre-planning consultation was held with Meath County Council in advance of lodging this application. Guidance received is integrated into the design and in turn is assessed in this EIAR.

Where relevant specialists engaged with prescribed bodies and the details of advice received is provided in the individual chapters of this EIAR.

An Opinion was received from An Bord Pleanála following the pre-application consultation meeting and it contained details of the prescribed bodies to be notified of the making of this application. We can confirm that each identified body has received a copy of the application including the EIAR. These prescribed bodies include:

1. National Transport Authority
2. Irish Water
3. Transport Infrastructure Ireland
4. Minister for Culture, Heritage and the Gaeltacht
5. Heritage Council
6. An Taisce – the National trust for Ireland
7. Kildare County Childcare Committee

CHAPTER 2
PROJECT DESCRIPTION

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2 Development Description

2.1 Introduction

This chapter was prepared by McCutcheon Halley Chartered Planning Consultants. It provides a detailed description of the proposed development and the existing site. In accordance with Article 5(1)(a) of the 2011 Directive as amended by Directive 2014/52/EU the description of the proposal should comprise *"…information on the site, design, size and other relevant features of the project*". A description of the site and its surrounding area is presented, together with a description of the proposed development. This description sets the basis against which the specialist assessments presented in this EIAR have been undertaken.

The lead author involved in drafting this Chapter was Adrian Toolan of McCutcheon Halley Chartered Planning Consultants, who graduated from University College Dublin with a BA Hons in Geography, Planning and Environmental Policy in 2009 and a Masters' Degree in Regional and Urban Planning in 2011. Adrian is currently a Planning Consultant in the Practice and is experienced in the field of planning and development consultancy which includes providing consultancy services in respect of major urban regeneration projects.

2.2 Site Location

The proposed development is for the construction of residential housing located in the townland of Newtownmoyaghy, Kilcock, Co. Meath. The development is urban expansion of the settlement of Kilcock, the majority of which is located in Co. Kildare. The subject site is located approximately 1km east of the centre of Kilcock and is shown in **Figure 2.1**.

FIGURE 2-1 LOCATION OF SUBJECT SITE

Kilcock is located approximately 30km to the west of Dublin and is situated at the junction of a number of regional roads. These include the R148 Dublin Road which is a single carriageway that links Kilcock to Maynooth (c.6km) to the east and Enfield (c.12km) to the west, the R407 to Clane (c.15km), the R158 to Summerhill (c.12km) and Trim (c.23km) and the R125 to Dunshaughlin (c.20km) and Ratoath (c.26km). The M4 Motorway passes Kilcock to the south, with an interchange located approximately 1km to the south of the Kilcock and provides easy access to Dublin and the west. Kilcock is located on the 'Dublin – Sligo' rail line, with services running daily, connecting Kilcock to areas such as Longford, Mullingar, Maynooth, Leixlip, Castleknock and various destinations in Dublin City. Kilcock is located on the 'Longford - Mullingar – Dublin' Bus Eireann service (Route 115) which connects the town to areas such as Longford, Edgeworthstown, Mullingar, Kinnegad, Enfield, Maynooth, Leixlip and various parts of Dublin. The nearest bus stop is located on Harbour Street which is located approximately 800m from the subject site.

Kilcock is located approximately 30km to the west of Dublin and to the north of the M4 Motorway. The proposed development (see **Figure 2.1**) will take place on land that is zoned for residential development and has been subject to Strategic Environmental Assessment (SEA) and Appropriate Assessment (AA) in the development of the Meath County Council County Development Plan (CPD) 2013-2019.

The town of Kilcock is located to the south and west across the Rye Water River, which forms the common administrative boundary between Meath County Council and Kildare County Council. The Royal Canal also bounds the southern extend of the subject site and also passes through the Kilcock settlement. While the application lands are within the administrative area of County Meath relevant environmental receptors within Co. Kildare have been assessed in this EIAR including, where needed reference to the Strategic Environmental Assessment (SEA) and Appropriate Assessment (AA) in the development of the Kildare County Development Plan (CPD) 2017-2023.

2.3 Proposed Development

2.3.1 Site Layout

The subject site area is approximately 24.24 hectares. The site layout is shown in **Figure 2.2**, as can be seen the residential layout is in two sections, one in the north and one in the south of the site. The northern residential footprint is approximately 8.38 hectares and the southern residential footprint is approximately 6.07 hectares. Two large areas of open space are provided to the south of both residential sections, comprising an area of approximately 9.79 hectares, both areas will be landscaped including footpaths and seating. There will be a number of pocket parks throughout the residential area and these will include planting, seating, play areas, and exercise equipment.

FIGURE 2-2 SITE LAYOUT OF PROPOSED DEVELOPMENT

The proposed development comprised of residential accommodation, and amenity space & open space. There will be other elements comprising of one creche facility (including outside play area) and one GAA changing rooms (including car parking facilities), both located in the southern section. A network of access roads will be constructed from the local road network and these will be planted with trees. Amenity open areas are located within the urban streetscape, with three in the northern section, two in the southern section, and other areas, in particular around apartment buildings, duplex buildings, and the Creche.

The divide between the northern and southern sections is the Upper ditch a drainage watercourse running and flowing east-to-west between the two sections and is part of the Office of Public Works (OPW) Arterial Drainage Scheme). The southern section is also bounded by the Rye Water River along its southern boundary. The lands along both these water courses in the vicinity of the site are partially within the extent of fluvial (river) flooding lands (see the Site Specific Flood Risk Assessment (SSFRA) within the application documentation) but it is noted that the layout design was completed in consideration of completed flood plain works and additional flood plain works within the proposed

development, for further details see section 2.3.7 below, EIAR Chapter 9, and the SSFRA submitted with the application.

The lands near the upper ditch and the Rye Water will be landscaped, including tree planting and pedestrian and cycle paths, providing residential and public amenity space. New Gaelic Athletic Association (GAA) changing room facilities and carpark will be provided adjacent to the consented (and under constructed) pitch located to the east of the proposed development and this sporting facility will use the access routes in the proposed development.

2.3.2 Residential Unit Mix

Table 2.1 shows the proposed residential unit mix. The development will also include the provision of a 623sq.m creche, 314 No. bicycle parking spaces, and a total of 1,019 No. car-parking spaces. New boundary walls and fences, open space amenity, internal site roads, pavements, public lighting, bin storage areas.

Unit Type	Houses	Apartments	Duplexes	Total
1 Bed	0	20	44	64
2 Bed	43	46	63	152
3 Bed	270	0	14	284
4 Bed	75	0	0	75
Total	**388**	**66**	**121**	**575**

TABLE 2-1 PROPOSED RESIDENTIAL UNIT MIX

2.3.3 Access

There will be separate entrances to the northern and southern sections. All entrances will be located off a new link road that will connect the R148 (which runs beside the Royal Canal to the south) and the R125 (which runs to the northwest). This road is consented and currently under construction and is due to be completed and operational by approximately Autumn 2020. The link road was consented under An Bord Pleanála case reference PL17.238370 (preceding Meath County Council planning reference DA100614) and An Bord Pleanála case reference PL17.239375 (preceding Meath County Council planning reference DA100697). The new link road will provide infrastructure for pedestrians, cyclists, and vehicles, while also linking the into the wider transportation networks (including cycle, motorway, and rail services) with pedestrians and bicycle access to Kilcock (c.1.5km) to the west and Maynooth (c.6.0km) to the east along routes predominately segregated from vehicle traffic along the Royal Canal Greenway.

There will be entrances to the northern section, the westerly most entrance in **Figure 2.2** is dedicated for pedestrians and cyclists and while the two entrances immediately to the east and further east is for all traffic types. There will be three full span bridges constructed over the upper ditch for these access routes into the northern section of the proposed development. The southern section will have two main vehicle entrances, for all traffic types, and other pedestrian and cyclist between building blocks. The northern vehicle entrance will be located off the main roundabout on the new link road and the southern vehicle entrance is located just north of the R148.

The proposed development is consistent with both the principles and guidance outlined within the Design Manual for Urban Roads and Streets (DMURS) 2013 (Updated May 2019). The scheme proposals are the outcome of an integrated design approach that incorporates traditional road design along with elements of urban design and landscaping to create lower traffic speeds and thereby facilitate a safer road environment for pedestrians and cyclists.

The proposed layout provides for a package of self-regulating design measures including:

- horizontal deflections through 'tight' corner radii;
- vertical deflections through the inclusion of raise tables;
- narrow residential streets and a meandering alignment to actively influence (reduce) vehicle speeds;
- internal footpaths both along vehicle routes and between buildings providing route options and increasing permeability throughout the development; and
- public lighting.

Furthermore, the permitted Distributor Road scheme will, once complete, provide dedicated segregated pedestrian / cycle facilities on both sides of the road. Internally, dedicated pedestrian footways will be provided on all streets which will connect with the existing / consented pedestrian facilities on the external network thereby facilitating excellent pedestrian connectivity.

2.3.4 Vehicle Parking

The development includes a total of 1,019 No. car-parking and 314 No. bicycle parking spaces and will provide mobility impaired car parking spaces as required. The development includes a total of 40 no. car parking spaces located beside the GAA changing facilities.

The development provides 14 no. neighbourhood focused creche car parking spaces comprising of 8 no. staff spaces and 6 no. drop-off spaces.

The development provides a total 314 cycle parking spaces comprising 163 no. long-term and 151 short-term spaces on-site. Residents of house type units can also accommodate bicycle parking in-curtilage. A total of 30 no. cycle parking spaces are proposed at the creche facility comprising 18 no. long stay (1 per staff) and 22 no. short stay spaces (approximately 1 in 5 children). A total of 32 short-term spaces are proposed at the GAA changing rooms.

2.3.5 Site Services

In terms of the overall infrastructure works, full details are set out in the Infrastructure Design Report prepared by DBFL Consulting Engineers and submitted with the application documents. Further details are also in EIAR Chapter 7 Material Assets - Built Services.

The utility services that will be constructed include, potable water supply, a dedicated wastewater drainage network, a separate surface water drainage network, natural gas supply, electricity supply, and telecommunication cables.

2.3.5.1 Water Supply

A watermain plan is shown on DBFL drawing 072116-3500-1 is included in **Appendix 7.4** and is submitted with the planning application, showing the location of existing surface watermain services in the vicinity of the site.

There is an existing 280mm/315mm PE 100 watermain which was constructed under An Bord Pleanála consent reference PL17.238370 (preceding Meath County Council application reference 'MCC DA/1000614') and the subject lands benefit from this watermain infrastructure. The existing 280/315mm is located in the link road along the subject sites southern and western boundaries and will serve as a connection for the proposed site. The internal watermain layout will consist of

160mm/180mm PE watermains with a number of 110mm/125mm PE loops supplied along Local Streets.

All connections, valves, hydrants, meters etc. have been designed and are to be installed in accordance with Irish Water's Code of Practice / Standard Details. Individual houses will have their own connections from the distribution main via service connections and boundary boxes. Individual service boundary boxes will be of the type to suit Irish Water and to facilitate domestic meter installation. An average daily domestic demand for the proposed development of approximately 232.9m³ and an average day in peak week demand of 291.1m³ has been calculated as outlined in the Irish Water Code of Practice for Water Infrastructure.

A Pre-Connection Feedback Letter has been received from Irish Water outlining that a water connection can be facilitated for the proposed development and is included with the application.

2.3.5.2 Foul Water Drainage

A foul water drainage network plan is shown on DBFL drawing 072116-3500 is included in **Appendix 7.1** and is submitted with the planning application. This foul sewer network, ranging from 375mm to 450m in diameter, was constructed under An Bord Pleanála (ABP) planning reference PL17.238370 (preceding Meath County Council reference 'MCC DA/1000614') and the subject lands benefit from this foul sewer infrastructure as the internal foul drainage networks will discharge to same. This discharges to the public Irish Water 600mm diameter foul sewer immediately to the south of the subject lands. This in turn discharges to the existing Kilcock Foul Pump Station located immediately to the south of the subject lands.

The proposed internal foul drainage network comprises of a network of 225mm diameter sewers designed based on the topography of the site. The foul drainage system will be completely separate from the surface water drainage system. The internal foul drainage network will discharge to the existing 375mm/450mm foul sewer already constructed in the link road.

Individual houses will be connected to the proposed 225mm diameter internal foul drainage system via individual 100mm pipe connections as per Irish Water Code of Practice for Wastewater Infrastructure.

The foul drainage network for the proposed development has been designed in accordance with the Building Regulations and specifically in accordance with the principles and methods as set out in the Irish Water Code of Practice, IS EN752 (2008), IS EN12056: Part 2 (2000) and the recommendations of the 'Greater Dublin Strategic Drainage Study (GDSDS)'.

A daily foul discharge volume for the proposed development of 256.2m³ and a maximum total Biological Oxygen Demand (BOD) loading of 98 kg/day has been calculated as outlined in Irish Water's Code of Practice for Wastewater Infrastructure.

A Pre-Connection Feedback Letter has been received from Irish Water outlining that a wastewater connection can be facilitated for the proposed development. Refer to letter submitted with the planning application for a copy of the form.

2.3.5.3 Surface Water Drainage

A surface water drainage network plan is shown in DBFL Consulting Engineers drawing 072116-3500 is included in **Appendix 7.1**, showing the location of existing surface water drainage services

in the vicinity of the site. The subject lands benefit from core infrastructure constructed under An Bord Pleanála (ABP) planning reference PL17.238370 (preceding Meath County Council reference 'MCC DA/1000614'). Proposed surface water drains have been designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS) and BS EN 752: 2008 Drain and Sewer Systems Outside Buildings.

Surface water calculations are based on an allowable outflow / greenfield runoff rate of 33.9 l/sec resulting in a total attenuation volume of 3,522 m^3, as determined in Chapter 9 (Water: Hydrogeology & Hydrology). The proposed surface water drainage networks will collect surface water runoff from the site via a piped network. Attenuation of surface water will be provided in two separate attenuation facilities before discharging to the Upper Ditch and Rye Water River via a hydrobrake manhole and a downstream defender unit. A non-return valve will be provided at outlet locations to prevent flood waters from entering the surface water drainage network. SUDS measures such as permeable paving, swales, filter trenches, detention basins, etc. will be provided to intercept and provide treatment to surface-water run-off at source.

It is noted that under An Bord Pleanála planning reference PL17.238370 (preceding Meath reference DA100614) flood defence works have been completed along the upper ditch (the watercourse located between the north and south residential portions of the proposed development). The course of a section of the upper ditch was relocated to be alongside the alignment of the new link road. The section of the upper ditch that was relocated is from just east of the western site access road to the western boundary of the proposed development. See **Figure 2.2**.

2.3.5.4 Electricity Supply

The subject site is traversed by two 10kV lines and two 38kV lines. The proposed development will result in this existing infrastructure being relocated underground or redirected along linear green space corridors (subject to approval of relevant utility providers). An ESB Networks plan is included in **Appendix 7.5** showing the location of existing electrical services in the vicinity of the site. Two 38kV lattice mast structures will be erected in the south of the site to facilitate the transition from underground cable to overhead line infrastructure.

The proposed development will be connected to the national ESB grid network. Buried cables will be installed to supply the residential units, all electrical infrastructure works and specifications will be agreed with ESB Networks prior to the commencement of works.

2.3.5.5 Gas Supply

Gas Networks Ireland plans are included in **Appendix 7.6** showing the location of gas services in the vicinity of the site. There are no recorded distribution gas mains running through the site. However, medium pressure distribution pipes run through the existing residential development constructed to the west and south of the new link road. This continues onto the R148 to the south of the site. The proposed development site will be provided with connections from these existing networks.

2.3.5.6 Telecommunication Network

The existing Eir and Virgin Media network plans in the local area are included in **Appendix 7.7** and **Appendix 7.8** showing telecommunications infrastructure in the vicinity of the site. Virgin Media have a network running along the R148 to the south of the site. Eircom have network ducting in the

residential development constructed to the south and west of the new link road. A range of voice and broadband fixed and wireless services are available in the area.

The proposed development includes for telecommunication network ducting that will be routed under or alongside the main access routes with network spurs to connect to individual houses, apartment buildings, duplex buildings, the creche, and the GAA changing facilities as required.

2.3.6 Building Energy Efficiency Strategy

The design intent is to follow the requirements of the E.P.B.D. (Energy Performance of Buildings Directive), Building Regulations Technical Guidance Document (TGD) Part L and the Meath County Development Plan 2013-2019 which are the current drivers for sustainable building design at the subject site.

The building services design strategy for the proposed development utilises as many sustainable design options and energy efficient systems that are technically, environmentally and economically viable for the project to achieve a low energy and environmentally friendly development.

A Building Life Cycle Report was prepared for the proposed residential development in accordance with the planning guidelines *Sustainable Urban Housing: Design Standards for New Apartments (Guidelines for Planning Authorities)* 2018. This report firstly assesses the factors effecting the long term running and maintenance costs and secondly outlines the measures undertaken at this stage which can affect them. This report details that the building specifications will be nearly-Zero Energy dwellings (nZEB). This standard will reduce primary energy demand by 70% in comparsion to the 2005 standards. The Building Energy Rating (BER) target will be A2 and will likely result in dwellings with an energy demand of between 25 - 50 kWh/m^2/year.

2.4 Construction Phase

A Construction and Environmental Plan (CEMP) was prepared and will be submitted with the application documentation. The CEMP shall be referenced in all tender and contract documentation (should consent be obtained) for the proposed works and is to be read in conjunction with all relevant Engineering and Architectural documentation.

A 10-year planning permission is being sought from An Bord Pleanála. For this EIAR the construction phase duration is assumed to be unlikely to exceed 7 years. A determination on the application is expected from An Bord Pleanála in Q2 2020. It is considered that construction works on site will commence in Q4 2020 with the projected completion of the development by Q4 2026.

The southern development site is proposed to be constructed first with the initial 100 housing units within the southern site assumed to be built and occupied by the end of 2021. The remaining units of the southern site and the full northern development site is assumed to be complete and occupied by 2026.

A phasing plan will be submitted with the application documentation where full details of the delivery of public open spaces, surface water management proposals, *et cetera*, are detailed.

2.4.1 Construction Compound

A construction compound will be provided for the construction phase and will be located within the subject site to the east of the new link road round-a-bout. The construction compound will be a hardstanding area approximately 60m by 50m. The construction compound will be enclosed by a security fence and will include low level security lighting and signage (health & safety, directions, company information, public information, etc) appropriate to the development construction activities. The construction compound will include office space, welfare facilities (such as wash rooms, drying rooms, canteen, first aid, etc.), a small staff car parking, material storage containers, material laydown areas, recycling facilities.

On-site parking provision will be minimised to ensure travel by car is not encouraged while simultaneously being aware of the need to facilitate vehicle travel due to the nature of the work and site location. Adequate numbers of cycle parking will be provided for site personnel and they will be encouraged to use public transport which is available in the local area and adequate numbers of cycle parking will be provided on site. A limited number of car parking spaces will be provided for visitors.

The location of the construction compound is likely to be relocated during the course of the works, in line with the phasing of the development. The exact location of the initial and any subsequent construction compound locations will be agreed in writing with the local authority prior to the commencement of construction works.

The construction compound will have temporary connections to the potable water, electricity supplies, and telecommunication network. Foul drainage discharge from the construction compound will be transported off-site by tanker lorry to a suitably licensed facility until a connection to the public foul drainage network has been established. Surface water run-off will the integrated this the development network when available and will initially be managed within the overall construction surface water management plan.

2.4.2 Construction Hours

The construction phase working hours will to be 07:00-18:00 Monday to Friday (excluding bank holidays) and 08:00 to 15:00 Saturdays, subject to the restrictions imposed by the local authority. No working will be allowed on Sundays and Public Holidays. Subject to the agreement of the local authority, out of hours working may be required for water main connections, foul drainage connections etc.

2.4.3 Construction Access

Pedestrian access will be strictly controlled during the construction phase. Only Safepass accredited personnel will be permitted on-site and daily in-out attendance records will be maintained. Safe pedestrian access points will be provided based on the stage of works and layout of the construction site.

Construction traffic will access the site via the existing access off the R148 so as to minimise disruption on other routes. Construction traffic routing will be strictly managed and controlled and details will be incorporated into the Traffic Management Plan (TMP) to be developed for the construction phase.

2.4.4 Construction Personnel

Based on a construction contract value of approximately €100 million over an approximate 312-week construction period.

2.4.5 Construction Traffic

During the general excavation of the foundations there will be additional Heavy Goods Vehicle (HGV) movements from the site. All suitable material will be used for construction, landscaping, and fill activities where possible and appropriate. All spoil material will be removed to a registered landfill site which will be agreed in writing with the local authority prior to the commencement of works.

In addition to the traffic generated by the disposal of surplus subsoil from the site, there will be traffic generated from deliveries of construction materials and equipment. It should be pointed out that construction traffic generated during the development works tends to be outside of peak hours. Such trips would generally be spread out over the full working day and will not be higher than the peak hour predicted volumes for the operational stage.

In addition to the traffic generated by the disposal of surplus subsoil from the site, there will be traffic generated from deliveries of construction materials and equipment. It should be pointed out that construction traffic generated during the development works tends to be outside of peak hours. Such trips would generally be spread out over the full working day and will not be higher than the peak hour predicted volumes for the operational stage.

It is noted that a Traffic Management Plan (TMP) will be developed for the construction phase.

2.4.6 Construction Waste

The principle of 'Duty of Care' in Waste Management Act 1996-2008 states that the waste producer is responsible for waste from the time it is generated through to its legal disposal (including its method of disposal). Waste materials generated by earthworks, demolition and construction activities will be managed according to the Department of the Environment, Heritage and Local Government's 2006 Pollution – Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects.

The management of waste will incorporate the following key measures and all measures in the CEMP submitted with the application documentation.

- The Construction Waste Management Plan (CWMP) will be made available to all relevant personnel on site.
- The Construction Waste Manager will be responsible for the implementation of the CWMP
- On-site segregation of non-hazardous waste materials into appropriate categories.
- On-site segregation of hazardous waste materials into appropriate categories. Hazardous waste will be separately stored in appropriate lockable containers prior to removal from site by an appropriate waste collection licence holder.
- The site will be maintained to prevent litter and regular picking will take place throughout the site.
- Left over materials (e.g. timber off-cuts) shall be re-used on site where possible.
- All waste leaving the site will be recycled, recovered or reused where possible.
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities.
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

2.5 Mitigation and Monitoring

The appointed contractor will be required to prepare a Construction and Environmental Management Plan (CEMP) prior to the commencing of works. This will incorporate all mitigation measures proposed within this EIAR for the protection of the environment and human health. The CEMP will be updated to address any changes required by planning conditions (should the application be granted planning permission).

Monitoring will be undertaken during the construction phase in line with the recommendations contained within this EIAR.

2.5.1 Air Quality

Appropriate Air Quality and Dust monitoring will be carried out and records will be kept of all such monitoring. Construction and demolition works will be carried out in such a way as to limit the emissions to air of pollutants (particularly dust and fine particles (PM2.5 and PM10)), using Best Practicable Means.

2.5.2 Construction Noise and Vibration

Noise monitoring will be carried out in reference to *BS5228: 2009 + A1 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Part 1 Noise for appropriate mitigation measures*, which offers detailed guidance on the control of noise and vibration from construction activities.

2.6 Construction Health and Safety

Health & Safety issues will be the primary concern for the appointed Contractors. This will apply in respect of persons working on the site and in respect of passing pedestrians, motorists or other transport carriers. In this regard the highest possible care will be taken in providing a detailed Construction Stage Health and Safety Plan in advance of works commencing on site.

The following Health and Welfare at Work (Construction) Regulations 2006–2012 Safety, Health and Welfare at Work Act 2005, BS 6187:2011 - Code of Practice for Full & Partial Demolition.

It is intended to operate a Health, Safety & Environmental Management System in line with ISO 18001 & ISO 14001. This Management System translates the company policy into processes to ensure safety, health and environmental responsibilities and performance can be monitored, reported and improved.

A suitably qualified and competent Project Supervisor Design Process (PSDP) will be appointed and a suitably qualified and competent Project Supervisor Construction Stage (PSCS) will be appointed in line with the requirements laid down in the Safety, Health and Welfare at Work Construction Regulations 2013.

2.7 Operational Phase

The operation phase will be relatively benign in comparison to the construction phase. The main operational phase activities will comprise of the following elements.

- Heating and lighting of the residential, Creche, and the GAA club.
- Traffic for Residents, Creche, and the GAA club.
- Maintenance of the open space and pocket park amenity areas.

- Maintenance and establishment of the landscaping trees and vegetation.
- Maintenance of site services (potable water consumption, surface water drainage, foul water drainage, gas, electricity, and telecommunication) infrastructure.
- Maintenance of the internal road, cycle, and footpath networks.

The CEMP Table 5.3 given the predicted vehicle trip generation. Peak flows will be of the order of 88 No. movements for the southern site and 101 No. movements for the northern site and will tend to occur in the morning. These figures will initially be lower and increase as residents occupy dwellings.

The Building Lifecycle Report details that an Owners Management Company (OMC) will be established with an operational budget for an annual Planned Preventative Maintenance (PPM) programme. Typical PPM programmes will detail the timing of the visits for fire alarm maintenance, lift maintenance, the landscaping specification, waste management protocols, along with day to day cleaning requirements.

The buildings have been designed with a low number of Stair and Lift Cores in order to increase efficiencies and ensuring that service charges and maintenance costs faced by residents into the future are kept at reasonable levels. Building materials proposed for use on block elevations achieve a durable standard of quality that will not need regular fabric replacement or maintenance outside general day-today care. In accordance with the MUDs Act, the OMC(s) will allocate a certain portion of funds towards a sinking fund, in order to adequately resource long-term replacement of components.

Management – A dedicated resident specific Mobility Management Plan (MMP) will be compiled. Resident specific MMP's include specialised plans and associated implementation strategies to encourage sustainable travel practices for all journeys, by residents and visitors travelling to and from the proposed development.

The primary likely and significant environmental impacts of the operation of the proposed development are fully addressed in this EIAR. These relate to Population and Human Health, Landscape and Visual Impact, and Noise and Air impacts associated with the detailed activities.

The proposed development also has the potential for cumulative, secondary and indirect impacts particularly with respect to such topics as traffic – which in many instances – are often difficult to quantify due to complex inter-relationships. However, all cumulative secondary and indirect impacts are likely to be not significant; and where appropriate, have been addressed in the content of this EIAR.

A Linkages Plan (drawing number 190009-DBFL-XX-XX-DR-C-1000) was prepared by DBFL Consulting Engineers and accompanying the documents submitted with this application. The Linkages Plan includes the pedestrian and cycle connection routes in the proposed development and the surrounding area, the rail network, Bus Eireann routes, the Royal Canal, and 500m and 1,000m walking distances.

Maynooth University is also in close proximity and is easily accessible from Kilcock. The University, which had a total student population of 13,760 in the 2016/2017 academic year and a staff of 925, is approximately 5km to the east of the proposed development site.

CHAPTER 3
ALTERNATIVES CONSIDERED

DECEMBER 2019

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3 Alternatives Considered

3.1 Introduction

This chapter was prepared by Adrian Toolan of McCutcheon Halley Chartered Planning Consultants, who graduated from University College Dublin with a BA Hons in Geography, Planning and Environmental Policy in 2009 and a Masters' Degree in Regional and Urban Planning in 2011. Adrian is currently a Planning Consultant in the Practice and is experienced in the field of planning and development consultancy, which has included providing consultancy services in respect of major urban regeneration projects.

The requirement to consider alternatives within an Environmental Impact Assessment Report (EIAR) is set out in Annex IV (2) of the EIA Directive (2014/52/EU) and in Schedule 6 of the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which state;

"A description of the **reasonable alternatives** *studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed development on the environment"* (emphases added).

Reasonable alternatives may include project design proposals, location, size and scale, which are relevant to the proposed development and its specific characteristics. The Regulations require that an indication of the main reasons for selecting the preferred option, including a comparison of the environmental effects to be presented in the EIAR.

The Environmental Protection Agency (2017) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports - Draft states:

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

As such, the consideration and presentation of the reasonable alternatives studied by the project design team is an important requirement of the EIA process.

This section provides an outline of the main alternatives examined during the design phase. It sets out the main reasons for choosing the development as proposed, taking into account and providing a comparison on the environmental effects. For the purposes of the Regulations, alternatives may be described at three levels:

i. Alternative Locations
ii. Alternative Designs
iii. Alternative Processes

Notwithstanding the above, 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 Draft 2017 Guidelines are also instructive in stating: *"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'".

3.2 Consideration of Alternatives

As part of the process of preparing the proposed development, at the outset an environmental appraisal was undertaken at a strategic level to assess the baseline environment and to understand likely significant environmental effects that may arise if the site was developed.

During that appraisal, the following matters were taken into consideration:

- Human Beings
- Flora and Fauna
- Soil
- Water
- Noise
- Air Quality
- Landscape and Visual
- Transportation
- Archaeology, Architectural Heritage, and Cultural Heritage

Having regard to the Kilcock Environs Written Statement (see section 3.3 for further details) that Kilcock is detailed as a moderate sustainable growth town in the Meath County Development Plan.

The biodiversity potential of the site was evaluated. The subject site is currently agricultural fields and native hedgerows that is structurally poor, with minimal connectivity to wider countryside habitats.

The subject site soils are detailed to be Gleys, which is a waterlogged grey soil and shallow poorly drained.

The subject site is within the Rye Water River Catchment which is a tributary of the River Liffey. The Rye Water River forms part of a Natura 2000 site located approximately 5km downstream (Rye Water River/ Carton SAC).

The subject site is located within the environs of the settlement of Kilcock and in terms of noise, air quality, landscape and visual, and transportation requirements is a residential development similar to neighbouring development.

There are two Record of Monuments and Places (RMP) sites within the subject site, both ring-ditches. Both were initially identified through aerial photography and neither has an above surface expression. These are relatively common archaeological site types; funerary or burial monuments; primarily of the Bronze Age period. The closest Protected Structures are the Little Church of the Assumption and an adjacent farmhouse which are located c. 350m to the south-west.

The above characteristics were considered at a strategic level for the subject site. The overall adverse environmental impacts will occur during the construction phase and are likely to be short-term and not significant. Although the character of the area will change with the implementation of the proposed development, the outcome of the appraisal process was that

the proposed operational phase of the proposed development will be a permanent significant positive impact for the settlement of of Kilcock.

3.3 Alternative Locations

The subject site is considered to represent a suitable location for the proposed development of residential dwellings, given its location within the Kilcock Development Area Boundary as identified in the Meath County Development Plan. The subject site is zoned for residential use (A2), albeit Residential Phase II (Post 2019) lands, and open space (F1) in the Meath County Development Plan 2013-2019.

The Meath County Development Plan 2013-2019 was subject to a formal public consultation process which included a Strategic Environmental Assessment (SEA) and Appropriate Assessment (AA) before the plan was adopted. The subject site is located within the map attached to the Kilcock Environs Written Statement which was part of the Meath CDP Variation No. 2 and this variation was subject to both AA and SEA before the plan was adopted on the 19th May 2014.

In light of the foregoing, it is considered that the application site is appropriately located from an environmental perspective for the proposed development. In light of the foregoing, it was considered that the application site offered a suitable location from an environmental perspective for the proposed development.

3.4 Alternative Designs

The design approach for the proposed development is presented in the **Architectural Design Statement** prepared by the project architects, Conroy Crowe Kelly Architects.

In summary, the proposed layout is designed to function as a sustainable and successful residential neighbourhood and is considered to be a natural extension to the town of Kilcock.

The subject proposal has evolved during the design phase in response to input from the appointed design team, advice received from Meath County Council at pre-planning stage, and direction provided by An Bord Pleanála at the Pre-Application Consultation stage of the Strategic Housing Development (SHD) process.

This process highlighted environmental matters that informed the consideration of alternative layouts and designs including the provision of open-space, permeability and connections, height and location of the proposed apartment blocks and transportation related issues, up to the formalisation of the final scheme which is now being submitted to An Bord Pleanála for approval.

At the outset, the design team undertook a site appraisal to identify the key characteristics and constraints of the site. A strength, weakness, opportunity, and Threat (SWOT) analysis was completed on the site in consideration the existing and consented developments within the environs of the subject site and the relevant information from the Architectural Design Statement is shown in **Figure 3.1** and **Table 3.1**.

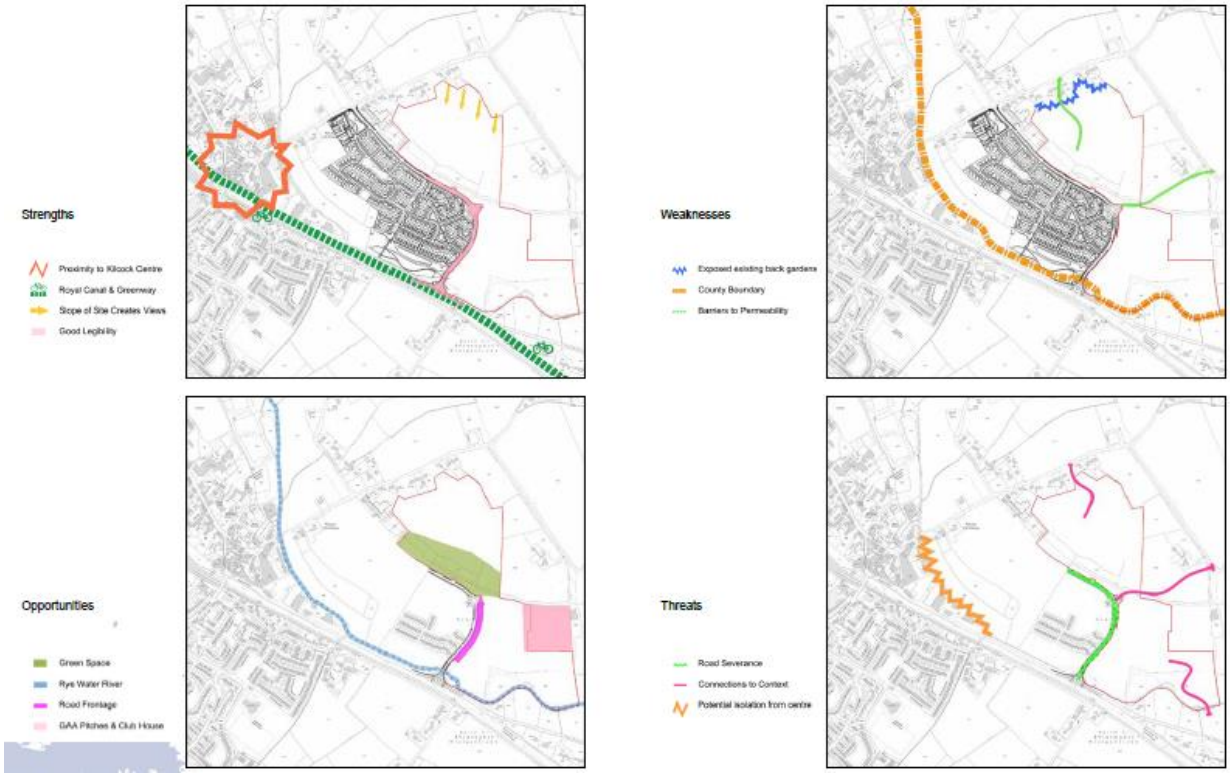

FIGURE 3-1 SWOT ANALYSIS

Strengths	Weaknesses	Opportunities	Threats
Proximity to Kilcock centre	Exposing existing back gardens	Green space	Road severance
Royal Canal and Greenway	County boundary	Rye Water river	Connections to Context
Slope of site creates views	Barriers to permeability	Road Frontage	Potential isolation from centre
Good legibility		GAA pitches and club house	

TABLE 3-1 SWOT ANALYSIS

A meeting was held with Meath County Council (MCC) on the 26th of February 2019 to discuss the draft layout in **Figure 3.2**.

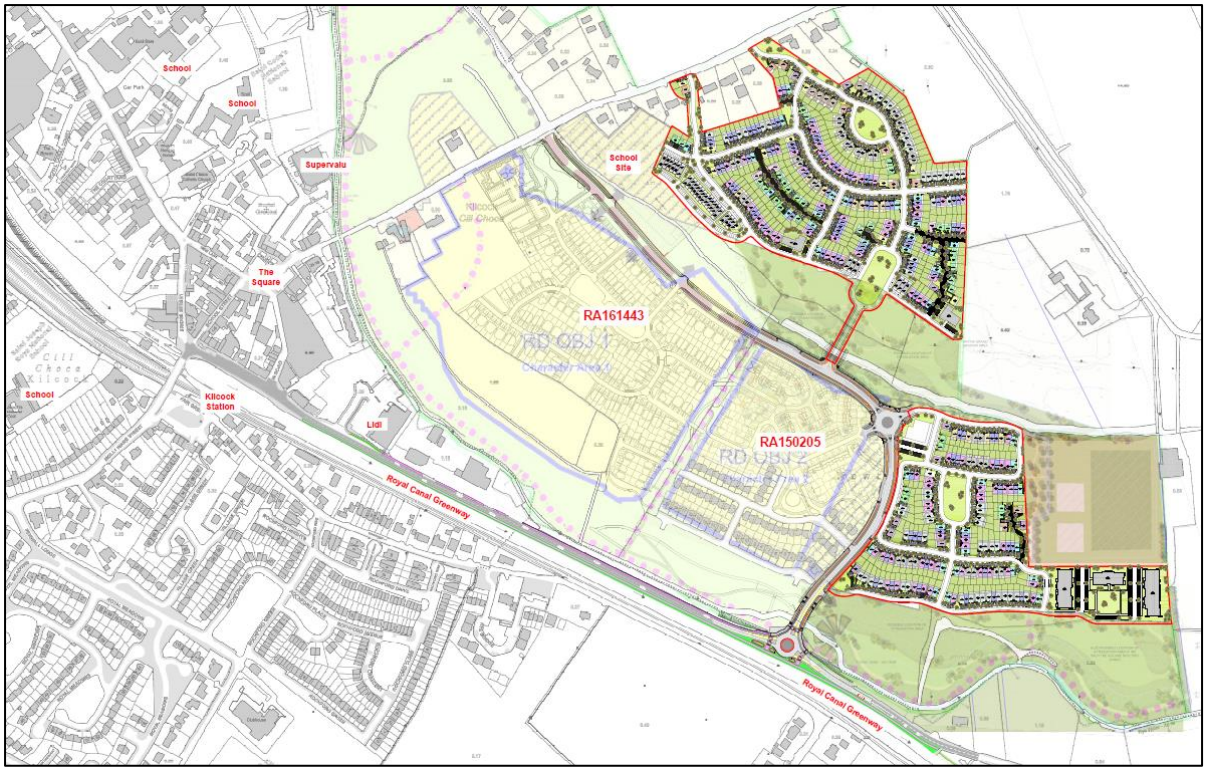

FIGURE 3-2 INITIAL DESIGN PROPOSAL

The main design changes between the initial design proposal in **Figure 3.2** and the proposed development are the flowing:

- The removal of the two northern vehicular and pedestrian access points off the Moyglare Road (a local third class road). This was due to a lack of width along the existing road corridor.
- The provision of one additional vehicular and one additional pedestrian access points from the northern section to the new link road.
- The locating of dual aspect duplex and corner block apartments throughout the development to provide passive surveillance of both the large public open spaces and the development access roads.
- The changes in the street layouts so the majority of residential buildings are accessed by looped streets with a minority accessed by cul-de-sac streets.
- The existing dwellings to the northwest of the development are now backed only by houses and not by apartment type buildings.
- The provision of additional pocket parks and green space within both the northern and southern residential areas.
- The provision of additional public open space to the northwest of the development adjacent to the future location of a potential school site with sports pitches.
- The inclusion of greater landscaping to enhance the streetscapes, the public open space and the biodiversity of the proposed development.
- The inclusion of greater landscaping to reduce the landscape and visual impacts.

FIGURE 3-3 FINAL LAYOUT OF PROPOSED DEVELOPMENT

The final design also proposed the following design features:

- There are opportunities for houses to extend into the rear garden for both the narrow and wide fronted house types.
- In some house types space in the roof can be converted into living accommodation.
- For apartment buildings external secure bin and bicycle storage facilities will be provided.

- Housing and apartments will now be built to Nearly Zero Energy Buildings (NZEB) standards. The insulation of the building fabric, air tightness and renewable technologies employed in building services all combine to ensure an almost zero energy home.

There are two main alternatives for this site:

- Do-nothing and retain the existing use as a car park and ancillary buildings.
- Progress the proposed development.

The final layout for the proposed development was selected as a suitable proposal after the initial consultation with Meath County Council and the pre-planning application (PAC) consultation process with An Bord Pleanála (ABP).

The site is ideally located to support high density development, being within walking distance of Kilcock where a range of shops, services, amenity and public transport options are available. The site is zoned in the current Meath County Development Plan for residential development and public open space as per the final layout design.

There is a clear need for residential development and creating a development containing high quality designs, low energy consumption, potential future extensions for individual houses, and flexibility of living space options has integrated sustainable development principles with the design of the proposed development.

3.5 Alternative Processes

The residential units will be designed to comply with the new Building Regulations TGD L 2019 – Conservation of Fuel and Energy – Dwellings. This new version of TGD L includes the requirements for Nearly Zero Energy Building (NZEB). The Building Lifecycle Report submitted with the application details a Building Energy Rating (BER) of A2, (between 25kWh/m^2/year and 50kWh/m^2/year).

The design team also recognizes the need for the development to be designed to maximize reliability and maintainability of the installations to efficiently operate the development in a sustainable manner. Lifecycle costs are also determined by the durability and maintenance requirements of materials. A high standard of finishes has been selected across the project. Low maintenance cladding materials such as brick and self-finished render are proposed to minimize the impact of façade maintenance. Balconies are designed to be capable of fabrication offsite, resulting in higher standard of finish, reducing damage during construction and improved durability.

3.6 Difficulties Encountered

There were no difficulties encountered in the preparation of this assessment for the proposed development.

CHAPTER 4
POPULATION & HUMAN HEALTH

DECEMBER 2019

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4 Population and Human Health

4.1 Introduction

This chapter was prepared by Tom Hennessy of McCutcheon Halley Chartered Planning Consultants, who graduated from University College Cork with a master's in Planning and Sustainable Development (Mplan) in 2018. Tom has over 2 years professional experience in the field of planning and development consultancy, which has included providing consultancy services in respect of several major urban regeneration projects including EIAR's.

According to European Commission's *Environmental Impact Assessment of Projects: Guidance on the Preparation of the Environmental Impact Assessment Report* (2017), human health is;

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

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

This chapter addresses potential impacts of the proposed development on population and human health. The likely impacts from the proposed development will be from traffic & transportation, air quality & climate, noise & vibration, landscape (or townscape) & visual, material assets: utilities and the risk of major accidents and/or disasters. These aspects are dealt with in detail in the specific chapters in this EIAR dedicated to those topics.

4.2 Proposed Development

Briefly, the proposed development comprises of the construction of 575 no. residential units, a creche facility of 623 sq. m, with a capacity for approximately 119 children and including outdoor open space provision including playground facilities. A full description of the development is provided in **Chapter 2** of this EIAR.

4.3 Methodology

The application area and surrounds were visited on a number of occasions in 2019 to inform this assessment. The purpose of the site walkover and survey was to identify characteristics of the subject land and surrounding area. Local consented planning applications, Ordnance Survey of Ireland (OSi) maps and aerial photography were also examined to assist in this process.

In addition, a desk-based study of information on employment, education, health, tourism, amenity and community facilities was completed.

Publications and other data sources consulted included;

- National Planning Framework, Ireland 2040 – Our Plan (Government of Ireland, 2018)
- Regional Planning Guidelines for the Greater Dublin Area 2010-2022
- Eastern and Midlands Regional Spatial and Economic Strategy

- Meath County Council Development Plan 2013-2019
- Kildare County Council Development Plan 2017-2023
- Central Statistics Office (CSO) website www.cso.ie
- Department of Education and Sciences (DES) website www.education.ie.

Additionally, reports prepared by McCutcheon Halley Planning Consultants and included in this application under separate cover were consulted, these are detailed following.

- Childcare Assessment Report.
- School Demand Report.

Information was gathered with respect to the demographic and employment characteristics of the resident population within the relevant catchment area, sourced from the 2011 and 2016 Census data. The data collected included information on population, structure, age profile and household size, number of persons at work and the unemployment profile.

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

- European Commission (2017) *Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report*.
- Environmental Protection Agency (2017) *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*.
- Environmental Protection Agency (2002) *Guidelines on the Information to be Contained in Environmental Impact Statements*.
- Environmental Protection Agency (2003) *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements*.

The impact assessment section of this chapter follows the terminology (where applicable) used in the EPA Guidelines as set out in **Chapter 1** of this EIAR.

4.4 Baseline Scenario

This section provides a description of the receiving environment, with a focus on demography, land use and local amenity.

The subject site lies within the Meath County Council administrative area, located close to the county border with Co. Kildare which is the Rye Water river along southern extent of the subject site. The National Planning Framework (NPF) identifies Meath as being located within the Eastern and Midland Region. The NPF notes that Co. Meath's location close to Dublin has led to significant population growth over recent times. The NPF outlines that future growth must be managed in a sustainable fashion with employment growth and infrastructure to be a priority.

The recently published Eastern and Midlands Regional and Spatial Economic Strategy (RSES) designates Co. Meath as one of four counties located in the Mid-east of the region.

4.4.1 Housing

The Governments *Rebuilding Ireland - Action Plan for Housing and Homelessness* set a target to construct 25,000 homes annually to 2021. According to the CSO Q4 2018 New Dwelling Completions Report, 18,072 new dwellings have been completed in 2018. This is approximately 38% below Rebuilding Ireland's annual target.

According to the Department of Housing, Planning and Local Government, Homelessness Report (2019), there were 111 homeless people recorded in Co. Meath during the week of 19th to 24th

August. A further 79 families were accessing local authority managed accommodation in the mid-east in the same period.

The National Planning Framework - Ireland 2040 requires delivery of a baseline of 25,000 homes annually to 2020, followed by a likely level of 30,000 to 35,000 annually up to 2027. Within this output 112,000 households are expected to have their housing needs met in social housing over the next decade. To achieve the objective of compact growth, 40% of future housing delivery is to be delivered within and close to the existing footprint of built-up areas.

4.4.2 Land Use

The subject site lands are zoned 'A2 New Residential' in the Meath County Development Plan 2013-2019. The A2 zoning objective aims *"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"*, shown by the yellow hatched area in **Figure 4.1** with the approximate site area circled in red.

The lands are designated 'Residential Phase II (Post 2019)' meaning they are earmarked for delivery in the post 2019 period.

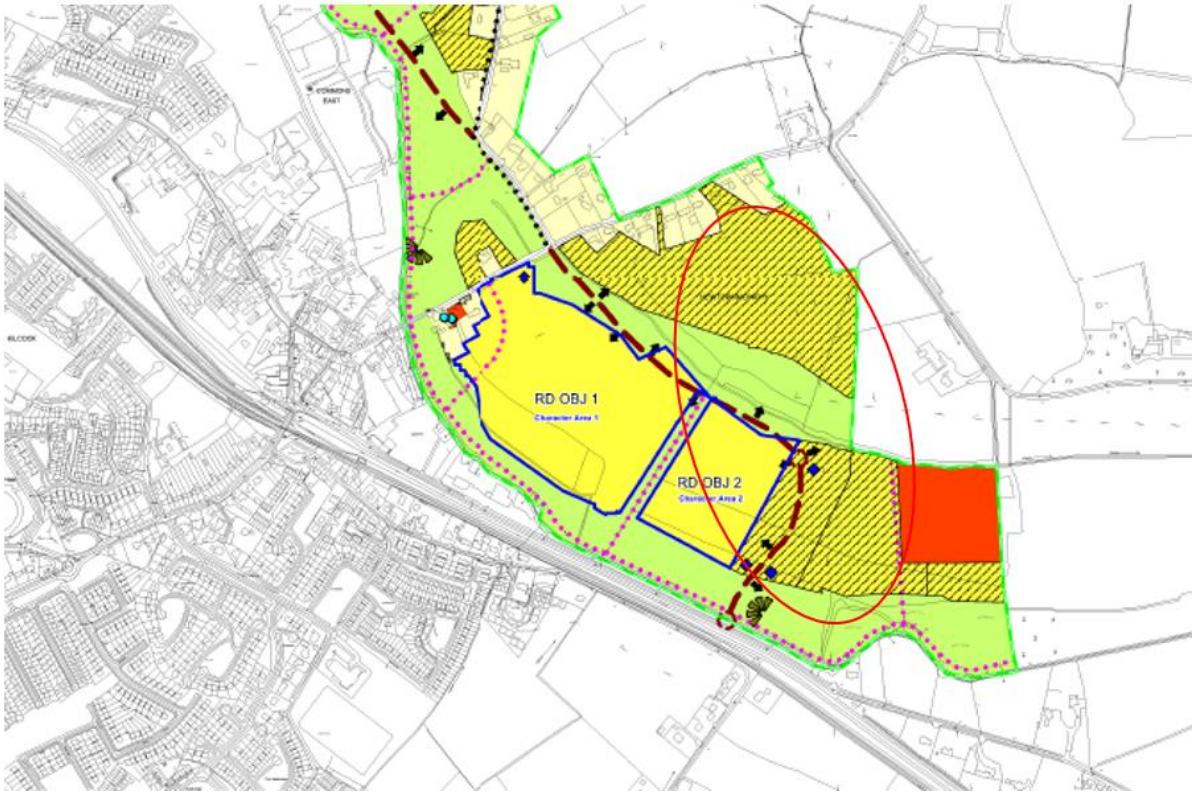

FIGURE 4.1 LAND USE ZONING

Both the Meath County Development Plan (2013-2019) and the Kildare County Development Plan (2017-2023) identify Kilcock as a Moderate Sustainable Growth Town. Moderate Sustainable Growth Towns are positioned third on the settlement hierarchy after Large Growth Towns 1 and 2.

The Meath County Development Plan is currently under review in preparation of the adoption of the CDP 2020-2026. The public display of the proposed draft plan is due to be commenced in December

2019 for a duration of 10 weeks, after which amendments may be made to the plan before the new CDP is adopted[1].

The Meath County Development Plan includes a number of objectives that aim to guide the development of towns throughout the County. Objective SS OBJ 11 states that it is an objective of Meath County Council "*To ensure that Moderate Sustainable Growth Towns develop in a self-sufficient manner with population growth occurring in tandem with physical and social infrastructure and economic development. Development should support a compact urban form and the integration of land use and transport*".

The Kildare CDP also identifies a number of objectives to help guide the development of Moderate Sustainable Growth Towns and states that *"Within the Hinterland area the overall function is for the Moderate Sustainable Growth Towns to develop in a self-sufficient manner, reducing commuting levels and ensuring sustainable levels of housing growth, providing a full range of local services adequate to meet local needs at district level and for surrounding rural areas. The provision of a strong social infrastructure in tandem with growth in population, particularly in relation to schools and leisure facilities is also required".*

Research conducted for this chapter has determined that a significant number of community facilities exist within 2 km radius of the development site. These developments were broken down into categories and in section 4.4.3.

There are a range of public transport options located in close proximity to the site which include.

- The M4 motorway (approximately 3km to the west) the main Dublin - Galway road and access to the M50 and wider Ireland motorway network.
- The Kilcock train station (approximately 1km to the west) on the main Dublin - Sligo line and providing frequent, high capacity commuter services to Dublin City Centre.
- Bus Éireann provides services from Kilcock (approximately 1.5km) to Dublin City Centre approximately every 30 to 60 minutes depending on the time of day and services to many other cities in Ireland.
- The Royal Canal (approximately 1km to the south) provides a long-distance greenway walking and bicycling route. The local route between Maynooth to Mullingar is completed with works between Dublin and Athlone due to be completed within approximately 2 - 3 years[2].

4.4.3 Demographic Profile

Population figures from the Central Statistics Office (CSO) Electoral Divisions data was used to create a profile of the area surrounding the subject site. The study area was defined as approximately 2 km from the site which intersects the 4 No. Electoral Divisions (EDs) of Rodanstown, Kilcock, Maynooth, and Cloncurry (see **Figure 4.2**).

Table 4.1 shows the populations within the 4 No. Electoral Divisions in 2011 and 2016. As can be seen the overall population has increased by approximately 3,237 people (or 14.5%) with the increase for Kilcock and Rodanstown of approximately 780 people. The overall population trend is expected to continue with an increase in population and urbanisation putting pressure on the need for more homes.

[1] http://countydevelopmentplanreview.meath.ie/2019/09/11/update-on-the-public-display-period-of-the-draft-meath-county-development-plan-2020-2026/

[2] https://royalcanalgreenway.ie/home/currentstatus/

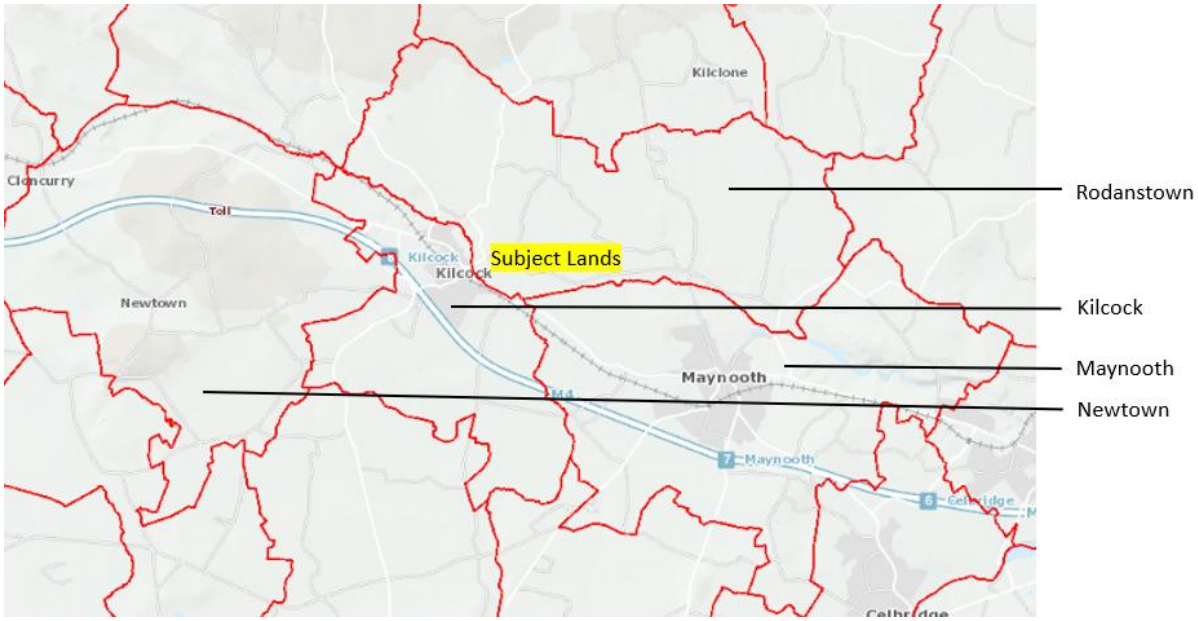

FIGURE 4.2 DEMOGRAPHIC PROFILE STUDY AREA

Electrical Division	2016	2011	Population Change	Percentage Population Change
Rodanstown	1,123	1,039	84	8.1%
Kilcock	6,930	6,234	696	11.2%
Maynooth	15,998	13,617	2,381	17.5%
Cloncurry	1,571	1,495	76	5.1%
Total	**25,622**	**22,385**	**3,237**	**14.5%**

TABLE 4-1 ELECTORAL DIVISION AREAS AND POPULATION CHANGE 2011-2016

In the study area there are 12,571 (49%) males and 13,051 (51%) females within the study area. The largest cohort is within the 35-39 years category, 2,461 persons but with very similar numbers for the 20-24 years category, 2,454 persons and the 30-34 years category, 2,377 persons.

Categorising 15 years and younger as 'youth' yields a population of 6,199 or approximately 23.9% of the total population. The total number of people aged 65 or older is 2,050, or approximately 6.8% of the total population.

The Pobal Deprivation Index is Ireland's most widely used social gradient metric, which scores areas in terms of affluence or disadvantage. The index uses information from Ireland's census, such as employment, age profile and educational attainment, to calculate this score. The 4 No. EDs considered in this assessment are all within either 'marginally above average' or 'affluent' categoriesas shown in **Table 4.2**.

Electoral Division	2006	2011	2016
Rodanstown	Marginally above average	Marginally above average	Marginally above average
Kilcock	Marginally above average	marginally above average	marginally above average
Maynooth	Marginally above average	Affluent	Affluent
Newtown	Marginally above average	Marginally above average	Marginally above average

TABLE 4-2 ELECTORAL DIVISION POBAL DEPRIVATION INDEX

4.4.4 Employment

Within the 4 No. EDs, of a total 12,326 people are eligible for work, 11,308 (57.1%) of people were recorded as being within employment in Census 2016. 161 (0.8%) are listed as 'unemployed or given up a previous job'. 3,881 (19.6%) are listed as students (Maynooth is a university town). 1,267 (6.4%) are listed as 'looking after the home' while 1,849 (9.3%,) are retired.

The industries that people are engaged in work in are illustrated in **Table 4.3**. Other (50.4%) is the largest sector, followed by public administration (13.4%) and manufacturing industries (13.2%) with professional services (6.8%), building and construction (5.3%), and commerce and trade (4.8%) the next in line. The figures in **Table 4.3** include the university and Intel plant in Maynooth which makes up approximately 7,001 (61.9%) of the 11,308 persons eligible for work.

Industry	Total (People)	Total (percentage)
Agriculture, forestry and fishing	673	3.0%
Building and construction	1,181	5.3%
Manufacturing industries	2,955	13.2%
Commerce and trade	1,078	4.8%
Transport and communications	694	3.1%
Public administration	3,013	13.4%
Professional services	1,523	6.8%
Other	11,308	50.4%
Total	**22,425**	**100.0%**

TABLE 4-3 PERSONS AT WORK BY INDUSTRY

4.4.5 Social Infrastructure

Social infrastructure includes a wide range of services and facilities including health, education, community, cultural, play, faith, recreation and sports facilities that contribute to the quality of life.

4.4.5.1 Education & Childcare

Four (4) education facilities are located within 2km of the subject site. Three (3) of these are primary schools and one (1) is a second level school. Eight (8) childcare facilities are located within approximately 2km of the subject site. All are shown in the **Table 4.4**.

Name	Category
Scoil Ui Riada	Primary School
St. Josephs National School	Primary School
Scoil Choca Naofa	Primary School
Scoil Dara	Secondary School
Naionra Siamsa	Childcare
Seesaws Playschool	Childcare
Kinder Cresent Kilcock	Childcare
Tiny Tots	Childcare
Kidz @ Play Playschool & Afterschool Kilcock	Childcare
Tir Na Nog Montessori	Childcare
Happy Steps	Childcare
Happy Steps Childcare	Childcare

TABLE 4-4 EDUCATION AND CHILDCARE FACILITIES NEAR TO SUBJECT SITE

4.4.5.2 Health and Wellbeing

There are 2 No. facilities associated with Health and Wellbeing identified within approximately 2km of the subject site. 1 No. medical centre which includes the services of 3 GP's and a mental health service comprising numerous specialities including a consultant psychiatrist, occupational therapist and social worker. Kilcock dental practice is located in the town centre with physical therapy and physiotherapy services also located in the town. A wellness centre and 3 No. fitness centres are also located in the town centre.

Name	Category
Kilcock Medical Centre	3 no. general practitioners
Northwest Kildare Mental Health Services	Various mental health services
Kilcock Dental Practice	Dental services
Kilcock Therapy	Physical therapy
Kilcock Physiotherapy Clinic	Physiotherapy service
Wellness Centre Kilcock	Yoga and fitness
Fitness Journey	Fitness centre
MaxxFit Ireland	Fitness centre

TABLE 4-5 HEALTHCARE FACILITIES

4.4.5.3 Community Facilities

There are 8 No. community facilities within approximately 2km of the subject site consisting of a library, a parish hall, sports pitches, GAA clubs, rugby clubs, football and other sports clubs. These are shown in **Table 4.6**.

Community Facility
Library
Parish Hall
Scout Den
Scoil Dara Hall and Pitches
Scoil Ui Riada – facilities used by sports clubs
Scoil Choca Naofa - facilities used by sports clubs
St. Josephs Boys NS – facilities Foroige Youth Club
Kilcock GAA
North Kildare Rugby Club & Squash Club
Kilcock Canoe Polo
St. Coca's Athletic Club
Kilcock Celtic FC
Kilcock Badminton Club
St. Joseph's Badminton Club
Kilcock Basketball Club
Kilcock Ramblers
Kilcock and Knockanally Golf Clubs
Common West Playground

TABLE 4-6 COMMUNITY FACILITIES

There are 10 No. facilities for sports as well as several other smaller sporting clubs. A playground is located in the Common West area of the town and the Royal Canal and Rye River offer important amenity to residents of the Kilcock. The majority of these facilities such as the sports clubs and playgrounds cater to youth recreation and provide an essential service to the area.

4.4.6 Principle Receptors

In identifying receptors that may be potentially impacted by the construction phase and operational phase of the proposed development, consideration was given to the proposed mixed-use residential scheme and the identified receiving environment. As identified in the land use section above, the application's immediate context is predominantly residential with one creche and GAA changing facilities.

In terms of existing residential receptors, the closest are the housing to the south and west of the new link road between the R125 and the R148.

Other receptors that may be impacted by the proposed development include schools and other services such as healthcare providers. None of these receptors are within 200m of the subject site.

4.5 Impact Assessment

This section of the assessment describes those effects that are likely to arise in the absence of mitigation. Section 4.7 of this report sets out the mitigation measures required to alleviate such effects and the assessment of impacts post mitigation is presented in the Residual Impact Section.

Potential Impacts are considered under the following headings:

- Land use
- Human Health Impacts
- Population & Economic Activity Impacts
- Local Amenity Impacts

4.5.1 Do Nothing Scenario

If the proposed development is not realised, it is anticipated that the subject site would remain as agricultural lands in the short to medium term. The application area is a significant landbank on lands located in close proximity to Kilcock Town Centre. In terms of Population and Human Health, not developing these lands will represent a lost opportunity to develop lands for residential and public open space use in close proximity to the centre of the Kilcock.

4.5.2 Construction Phase

4.5.2.1 Land use

The proposed development complies with the statutory land use zoning. There will be no severance of land, loss of rights of way or amenities as a result of the proposed development.

There will be negative impacts from construction works which will remove top soil and hedgerows, create hard and permeable surfaces, and residential infrastructure. There will be positive impacts from the preservation of parts of the subject site providing flood defence measures.

The impact is likely and will have a **neutral**, **short-term**, **imperceptible** impact.

4.5.2.2 Human Health

Construction sites pose potential risks to the health and safety of the public. However, access by the public would be considered trespassing on private property.

There will be negative impacts to local residents from constructions activities from construction traffic, noise, dust, and visual effects. It is noted that the potential for effects on human health

during the construction phase are dealt with in this EIAR under the more specific topics of the environmental media by which they might be caused including air, traffic and noise.

The impact is likely and will have a **neutral**, **short-term**, **imperceptible**.

4.5.2.3 Population and Economic Activity

A significant portion of the capital spend will be for the purchase of Irish sourced goods and services. The construction phase will provide a boost for local and regional construction services for the supply of materials and labour.

The staff will comprise of managerial, technical, skilled and unskilled workers and as far as practicable local labour will be employed. It is expected that the total construction expenditure will be approximately €100m. It is unlikely that the proposed development will increase the population of the area as a result of the construction phase.

In addition to direct employment, there will be substantial off-site employment and economic activity associated with the supply of construction materials and provision of services such as professional firms supplying financial, architectural, engineering, legal and a range of other services. Local commercial revenue during the construction phase will have a short-term benefit due to expenditure on local goods and services.

The impact is likely and will have a **positive**, **short-term**, **not significant** impact.

4.5.2.4 Local Amenities

Construction works will occur near to the local GAA sports ground located to the east of the proposed development. There will likely be some disruption until the main access road to this facility is completed but these are likely to be brief effects when considering the respective time of day of construction and sporting activities. Construction works will also create two large area of open public amenity space and changing facilities for the GAA club. Works in local public roads (and new link road) will likely require temporary closures.

Please refer to Chapters 5, 6, 11 and 12 of this EIAR for information on the effects on landscape and visual, traffic, noise and air quality.

The impact is likely and will have a **negative**, **brief** and **short-term**, **not significant** impact.

4.5.3 Operational Phase

4.5.3.1 Land use

The proposed development will deliver 575 no. residential units, a creche, GAA changing facilities, and two large areas of public open space amenity. Approximately 10% of the housing will be social housing (Part V). The public open space amenity will integrate with similar public open space, particularly along the Rye Water river, adding an approximate additional 600m to this riverside walk for the residents of Kilcock and the local area.

In the context of the current housing crisis, the proposed development will create urban consolidation through the efficient use of a zoned and serviced landbank with high-quality amenities for future occupants. The development is located close to Kilcock Town Centre and is well served by public transport and links in with the existing amenity of the Royal Canal. See the Linkages Plan (drawing number 190009-DBFL-XX-XX-DR-C-1000) prepared by DBFL Consulting Engineers and accompanying the documents submitted with this application.

The impact is likely and will have a **positive**, **permanent**, **moderate** impact.

4.5.3.2 Human Health

The proposed design provides for the segregation of pedestrians and bicycle traffic from motorised traffic. The design also incorporates the principles of universal design and the requirements of Part M of the Building Regulations so that the development will be readily accessible to all, regardless of age, ability or disability.

The integration of energy efficient measures into the design will provide for healthier living standards for future occupants, less dependence on fossil fuels and associated improved air quality. The availability of on the doorstep public open space, dedicated and segregated pedestrians and bicycle routes into Kilcock (and the short distance) will encourage sustainable modes of outdoor access for a wide age group.

The impact is likely and will have a **positive**, **permanent**, **slight** impact.

4.5.3.3 Population and Economic Activity

In terms of the operational phase, the potential employment opportunities will be limited given that residential is the predominant land use proposed. Notwithstanding this, there will be staff required for the proposed childcare / creche facility and the exact number will depend on the number of children availing of the facility. There will also be some employment created in the servicing and maintenance of the apartment buildings (maintenance of lifts, communal spaces, etc), and for the upkeep of the landscaped areas.

The economic impact of the operational phase on the immediate area would therefore be **permanent**, **positive** and **imperceptible**.

The proposed development will contribute to the growth of Kilcock in a compact manner. It is envisaged that the proposed development will accommodate a projected full-time residential population of approximately 1,547 persons. This is an increase in the population of Kilcock by approximately 22.3% and by approximately 6.0% for the population within approximately 4km of the subject site. This population will generate additional economic activity for goods and services from Kilcock and the surrounding areas. This increase in population will also support the ongoing provision of an efficient public transport system.

The proposed development will likely have a **positive**, **permanent**, **moderate** impact on the population of Kilcock. The proposed development will likely have a **positive**, **permanent**, **not significant** impact on the local area.

4.5.3.4 Local Amenity and Services

The proposed development provides for excellent public amenity and recreational facilities, including open spaces and high-quality public realm that will integrate with existing/consented high-quality public realm provision. The provision of amenity facilities within the development will be of benefit to residents of the proposed development and existing residents in the local area.

The School Demand Report, submitted with the application, demonstrates an increased need for childcare and education will be generated by the proposed development. The School Demand Report estimates total figure of 283 No. additional Primary and Post-Primary school places, broken down into approximately 166 No. primary level places and approximately 117 No. Post-Primary

places. An assessment of the area's existing and forecast Primary and Post-Primary capacity has illustrated the area immediately around the site location has the capacity to adequately meet the demand likely to be generated by the development.

The proposed development will likely have a **positive**, **permanent**, **slight** impact on the local area.

4.5.3.5 Cumulative Impacts

The proposed development will increase demand on local infrastructure and services. This will include increased demand on potable water supply, foul water treatment capacity, gas supply, electricity supply, and telecommunication (fibre / broadband) capacity. There will be an increased demand on creche, primary and secondary schools. The proposed development will create an increase local vehicular traffic and increase demand for public transportation.

The chapters in this EIAR and the separate documentation submitted with the application demonstrate that there is capacity available in the local area to accommodate the cumulative impacts from the proposed development.

The proposed development will likely have a **positive**, **permanent**, **slight** cumulative impact.

4.6 Mitigation Measures

4.6.1 Construction Phase

A site Construction and Environmental Management Plan (CEMP) was prepared by DBFL the consulting engineers for the proposed development and is included in the application documentation. The CEMP will be reviewed and implemented by the selected contractor after any consent is received and after agreeing the CEMP in writing with the planning authority prior to the commencement of any works.

The CEMP provides for a construction phase management structure to ensure that environmental protection and mitigation measures are put in place. The CEMP requires that these measures will be checked, maintained to ensure adequate environmental protection. The CEMP also requires that records will be kept and reviewed as required to by the project team and that the records will be available on site for review by the planning authority. All construction personnel will attend induction and training classes as required to ensure that the CEMP is effectively implemented. The CEMP will comply with all appropriate legal and best practice guidance for construction sites.

Project supervisors for the construction phase will be appointed in accordance with the Health, Safety and Welfare at Work (Construction Regulations) 2013, and a Preliminary Health and Safety Plan will be formulated during the detailed design stage which will address health and safety issues from the design stages, through to the completion of the construction phases.

Adherence to the construction phase mitigation measures presented in this EIAR will ensure that the construction of the proposed development will be completed with minimal risks to population and human health.

4.6.2 Operational Phase

The proposed development has been designed to avoid and reduce negative impacts on population and human health through the following measures.

- Including a creche / childcare facility within the design of the proposed development.
- Incorporating extensive leisure and amenity facilities within the layout, including local play areas and extensive provision for walking and cycling throughout the development.

- Layout design incorporating considerations of natural daylighting, passive surveillance, and accessibility.
- Landscaping to enhance the amenity value of the proposed development for both humans and wider biodiversity.
- Including a foul water drainage system draining to an existing waste water treatment plant with adequate capacity.
- Including a separate surface water management and attenuation system.
- Including buildings that incorporate low energy consumption and energy efficient measures.
- Including buildings with high quality finishes and materials.
- Including house designs that can be adapted and extended to allow for general changes in family circumstances.

The proposed development was designed to modern standards that incorporate measures that reduce risks to and enhance amenity in terms of population and human health.

4.7 Residual Impact Assessment

It is considered that the proposed development will realise significant positive overall economic and social benefits for the local community and the wider Kilcock area for both the construction and operational phases. The delivery of much needed housing and amenity for Kilcock while being located to avail of existing utility infrastructure and to integrate community & social infrastructure are considered to be beneficial to Kilcock.

Implementation of the mitigation measures given in this EIAR will ensure that the risks to population and human health in the construction phase will likely be a **negative**, **short-term**, **slight** impact.

Implementation of the mitigation measures given in this EIAR will ensure that the risks to population and human health in the operational phase will likely be a **positive**, **permanent**, **slight** impact.

4.8 Monitoring

Measures to avoid negative impacts on Population and Human Health are largely integrated in to the design and layout of the proposed development. Compliance with the design and layout will be a condition of any permitted development.

No specific monitoring is proposed in relation to this section.

4.9 Worst Case Scenario

The worst-case scenario for the proposed development is considered to be the risk of an accident that would release pollutants to the local watercourses. This risk is considered to be unlikely for both the construction phase and the operational phase. This worst case scenario is considered an **unlikely** and **indeterminable** impact.

4.10 References

- National Planning Framework, Ireland 2040 – Our Plan (Government of Ireland, 2018);
- Sustainable Urban Housing: Design Standards for New Apartments (Guidelines for Planning Authorities) (Department of Housing, Planning and Local Government) (March 2018);
- Childcare Facilities (Guidelines for Planning Authorities) (June 2001);
- Regional Planning Guidelines for the Greater Dublin Area 2010-2022;
- Draft Eastern and Midlands Regional Spatial and Economic Strategy;
- Dublin City Council Development Plan 2016-2022;
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – Draft (EPA, 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, 2003).
- Social Infrastructure Audit, MH Planning, 2019;
- Central Statistics Office (CSO) website www.cso.ie; and
- Department of Education and Sciences (DES) website www.education.ie.

CHAPTER 5
LANDSCAPE & VISUAL

DECEMBER 2019

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5 Landscape and Visual Impact

5.1 Introduction

The landscape and visual impact assessment of the proposed development is a means of appraising the effect the proposed Housing Development at Newtownmoyaghy, Kilcock, Co. Meath will likely have on the receiving environment in terms of quality of landscape – both physically and visually.

As part of the assessment, the site and its environs were visited on the 16th October 2019. The weather conditions were clear and dry with good visibility.

This Chapter has been prepared by Murray & Associates, Landscape Architecture (Mark Boyle, Bachelor of Agricultural Science (Landscape Horticulture) UCD, 1998; Master of Landscape Architecture, UCD, 2002; Corporate Member of the Irish Landscape Institute, 2005). Mark Boyle has carried out landscape and visual assessments for more than fifty residential and commercial developments over his career to date, as well as assessments for national road, rail, windfarm and greenway developments.

5.2 Proposed Development

The proposed development comprises of 388no. housing units, 121no. duplex units and 66no. apartments, a total of 575no. units. It also includes a creche, new GAA changing room facilities and all associated infrastructure works (attenuation basins, roads, car parking, cycle parking, etc.). The proposed development represents a residential expansion north of the River Rye Water and East of R125, situated in County Meath. The proposed development falls within the area assigned for residential development on the Kilcock Environs Local Area Plan 2009-2015 (Meath Co. Council). For location of the subject site refer to **Figure 5-1 Site** Location Map

The total area of the site is 24.24 hectares, covering mostly agricultural use land divided by hedgerows. The site is divided into two distinct areas by a drainage ditch that feeds into River Rye Water which runs to the south of the site and a proposed open space. The southern part of the site is approximately 6.07 hectares and situated at the edge of Co. Meath boundary with Co. Kildare which aligns with the course of the River Rye Water. South of the Rye Water is the R148 road and running parallel to this is the Royal Canal. The northern part of the site is approximately 8.38 hectares and is located southeast of the R125. Both areas of the proposed development are connected through a consented road, part of a previous development (under construction), that links the R125 and R148 roads. The proposed development provides an extension of the residential fabric, linking the new site to the housing area located to the west of the consented link road. The proposed development road network allows for cycleways and pedestrian routes that link with the consented road and onto the existing main road network. The proposed development also includes approximately 9.79 hectares of public open space. Within the public open space, provision is made for flood mitigation works, including infiltration basins, berms and related earthworks. Two 38kV overhead electricity lines will be relocated underground and will require two lattice masts to be constructed in the south of the site. These lattice masts will be up to 13.0m in height. Several wooden pole sets associated with the 38kV lines will be removed.

FIGURE 5-1 SITE LOCATION MAP

Please see the Site Layout Plan (drawing number 1829-P-104) and other drawings submitted for an illustration of the proposals described above.

5.2.1 Landscape & Visual Characteristics of the Proposed Development

The proposed development is suburban in character, visually similar to the existing adjacent residential development, Millerstown, in scale and typology. The site layout is divided into two residential groups to the north and south of the site and includes two large open spaces with four local open spaces dispersed through the residential areas and communal gardens to the apartment blocks. All of the houses have private gardens.

The majority of the site is laid out in streets with housing. Several corners have been addressed with specific designs and there are street trees planted in front gardens. The streets are varied in layout and elevation, with several house types, both 2-storey and 3-storey, ranging from 7.8m to 11.6m in height. The duplexes are located in the southwestern part of the north site and measure 12.7m in 3-storeys. There are three 4-storey apartment blocks, one to the southeastern edge of the northern site and the other two on the northern edge of the southern site, ranging from 15.6-16.5m in height. A neighbourhood centre is located adjacent to the roundabout in the centre of the site, northwestern corner of the south site. All buildings are designed with pitched roofs except for one apartment block (S2 on site layout plans) which has a flat roof. Façade materials are varied to include render and brick.

The open space areas are designed to include play areas, walking routes, grassed and planted areas and tree and shrub planting. These spaces also accommodate engineering proposals for flood mitigation works. These take the form of berms and basins and will have a naturalistic appearance when complete, i.e. seeded and integrated with the landscape design. Existing flood relief measures are retained in the scheme and are also integrated with the landscape design through grading proposals. *[Please note, for the purposes of this assessment, the landscape*

proposals, although an integral part of the proposed design, are considered a mitigation measure, so are not taken into account for the assessment of worst case scenario impacts.]

Refer to EIAR chapter 2 Development Description for full details of the proposed development.

5.3 Methodology

5.3.1 Terminology

Landscape impacts are defined as changes in the fabric, character and quality of the landscape as a result of the development. This includes direct impacts to landscape receptors and greater effects that can alter the wider distinctiveness of the landscape. Landscape receptors are the physical or natural resource that will experience an impact. The sensitivity (of a landscape receptor) is the vulnerability to change. The extents of the landscape impacts have been assessed by professional evaluation using the terminology defined as per **Table 5.1, Table 5.3** and **Table 5.4**. The terminology is based on the criteria set down in the *Guidelines for Landscape and Visual Impact Assessment* (3rd Edition, by The Landscape Institute / Institute of Environmental Assessment published by E&FN Spon, 2013) and *Guidelines on the information to be contained in environmental impact statements*, published by the EPA (2002 and 2017 Draft publication).

Extent of Effect	Description of the Landscape Impact
Imperceptible Effects	An effect capable of measurement but without noticeable consequences. There are no noticeable changes to landscape context, character or features.
Not significant	An effect which causes noticeable changes in the character of the landscape but without noticeable consequences. There are no appreciable changes to landscape context, character or features.
Slight Effects	An effect which causes noticeable changes in the character of the landscape without affecting its sensitivities. There are minor changes over a small proportion of the area or moderate changes in a localised area or changes that are reparable over time.
Moderate Effects	An effect that alters the character of the landscape in a manner that is consistent with existing and emerging trends. There are minor changes over some of the area (up to 30%) or moderate changes in a localised area.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the landscape. There are notable changes in landscape characteristics over a substantial area (30-50%) or an intensive change over a more limited area
Very Significant Effects	An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment. There are notable changes in landscape characteristics over a substantial area (50-70%) or a very intensive change over a more limited area
Profound Effects	An effect which obliterates sensitive characteristics. There are notable changes in landscape characteristics over an extensive area (70-100%) or a very intensive change over a more limited area

TABLE 5-1 EXTENT OF LANDSCAPE IMPACT

Visual impacts relate solely to changes in available views of the landscape and the effects of those changes on people viewing the landscape. They include the direct impact of the development on views, the potential reaction of viewers, their location and number and the impact on visual amenity. The intensity of the visual impacts is assessed by professional evaluation using the terminology defined as per **Table 5.2, Table 5.3** and **Table 5.4**.

Extent of Effect	**Description of the Visual Impact**
Imperceptible Effects	There are no changes to views in the visual landscape.
Not significant	An effect which causes noticeable changes in the character of the visual environment but without noticeable consequences. The proposal is adequately screened due to the existing landform, vegetation or constructed features.
Slight Effects	An effect which causes noticeable changes in the character of the visual environment without affecting its sensitivities. The affected view forms only a small element in the overall visual composition, or changes the view in a marginal manner.
Moderate Effects	An effect that alters the character of the visual environment in a manner that is consistent with existing and emerging trends. The proposal affects an appreciable segment of the overall visual composition, or there is an intrusion in the foreground of a view.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the visual environment. The proposal affects a large proportion of the overall visual composition, or views are so affected that they form a new element in the physical landscape.
Very Significant Effects	An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the visual environment. The proposal affects the majority of the overall visual composition, or views are so affected that they form a new element in the physical landscape.
Profound Effects	An effect which obliterates sensitive characteristics. The view is entirely altered, obscured or affected.

TABLE 5-2 EXTENT OF VISUAL IMPACT

Quality of Impact	**Description of Effect**
Neutral Impact	Neither detracts from nor enhances the landscape of the receiving environment or view
Positive Impact	Improves or enhances the landscape of the receiving environment or a particular view
Negative Impact	Detracts from the quality of the landscape or view

TABLE 5-3 QUALITY OF THE LANDSCAPE AND VISUAL IMPACT

Duration	Description
Temporary	Impacts lasting one year or less
Short-term	Impacts lasting one to seven years
Medium-term	Impacts lasting seven to fifteen years
Long-term	Impacts lasting fifteen to sixty years
Permanent	Impacts lasting over sixty years

TABLE 5-4 DURATION OF THE LANDSCAPE AND VISUAL IMPACT

With regard to the duration of visual impact, it should be noted that 'Momentary' and 'Brief' impacts are not considered to occur in landscape and visual assessment for this type of development. Landscape impacts are assumed to be permanent, unless otherwise noted.

The landscape and visual assessment methodology will be utilised in conjunction with a professional evaluation of the proposed development to determine the degree of impact.

The term 'study area' as used in this report refers to the site itself and its wider landscape context in the study of the physical landscape and landscape character. This may extend for approximately 1km in all directions from the site in order to achieve an understanding of the overall landscape. In terms of the visual assessment, the study of visual amenity may extend to areas where views of the site are available, but the majority of visual impacts for a development of this nature are most significant within 500m.

5.3.2 Methodology

The methodology employed in the landscape and visual impact assessment is as follows:

a) Desktop survey of detailed maps, aerial photography and other information relevant to the study area, including the Meath County Development Plan 2013-2019 and the Kilcock Environs Local Area Plan 2009-2015 (Meath Co. Council) and the Kildare County Development Plan 2017-2023.
b) Site survey and photographic survey to determine landscape character of the general study area and specific landscape of the site.
c) Assessment of the potential significant impacts of the proposed scheme utilising the plan and elevation drawings of the scheme to determine the main impacting features and the degree to which these elements would be visible in relation to observations made during the field survey. In determining visibility, the views to and from the proposed development are considered based on the heights, finishes, design and other visual characteristics of the proposed structures and setting. Verified photomontages have also been prepared to give an accurate visual representation of the proposals from a selection of viewpoints. Please see the Verified Photomontages report submitted under separate cover.
d) The proposal of a scheme of mitigation measures, where relevant. These will be defined as measures which will be generally implemented and specific landscape measures which will be site-specific and address particular landscape or visual issues identified.
e) An evaluation of the impacts of the scheme before and after consideration of the mitigation/amelioration measures. For the purposes of assessment the predicted visual effects of the scheme are assumed at 10-15 years following the completion of the proposed development and once the landscaping vegetation has established / matured. A three-dimensional computer model was constructed of the site and the wider landscape by a

specialist company in order to enable the production of verified views which assist in evaluating the impact of the proposed development on the existing views.

The assessment follows prescribed methodologies, as set down in the following publications:

- *Guidelines for Landscape and Visual Impact Assessment* 3rd Edition, by The Landscape Institute / Institute of Environmental Assessment published by E&FN Spon (2013),
- *Advice notes on Current Practice in the Preparation of Environmental Impact Statements*, published by the Environmental Protection Agency (EPA) (2003), and
- *Guidelines on the information to be contained in environmental impact statements*, published by the EPA (2002).

The Draft *EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (EPA, 2017) and *Advice Notes for preparing Environmental Impact Statements* (EPA. 2015) were also consulted.

5.4 Baseline Scenario

5.4.1 Landscape Planning Context

5.4.1.1 Meath County Development Plan (Co. Meath 2007-2013)

There are several relevant landscape policies in the Meath County Development Plan, including those related to Natural and Cultural Heritage, Green Infrastructure, including:

- NH POL 1 To protect, conserve, and seek to enhance the County's biodiversity.
- NH POL 2 To promote measures to protect biodiversity in the development management process by creating and improving habitats, where possible.
- NH POL 21 To protect the recreational, educational and amenity potential of navigational and non-navigational waterways within the County, towpaths and adjacent wetlands.
- LC POL 2 To require that any necessary assessments, including landscape and visual impact assessments, are provided when undertaking, authorising, or approving development.

There are no protected views and prospects listed in Appendix 12 or shown in Map 9.5.1 of the Meath County Development Plan that could be relevant to this study area.

Landscape Character Assessment for Co. Meath is included at Appendix 7 to the Meath County Development Plan. The site is located within the Royal Canal Character Area and is described as follows, which is true for the study area:

> *The landscape adjacent to the Royal Canal is rolling lowland, which is more open due to larger arable field patterns and in general this area is less densely vegetated.*

This landscape is categorised as having a High landscape value but with an overall moderate landscape sensitivity. This value is arrived at due to the combination of visual, ecological, recreational and historical attributes.

5.4.1.2 Kilcock Environs Local Area Plan (2009-2015) – Meath County Council

The site is located within the planning boundaries of the Meath CDP in the Kilcock Environs Local Area Plan 2009-2015. The land zoning within the site has been defined as Residential (A2 – Land

Use Objective), with a large portion of the subject lands are also zoned as Open Space and Amenity (F1).

Open space provision that enhances and respects the main water courses is a key element of the LAP. Section 4.14 of the LAP states "*The principal element in this Local Area Plan to provide recreational and amenity facilities is the creation of a riverside walk and linear amenity area adjacent to the Rye Water River."* Due to its dynamic behaviour and its strong presence on the landscape, the LAP considers this water course as a riverside amenity area. Any of these open space areas shall be delivered in tandem with the development of adjoining lands, consequently ensuring that the open spaces are inter-linked.

There are also a series of policies relating to flooding and transport that will influence the form of development and shape the landscape that will be implemented on this site.

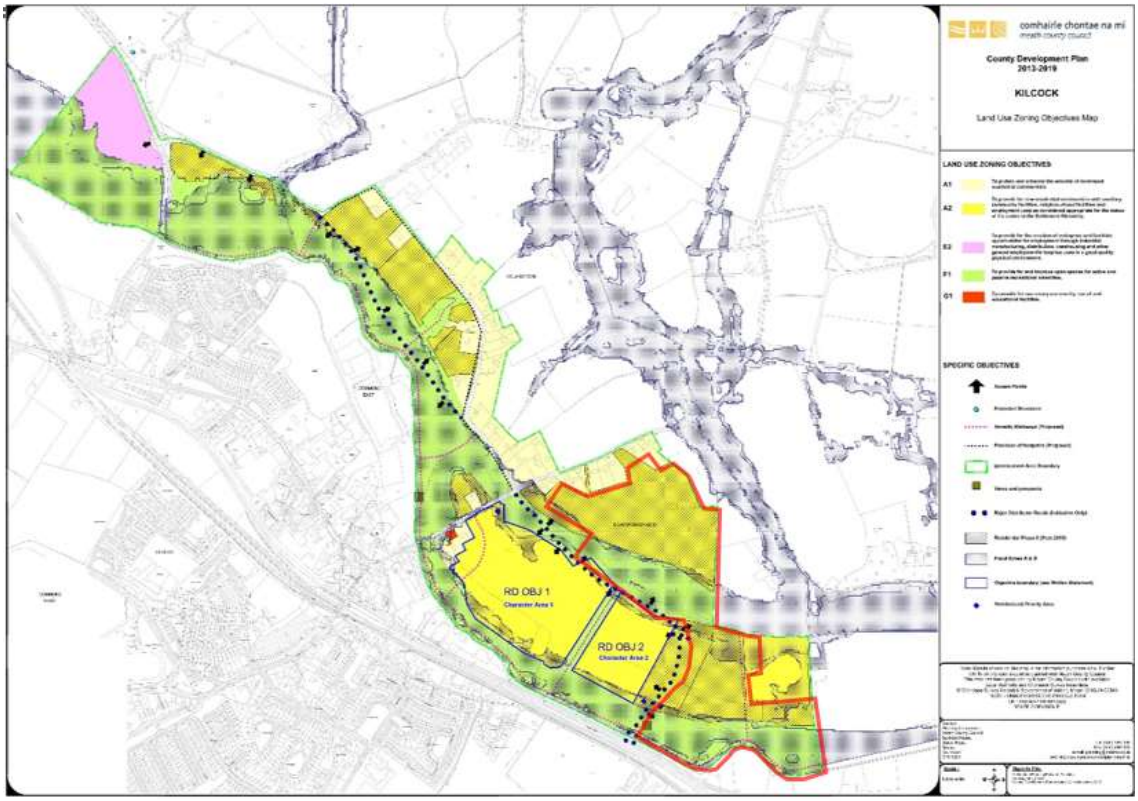

FIGURE 5-2 EXCERPT OF LAND USE ZONING OBJECTIVES MAP, COUNTY DEVELOPMENT PLAN 2013-2019 (DEVELOPMENT SITE BOUNDARY IN RED LINE ADDED FOR CONTEXT).

5.4.1.3 Kildare County Development Plan (2017-2023) and Draft Kilcock Local Area Plan (2015-21) – Kildare Co. Council

Whilst the site is outside the boundary of Kildare county, protected views in the Kildare CDP and Draft Kilcock LAP published by Kildare County Council are potentially relevant as the viewshed or prospect of the view could potentially be affected by the proposed development. Section 14.6.1 sets out protections to views to and from the county's waterways including the Royal Canal. There are two bridges within the study area: Chambers Bridge, Maws (view reference RC9) at Lock 15

and Shaw Bridge (view reference RC10), Kilcock. The latter is also included on Map 9: Green Infrastructure Map of the LAP.

5.4.1.4 Planning Context Summary

The site is zoned for residential development so long as the proposed housing growth protects and retains some of the natural elements and dynamics that the site contains. Within the site, the open space areas are identified of landscape and ecological value which need to be protected and retain its character during the development of the site.

Based on both Meath County Development Plan 2013 -2019 and Kilcock and Environs Local Area Plan 2009-2015, the existing site does not possess any significant features of note or trees that require protection. Protected views in the vicinity of the site, protected by Kildare County Council, are from the bridge in Kilcock and the bridge at Lock 15 of the Royal Canal.

There are no scenic routes or viewpoints within the site, neither are there any Tree Preservation Orders.
The site is located within an area under 'Urban Influence', as designated in The Meath County Development Plan, and within the Royal Canal Landscape Character Area, with Moderate sensitivity.

5.4.2 Site Setting/Landscape Character

The proposed development site is located approximately 500m northeast and 800m to the east of Kilcock village in the townland of Newtownmoyaghy. The site is set in a predominantly rural agricultural context, with peri-urban built elements such as housing and commercial retail units along the roads to the west.

Within the wider agricultural landscape, there are existing farms and associated buildings. There is a plot of deciduous forestry to the east of the southern site. The topography of the site and environs is generally flat to undulating, falling locally towards water courses. Trees and hedgerows dominate the landscape due to this relatively flat topography. The Landscape Character Assessment (Appendix 7 for Meath County Development Plan) speaks of rolling lowlands associated with this part of the county which is true for this site too.

There is an existing housing estate to the west of the site, Millerstown, part of which was recently constructed and occupied, and part is still under construction.

In terms of cultural landscape, historical mapping (Ordnance Survey 1837-42; accessed via Geohive.ie website) shows demesne or private garden areas to the east (Newtown Prospect) and north (Dolanstown House) of the site, but these do not intersect the site. The field patterns on the historic maps are largely unchanged, but the course of the Rye Water appears to have been straightened somewhat in the intervening time period.

5.4.3 Site Description

Within the site, the field pattern is defined by hedgerows of Hawthorn, Ash, Blackthorn, Elder and scrub. A tree survey was carried out by CMK Horticulture and Arboriculture and identified 28 trees most of which are located near the R125 roadway in two former residential gardens. The main species on the site are Ash and Silver Birch, with Lawson Cypress and other ornamental trees forming the majority of the trees associated with the gardens. The remaining trees on the site,

primarily self-seeded ash, are interspersed in the agricultural hedgerows directly south of the R125. The hedgerows are in reasonable condition but have been unmanaged and are developing gaps in places. One hedgerow, the southernmost (Hedgerow G in Tree Survey Report), is described as “degraded”. The plot of deciduous forestry to the east of the southern site slightly overhangs the boundary.

There are two water courses within the site, the Rye Water to the south, which also forms the county boundary between Meath and Kildare, and the Upper ditch between the northern and southern sections of the site. The Rye Water is a substantial water course, 4-5m in width whilst the ditch is perhaps 1-2m wide and is culverted at a central point for a distance of c.20m. There are flood plains and bunds / banks associated with both water courses. Bunds / banks are 1-2m in height and form ridges in the landscape. In the case of the ditch/stream in the centre of the site, the bunds are immediately adjacent to either side of the course making it difficult to see the water.

The natural topography of the site falls gently towards the water courses. In the northern site area, there is a difference of 8m between the highest (the housing in the northwest of the site at c.70m OD) and the lowest point (stream at c.62m OD), with slopes not exceeding around 7% at the steepest point, but are generally much less steep. In the southern site, the land is flatter, with the highest point around 65.5m OD in the central hedgerow (Hedgerow G) and the land gently falling to 62m at the stream to the north and c.61.5m OD at the Rye Water adjacent to the recently constructed bridge at the entrance to Millerstown. The topography was altered in recent years due to the implementation of flood control measures, introducing banks and bunds around the watercourses. The banks and bunds are man-made and are obvious in the landscape due to the otherwise flat or gently sloping nature of the site.

There are several overhead powerlines crossing the site at present, carried on timber polesets. Some of the land is disturbed by adjacent construction and site investigations, but the current condition of the site is best described as fallow arable agricultural land.

5.4.4 Views and Visual Environment

The wider landscape, viewed from ground level in and around the site is quite flat and horizons are defined by mature trees, particularly to the north.

Sensitive visual receptors are those views from the public realm or adjacent residential sites that are considered to have sensitivity to change in their views or visual environment. Potential receptors have been identified through field work and desktop study and are shown in **Figure 5.3** and detailed in **Table 5.5** below. The site is enclosed to a large extent by different hedgerows and trees along the north, east and west boundaries, so there are few external views into the site along Moyglare Road due to the existing vegetation (views no. 1 & 7). Several detached houses are present along the R125 and form part of the north-west boundary. These houses have ornamental hedges along their property south boundary, so current views to the site are largely blocked.

FIGURE 5-3 MAP OF VISUAL SENSITIVE RECEPTOR LOCATIONS

VP Reference	Visual Sensitive Receptor Description
01	View south from the junction of R125 and Moyglare Road.
01A	Dwellings located off R125
02	View south east from the County Bridge, a protected structure.
03	View south-east from the R407 at Shaw Bridge – a scenic viewpoint – KCC DP.
04	View north / northeast from Branganstown south of canal and rail line.
05	View north-west from R148 adjacent to the Royal Canal.
05A	Dwelling 'Rosdara' off R148
06	View north-west from the Chambers Bridge, a scenic viewpoint – KCC DP.
07	View west from Moyglare Road at a farmyard entrance.
07A	Dwelling located off Moyglare Road
08	View east from western entrance to Kilcock over Royal Canal.
09	View east/south-east from R125 at distributor road junction.
10	View east from R148 / Royal Canal Way at site.
11	Open view north from Royal Canal Way adjacent to site.
12	Millerstown Estate (new dwellings)

TABLE 5-5 DESCRIPTION OF VISUAL SENSITIVE RECEPTOR LOCATIONS

A new housing development (construction on-going) and consented road linking the R125 and the R148, which currently serves as access for construction, bounds the site to the west. Clear views towards the north, east and south-east are available along this route. The south boundary is defined by River Rye Water and small plots of agricultural use land with hedgerows which block views into the site from the R148 (views no. 4 & 5).

The most exposed views are located along the R148 and the Royal Canal Way pedestrian route. Views no. 10 & 11 towards the north and east currently have an unobstructed view of the subject site and the currently in construction Millerstown residential development. There are no

hedgerows, high vegetation or buildings that block the sightlines towards the site. A clear visual connection is established between the Royal Canal and the site at these locations.

From the Kilcock town centre, there are scenic views along the Royal Canal which are protected by Kildare County Council, but views towards the site are restricted due to the two-story commercial buildings along the northern shore of the Royal Canal and a hedgerow populated by tall poplar trees (view no.3).

Views from within the site are generally open and distant, with trees on all horizons due to the flat topography. From certain parts of the site there are distant views of the Dublin and Wicklow Mountains on the horizon.

The existing farmland of the site is crossed by several overhead powerlines, carried on wooden polesets, which detract from the quality of the landscape and views somewhat.

FIGURE 5-4 VIEW OF THE NORTHERN BOUNDARY OF THE SITE FROM R125 (VIEW NO. 1)

FIGURE 5-5 VIEW OF THE RYE WATER RIVER LOOKING EAST FROM MILLERSTOWN ENTRANCE WITH SITE TO LEFT (NORTH) AND R148 TO EAST

FIGURE 5-6 INTERNAL VIEW OF THE SITE TOWARDS SOUTH-EAST (FROM MILLERSTOWN FUTURE R125-R148 LINK).

FIGURE 5-7 VIEW FROM THE ROYAL CANAL WAY LOOKING WEST TOWARDS KILCOCK, WITH CANAL ON LEFT, R148 AND SITE OF PROPOSED DEVELOPMENT ON RIGHT WITH MILLERSTOWN ESTATE IN BACKGROUND RIGHT

5.4.5 Sensitivity of the Identified Receptors

In landscape and visual assessment, one of the key factors is the sensitivity of a landscape to change, where the proposed development will result in adding a new element to the landscape. The publication Guidelines for Landscape and Visual Impact Assessment (2013) defines sensitivity as: "*A term applied to specific receptors, combining judgments of the susceptibility of the receptor to the specific type of change or development proposed and the value related to that receptor.*"

Also, landscape sensitivity refers to the inherent sensitivity to change of the landscape resource, as well as the visual sensitivity in terms of views, visibility, number and nature of viewers and scope to mitigate visual impact.

In landscape terms, the site is considered to have generally low sensitivity due to the low value of the grass areas and the fact that the site is zoned for residential development, which indicates a relatively low landscape sensitivity value. However, the Rye Water and flood plains are considered to have high sensitivity. Hedgerows and the ditch / stream are considered to be of medium sensitivity.

Views from the receptors identified above are considered to have varying sensitivities, see **Table 5.6** for the viewpoint location, distance from site, description of the view, and the specific sensitivity ratings.

The views within the site are not considered sensitive as there is no defined user group that currently enjoys these views.

Ref.	Viewpoint location	Distance from site	Description of View	Level of Sensitivity
01	Junction of R125 and Moyglare Road.	125m north	View south from junction of public roads into site. View of open field with hedgerows and trees defining site boundary and most of horizon in the middle distance. Several powerlines and wooden polesets are present in the view. See Figure 5.3.	Low
01A	Dwellings located off R125	Directly north / west	Views east/south from residences substantially restricted by existing mature garden hedge boundary vegetation but partial views of site will be available from private amenity space and upper floor windows. Powerlines and polesets are visible in middleground of views.	Moderate
02	County Bridge (protected structure) & adjacent dwellings	420m west-southwest	Restricted view southeast from bridge due to adjacent housing and mature landscape vegetation. Site is not visible.	Imperceptible
03	R407 at Shaw Bridge (protected view)	650m west	Southern edge of site is just visible due southeast from bridge, parallel to the canal, due to buildings on edge of town and mature landscape vegetation. Main element in view is Royal Canal.	Low
04	Branganstown south of canal and rail line.	70m southwest	View north / north-east from residential receptors at Branganstown south of canal and rail line. Views constrained by existing hedges and shed at end of road. Existing Millerstown development partially visible.	Low
05	R148 adjacent to the Royal Canal	55m southeast	View north-west partially restricted by existing vegetation, dwelling and powerlines.	Medium
05A	Dwelling 'Rosdara' off R148	55m southeast	View north-west from entrance to dwelling and private amenity space, partially restricted by existing vegetation and powerlines with wooden poleset are visible. *Note: Other dwellings to southeast along the R148 are set back from the road, and have mature boundary vegetation on their boundaries which screen views of the site, so these are not considered sensitive receptors.*	High
06	Chambers Bridge (protected view)	380m southeast	View northwest from the bridge at Lock 15 on the Royal Canal, a scenic viewpoint in the KCDP, towards the site is blocked	Imperceptible

			entirely by the existing mature hedgerows and dwelling adjacent.	
07	Moyglare Road	220m northeast	View west/southwest from Moyglare Road at a farmyard entrance and generally views south from Moyglare Road are very restricted by existing mature boundary vegetation and existing dwelling.	Low
07A	Dwelling located off Moyglare Road	160m north / east	Views west/south from residence partially restricted by existing garden hedge boundary vegetation but views of site will be available from private amenity space and upper floor windows. Powerlines with wooden poleset are visible in the field to the west/south.	High
08	Western entrance to Kilcock.	1200m west	View east from western entrance to Kilcock over Royal Canal. Site is not visible from this distance and due to intervening town and vegetation.	Imperceptible
09	R125 at distributor road junction.	140m southwest	View east/south-east from future entrance to the residential area under construction and subject of this application. Open views of northern part of site. Existing views include construction site and powerlines.	Medium
10	R148 Footpaths / Royal Canal Way.	150m west	Views east from Royal Canal Way with open views across the site to rural landscape / horizon defined by trees in context with the existing Millerstown development. Powerlines and polesets on the site are visible in these views. *Note: (1) This is a representative view from the visual sequence along the Royal Canal Way moving parallel to the southern edge of the site; (2) the building line of the proposed development is more than 100m north from the site boundary.*	Medium
11	Open view north from Royal Canal Way adjacent to site.	30m south	Views north from Royal Canal Way with open views across the site to rural landscape / horizon defined by trees in context with the existing Millerstown development. Powerlines and polesets on the site are visible in these views. *Note: (1) This is a representative view from the visual sequence along the Royal Canal Way moving parallel to the southern edge of the site; (2) the building line of the proposed development is more than 100m north from the site boundary.*	High
12	Millerstown Estate (new dwellings)	20m west	Open views from existing dwellings and entrance road on east of Millerstown. Currently have open views of the agricultural landscape and Rye Water. Existing construction works adjacent and disturbed landscape reduce sensitivity. Powerlines and polesets on the site are visible in these views.	Medium

TABLE 5-6 SENSITIVITY OF POTENTIAL VISUAL RECEPTORS

5.5 Impact Assessment

This section identifies the potential effects that the development could have without consideration of landscape mitigation or amelioration – i.e. without landscape works. Although the landscape proposals for this development have been designed in parallel with, and as an integral part of, the urban design and layout, for the purposes of this assessment, landscape proposals are considered to be mitigation.

The likely effects have been assessed to identify any areas where the proposed development may have adverse impacts to the scenic and visual character of the area. and represent the potential impact rather than the eventual long-term effect. For this section, it is assumed that no specific landscape works are carried out with the construction of the development and that the open spaces are simply grass areas. This enables the assessment of potential worst case impacts. The residual impact assessment includes consideration of the mitigation measures, which facilitates the assessment of the effectiveness of the landscape mitigation measures proposed.

The proposed development is likely to visually impact on the existing environment and its surroundings. This will be due to the need for vegetation removal in places, the potential impacts from construction works and the operational use of the proposed development. These effects are examined in detail below under Construction Phase and Operational Phase designations.

The magnitude of change due to the proposed development is considered to be substantial due to the level of site coverage. However, there are large areas of open space included in the site layout which reduce the overall magnitude of change and perception of the site.

5.5.1 Do Nothing Scenario

If the current agricultural landuse of the subject site continues no changes will occur to the landscape or views in the area. Should the site be left vacant, this could create negative impacts upon the landscape character and visual amenity of the area.

5.5.2 Construction Phase – Potential Landscape and Visual Effects

During the implementation of the proposed development, the site will undergo a change from agricultural area into a construction site, with associated building activities, vehicle movements, plant and machinery. Site clearance works will alter the topography, landscape character and result in the removal of vegetation.

This site will undergo a change from that of an area of agricultural fields to a large construction site. Landscape impacts will occur over most of the site due to the excavation works required into the existing slope, giving a moderately negative effect on the existing landscape.

Existing hedgerows internal to the site will be removed during the construction stage, which is a permanent landscape impact. This is considered a permanent negative impact, locally significant, but moderate in the wider regional landscape context of agricultural fields divided by hedgerows.

There will be negative visual effects associated with the construction works of this development. The visual appearance of the site will be affected by the building processes and views of exposed earth, mud, scaffolding, plant and machinery, vehicles, cranes etc. are considered to generate negative visual effects. This process will be internal to the site and buffered by existing retained

hedgerows and woodlands on the north, east and west boundaries of the site. However, the south and south-west side are open and exposed due to the lack of vegetation screening the site. The eastern side of the northern site will also be exposed due to the removal of hedgerows here.

The most substantive visual effects during construction will be experienced by the adjacent established residential receptors closest to the proposed development i.e. the dwellings / junction adjacent to R125 (Viewpoints 01A/09 – Significant negative short-term effects), a dwelling off Moyglare Road (Viewpoint 07A – Very Significant negative short-term effects), a dwelling 'Rosdara' along the R148 (Viewpoint 05A – Very Significant negative short-term effects). Viewpoints in the public realm along the R148 and Royal Canal (Viewpoints 05 and 10) and in Millerstown estate (Viewpoint 10) will also have significant negative visual impact. Visual impacts on residential receptors in Millerstown (Viewpoints 10 and 12) who will be closest to the construction activity will be significant, but their sensitivity is reduced as the residents will have moved in during ongoing construction of other phases and will have been aware that the area would undergo further development over time. Direct views from the Royal Canal Way (viewpoint 11) will also have very significant negative short-term effects due to the high level of sensitivity of recreational walkers, etc., particularly during the construction of the lattice masts for powerlines.

For all other identified receptors, the construction phase visual impact will be a short-term, negative, moderate effect, due to the high level of change in the environment and the proximity between the works and the viewpoints.

5.5.3 Operational Phase – Potential Landscape Effects

In the operational phase the main landscape effects of the proposed development are associated with the presence of the proposed development. The completed development will have a substantial effect on the landscape character of the site. This is due to the change in character from that of agriculture fields into a residential neighbourhood. While the retention of boundary hedgerows will help maintain the integrity of the northern periphery of the site, the required removal of internal hedgerows will cause permanent negative impact. This is ameliorated somewhat by the large areas of open space around the most sensitive landscapes of the site associated with the water courses.

Flood relief measures which are extant in the landscape will be enhanced and extended in the proposed development. The earth works required are part of the site design proposals and comprise of berms and basins which form part of the open spaces adjacent to the water courses. These will have naturalistic forms and will be integrated into the landscape, resulting in a neutral, permanent, landscape effect on the character of the site over time. They are considered neutral because, other than a change to the levels / physical topography of the site, there will be no appreciable difference in the landscape which will be perceivable and no inherent quality of the landscape is impacted upon.

The removal of overhead powerlines through most of the site is considered a positive effect, but is offset by the construction of the new dwellings and so is considered overall negative. The proposed lattice masts in the south of the site generate negative localised permanent landscape impacts due to their character in the riparian landscape.

5.5.4 Operational Phase – Potential Visual Effects

Potential visual effects of the proposed development are assessed by examining specific views to and from the site of the proposed development. Views into the site and from the site can be seen in the accompanying contextual site photos herein and in the Verified Photomontages report submitted under separate cover. These photographs show key viewpoints from the surrounding area, which will be potentially affected by the proposed development.

The following **Table 5.7** sets out the potential impacts to the sensitive viewpoints identified. All are considered to be potentially permanent impacts.

Ref.	Viewpoint / Photomontage View Reference	Level of Sensitivity	Magnitude of Change	Potential Operational Visual Effects
01	Junction of R125 and Moyglare Road.	Low	High	Moderate Negative Proposed development will be visible in the middle/background of the view and will create a new element on the horizon, but 2-storey housing proposed is relatively low and the existing hedgerow will be maintained which softens and screens much of the housing. Removal of some overhead powerlines from this view is a slight positive effect, but overall effect is moderate and negative.
01A	Dwellings located off R125	Medium	High	Significant Negative Proposed development will be visible in the middle/background of the view and will create a new element on the horizon, but 2-storey housing proposed is relatively low and the existing hedgerows and garden vegetation will be maintained which softens and screens much of the housing.
02	County Bridge (protected structure) & adjacent dwellings	Imperceptible	Imperceptible	Imperceptible Neutral Proposed development is screened by the existing dwellings and vegetation, so there is no impact.
03	R407 at Shaw Bridge (protected view)	Low	Imperceptible	Imperceptible Neutral Proposed development is screened by the existing town buildings and vegetation, so there is no impact.
04	Branganstown south of canal and rail line.	Low	Medium	Slight Negative Proposed development will be visible in the middle/background of the view and will create a new element on the horizon, but forms a relatively minor element of the view due to the mature hedgerows along the canal and existing shed in view which partially screen much of the proposed housing.
05	R148 adjacent to the Royal Canal	Medium	High	Significant Negative Proposed development will be visible in the middle/background of the view and will create a new element on the

				horizon, and will form a substantial element of the view partially screened by the existing dwelling, hedgerows, outbuildings and garden vegetation which partially screen the proposed housing. The two proposed lattice masts at 13m height will be visible in the views, contributing to the negative effects.
05A	Dwelling 'Rosdara' off R148	High	High	Very Significant Negative Proposed development will be visible in the middle/background of the view across the Rye Water River and will form a substantial element in the view. It will be slightly screened by the existing garden vegetation which partially screen the proposed housing. The westernmost proposed lattice mast at 13m height will be visible from this viewpoint, contributing to the negative effects.
06	Chambers Bridge (protected view)	Imperceptible	Imperceptible	Imperceptible Neutral Proposed development is screened by the dwelling and mature hedgerow vegetation along the Royal Canal, so there is no impact.
07	Moyglare Road	Low	Low	Not Significant Negative Proposed development may be partially visible in glimpses through the existing mature vegetation along the Moyglare Road, but will generally be screened in almost all views.
07A	Dwelling located off Moyglare Road	High	High	Very Significant Negative Proposed development will be visible in the middle/background of the view and will create a substantial new element in views. The proposed 2-storey housing in this area will be highly visible due to the removal of existing hedgerows on this boundary. Garden boundary vegetation may soften or screen some of the housing in some views from the dwelling.
08	Western entrance to Kilcock.	Imperceptible	Imperceptible	Imperceptible Neutral The site is not visible at this distance and due to the existing buildings and vegetation in the intervening townscape/landscape, so there is no potential for impact.
09	R125 at distributor road junction.	Medium	High	Significant Negative Open views of the proposed development across potentially barren and flat open space results in high visibility of the proposed housing and significant potential impact.
10	R148 Footpaths / Royal Canal Way.	Medium	Medium	Moderate Negative Proposed development will be visible in the middle/background of the view across the Rye Water River and in

				context with existing Millerstown estate. It will form a substantial element in the view, slightly screened by the existing housing and maturing planting in open space to south of Millerstown. The proposed lattice masts at 13m height will be visible in the views from some viewpoints, contributing to the negative effects, but will not form a substantive element in most distant or oblique views from the Royal Canal Way.
11	Open view north from Royal Canal Way adjacent to site.	High	High	Very Significant Negative Proposed development will be visible in the middle/background of the view across the Rye Water River and in context with existing Millerstown Development. In direct views of the site, Millerstown estate is less dominant in the view so the proposed development will cause greater negative effects than oblique views such as View 10. The westernmost proposed lattice mast at 13m height will be visible and distinct in the middleground from this viewpoint, contributing to the negative effects.
12	Millerstown Estate (new dwellings)	Medium	Medium	Moderate Negative Proposed development will be visible from the entrance to the existing Millerstown estate and from dwellings on the east of the development. The proposed development will be directly visible and will change the views considerably, although the landscape is currently undergoing change with adjacent construction of new housing which results in poor quality foreground in views. The existing residential zoning within which the Millerstown development is located is also relevant here in that people living in Millerstown will have been aware that this view was likely to change due to the zoning. The westernmost proposed lattice mast at 13m height will be visible in the middle-/back-ground from this viewpoint, contributing to the negative effects.

TABLE 5-7 POTENTIAL OPERATIONAL VISUAL EFFECTS

5.5.4.1 Potential Night-time Effects

Lighting to the proposed development consists of luminaires along public roads, the local access roads, local and pocket parks throughout the development. As there is lighting currently in place on nearby roads R125 and R148, Millerstown estate and in Kilcock, this additional lighting is not considered to generate additional adverse effects on the landscape and visual environment.

5.5.5 Cumulative

The proposed development is part of the wider expansion and consolidation of Kilcock town in this area under the Kilcock Environs LAP (Meath County Council) and Kilcock LAP (Kildare County Council). The proposed development represents the majority of the undeveloped residential zoning in the LAP area to the east of Kilcock. The LAPs envisage an expansion of the town including a riverside walkway/cycleway along the Rye Water River and other open spaces, as well as residential, mixed use and commercial / industrial areas. When the remainder is built out, for some views this will mean further development occurring adjacent to the proposed development expanding the urban area. It is assumed that the proposed development is in accordance with the Kilcock Environs LAP and all relevant local and national policy on the proper planning and sustainable development in urban areas. Cumulatively this is considered to be a minor additional impact to landscape and visual receptors over the levels assessed in detail in this study. This is likely to generate slight to moderate levels of impact for receptors along the western fringes of the proposed site (viewpoint nos. 01, 02, 03 and 09), but would be unlikely to generate any appreciable impacts for other receptors included in this study due to the positioning of the majority of development to the north of the existing town, outside the viewshed of these receptors. The quality of impact would be considered positive as it would be completing a planned and approved land use pattern of the area and creating new open spaces, pedestrian, cyclist and vehicular connectivity with the urban centre of Kilcock. This is subject to the assumption that the quality of build out would be within the expected parameters.

The Kilcock Environs Written Statement is part of the Meath County Development Plan 2013-2019 and includes for the provision of a primary school in a site of 1.6 hectares and consideration of pedestrian and cyclist connectivity. The school site is located adjacent to the western most extent of the proposed development boundary and is shown in the Site Layout Plan (drawing no.1829-P-104) and is likely comprise of a school building with 24 class rooms, parking and sports facilities. The cumulative impact of this development is likely to be a minor additional impact to landscape receptors over the levels assessed in detail in this study. It would be a neutral effect to most of the visual receptors as it will be surrounded by the housing previously granted and under construction to the south and this proposed development to the north and east, so the school is unlikely to be visible to receptors outside of the development area.

Lands south of the Royal Canal (Branganstown) zoned as Residential and Open Space, serve as an expansion for the existing residential area. Due to the separation created by the railway and Royal Canal, this is not considered to be within the same landscape unit.

5.6 Mitigation Measures

The following mitigation measures have been considered to assess the avoidance, prevention, reduction, and offsetting of the potential negative effects described in the preceding section. Mitigation measures can also reinforce the positive impacts of the proposed development. Mitigation measures are proposed and considered only on the lands of the subject site.

5.6.1 Incorporated Design Mitigation

Some mitigation strategies which minimise visual impact or enhance the visual and aesthetic appearance of the proposed development were integrated into the design of the proposed development at an early stage. The architectural layout aims to create an appropriate and varied visual environment within the housing area by proposing variety in scale and massing of buildings and by creating high quality buildings. The roofscape is varied with pitched roofs and features to

add interest to the skyline, particularly at important access road corners in the layout. Façade colours and materials also vary, resulting in a diverse and human-scale architectural environment.

5.6.2 Construction Phase

During the construction phase, site hoarding will be erected to restrict views of the site during construction. Hours of construction activity will also be restricted in accordance with local authority guidance.

5.6.3 Operational Phase

As noted above, despite the fact that the landscape architectural design proposals are integral to the scheme, for the purposes of this assessment, they are considered as mitigation strategies. The primary proposed ameliorative, remedial or reductive measures are as follows:

a) The architectural layout has addressed visual impact by proposing variety in scale and massing of buildings and by creating high quality buildings. The roofscape is varied with pitched roofs and features to add interest to the skyline. Façade colours and materials also vary, resulting in a diverse and human-scale architectural environment.
b) Planting of trees and shrubs to the proposed streetscapes, open spaces and boundary areas will create an attractive immediate visual environment and aid in the screening of the development and integration into the existing context.
c) Use of native trees, shrubs and wildflowers where possible, particularly in the boundary spaces will improve local biodiversity, in accordance with the All-Ireland Pollinator Plan and local county development plan policies. See Chapter 10 Biodiversity for further details.
d) It is proposed to protect and retain the existing hedgerows to the north and west of the development. It is noted that this is subject to detailed site investigation and setting out. If it is deemed necessary by a Landscape Architect or Arborist to remove the hedgerow, then it will be re-planted following construction, in accordance with Meath Co. Council policy, with the same species and density and will be managed sustainably going forward.
e) The proposed landscape spaces will respect and enhance the water courses on the site, adding to amenity and visual values and creating a sustainable landscape around the water elements, allowing for flooding to occur without damaging the landscape, housing or towns/settlements up-stream or down-stream. The existing and proposed flood mitigation measures, including bunds, banks, basins are integrated with the landscape proposals for the open spaces.

Mitigation measures are shown in the Landscape Design Statement by NMP Architecture / Masterplanning / Landscape Architecture and submitted under separate cover with the application. At time of planting, the proposed trees will be at least 3.5m in height with all plaza and street tree planting a minimum of 5m in height. The trees will reach a mature height of at least 10-12m within 10-15 years. Landscape tender drawings and specifications will be produced to ensure that the landscape work is implemented in accordance with best practice. This document will include tree work procedures, soil handling, planting and maintenance. The contract works will be supervised by a suitably qualified landscape architect and/or arboricultural consultant.

The planting works will be undertaken in the planting season after completion of the main civil engineering and building work.

5.7 Residual Impact

The residual impacts are the effects that the development is most likely to have on the receiving environment having regard to the remedial and reductive measures outlined in the previous section. It is anticipated that the proposed mitigation measures will substantially improve the landscape and visual quality of the proposed development over time, by increasing tree and vegetation cover, screening or softening the proposed buildings and creating new visual elements of high aesthetic and amenity value within the new development. However, some of the negative effects associated with limiting or restricting the depth of existing views across the relatively open landscape will remain, notwithstanding that the proposed planting will be a pleasant element in the view, rather than open views of buildings. Please see **Table 5.7** for a summary of all residual impacts.

5.7.1 Construction Phase

Predicted landscape impacts at construction stage are assessed to be as per the potential impacts (see section 5.5.2). In overall terms, the construction phase landscape impact will be a short-term, negative, moderate effect.

With regard to visual effects, the proposed hoarding will slightly improve the negative effect on visual impact as much construction traffic and activity on site will be screened, particularly in views from local roads and pedestrian areas. However, as the proposed development terrain will be higher than the hoarding, the predicted visual impacts will otherwise be as given in the potential impacts (See section 5.5.2). In overall terms, the construction phase visual impact will be a short-term, negative, moderate effect.

5.7.2 Operational Phase

To aid in the assessment of predicted impacts, a three-dimensional computer model and photomontages have been prepared by a specialist 3D computer visualisation company, G-Net 3D. The prepared photomontages give an accurate representation of the proposed development in its existing landscape context. Please see the Verified Photomontages report submitted under separate cover, which includes photomontages of the proposed development.

5.7.2.1 Residual Landscape Impact

Whilst there will be a moderate negative overall impact to the character of the site, changing from rural agricultural landscape, the most important features of the site, the water courses, are protected and enhanced in the design of the proposed development. There is a very significant area of open space proposed, approximately 10 hectares. The landscape impacts due to the proposed development would overall be slight and positive, particularly considering the overall cumulative effects of the aspirations of the LAP being built out over time. This is primarily due to the quantum and quality of open spaces proposed to surround the water courses on the site, the quality of the buildings and public realm, the cohesive land use and pattern that would result and the new open spaces, landscape features and distinctiveness introduced. The proposed planting would substantially increase the tree resource and quality in the area, as well as introducing new landscape features and spaces. The two proposed lattice masts in the south of the site adjacent to the Rye Water and open space will generate some localised negative impacts which are locally significant and impact on character.

In overall terms, the operational phase landscape impact will be a permanent, slight, positive effect.

5.7.2.2 Residual Visual Impact

The residual visual impacts are those that will persist following implementation and establishment of the proposed landscape measure. Despite the slight improvements to the landscape described above, the built elements in the views contrast with the existing rural landscape in the current views, resulting in generally negative visual impact, although this is ameliorated by the landscape proposals. The two proposed lattice masts in the south of the site adjacent to the Rye Water and open space will generate localised negative impact on views which are locally significant and generate negative impact which cannot be effectively screened. The following **Table 5.7** sets out the likely residual impacts.

The most significant residual visual impacts are likely to be from the existing dwellings which have direct views from their properties into the site and pre-date the Millerstown estate, i.e. viewpoints 01A, 05A and 07A, where existing views will be changed by the introduction of the proposed buildings into the landscape. Even with the extensive planting proposed as mitigation, some negative impacts remain, primarily associated with limiting the depth of views (bringing the horizon closer), as well as the change to the visual environment. The views from dwellings at 01A (off R125) are partially mitigated by existing garden and hedgerow vegetation to be retained, resulting in moderate negative impact in the long term. The main element of the view from 05A is the Rye Water River, which will be enhanced in the proposal, with additional vegetation and trees planted as part of the landscape proposals in the open space which is 80-130m wide. However, significant residual impact will remain for Receptor 05A because of the introduction of the lattice masts, which replaces an existing wooden poleset in the view. The dwelling represented by view 07A will experience significant negative residual impact due to the removal of the hedgerow and construction of housing within 160m to the west of the dwelling, which will form a new element in the view with a hard edge, likely to be concrete / timber fencing. The most sensitive views from the public realm are from the Royal Canal Way which is used by locals and tourists for recreation and the high level of sensitivity results in significant negative residual impact. The proposed planting in the open spaces adjacent to the Rye Water ameliorates the impacts somewhat, but there is a residual significant effect because the horizon to the north is brought considerably nearer and the view of housing (albeit somewhat screened by the proposed planting) is lower in quality than the existing views of the agricultural landscape.

In overall terms, the operational phase visual impact will be a permanent, negative, moderate effect.

5.8 Worst Case Scenario

The views selected for analysis are those from where the proposed development is most likely to be visible and so the analysis of impacts, above, represents a worst case scenario.

5.9 Difficulties Encountered

There were no specific difficulties encountered in compiling the information and completing this assessment.

5.10 Monitoring

5.10.1 Construction phase

The establishment of the landscape planting will be managed to ensure that any planting that fails is replaced and that the planting establishes and grows to maturity. These works will be commenced as soon as practical. Initially this will be the re-establishment of grassed areas and later larger plants and trees. This monitoring will continue into the operational phase as detailed in the following section.

5.10.2 Operational phase

Landscape maintenance will be of a very high standard, to the level currently visible in the earlier phases of development. This will consist of grass cutting, weed control, replacement planting, pruning, etc. All landscape works will be in an establishment phase for the initial three years from planting. The company responsible for site management of the scheme will be responsible for the ongoing maintenance of the site after this three-year period is complete. Part of these responsibilities will include monitoring to ensure that failed trees are replaces so the landscape proposals maintain the mitigation effects noted herein.

5.11 References and Sources

Kilcock Environs Local Area Plan 2009-2015 (Meath Co. Council)

Meath County Development Plan 2013-2019 (Meath Co. Council)

Kildare County Development Plan 2017-2023 (Kildare Co. Council)

Draft Kilcock Local Area Plan 2015-21 (Kildare Co. Council)

Guidelines for Landscape and Visual Impact Assessment 3rd Edition, by The Landscape Institute / Institute of Environmental Assessment, published by E&FN Spon (2013)

Advice notes on Current Practice in the Preparation of Environmental Impact Statements, published by the Environmental Protection Agency, published by the EPA (2003)
Draft *Advice Notes for preparing Environmental Impact Statements* (EPA. 2015)

Guidelines on the information to be contained in environmental impact statements, published by the EPA (2002)
Draft *EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (EPA, 2017)

Discovery Series Mapping Sheet nos. 49 & 50, published by Ordnance Survey Ireland

Various Ordnance Survey Maps, accessed on-line at www.geohive.ie, March to June 2019.

Note: The residual impact assessment takes into account relevant landscape & visual mitigation measures for construction and residual stages.						
Ref.	***Viewpoint / Photomontage View Reference***	***Level of Sensitivity***	***Magnitude of Change to View – Construction***	***Residual Construction Impact***	***Magnitude of Change to View – Operational/ Residual***	***Residual Operational Impact***
01	Junction of R125 and Moyglare Road.	Low	High	Moderate Negative Long Term	Medium	Slight Negative Long Term
01A	Dwellings located off R125	Medium	High	Significant Negative Long Term	Medium	Moderate Negative Long Term
02	County Bridge (protected structure) & adjacent dwellings	Imperceptible	Imperceptible	Imperceptible Neutral	Imperceptible	Imperceptible Neutral
03	R407 at Shaw Bridge (protected view)	Low	Imperceptible	Imperceptible Neutral	Imperceptible	Imperceptible Neutral
04	Branganstown south of canal and rail line.	Low	Medium	Slight Negative Long Term	Low	Not Significant Negative Long Term
05	R148 adjacent to the Royal Canal	Medium	High	Significant Negative Long Term	Medium	Moderate Negative Long Term
05A	Dwelling 'Rosdara' off R148	High	High	Very Significant Negative Long Term	Medium	Significant Negative Long Term
06	Chambers Bridge (protected view)	Imperceptible	Imperceptible	Imperceptible Neutral	Imperceptible	Imperceptible Neutral
07	Moyglare Road	Low	Medium	Slight Negative Long Term	Low	Not Significant Negative Long Term
07A	Dwelling located off Moyglare Road	High	High	Very Significant Negative Long Term	Medium	Significant Negative Long Term
08	Western entrance to Kilcock.	Imperceptible	Imperceptible	Imperceptible Neutral	Imperceptible	Imperceptible Neutral
09	R125 at distributor road junction.	Medium	High	Significant	Medium	Moderate

				Negative Long Term		Positive Long Term
10	R148 Footpaths / Royal Canal Way.	Medium	Medium	Moderate Negative Long Term	Low	Slight Negative Long Term
11	Open view north from Royal Canal Way adjacent to site.	High	High	Very Significant Negative Long Term	Medium	Significant Negative Long Term
12	Millerstown Estate (new dwellings)	Medium	Medium	Moderate Negative Long Term	Low	Slight Positive Long Term

TABLE 5-8 RESIDUAL VISUAL IMPACTS ASSESSMENT

CHAPTER 6
MATERIAL ASSETS: TRAFFIC AND TRANSPORT

DECEMBER 2019

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6 Traffic & Transport

6.1 Introduction

6.1.1 Overview

This chapter of the EIAR includes of an assessment of the likely impact on the existing transport environment as a result of the proposed 575 residential units comprising 388 no. houses and 187 no. apartments plus a 623m^2 neighbourhood focused creche facility.

In accordance with Article 5(3)(a) of the EU Directive, by appointing DBFL, the applicant has ensured that this chapter has been prepared by a "competent expert". This Chapter has been prepared by Mark McKenna BEng (Hons) MSc MIEI, who has over 7 years' experience in the transport engineering and construction industry.

6.1.2 Receiving Environment

Location

The proposed development site is located approximately 800m to the east of Kilcock Town Centre, north of the R148 Maynooth Road corridor. The subject scheme is proposed to be implemented on two individual plots (Northern and Southern sites) of land within the Meath County Local Area Plan Boundary as per the Kilcock LAP (2015-2021). The general location of the subject site in relation to the surrounding road network is illustrated in **Figure 6.1** below whilst **Figure 6.2** indicatively shows the full extent of the subject lands in the context of the urban environment.

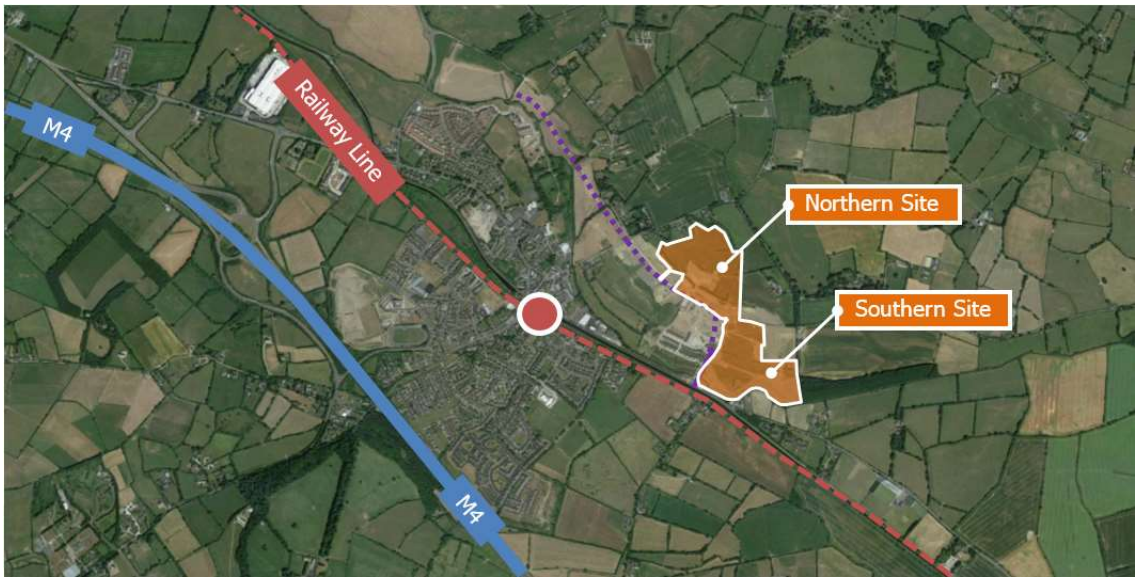

FIGURE 6-1 SITE LOCATION

FIGURE 6-2 INDICATIVE SITE BOUNDARY

Land Use

The subject lands are zoned "*A2 – 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*" within the Meath County Development Plan 2013-2019.

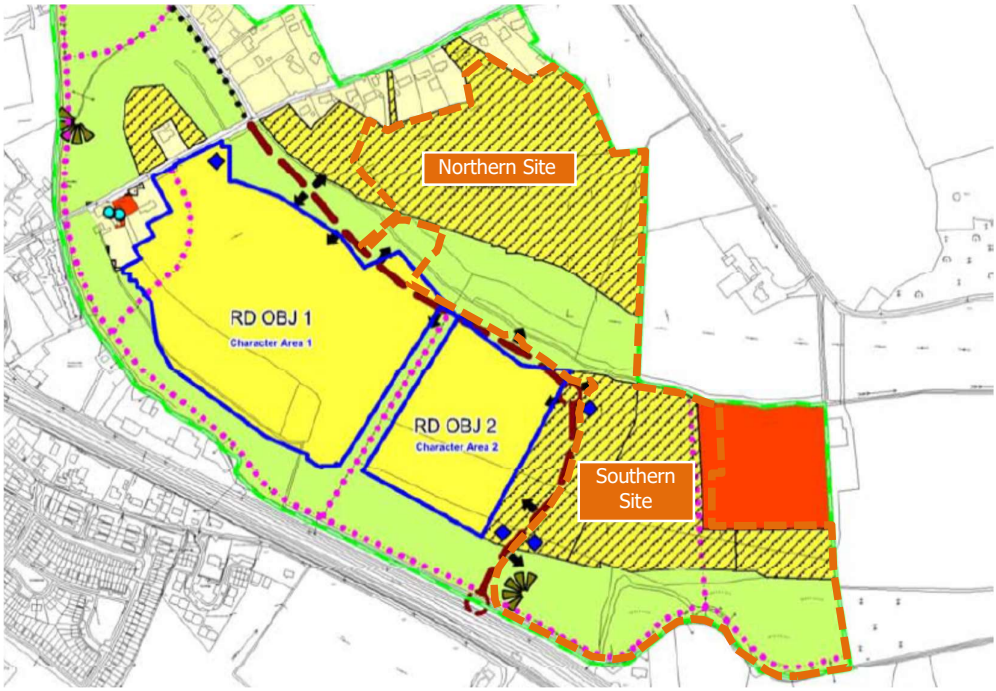

FIGURE 6-3 LAND USE ZONING OBJECTIVES (SOURCE: MAP 1 KILCOCK LAP 2015-2021)

The surrounding area to the west and south of the subject southern and northern development sites comprise the emerging 152 unit residential development on the Character Area 2 lands (as designated within the Kilcock LAP 2015-2021) of which 33 no. units are currently occupied (Pl.

Ref. RA171230 / 150205) and the permitted 187 unit residential development on the Character Area 1 lands (Pl. Ref. 161443).

Road Network

The proposed northern site is located to the north of the emerging Distributor Road corridor whilst the southern site is located to the east of this emerging road infrastructure.

Currently the initial 160m of the emerging Distributor Road has been completed from the recently constructed roundabout on the R148 Maynooth Road to just north of the existing access to the partially constructed (33 units out of a total 152 units currently occupied) Character Area 2 development.

Travelling southeast on the R148, from the recently constructed roundabout, leads to Maynooth located approximately 5km to the east. Travelling northwest on the R148 for approximately 800m leads to Kilcock Town Centre and the R125 / R148 signal controlled junction. Travelling southwest on the R125, this corridor terminates at the R407 which subsequently provides access to the M4 strategic road network to the west and destinations to the south including Clane, Naas and the strategic M7 road network.

Travelling north on the R125 provides access to Dunboyne (15km via Moyglare Road), Dunshaughlin (19km) and the strategic M3 road network.

Existing Pedestrian and Cycling Facilities

The R148 Maynooth Road (**Figure 6.4**) is subject to a speed limit of 50kph. It benefits from recently upgraded pedestrian and cycle infrastructure including a good quality footway along the northern side of the corridor between the new R148 roundabout junction and Kilcock Town Centre. A shared cycle / pedestrian facility, which forms part of the Royal Canal Greenway, is available to the south of the Road corridor along the Royal Canal bank.

FIGURE 6-4 EXISTING PEDESTRIAN & CYCLE FACILITIES ON THE R148 MAYNOOTH ROAD

Along the R125 road corridor (**Figure 6.5**), pedestrians can benefit from the provision of a footway along the western side of the corridor between the Town Centre and the upgraded R145 /

Distributor Road junction which benefits from pedestrian footways on both sides of the road in the immediate facility of the emerging upgraded junction. In addition, there is a southbound raised cycle lane in place over a distance of approximately 50m after which cyclists share the carriageway with vehicular traffic on approach to Kilcock Town Centre.

FIGURE 6-5 EXISTING PEDESTRIAN & CYCLE FACILITIES ON THE R125 ROAD CORRIDOR

Public Transport - Bus

Kilcock is located on the 'Longford - Mullingar – Dublin' Bus Eireann service (Route 115) which connects the town to areas such as Longford, Edgeworthstown, Mullingar, Kinnegad, Enfield, Maynooth, Leixlip and various parts of Dublin. The nearest bus stop is located on Harbour Street which is located approximately 800m from the subject site. This service links Kilcock to Maynooth and Dublin with 33 services from the city centre and 32 services from Kilcock every weekday as presented in **Table 6.1** below. The journey time is approximately 30 minutes from Kilcock to Dublin (Heuston).

Direction	Mon-Fri	Sat	Sun
Dublin to Kilcock	33	32	18
Kilcock to Dublin	32	31	16

TABLE 6.1 BUS EIREANN ROUTE 115 (NO. OF SERVICES)

Public Transport - Rail

Kilcock is located on the 'Dublin – Sligo' rail line, with services running daily, connecting Kilcock to areas such as Longford, Mullingar, Maynooth, Leixlip, Castleknock and various destinations in Dublin City. Kilcock station is fully accessible and benefits from car-parking facilities. The subject development site is located approximately 1.2km from Kilcock Train Station. **Table 6.2** provides a summary of the number of rail services available at Kilcock on each day of the week.

Direction	Mon-Fri	Sat	Sun
Dublin to Sligo / Longford	11	7	6
Sligo / Longford to Dublin	10	7	6

TABLE 6.2 RAIL SERVICES AVAILABLE AT KILCOCK TRAIN STATION (NUMBER OF SERVICES)

6.2 Proposed Development

6.2.1 Overview

The proposed development is for the provision of a 575 unit residential development over 2 no. groups of units. The Southern site comprises a total of 266 residential units including 147 no. houses and 119 apartments / duplex apartments. The Northern site comprises a total of 309 residential units including 241 no. houses and 68 no. apartments / duplex apartments. A 623m^2 creche facility is also proposed within the Southern site which is predicted to accommodate 18 staff and 119 children. Refer to Chapter 2 (Description of Development) for a detailed site and development description.

6.2.2 Site Access

Both the southern and northern development lands will be accessed off the emerging Distributor Road corridor. The southern development lands will be accessible via a new **roundabout junction** and **priority controlled junction** with the emerging Distributor Road. The northern development lands will be accessible via 2 no. **priority controlled junctions** with the Distributor Road as presented in **Figure 6.6** (which also shows the connectivity locations into the neighbouring housing developments located to the south and west of the Distributor Road and shown in blue).

The subject development will be highly accessible to both pedestrians and cyclists via a range of convenient connection points including all of the aforementioned vehicle access locations. Furthermore, the permitted Distributor Road scheme will, once complete, provide dedicated segregated pedestrian / cycle facilities on both sides of the road. Internally, dedicated pedestrian footways will be provided on all streets which will connect with the existing / future pedestrian facilities on the external network thereby facilitating excellent pedestrian connectivity.

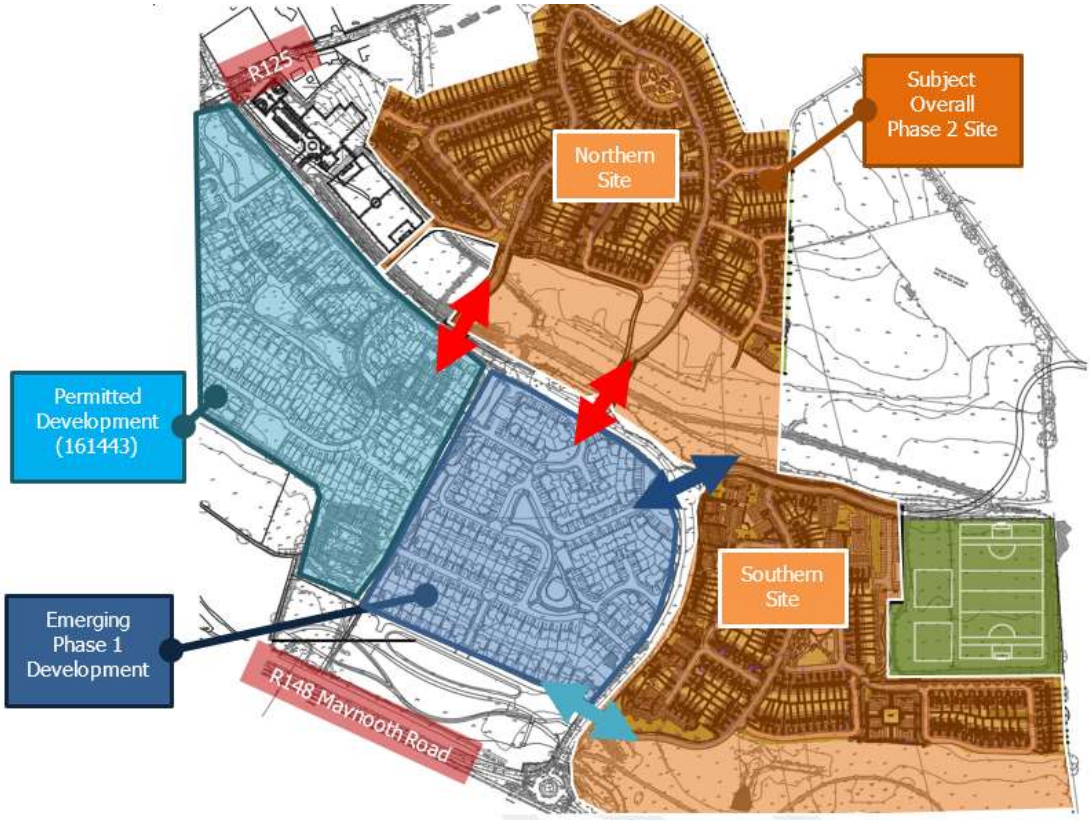

FIGURE 6-6 PROPOSED DEVELOPMENT SITE ACCESS LOCATIONS

Map 1 of the Kilcock LAP 2015-2021 indicatively illustrates future pedestrian walkway proposals in the vicinity of the subject site, which, once complete would provide convenient pedestrian / cycle access to the Maynooth Road corridor and the Royal Canal Greenway and subsequently result in shorter walking / cycling distances between the subject development lands and Kilcock Town Centre, Public Transport interchange locations (bus and train) and the Royal Canal Greenway facility.

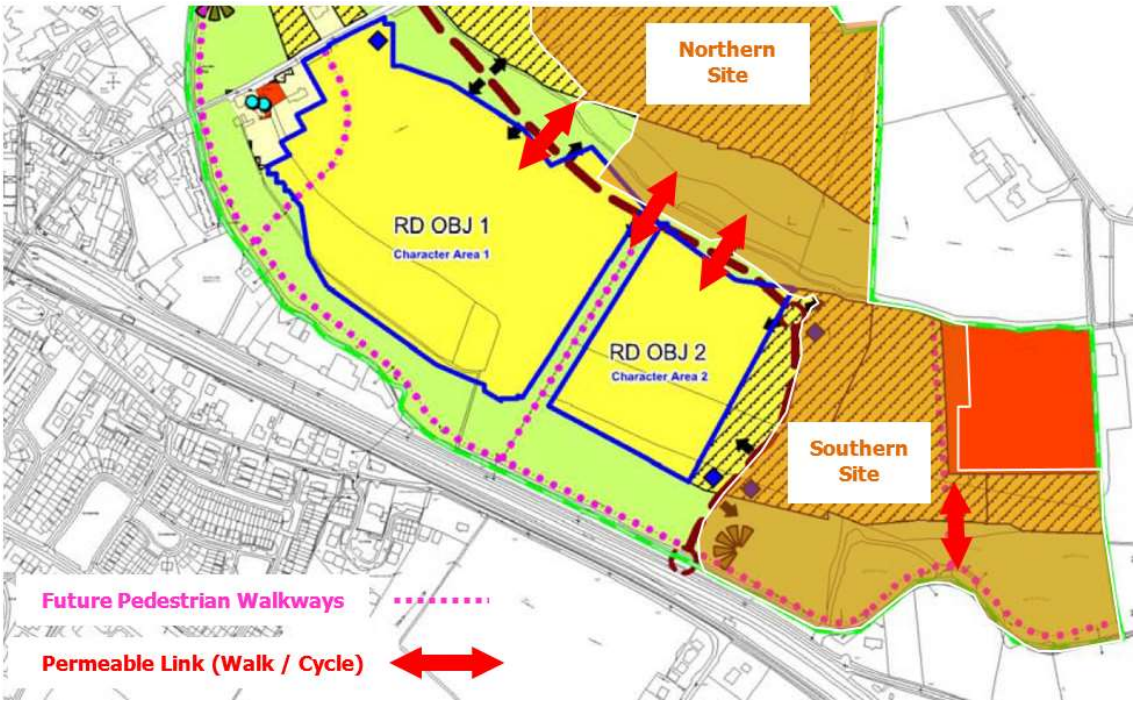

FIGURE 6-7 FUTURE KILCOCK LAP 2015-2021 PROPOSED PEDESTRIAN WALKWAYS

6.2.3 Parking

Car Parking

The development proposals include the provision of 1019 dedicated car parking spaces on-site comprising 561 no. within the Northern site and 458 no. within the Southern (including 40 no. GAA changing room car parking spaces) site as summarised in **Table 6.3** below.

The subject scheme proposes the following dedicated car parking provision ratio's per residential unit type;

- 2 spaces per 3+ bed house,
- 1 space per 2 bed house,
- 1 space per apartment unit, and
- 1 space per duplex apartment unit.

The proposed car parking provision for the three and four bedroom houses is fully compliant with the Meath County Council (MCC) development management standards (i.e. 2 spaces per unit).

The scheme proposals include for 1 space per 2 bedroom house which is lower than the permitted development plan. Furthermore, apartment and duplex car parking provision is proposed at a rate of 1 per unit which is lower than the development plan requirement. Accordingly, a management regime will be implemented by the development's management company to control access to

these on-site apartment car parking bays thereby actively managing the availability of on-site car parking for residents / visitors.

Description	Northern Site	Southern Site	Total
Houses	460	273	**733**
Apartments	14 resident / 2 visitor	52 resident / 6 visitor	**74**
Duplex	42 resident / 28 visitor	-	**70**
Corner Blocks	12 resident / 3 visitor	67 resident / 6 visitor	**88**
Creche	-	14	**14**
GAA Club	-	40	**40**
Total	**561**	**458**	**1,019**

TABLE 6.3 PROPOSED CAR PARKING PROVISION

The residents within one of the proposed residential apartments will NOT include the ownership of a designated parking space. Nevertheless, all residents of the proposed residential apartment scheme will have the opportunity to apply to the management company for both (i) a residents car parking permit (updated annually or upon return of same permit) to the management company to gain access to a dedicated (assigned) on-site car parking space or (ii) a visitor's car parking permit (which will be issued electronically and subject to time restrictions). A nominal charge will be applied to obtain a permit with the objective of covering the associated management and enforcement costs.

Each permit will enable the resident (or visitor) to park a vehicle within a specific assigned parking bay for a defined period of time. This management regime will enhance the availability of on-site car parking, ensuring that every resident who needs car parking can avail of an on-site car parking space whilst residents that actually don't own a car are not unnecessarily assigned a car parking space.

Notwithstanding the above car parking management regime, whilst the proposed car par parking provision to be assigned to the apartment units (and 2 bed houses) is slightly lower than the allowable development plan requirement, this is considered appropriate due to;

i. the subject scheme proposals include for a high provision of cycle parking at the apartment units which is significantly higher than the development management standards;

ii. the convenient location of the Royal Canal Greenway facility to the south of the subject site (particularly accessible from the southern site);

iii. the proximity of the subject development site to Kilcock Train Station (approx. 1.2km);

iv. the Department of Housing, Planning and Local Government (DHPLG) publication *"Sustainable Urban Housing: Design Standards for New Apartments"* requires only 1 car parking space per unit plus 1 visitor space per 3-4 units (it is assumed that a 2 bed house would have a similar car parking demand to that of an apartment), and

v. a review of the Census (Sapmap) 2016 data has been undertaken for 4 no. small areas with similar characteristics to the subject development site. The analysis revealed that, on average, there is a car parking availability of 0.86 per residential unit. **Table 6.4** below presents a summary of the car availability data at the adopted Census 2016 small areas.

Small Area	Ratio
Sa2017_087047018	0.87
Sa2017_087047016	0.90
Sa2017_087047010	0.71
Sa2017_087047017	0.96
Average	**0.86**

TABLE 6.4 SUMMARY OF CENSUS 2016 CAR AVAILABILITY

Accordingly, based on a cumulation of the above reasons, the opportunity exists to provide car parking at a rate slightly lower than the recommended development management standards.

The subject proposals promote the provision of 14 no. neighbourhood focused creche car parking spaces comprising 8 no. staff spaces and 6 no. drop of spaces. Whilst this proposed provision is less than the development plan maximum requirements (18 staff and 24 set down), the proposed creche facility is expected to primarily cater for the subject Phase 2 development as the approved / emerging adjoining residential developments (Pl. Ref. RA 171230 / RA 150205 / PL17.246141 and Pl. Ref. RA161443) incorporate a creche facility as part of their proposals. Accordingly, the vast majority of trips to / from the proposed creche facility will be walking trips from within the proposed development.

In addition to the aforementioned dedicated car parking provision, a total of 45 no. visitor car parking spaces are proposed comprising 33 no. in the Northern Site and the remaining 12 in the Southern Site.

Furthermore, the proposals for the allocation of 40 no. car parking spaces at the playing pitches located to the east of the southern site boundary.

Mobility Impaired Parking Provision

The subject scheme is required to provide 2 no. mobility impaired car parking spaces per 100 car parking spaces. It is assumed that housing units can accommodate mobility impaired parking in curtilage. Accordingly, dedicated mobility impaired car parking is provided for the apartment / duplex units and the creche only. Applying the development plan requirement to the subject apartment / duplex units necessitates the provision of 2 no. dedicated mobility impaired car parking spaces in both the northern and southern development sites. Additionally, 1 no. dedicated mobility impaired car parking space is required at the proposed creche facility.

The subject proposals include for the provision of 4 no. dedicated mobility impaired apartment / duplex car parking spaces in the northern site and 6 no. in the southern site comprising 5 apartment spaces and 1 no. creche space.

Cycle Parking Provision

The proposals include the provision of a total 314 cycle parking spaces including 242 no. residential, 40 no. crèche and 32 no. GAA club cycle parking spaces on-site. The 242 no. residential cycle parking spaces comprise 163 long stay parking spaces and 97 short stay parking spaces. Residents of residential housing units can accommodate long and short stay bicycle parking in-curtilage. It is expected that duplex units can accommodate long stay cycle parking in-curtilage however 24 no. dedicated short stay cycle parking spaces have been provided. A summary of the cycle parking provision is presented in **Table 6.4** below.

The provision of 242 no. residential cycle parking spaces is significantly higher than the development plan minimum requirement of 101 no. spaces and represents a good compromise between the development plan and generous DHPLG requirements (416).

A total of 40 no. cycle parking spaces are proposed to be provided at the creche facility comprising 18 no. long stay (1 per staff) and 22 no. short stay spaces (approximately 1 in 5 children). The proposed overall provision of 40 no. creche cycle parking spaces is 26 no. spaces higher than the minimum development plan requirement.

Description	Northern Site		Southern Site		Total	
	Long Stay	Short Stay	Long Stay	Short Stay	Long Stay	Short Stay
Houses	-	-	-	-	-	-
Apartments	14	7	52	26	66	33
Duplex	-	24	-	-	-	24
Corner Blocks	12	6	67	34	79	40
Creche	-	-	18	22	18	22
GAA Club	-	-	-	32	-	32
Sub-Total	**26**	**37**	**137**	**114**	**163**	**151**
Total	**63**		**251**		**314**	

TABLE 6.5 PROPOSED CYCLE PARKING PROVISION

6.2.4 Design Approach

Internal Roads Layout

The proposed development is consistent with both the principles and guidance outlined within the Design Manual for Urban Roads and Streets (DMURS) 2013 (Updated May 2019). The scheme proposals are the outcome of an integrated design approach that incorporates traditional road design along with elements of urban design and landscaping to create lower traffic speeds and thereby facilitate a safer road environment for pedestrians and cyclists. The proposed layout provides for a package of self-regulating design measures including: -

- Horizontal deflections through 'tight' corner radii
- Vertical deflections through the inclusion of raise tables
- Narrow residential streets and a meandering alignment to actively influence (reduce) vehicle speeds.

Development Phasing

The southern development site is proposed to be constructed first with the initial 100 housing units within the southern site assumed to be built and occupied by the end of the adopted 2021 Opening Year. The remaining units of the southern site and the full northern development site is assumed to be complete and occupied by the 2026 Future Design Year.

Construction Activities

Construction activities will adhere to both the Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 3013) and Safety, Health and Welfare at Work (General Application) (Amendment) Regulations 2016 (S.I No. 36 of 2016).

6.3 Methodology

Our approach to the study accords with policy and guidance both at a national and local level. Accordingly, the adopted methodology responds to best practices, current and emerging guidance,

exemplified by a series of publications, all of which advocate this method of analysis. Key publications consulted include;

- 'Traffic and Transport Assessment Guidelines' (May 2014) Transport Infrastructure Ireland (TII)
- 'Traffic Management Guidelines' Dublin Transportation Office & Department of the Environment and Local Government (May 2003)
- 'Guidelines for Traffic Impact Assessments' The Institution of Highways and Transportation
- Kilcock Local Area Plan 2015-2021
- Kildare County Council Development Plan 2017-2023
- Meath County Development Plan 2013-2019

Our methodology incorporated a number of key inter-related stages, including;

- **Site Audit**: A site audit was undertaken to quantify existing road network issues and identify local infrastructure characteristics, in addition to establishing the level of accessibility to the site in terms of walking, cycling and public transport. An inventory of the local road network was also developed during this stage of the assessment.
- **Traffic Counts**: Junction turning counts were commissioned and the results analysed with the objective of establishing local traffic characteristics in the immediate area of the proposed residential development.
- **Trip Generation**: A trip generation exercise has been carried out to establish the potential level of vehicle trips generated by both third party committed development and the proposed residential development.
- **Trip Distribution**: Based upon the 2021, 2026 and 2036 transport network provision and associated junction layout / control characteristics, in addition to the spatial / land use configuration of the urban environment across the catchment area of the development site, a distribution exercise has been undertaken to assign both committed development and the applicant's proposed development's site generated vehicle trips across the local road network in each of the three future design year scenarios.
- **Network Impact**: Ascertain the specific level of influence generated by the proposed development upon the local road network and subsequently identify which junctions need to be assessed in greater detail in accordance with the appropriate TII guidelines.
- **Network Assessment**: Drawing upon the findings of the previous stages, an operational assessment of the local road network has been undertaken to evaluate the performance of key local junctions following the implementation and occupation of the proposed development.

6.4 Baseline Scenario

The 'Baseline' scenario incorporates the existing traffic characteristics growthed accordingly for each of the adopted design years.

Both AM and PM peak period weekday traffic counts (classified junction turning counts) were conducted over a 6-hour period from 07:00 - 10:00 and again from 16:00 - 19:00 on Wednesday

14th March 2019. The surveys, undertaken by IDASO Ltd., established that the local networks AM and PM peak hours occur between 08:15 – 09:15 and 17:45 - 18:45, respectively.

In order to analyse and assess the impact of the potential future development upon the local road network, a traffic model of the following junctions was created (**Figure 6.8**);

Junction 1 – Harbour St / Bridge St / School St Junction,

Junction 2 – Harbour St / New Rd Junction,

Junction 3 – Distributor Rd / Maynooth Rd Junction,

Junction 4 – Distributor Rd / Moyglare Rd / Dunshaughlin Rd Junction,

Junction 5 – School St / New Lane Junction, and

Junction 6 – New Lane / The Square Junction.

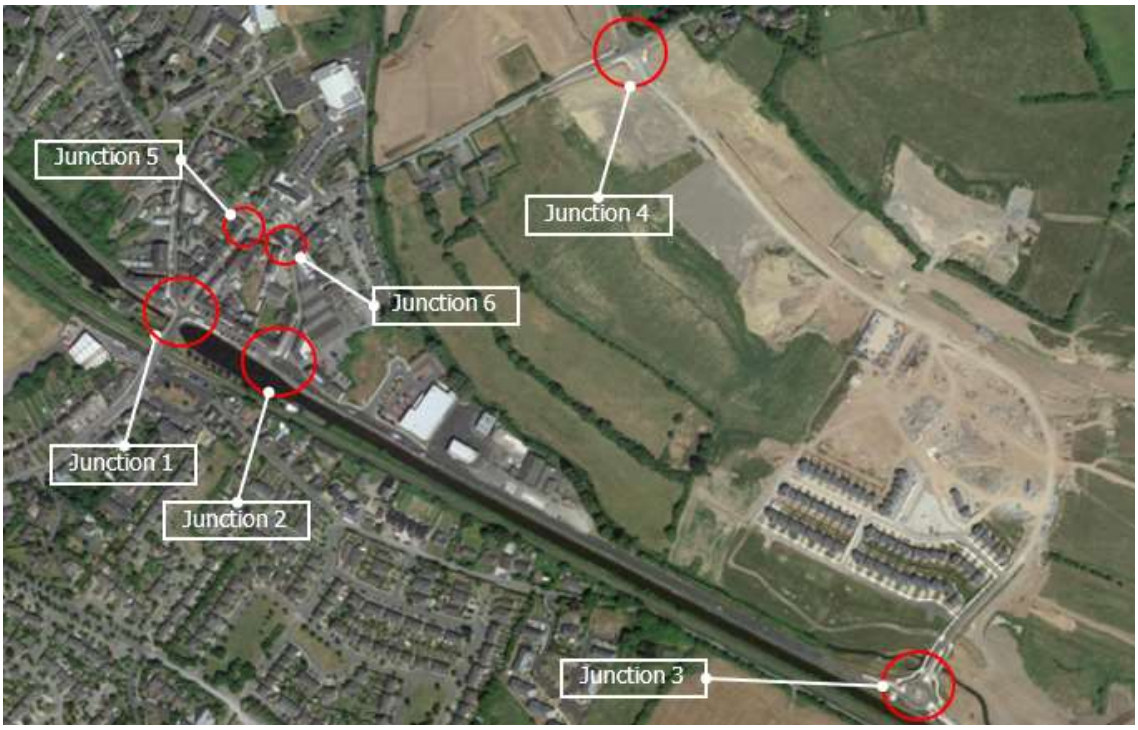

FIGURE 6-8 JUNCTIONS INCLUDED WITHIN THE TRAFFIC MODEL

This appraisal adopts an Opening Year of 2021. In accordance with TII Guidance, Future Design years (+5 and +15 years) of 2026 and 2036 have therefore been adopted. We note that this TII defined 15-year future year projection is significantly larger when compared to international best practice.

The TII Project Appraisal Guidelines (PAG) have been utilised to determine the traffic growth forecast rates. The traffic growth forecast rates within the PAG ensures local and regional variations and demographic patterns are accounted for.

Table 6.2 within the PAG provides Annual National Traffic Growth Factors for the different regions within Ireland. The subject site in Kilcock lies within 'Meath' with the growth factors as outlined within **Table 6.6** below.

Name	Low Sensitivity Growth				Central Growth				High sensitivity Growth			
	2016-2030		2030-2040		2016-2030		2030-2040		2016-2030		2030-2040	
	LV	HV	LV	HV	LV	HV	LV	HV	LV	HV	LV	HV
Meath	1.0156	1.0349	1.0052	1.0164	1.0173	1.0365	1.0070	1.0174	1.0205	1.0400	1.0108	1.0226

TABLE 6.6 LINK-BASED GROWTH RATES: ANNUAL GROWTH FACTORS (SOURCE: PAG)

In order to provide a robust assessment DBFL have assumed 'Central Growth' rates for the adopted Opening Year of 2021 and Future Design Years of 2026 & 2036. As such, applying the annual factors as outlined in **Table 6.6** above, the following growth rates were adopted to establish corresponding 2021, 2026 and 2036 baseline network flows:-

- 2019 to 2021 – 1.035 (or 3.49%);
- 2019 to 2026 – 1.128 (or 12.8%); and
- 2019 to 2036 – 1.247 (or 24.7%).

6.5 Difficulties Encountered

There were no material difficulties encountered in compiling and assessing the data for this EIAR sufficient to prevent modelling of the likely transportation effects of the proposed development.

6.6 Impact Assessment

6.6.1 Do Nothing Scenario

The 'Do Nothing' scenario incorporates the impact of committed developments on the surrounding road network before the introduction of the subject development proposals and the implementation of the emerging distributor road and subsequent redistribution of base traffic.

Committed Development

Following a review of MCC / Kildare County Council (KCC) on-line planning portal DBFL have established the existing third-party sites, as located within the area of influence of the subject development site, which currently benefit from a valid planning permission but have yet to be constructed and / or occupied. DBFL have subsequently included the following third-party developments proposals (as indicated in **Figure 6.9**) as 'committed development' within the subject developments network assessment.

Site 1 - Residential Development (Pl. Ref. RA 171230 / RA 150205 / PL17.246141)

Planning permission was granted for 152 residential units in June 2016 (Pl. Ref. RA 150205 / PL17.246141). Subsequently, a change of unit types for 2 no. sites was approved in January 2018 (Pl. Ref. RA 171230).

The site for this committed residential development is known as 'Character Area 2' within the Kilcock Local Area Plan (LAP). The development is currently under construction and at the time the traffic surveys were undertaken (March 2019), 33 no. residential houses where occupied.

In order to determine the level of traffic generated from this permitted development reference was made to the original planning application (Ref. RA 150205) which included a Traffic and Transport Assessment (TTA) containing the predicted vehicle trips that could be generated by this predicted development. The existing vehicle flows from the 33 no. currently occupied units has been recorded in the traffic surveys and therefore have been subtracted from the predicted vehicle trip generation as summarised in **Table 6.7** below.

As this development is partially completed, in order to provide a robust worse case assessment DBFL have assumed that all of the proposed 152 residential units will be occupied by the subject residential developments 2021 Opening Year.

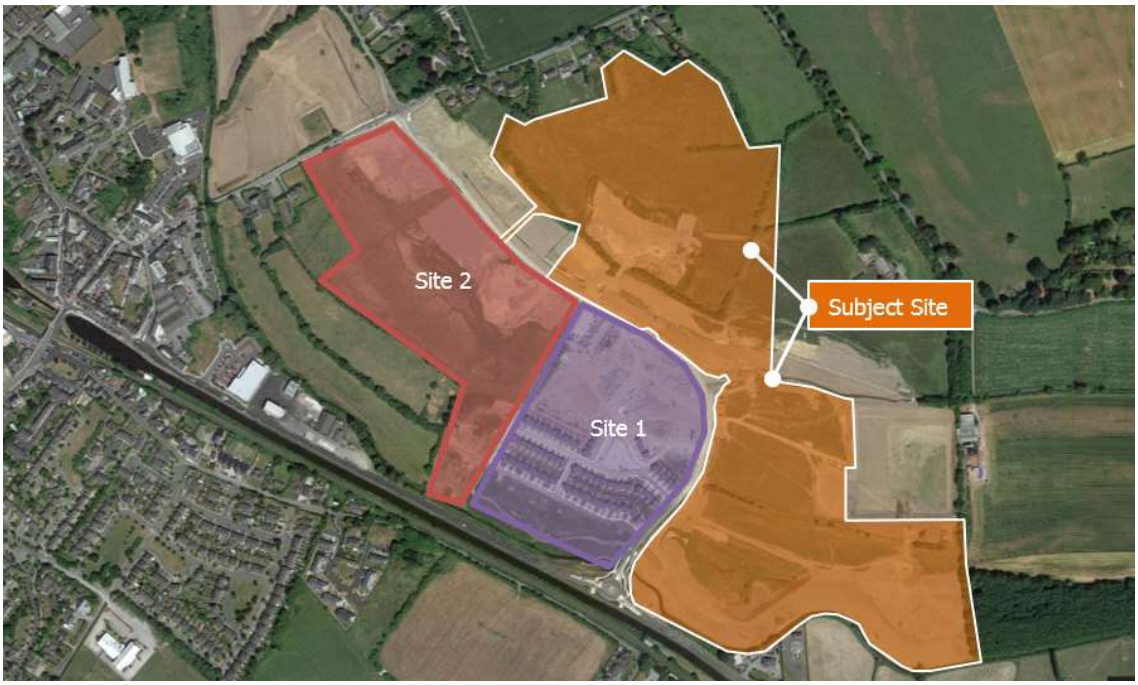

FIGURE 6-9 EXISTING THIRD PARTY COMMITTED DEVELOPMENTS

Land Use	AM Peak Hour		PM Peak Hour	
	Arrive	Depart	Arrive	Depart
Trip Generation	20	44	50	33

TABLE 6.7 COMMITTED DEVELOPMENT SITE 1 PEAK HOUR VEHICLE TRIP GENERATION

Site 2 - Residential Development (Pl. Ref. RA161443)

Planning permission was granted for 187 residential units comprising 150 houses and 37 apartments in December 2017. The site for the proposed residential development is located adjacent to the aforementioned permitted development and is known as Character Area 1 within the Kilcock LAP.

In order to determine the level of traffic generated from the permitted development, reference was made to the original planning application (Ref. RA161443). The TTA submitted with this application estimated traffic generation for the residential units as presented in **Table 6.8**.

Land Use	AM Peak Hour		PM Peak Hour	
	Arrive	Depart	Arrive	Depart
Trip Generation	24	54	62	41

TABLE 6.8 COMMITTED DEVELOPMENT VEHICLE TRIP GENERATION

As this development has yet to be constructed, in order to provide a robust assessment, DBFL have assumed that all of the proposed 187 residential units will be occupied by the subject residential developments 2021 Opening Year.

Emerging Distributor Road

A number of road objectives are proposed within the Kilcock Local Area Plan (LAP) 2015-2021 as presented in **Figure 6.10** below.

In addition to the Distributor Road proposals through the subject masterplan lands, as discussed in greater detail in the following paragraphs, further road proposals within the LAP include the extension of the aforementioned distributor road to the R148 / R158 roundabout thereby providing a complete route between the Maynooth Road in the east and the M4 motorway in the west which avoids Kilcock Town Centre.

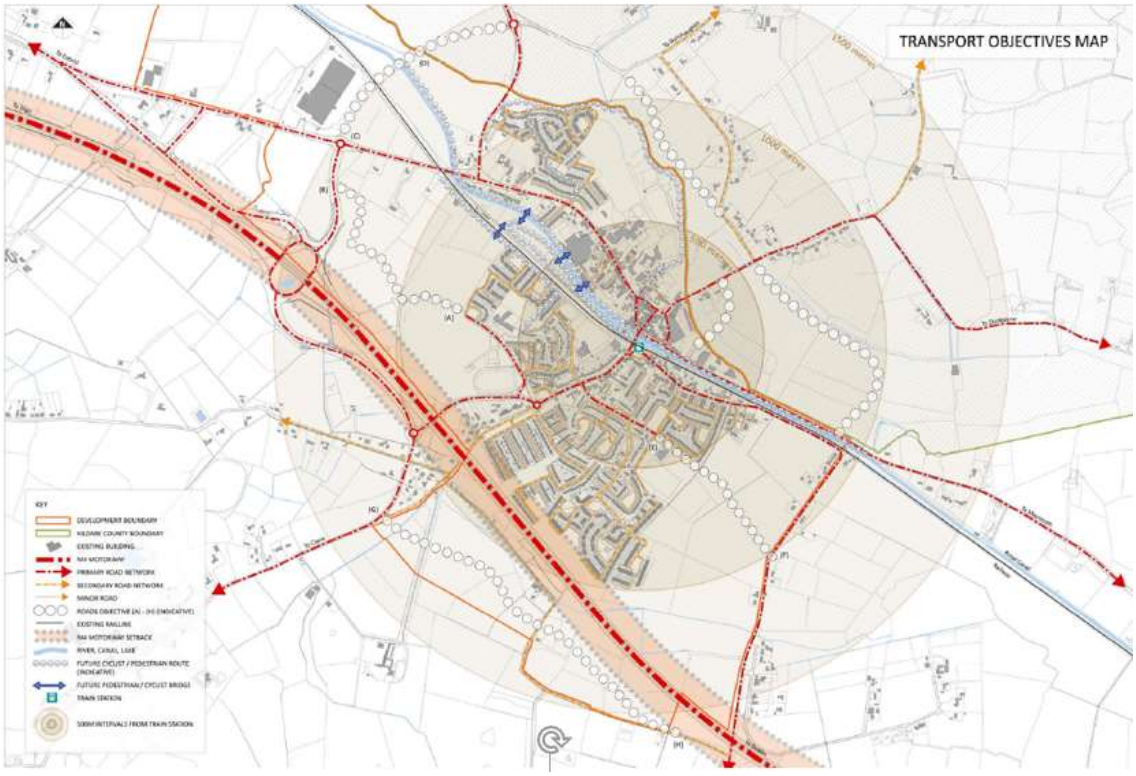

FIGURE 6-10 TRANSPORT OBJECTIVES MAP (KILCOCK LAP 2015-2021)

The section of the Distributor Road which runs through the Masterplan Lands, (and approved by An Bord Pleanala under PL17.239375, PL17.238370 and PL09.238818) is approximately 0.86km in length and will consist of a 7.3m wide carriageway, with a 1.5m wide verge, 1.5m cycle track and a 2.0 m wide footpath on each side of the road. This road will run in a north-west direction from a new roundabout on the R148, Maynooth Road. The road will form approximately 32% of

the overall distributor road identified in the Kilcock LAP (approximately 2.7 km in length) and will stretch from the R148 Maynooth Road to the R125 Dunshaughlin Road. We note that all other sections of the distributor road outside the subject masterplan lands between the R148 and R158 have been granted planning permission by An Bord Pleanla. Works on the approved sections of Distributor Road within the overall Masterplan lands have commenced.

The approved Kilcock LAP Distributor Road (to be completed by others) will connect to the existing road network at five locations as described below and illustrated in **Figure 6.11**.

A. The first is the recently constructed 3-arm **roundabout junction** with the R148 Maynooth Road to the southeast of the town centre;

B. The second is the recently upgraded 4-arm **signalised junction** with the existing R125 Dolanstown / Newtownmoyaghy junction;

C. The third is the approved **priority junction** with the R125 Dolanstown at the location of the existing bend in the road approximately 250m north west of Newtownmoyaghy;

D. The fourth junction is the **priority junction** with the existing county road linking the R158 and R125, at the location of the ninety degree bend in the road;

E. Finally, the tie-in to the existing R158 / county road **roundabout junction**.

As part of the subject assessment, whilst the recently constructed Junctions A (Maynooth Road roundabout) and Junction B (R125 Dunshaughlin Road Signal-controlled junction) are operational, it has been assumed that a through route will not be complete between these two junctions at this time. By the 2026 Future Design Year, it has been assumed that the entire section of Distributor Road between the R148 Maynooth Road and the R125 will be complete whilst the remaining sections of Distributor Road will be complete by the 2036 Future Design Year.

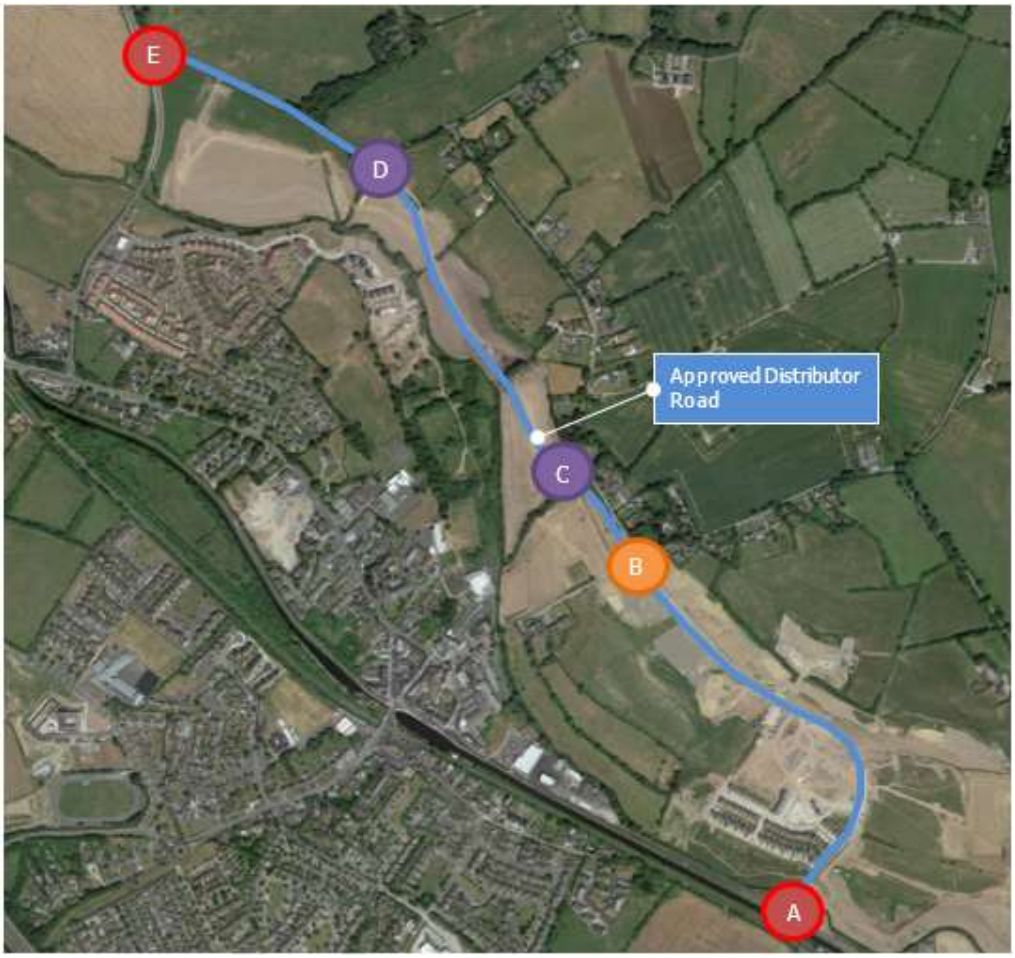

FIGURE 6-11 APPROVED DISTRIBUTOR ROAD / EXISTING ROAD JUNCTIONS

New Road / Harbour Street Junction Upgrade

As part of the emerging permitted development, the existing New Road / Harbour Street junction is proposed to be upgraded from the current priority controlled junction arrangement to a signal controlled junction arrangement. The proposals will also facilitate two-way traffic along New Road between Harbour Street and the R125 Dunshaughlin Road. In summary, the following enhancements (which do not form part of the subject planning application) are proposed at this junction;

- New signal controls at New Road / Harbour Street including pedestrian crossings on the New Road and Harbour Street (E) arms,
- Introduction of a northbound lane along New Road (currently one-way),
- Right turn pocket on Harbour Street for traffic travelling north on New Road, and
- Two-lane approach to Harbour Street / Shaw bridge signalised junction on Harbour Street arm.

For the purposes of this assessment, it has been assumed that this proposed junction upgrade will be operational sometime before the subject development's adopted 2021 Opening Year.

Base Traffic Redistribution

For the purposes of this assessment, it has been assumed that, in the 2021 Opening Year scenario, the section of Distributor Road between the existing Maynooth Road roundabout and the future roundabout junction providing access to the subject southern site and the section between the committed "Character Area 1" development access and the Dunboyne / Dunshaughlin Road upgraded (but not yet operational, i.e. currently operating as a priority controlled junction) signal controlled junction will be constructed. Accordingly, it has been assumed that there will be no through road in place resulting in no redistribution of base traffic in the 2021 Opening Year.

By the adopted 2026 Future Design Year, the complete section of the permitted Distributor Road between the R148 Maynooth Road and the R125 Dunboyne / Dunshaughlin Road will be complete and operational. Accordingly, a proportion of the base (growthed) traffic flows as recorded in the 2019 traffic surveys will reassign onto this new piece of road infrastructure thereby reducing the potential future traffic flow through Kilcock Town Centre. By the 2036 Future Design Year, the full length of Distributor Road between the R148 Maynooth Road and the R158 roundabout is assumed to be complete and therefore an additional redistribution exercise has been undertaken to reflect the potential diverted traffic currently travelling between the R158 and Maynooth onto the future Distributor Road.

The permitted Kilcock LAP Character Area sites TTA's incorporated a vehicle registration survey which was carried out between 08:00 - 10:00 and 16:30 -18:30. This survey involved recording all vehicle registration plates at the following locations:

- R158 / Church Street;
- County Meath Bridge (R125); and
- Harbour Road / New Road.

The information contained in this survey was used to determine (i) The percentage of vehicles that travel from the R125 / R158 and exit left onto Harbour Street at New Road in the morning peak and (ii) the percentage of vehicles that travel along Harbour Street at New Road and use the R158 / R125 in the evening peak.

The results of the surveys indicated that some 3.1% of the traffic travelling south along the R158 and 35.58% of the traffic travelling south along the R125 is likely to divert east along the proposed distributor road to exit at the new roundabout on R148 Maynooth Road, thus avoiding Kilcock Town Centre. 20.62% of the traffic travelling west along R148 Maynooth Road is likely to divert north along the new distributor road to avoid Kilcock Town Centre, with 5.35% exiting at the R125 and 15.27% at the R158.

We consider that the above figures should still be representative of the traffic likely to be diverted from the Town Centre and its environs onto the proposed new Distributor Road, when completed, and therefore, the same redistribution proportions have been incorporated into the subject assessment.

Do Nothing Network Analysis

The operational assessment of the local road network has been undertaken using the Transport Research Laboratory (TRL) computer packages TRANSYT for signal-controlled junctions and Junctions 9.0 (ARCADY) for roundabout controlled junctions.

In order to analyse and assess the impact of the existing network traffic and committed development traffic on the surrounding road network, a traffic model of the junctions was created and analysed for the schemes following Opening and Future Design Years:

- 2021 Opening Year

- 2026 Future Design Year (Opening Year +5 years)
- 2036 Future Design Year (Opening Year +15 years)

As introduced previously, the following key junctions have been considered for further analysis: -

- Junction 1: R148 Harbour St / R125 Bridge St Signal Controlled Junction
- Junction 2: R148 Harbour St / New Lane Junction
- Junction 3: R148 Maynooth Rd / Distributor Road Roundabout
- Junction 4: Distributor Road / R125 / Moyglare Rd Junction

Junction 1 And 2: R148 Harbour St / Shaw Bridge / New Road Junction

Junctions 1 and 2 have been modelled as one junction due the close proximity of both junctions to one another. As introduced previously, there are future proposals to upgrade the existing New Road / Harbour Street priority controlled junction to a signal controlled junction and therefore both the 'Do Nothing' and 'Do Something' scenarios incorporate the upgraded New Road / Harbour Street junction layout.

Notwithstanding the above, a model of the existing junction arrangement has been constructed and calibrated in order to establish the existing junction's operational performance within the 2019 base traffic scenario (**Table 6.9**). The arms were labelled as follows within the existing layout TRANSYT model:

Arm A: Shaw Bridge
Arm B: Bridge Street
Arm C: School Street
Arm D: Harbour Street (W)
Arm E: New Road
Arm F: Harbour Street (E)

Arm	Movement	AM Peak Hour			PM Peak Hour		
		DoS (%)	Delay (s)	MMQ (pcu)	DoS (%)	Delay (s)	MMQ (pcu)
A	S,L,R	69	18.78	9.86	62	22.69	6.67
D	S,L,R	95	144.75	21.89	95	88.06	22.15
E	L	17	0.18	0.02	6	0.06	0.00
	R	100	207.44	16.29	101	163.16	17.19
F	S	0	16.41	3.31	114	267.09	40.09

TABLE 6.9 2019 TRANSYT ANALYSIS – EXISTING JUNCTION ARRANGEMENT

The results of this 2019 base assessment (**Table 6.8**) reveal that, i) before the application of growth factors to the base traffic and ii) the introduction of the proposed and committed development traffic, the existing junction arrangement is currently approaching or operating over capacity during the morning (100%) and evening (114%) peak hours. Queuing is observed on the Harbour Street approach during the peak hours which extend beyond the New Road junction thereby causing queuing to occur along New Road. Accordingly, it is envisioned that the future enhancements at this junction will alleviate the observed queuing levels with the existing layout.

The principal results of the operational assessment of the future upgraded signal-controlled junction layout during the weekday morning and evening peaks are summarised in **Table 6.10**, **Table 6.11**, and **Table 6.12** below. The arms were labelled as follows within the TRANSYT model:

Arm A: Shaw Bridge

Arm B: Bridge Street

Arm C: School Street

Arm D: Harbour Street (W-Westbound)

Arm E: Harbour Street (E)

Arm F: New Road

Arm G: Harbour Street (W-Eastbound)

The 'Do Nothing' 2021 AM peak hour TRANSYT results (**Table 6.10**) indicate that this junction is predicted to be operating with significant reserve capacity with a maximum Degree of Saturation (DoS) value of 60% and a maximum Mean Max Queue (MMQ) of 12.90 passenger car units (pcu's) being recorded.

Arm	Movement	AM Peak			PM Peak		
		DoS (%)	Delay (s)	MMQ (pcu)	DoS (%)	Delay (s)	MMQ (pcu)
A	S,L,R	58	18.67	12.90	54	27.99	10.57
D	L	21	0.91	0.40	32	1.39	1.52
	S,R	46	32.33	4.13	40	19.66	4.61
E	S	50	46.21	6.58	62	36.39	12.74
	R	4	38.19	0.48	1	25.71	0.22
F	L	40	15.71	5.93	20	22.90	3.03
	R	28	14.38	4.58	43	26.68	7.68
G	S, L	60	52.09	8.40	23	34.69	5.30

TABLE 6.10 JUNCTION 1 & 2 2021 'DO NOTHING' TRANSYT ANALYSIS

The PM peak hour 'Do Nothing' TRANSYT results indicate that this junction is predicted to be again operating well within capacity with a maximum DoS value of 62% and a maximum MMQ of 12.74 pcu's being recorded.

The 'Do Nothing' 2026 AM peak hour TRANSYT results (**Table 6.11**) indicate that this junction is again predicted to be operating with significant reserve capacity with a maximum Degree of Saturation (DoS) value of 65% and a maximum MMQ of 14.59 pcu's being recorded.

The PM peak hour 'Do Nothing' TRANSYT results indicate that this junction is predicted to be again operating well within capacity with a maximum DoS value of 61% and a maximum MMQ of 12.27 pcu's being recorded.

Arm	Movement	AM Peak			PM Peak		
		DoS (%)	Delay (s)	MMQ (pcu)	DoS (%)	Delay (s)	MMQ (pcu)
A	S,L,R	63	19.90	14.59	57	28.15	11.54
D	L	22	0.89	0.40	35	1.43	1.54
	S,R	41	33.06	3.88	36	20.22	4.17

E	S	46	45.16	5.94	61	36.86	12.27
	R	5	38.22	0.53	2	26.38	0.24
F	L	37	15.66	5.88	11	21.10	1.58
	R	31	14.86	5.33	45	26.55	8.19
G	S, L	65	53.57	9.28	26	35.48	5.85

TABLE 6.11 JUNCTION 1 & 2 2026 'DO NOTHING' TRANSYT ANALYSIS

The 'Do Nothing' 2036 AM peak hour TRANSYT results (**Table 6.12**) indicate that this junction is again predicted to be operating with significant reserve capacity with a maximum Degree of Saturation (DoS) value of 65% and a maximum MMQ of 14.59 pcu's being recorded.

The PM peak hour 'Do Nothing' TRANSYT results indicate that this junction is predicted to be again operating well within capacity with a maximum DoS value of 61% and a maximum MMQ of 12.27 pcu's being recorded.

Arm	Movement	AM Peak			PM Peak		
		DoS (%)	Delay (s)	MMQ (pcu)	DoS (%)	Delay (s)	MMQ (pcu)
A	S,L,R	70	22.88	17.71	63	29.77	13.15
D	L	24	0.92	0.43	38	1.53	1.57
	S,R	43	32.74	4.24	39	20.42	4.66
E	S	48	44.76	6.37	67	38.85	13.99
	R	5	37.46	0.58	2	26.38	0.26
F	L	43	16.17	5.96	13	21.40	1.96
	R	34	15.24	5.24	50	27.42	8.90
G	S, L	70	54.59	10.49	29	35.34	6.39

TABLE 6.12 JUNCTION 1 & 2 2036 'DO NOTHING' TRANSYT ANALYSIS

Junction 3: R125 Maynoth Rd / Distributor Rd Junction

The principal results of the operational assessment of this roundabout controlled junction during the weekday morning and evening peaks are summarised in **Table 6.13** to **Table 6.17** inclusive below. The three arms were labelled as follows within the ARCADY model:

Arm A: Maynooth Road (East)

Arm B: Dstributor Road

Arm C: Maynooth Road (West)

The 'Do Nothing' 2021 AM peak hour ARCADY results (**Table 6.13**) indicate that this junction is predicted to be operating with significant reserve capacity with a maximum Ratio of Flow to Capacity (RFC) value of 0.54 and a maximum Queue of 1.3 pcu's being recorded. The PM peak hour 'Do Nothing' ARCADY results indicate that this junction is predicted to be again operating well within capacity with a maximum RFC value of 0.28 and a maximum Queue of 0.3 pcu's being recorded.

Arm	AM Peak			PM Peak		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
A	0.2	4.38	0.17	0.4	5.06	0.28
B	1.3	7.59	0.54	0.3	4.45	0.23
C	0.1	4.36	0.08	0.0	3.39	0.04

TABLE 6.13 JUNCTION 3 2019 'DO NOTHING' ARCADY ANALYSIS

The 'Do Nothing' 2026 AM peak hour ARCADY results (**Table 6.14**) indicate that this junction is again predicted to be operating with significant reserve capacity with a maximum Ratio of Flow to Capacity (RFC) value of 0.53 and a maximum Queue of 1.2 pcu's being recorded. The PM peak hour 'Do Nothing' ARCADY results indicate that this junction is predicted to be again operating well within capacity with a maximum RFC value of 0.31 and a maximum Queue of 0.5 pcu's being recorded.

Arm	AM Peak			PM Peak		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
A	0.2	4.38	0.18	0.5	5.16	0.31
B	1.2	7.57	0.53	0.3	4.38	0.20
C	0.2	4.78	0.18	0.1	3.61	0.12

TABLE 6.14 JUNCTION 3 2026 'DO NOTHING' ARCADY ANALYSIS

The 'Do Nothing' 2026 AM peak hour ARCADY results (**Table 6.15**) indicate that this junction is again predicted to be operating with significant reserve capacity with a maximum Ratio of Flow to Capacity (RFC) value of 0.60 and a maximum Queue of 1.6 pcu's being recorded.

Arm	AM Peak			PM Peak		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
A	0.3	4.48	0.20	0.6	5.42	0.34
B	1.6	8.91	0.60	0.3	4.56	0.23
C	0.2	5.00	0.17	0.1	3.65	0.12

TABLE 6.15 JUNCTION 3 2036 'DO NOTHING' ARCADY ANALYSIS

The PM peak hour 'Do Nothing' ARCADY results indicate that this junction is predicted to be again operating well within capacity with a maximum RFC value of 0.34 and a maximum Queue of 0.6 pcu's being recorded.

Junction 4: R125 / Distributor Rd / Moyglare Rd Junction

The principal results of the operational assessment of this roundabout controlled junction during the weekday morning and evening peaks are summarised in **Table 6.15** to **Table 6.17** inclusive below. The three arms were labelled as follows within the TRANSYT model:

Arm A: Distributor Road
Arm B: R125 (South)
Arm C: R125 (West)
Arm D: Moyglare Road

The 'Do Nothing' 2021 AM peak hour TRANSYT results (**Table 6.16**) indicate that this junction is again predicted to be operating with significant reserve capacity with a maximum Degree of Saturation (DoS) value of 54% and a maximum MMQ of 4.21 pcu's being recorded.

The PM peak hour 'Do Nothing' TRANSYT results indicate that this junction is predicted to be again operating well within capacity with a maximum DoS value of 54% and a maximum MMQ of 4.20 pcu's being recorded.

Arm	Movement	AM Peak			PM Peak		
		DoS (%)	Delay (s)	MMQ (pcu)	DoS (%)	Delay (s)	MMQ (pcu)
A	S,L	9	19.01	0.65	4	21.02	0.20
	R	26	19.60	2.39	7	19.97	0.45
B	S,L,R	30	25.59	1.28	53	25.84	4.18
C	S,L	11	19.15	0.81	11	21.47	0.62
	R	1	17.81	0.00	0	20.03	0.00
D	S,L,R	54	24.89	4.21	54	26.97	4.20

TABLE 6.16 JUNCTION 4 2021 'DO NOTHING' TRANSYT ANALYSIS

The 'Do Nothing' 2026 AM peak hour TRANSYT results (**Table 6.17**) indicate that this junction is again predicted to be operating with significant reserve capacity with a maximum Degree of Saturation (DoS) value of 55% and a maximum MMQ of 4.44 pcu's being recorded.

The PM peak hour 'Do Nothing' TRANSYT results indicate that this junction is predicted to be again operating well within capacity with a maximum DoS value of 54% and a maximum MMQ of 4.45 pcu's being recorded.

Arm	Movement	AM Peak			PM Peak		
		DoS (%)	Delay (s)	MMQ (pcu)	DoS (%)	Delay (s)	MMQ (pcu)
A	S,L	21	19.92	1.70	21	22.58	1.19
	R	23	19.00	2.15	6	19.92	0.37
B	S,L,R	35	27.23	1.52	52	24.12	4.45
C	S,L	16	19.38	1.30	23	22.88	1.41
	R	3	17.61	0.24	5	20.23	0.31
D	S,L,R	55	25.21	4.44	54	28.65	3.75

TABLE 6.17 JUNCTION 4 2026 'DO NOTHING' TRANSYT ANALYSIS

The 'Do Nothing' 2036 AM peak hour TRANSYT results (**Table 6.18**) indicate that this junction is again predicted to be operating with significant reserve capacity with a maximum Degree of Saturation (DoS) value of 60% and a maximum MMQ of 4.91 pcu's being recorded.

The PM peak hour 'Do Nothing' TRANSYT results indicate that this junction is predicted to be again operating well within capacity with a maximum DoS value of 59% and a maximum MMQ of 5.03 pcu's being recorded.

Arm	Movement	AM Peak			PM Peak		
		DoS (%)	Delay (s)	MMQ (pcu)	DoS (%)	Delay (s)	MMQ (pcu)
A	S,L	21	20.16	1.57	18	22.27	1.02
	R	26	19.64	2.42	6	19.94	0.40
B	S,L,R	37	26.82	1.65	57	25.38	5.03
C	S,L	17	19.80	1.36	25	23.01	1.47

	R	3	17.90	0.26	5	20.26	0.34
D	S,L,R	60	26.51	4.91	59	30.15	4.17

TABLE 6.18 JUNCTION 4 2036 'DO NOTHING' TRANSYT ANALYSIS

6.6.2 Construction Phase

The proposed development will be constructed over a number of years with the initial 100 no. house units assumed to be complete by the end of the adopted 2021 Opening Year. The remaining residential and crèche facility are predicted to be complete and occupied sometime before the adopted 2026 Future Design Year.

During the general excavation of the foundations there will be additional Heavy Goods Vehicle (HGV) movements from the site. All suitable material will be used for construction, landscaping, and fill activities where possible and appropriate. All spoil material will be removed to a registered landfill site which will be agreed in full with the Local Authority.

In addition to the traffic generated by the disposal of surplus subsoil from the site, there will be traffic generated from deliveries of construction materials and equipment. It should be pointed out that construction traffic generated during the development works tends to be outside of peak hours. Such trips would generally be spread out over the full working day and will not be higher than the peak hour predicted volumes for the operational stage.

Construction traffic will consist of the following categories:

- Private vehicles owned and driven by site construction staff and by full time supervisory staff. On-site employees will generally arrive before 08:00, thus avoiding the morning peak hour traffic. These employees will generally depart after 18:00. It should be noted that a large proportion of construction workers will arrive in shared transport.
- Excavation plant and dumper trucks involved in site development works and material delivery vehicles for the following: granular fill materials, concrete pipes, manholes, reinforcement steel, ready-mix concrete and mortar, concrete blocks, miscellaneous building materials, etc.

Impact Assessment

The construction impact is likely and will have a negative effect in the short-term as construction will be between 1 - 7 years. This likely short term effect during the construction stage is predicted to be imperceptible as appropriate mitigation measures will be put in place to minimise the impact of construction vehicles on the surrounding road network.

6.6.3 Operational Phase

In the Operational Phase the proposed development traffic flows are added to the network's 'Do Nothing' traffic flows to establish the new 'Post Development' traffic flows. Consideration has been given to the potential reassignment of baseline (and committed development) traffic movements as a result of the introduction of alternative vehicle routing options following the delivery of new road infrastructure through the site.

This section highlights the predicted impact of the proposed development traffic upon the surrounding road network compared to the 'Do Nothing' scenario.

Network Impact

In accordance with the National Roads Authority NRA (now TII) guidelines we have undertaken an assessment to establish the potential level of impact upon the key junctions of the local road network. To enable this calculation to be undertaken we have based the analysis upon the 2021 Opening Year and 2036 Future Design Year scenarios.

The analysis has demonstrated that whilst the proposals will generate a subthreshold impact upon the key off-site junctions 4, 5 and 6, a material impact (>10%) is noted at Junctions 1, 2 & 3 in the 2036 Future Design Year. **Table 6.19** below details the specific scale of network impact predicted at each of the key local off-site junctions during the 2021 and 2036 Design Years.

Ref.	Junction	Design Year	AM Peak Hour	PM Peak Hour
1	R148 Harbour St / R125 Bridge St Signal Controlled Junction	2021	2.9%	2.5%
		2036	12.5%	11.1%
2	R148 Harbour St / New Lane Priority Controlled Junction	2021	3.3%	4.0%
		2036	13.9%	15.5%
3	R148 Maynooth Rd / Distributor Road Roundabout	2021	6.6%	9.5%
		2036	20.4%	28.9%
4	Distributor Road / R125 / Moyglare Rd Junction	2021	1.1%	2.4%
		2036	8.8%	9.2%
5	School Street / New Lane Junction	2021	0.5%	1.0%
		2036	1.1%	3.3%
6	New Lane / The Square Junction	2021	0.6%	1.8%
		2036	1.2%	3.4%

TABLE 6.19 PROPOSED DEVELOPMENTS NETWORK IMPACT

In **Table 6.20** (AM Peak Hour) and **Table 6.21** (PM Peak Hour) the predicted impacts have been categorised for the 2036 Future Design Year. At all junctions the quality of effects can be described as "Negative". During the AM peak hour the significance of effects is described as moderate at Junctions 1 & 2, significant at Junction 3, slight at Junction 4, and imperceptible at Junctions 5 & 6.

During the PM peak hour the significance of effects is described as moderate at Junctions 1 & 2, significant at Junction 3, slight at Junction 4, and not significant at Junctions 5 & 6.

Junction - Nature of Impact (Additional Vehicular Traffic on key Junctions)		Impact Scale	Quality of Effects	Significance of Effects
1	R148 Harbour St / R125 Bridge St Signal Controlled Junction	12.5%	Negative	Moderate
2	R148 Harbour St / New Lane Priority Controlled Junction	13.9%	Negative	Moderate
3	R148 Maynooth Rd / Distributor Road Roundabout	20.5%	Negative	Significant
4	Distributor Road / R125 / Moyglare Rd Junction	8.8%	Negative	Slight
5	School Street / New Lane Junction	1.1%	Negative	Imperceptible
6	New Lane / The Square Junction	1.2%	Negative	Imperceptible

TABLE 6.20 NETWORK IMPACT CATEGORISATION 2036 AM PEAK HOUR

Junction - Nature of Impact (Additional Vehicular Traffic on key Junctions)		Impact Scale	Quality of Effects	Significance of Effects
1	R148 Harbour St / R125 Bridge St Signal Controlled Junction	11.1%	Negative	Moderate
2	R148 Harbour St / New Lane Priority Controlled Junction	15.5%	Negative	Moderate
3	R148 Maynooth Rd / Distributor Road Roundabout	29.0%	Negative	Significant
4	Distributor Road / R125 / Moyglare Rd Junction	9.2%	Negative	Slight
5	School Street / New Lane Junction	3.4%	Negative	Not Significant
6	New Lane / The Square Junction	3.4%	Negative	Not Significant

TABLE 6.21 NETWORK IMPACT CATEGORISATION 2036 PM PEAK HOUR

Based on the network impact categorisation discussed above, the following junctions will be subject to detailed analysis (**Figure 6.12**). Whilst the impact level at Junction 4 is predicted to be less than 10%, this junction will also be subject to detailed analysis due to its close proximity to the subject development site;

- Junction 1: R148 Harbour St / R125 Bridge St Signal Controlled Junction
- Junction 2: R148 Harbour St / New Lane Priority Controlled Junction
- Junction 3: R148 Maynooth Rd / Distributor Road Roundabout
- Junction 4: Distributor Road / R125 / Moyglare Rd Junction

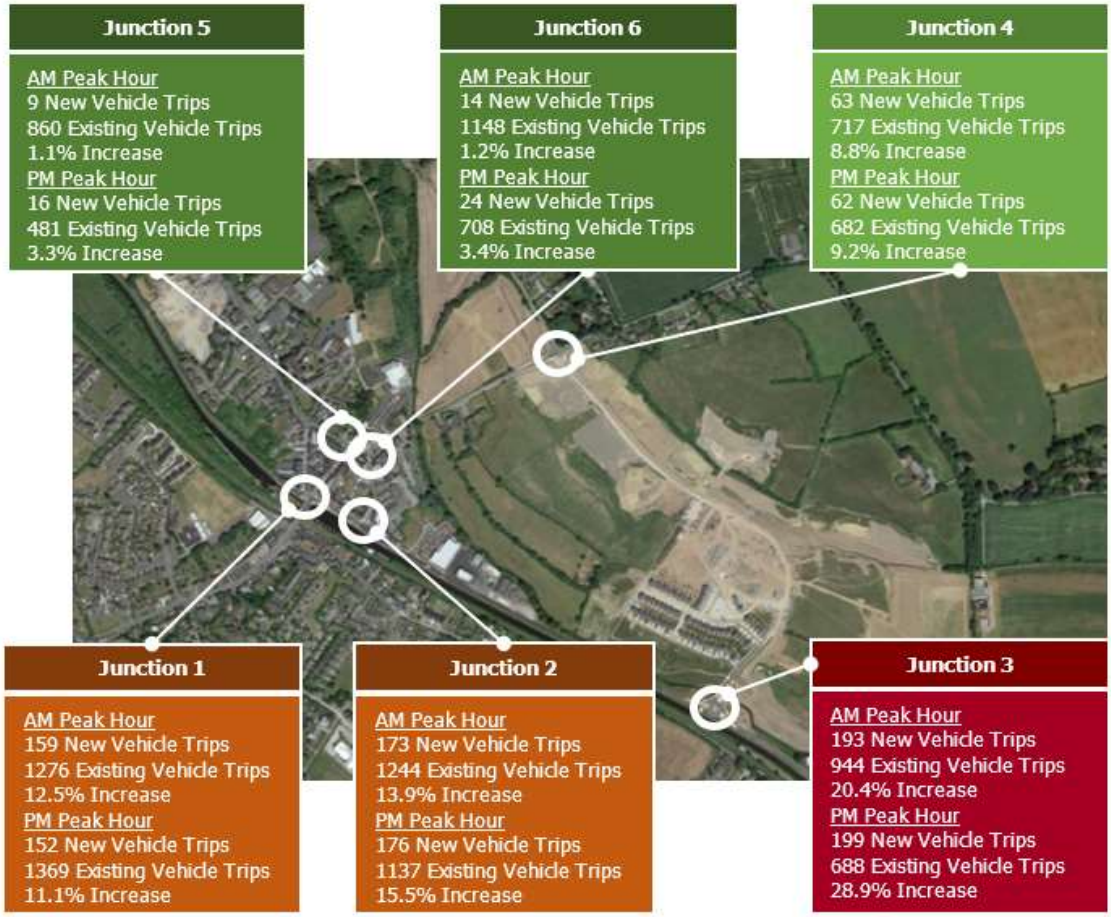

FIGURE 6-12 INCREASE IN VEHICLE TRIPS GENERATED THROUGH KEY LOCAL JUNCTIONS (2036 FUTURE DESIGN YEAR)

Network Analysis

Similar to the 'Do Nothing' scenario, in order to analyse and assess the impact of the proposed development on the surrounding road network, the aforementioned 4 no. junctions have been again analysed for the schemes adopted 2021 Opening, 2026 Future Design Year and 2036 Future Design Year.

Junction 1 And 2: R148 Harbour St / Shaw Bridge / New Road Junction

The principal results of the operational assessment of the future upgraded signal-controlled junction layout during the weekday morning and evening peaks are summarised in **Table 6.22** to **Table 6.24** below. The arms were labelled as follows within the TRANSYT model:

Arm A: Shaw Bridge

Arm B: Bridge Street

Arm C: School Street

Arm D: Harbour Street (W-Westbound)

Arm E: Harbour Street (E)

Arm F: New Road

Arm G: Harbour Street (W-Eastbound)

The AM peak hour 'Do-Something' scenario, with the introduction of the proposed development traffic (100 housing units in the 2021 Opening Year), this junction is predicted to continue to be operating with significant reserve capacity with a maximum DoS value of 60% and a maximum MMQ of 13.44 pcu's being recorded. This represents zero increase in the maximum DoS value and 0.54 pcu increase in predicted maximum MMQ length compared to the 'Do Nothing' scenario.

Similarly, the PM peak hour 'Do-Something' TRANSYT results indicate that this junction is predicted to continue to operate well within capacity with a maximum DoS value of 63% and a maximum queue of 13.32 pcu's being recorded. This represents an increase in the maximum DoS value of only 1% and 0.58 pcu increase in predicted maximum MMQ length compared to the 'Do Nothing' scenario.

Arm	Movement	AM Peak			PM Peak		
		DoS (%)	Delay (s)	MMQ (pcu)	DoS (%)	Delay (s)	MMQ (pcu)
A	S,L,R	60	19.63	13.44	58	29.49	11.38
D	L	22	0.97	0.45	33	1.42	1.53
	S,R	46	30.75	4.12	40	18.84	4.60
E	S	54	46.38	7.38	63	36.09	13.32
	R	6	37.69	0.74	2	25.08	0.32
F	L	42	16.19	5.95	22	23.82	3.34
	R	29	14.81	4.54	44	27.47	7.75
G	S, L	59	51.25	8.66	25	34.22	5.86

TABLE 6.22 JUNCTION 1 & 2 2021 'DO SOMETHING' TRANSYT ANALYSIS

The 'Do Something' 2026 AM peak hour TRANSYT results (**Table 6.23**) with the introduction of the proposed development traffic (full development complete), this junction is predicted to continue to be operating with significant reserve capacity with a maximum DoS value of 71% and a maximum MMQ of 17.86 pcu's being recorded. This represents an increase in the maximum DoS value of 6% and 3.27 pcu increase in predicted maximum MMQ length compared to the 'Do Nothing' scenario.

The PM peak hour 'Do Something' TRANSYT results indicate that that this junction is predicted to continue to operate well within capacity with a maximum DoS value of 70% and a maximum queue of 15.10 pcu's being recorded. This represents an increase in the maximum DoS value of 9% and 2.83 pcu increase in predicted maximum MMQ length compared to the 'Do Nothing' scenario.

Arm	Movement	AM Peak			PM Peak		
		DoS (%)	Delay (s)	MMQ (pcu)	DoS (%)	Delay (s)	MMQ (pcu)
A	S,L,R	71	25.16	17.86	69	32.66	15.10
D	L	28	1.18	1.50	39	1.61	1.57
	S,R	39	26.89	3.59	36	18.73	4.05
E	S	62	46.44	9.65	70	39.13	15.09
	R	6	35.31	0.74	2	25.74	0.37
F	L	41	17.79	5.94	14	22.13	2.09
	R	33	16.83	5.23	46	27.38	8.30
G	S, L	66	50.71	10.82	38	36.38	8.58

TABLE 6.23 JUNCTION 1 & 2 2026 'DO SOMETHING' TRANSYT ANALYSIS

The 'Do Something' 2036 AM peak hour TRANSYT results (Table 6.24) indicate that this junction is predicted to continue to be operating with significant reserve capacity with a maximum DoS value of 78% and a maximum MMQ of 21.25 pcu's being recorded. This represents an increase in the maximum DoS value of 8% and 3.54 pcu increase in predicted maximum MMQ length compared to the 'Do Nothing' scenario.

The PM peak hour 'Do Something' TRANSYT results indicate that this junction is predicted to continue to operate well within capacity with a maximum DoS value of 75% and a maximum queue of 17.02 pcu's being recorded. This represents an increase in the maximum DoS value of 8% and 3.03 pcu increase in predicted maximum MMQ length compared to the 'Do Nothing' scenario.

Arm	Movement	AM Peak			PM Peak		
		DoS (%)	Delay (s)	MMQ (pcu)	DoS (%)	Delay (s)	MMQ (pcu)
A	S,L,R	78	28.46	21.25	75	35.18	17.02
D	L	30	1.21	1.52	42	1.72	1.60
	S,R	42	27.20	3.98	40	18.98	4.55
E	S	66	47.92	10.44	75	41.93	16.94
	R	6	35.37	0.79	3	25.74	0.39
F	L	46	17.56	6.00	17	22.47	2.48
	R	36	16.47	5.10	51	28.22	8.94
G	S, L	73	53.15	12.17	40	36.12	9.14

TABLE 6.24 JUNCTION 1 & 2 2036 'DO SOMETHING' TRANSYT ANALYSIS

A summary of the Do-Nothing and Do-Something junction operational performance are presented in **Table 6.25**. The subject assessment incorporates a 15 year Design Year from the projected 2021 Opening Year. The probability of the predicted impacts occurring during this timeframe can be described as *'likely'*. However, the impacts are predicted to be *'Medium Term'* due to the future roads objectives in Kilcock which, once complete, will result in subject development traffic having the option to access destinations to the south and west via new routes which avoid Kilcock Town Centre and the subject signal controlled junction.

Peak Hour	Design Year	Do-Nothing		Do-Something		Quality of Effects	Significance
		DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)		
AM	2021	60	12.9	60	13.4	Neutral	Imperceptible
	2026	65	14.6	71	17.9	Negative	Slight
	2036	70	17.7	78	21.3	Negative	Slight
PM	2021	62	12.7	63	13.3	Neutral	Imperceptible
	2026	61	12.3	70	15.1	Negative	Slight
	2036	67	13.99	75	17.0	Negative	Slight

TABLE 6.25 JUNCTION 1 & 2 DESCRIPTION OF EFFECTS

Junction 3: R125 Maynoth Rd / Distributor Rd Junction

The principal results of the operational assessment of this roundabout controlled junction during the weekday morning and evening peaks are summarised in **Table 6.26** to **Table 6.28** below. The three arms were labelled as follows within the ARCADY model:

Arm A: Maynooth Road (East)

Arm B: Dstributor Road

Arm C: Maynooth Road (West)

The 'Do Something' 2021 AM peak hour ARCADY results (**Table 6.26**) indicate that this junction is predicted to be operating with significant reserve capacity with a maximum Ratio of Flow to Capacity (RFC) value of 0.56 and a maximum queue of 1.4 pcu's being recorded. This represents an increase in the maximum RFC value of only 0.02 and no change in the predicted maximum queue length compared to the 'Do Nothing' scenario.

Similarly, the 'Do Something' 2021 PM peak hour ARCADY results indicate that this junction is predicted to again be operating with significant reserve capacity with a maximum RFC value of 0.26 and a maximum queue of 0.4 pcu's being recorded. This represents an increase in the maximum RFC value of only 0.01 and no change in the predicted maximum queue length compared to the 'Do Nothing' scenario.

Arm	AM Peak			PM Peak		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
A	0.2	4.48	0.17	0.4	5.15	0.29
B	1.4	7.80	0.56	0.4	4.59	0.26
C	0.1	4.58	0.13	0.1	3.47	0.06

TABLE 6.26 JUNCTION 3 2021 'DO SOMETHING' ARCADY ANALYSIS

The 'Do Something' 2026 AM peak hour ARCADY results (**Table 6.27**) indicate that this junction is predicted to be operating with significant reserve capacity with a maximum Ratio of Flow to Capacity (RFC) value of 0.60 and a maximum queue of 1.6 pcu's being recorded. This represents an increase in the maximum RFC value of 0.07 and maximum queue length of 0.4 pcu compared to the 'Do Nothing' scenario.

Similarly, the 'Do Something' 2026 PM peak hour ARCADY results indicate that this junction is predicted to again be operating with significant reserve capacity with a maximum RFC value of 0.34 and a maximum queue of 0.5 pcu's being recorded. This represents an increase in the maximum RFC value of only 0.03 and no change in the predicted maximum queue length compared to the 'Do Nothing' scenario.

Arm	AM Peak			PM Peak		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
A	0.3	4.73	0.20	0.5	5.55	0.34
B	1.6	8.68	0.60	0.5	4.99	0.31
C	0.5	5.84	0.32	0.2	3.95	0.20

TABLE 6.27 JUNCTION 3 2026 'DO SOMETHING' ARCADY ANALYSIS

The 'Do Something' 2036 AM peak hour ARCADY results (**Table 6.28**) indicate that this junction is predicted to be operating with significant reserve capacity with a maximum Ratio of Flow to Capacity (RFC) value of 0.67 and a maximum queue of 2.1 pcu's being recorded. This represents an increase in the maximum RFC value of 0.07 and maximum queue length of 0.5 pcu compared to the 'Do Nothing' scenario.

Similarly, the 'Do Something' 2026 PM peak hour ARCADY results indicate that this junction is predicted to again be operating with significant reserve capacity with a maximum RFC value of 0.37 and a maximum queue of 0.6 pcu's being recorded. This represents an increase in the

maximum RFC value of only 0.03 and no change in the predicted maximum queue length compared to the 'Do Nothing' scenario.

Arm	AM Peak			PM Peak		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
A	0.3	4.85	0.22	0.6	5.85	0.37
B	2.1	10.52	0.67	0.5	5.23	0.34
C	0.5	6.17	0.33	0.2	4.00	0.20

TABLE 6.28 JUNCTION 3 2036 'DO SOMETHING' ARCADY ANALYSIS

A summary of the Do-Nothing and Do-Something junction operational performance are presented in **Table 6.29**. The subject assessment incorporates a 15 year Design Year from the projected 2021 Opening Year. The probability of the predicted impacts occurring during this timeframe can be described as *'likely'* and the impacts are predicted to be *'Permanent'*.

Peak Hour	Design Year	Do-Nothing		Do-Something		Quality of Effects	Significance
		RFC	Queue (pcu)	RFC	Queue (pcu)		
AM	2021	0.54	1.3	0.56	1.4	Neutral	Imperceptible
	2026	0.53	1.2	0.60	1.6	Negative	Slight
	2036	0.60	1.6	0.67	2.1	Negative	Slight
PM	2021	0.28	0.4	0.29	0.4	Neutral	Imperceptible
	2026	0.31	0.5	0.34	0.5	Negative	Slight
	2036	0.34	0.6	0.37	0.6	Negative	Slight

TABLE 6.29 JUNCTION 3 DESCRIPTION OF EFFECTS

Junction 4: R125 / Distributor Rd / Moyglare Rd Junction

The principal results of the operational assessment of this roundabout controlled junction during the weekday morning and evening peaks are summarised in **Table 6.30** to **Table 6.32** below. The three arms were labelled as follows within the TRANSYT model:

Arm A: Distributor Road

Arm B: R125 (South)

Arm C: R125 (West)

Arm D: Moyglare Road

The 'Do Something' 2021 AM peak hour TRANSYT results (**Table 6.30**) with the introduction of the proposed development traffic (full development complete), this junction is predicted to continue to be operating with significant reserve capacity with a maximum DoS value of 55% and a maximum MMQ of 4.29 pcu's being recorded. This represents an increase in the maximum DoS value of only 1% and 0.8 pcu increase predicted maximum MMQ length compared to the 'Do Nothing' scenario.

The PM peak hour 'Do Something' TRANSYT results indicate that that this junction is predicted to continue to operate well within capacity with a maximum DoS value of 56% and a maximum queue of 4.29 pcu's being recorded. This represents an increase in the maximum DoS value of only 2% and 0.09 pcu increase predicted maximum MMQ length compared to the 'Do Nothing' scenario.

Arm	Movement	AM Peak			PM Peak		
		DoS (%)	Delay (s)	MMQ (pcu)	DoS (%)	Delay (s)	MMQ (pcu)
A	S,L	9	19.01	0.65	4	21.02	0.20
	R	26	19.64	2.42	8	20.03	0.52
B	S,L,R	30	25.66	1.30	53	25.72	4.14
C	S,L	11	19.15	0.81	11	21.47	0.62
	R	1	17.81	0.00	0	20.03	0.00
D	S,L,R	55	25.11	4.29	56	27.27	4.29

TABLE 6.30 JUNCTION 4 2021 'DO SOMETHING' TRANSYT ANALYSIS

The 'Do Something' 2026 AM peak hour TRANSYT results (**Table 6.31**) with the introduction of the proposed development traffic (full development complete), this junction is predicted to continue to be operating with significant reserve capacity with a maximum DoS value of 56% and a maximum MMQ of 4.61 pcu's being recorded. This represents an increase in the maximum DoS value of only 1% and 0.17 pcu increase predicted maximum MMQ length compared to the 'Do Nothing' scenario.

The PM peak hour 'Do Something' TRANSYT results indicate that that this junction is predicted to continue to operate well within capacity with a maximum DoS value of 54% and a maximum queue of 4.61 pcu's being recorded. This represents zero increase in the maximum DoS value and 0.16 pcu increase predicted maximum MMQ length compared to the 'Do Nothing' scenario.

Arm	Movement	AM Peak			PM Peak		
		DoS (%)	Delay (s)	MMQ (pcu)	DoS (%)	Delay (s)	MMQ (pcu)
A	S,L	23	19.87	1.94	27	23.44	1.60
	R	22	18.65	2.14	6	19.92	0.37
B	S,L,R	39	28.64	1.65	54	25.25	4.61
C	S,L	23	19.77	1.95	30	23.72	1.83
	R	4	17.35	0.31	6	20.27	0.35
D	S,L,R	56	25.59	4.61	54	28.07	3.88

TABLE 6.31 JUNCTION 4 2026 'DO SOMETHING' TRANSYT ANALYSIS

The 'Do Something' 2036 AM peak hour TRANSYT results (**Table 6.32**) with the introduction of the proposed development traffic (full development complete), this junction is predicted to continue to be operating with significant reserve capacity with a maximum DoS value of 61% and a maximum MMQ of 5.18 pcu's being recorded. This represents an increase in the maximum DoS value of only 1% and 0.27 pcu increase predicted maximum MMQ length compared to the 'Do Nothing' scenario.

The PM peak hour 'Do Something' TRANSYT results indicate that that this junction is predicted to continue to operate well within capacity with a maximum DoS value of 60% and a maximum queue of 5.32 pcu's being recorded. This represents a 1% increase in the maximum DoS value and 0.29 pcu increase predicted maximum MMQ length compared to the 'Do Nothing' scenario.

Arm	Movement	AM Peak			PM Peak		
		DoS (%)	Delay (s)	MMQ (pcu)	DoS (%)	Delay (s)	MMQ (pcu)
A	S,L	23	20.11	1.84	25	23.09	1.44
	R	26	19.27	2.42	6	19.94	0.40
B	S,L,R	40	28.23	1.78	60	26.97	5.32
C	S,L	24	20.22	2.01	31	23.92	1.92
	R	4	17.64	0.32	6	20.29	0.38
D	S,L,R	61	27.04	5.18	59	29.63	4.42

TABLE 6.32 JUNCTION 4 2036 'DO SOMETHING' TRANSYT ANALYSIS

A summary of the Do-Nothing and Do-Something junction operational performance are presented in **Table 6.33**. The subject assessment incorporates a 15 year Design Year from the projected 2021 Opening Year. The probability of the predicted impacts occurring during this timeframe can be described as *'likely'* and the impacts are predicted to be *'Permanent'*.

Peak Hour	Design Year	Do-Nothing		Do-Something		Quality of Effects	Significance
		DoS (%)	MMQ (pcu)	DoS (%)	MMQ (pcu)		
AM	2021	54	4.2	55	4.3	Negative	Imperceptible
	2026	55	4.4	56	4.6	Negative	Imperceptible
	2036	60	4.9	61	5.2	Negative	Imperceptible
PM	2021	54	4.2	56	4.3	Negative	Imperceptible
	2026	54	4.5	56	4.6	Negative	Imperceptible
	2036	59	5.0	60	5.3	Negative	Imperceptible

TABLE 6.33 JUNCTION 4 DESCRIPTION OF EFFECTS

6.6.4 Cumulative

The adjacent consented developments (Pl. Ref. RA 171230 / RA 150205 / PL17.246141 and Pl. Ref. RA161443) have been incorporated into the analysis detailed above and therefore the cumulative impact of the proposed development in addition to the consented developments have been assessed.

Should the construction phase of these developments coincide with the development of the subject development site, potential cumulative impacts are not anticipated once similar mitigation measures are implemented. It is anticipated that any construction overlap will likely be in the short term as Phase 1 of Millerstown is anticipated to be completed by Q3 2020. Any potential construction impacts will be short term, negative, and imperceptible. Any potential operational impacts will be *'Negative'* but *'Not Significant'* and will be *'permanent'*.

6.7 Mitigation

6.7.1 Incorporated Design Mitigation

The proposed development fully respects the below road infrastructure improvements permitted as part of neighbouring planning applications. The road infrastructure permitted with these

schemes (as discussed below) will, once operational, help reduce the level of traffic movements within Kilcock Town Centre by providing an alternative route between locations in the north / west and those to the east.

- Infrastructure (to be constructed by others) 2026 – Completion of the Distributor Road between the R148 Maynooth Road and the R125. Whilst the completion of this section of the corridor provides benefits for the proposed development, it will also result in potential notable decreases in base and development traffic travelling through the town centre. Furthermore, the design of this emerging Distributor Road incorporates dedicated segregated cycle and pedestrian facilities on both sides of the corridor.
- Infrastructure (to be constructed by others) 2036 – Completion of the Distributor Road between the R148 Maynooth Road and the R158. Whilst the completion of this section of the corridor provides benefits for the proposed development, it will also result in potential notable decreases in base and development traffic travelling through the town centre.
- Infrastructure (permitted development) Before 2021 Opening Year – Upgrade of the existing New Road / Harbour Street from the current priority controlled junction arrangement to a signal controlled junction arrangement. This junction enhancement will result in reduced queues and delays at this junction which have been observed during the morning and evening peak hours.

6.7.2 Construction Phase Mitigation

A Construction and Environmental Management Plan (CEMP) and the associated Construction Traffic Management Plan (CTMP) in addition to the application accompanying Construction and Waste Management Plan (CWMP) will be developed by the appointed contractor and submitted to Meath County Council for approval prior to commencement of works.

The CEMP will incorporate a range of integrated control measures and associated management initiatives with the objective of mitigating the impact of the proposed development's on-site construction activities.

In order to ensure satisfactory operation of the construction stage the following mitigation measures are proposed:

- Provision of sufficient on-site parking during the construction phase to ensure no potential overflow onto the local network.
- Members of the construction team will be brought to/from the site in vans/minibuses, which will serve to reduce the trip generation potential.
- The site construction compound will be able to accommodate employee and visitor parking throughout the construction period through the construction of temporary hardstanding areas.
- Truck wheel washes will be installed at construction site entrances to reduce the tracking of mud and dirt onto the local road network; and
- Any specific recommendations with regard to construction traffic management made by the Local Authority will be adhered to.

6.7.3 Operational Phase Mitigation

With the objective of mitigating the potential impact of the proposed development as recommended in Section 6.7.3 above during its operational stage, the following initiatives have been identified and subsequently form an integral part of the subject development proposals.

- Infrastructure (Connectivity) – The design of the proposed development has sought to maximise the ability to provide attractive connections to the surrounding pedestrian / cycle network. Internally, dedicated pedestrian footways will be provided on all streets which will connect with the existing / future pedestrian facilities in the local public road network thereby facilitating excellent pedestrian permeability. As introduced previously, Map 1 of the Kilcock LAP 2015-2021 indicatively illustrates future pedestrian walkway proposals in the vicinity of the subject site, which, once complete will provide convenient pedestrian / cycle access to the Maynooth Road corridor and the Royal Canal Greenway and subsequently result in shorter walking / cycling distances between the subject development lands, Kilcock Town Centre, and Public Transport interchange locations (bus and train).
- Facilities – Cycle parking has been provided at a much higher rate to that proposed within the development management standards. Accordingly, this generous provision of cycle parking will help ensure cycling is a viable alternative mode of transport to private car travel thereby helping minimise private car trips generated by future residents.
- Management – A Mobility Management (MMP) is to be compiled with the aim of guiding the delivery and management of coordinated initiatives by the scheme promotor. The MMP ultimately seeks to encourage sustainable travel practices for all journeys to and from the proposed development.

6.8 Residual Impact

6.8.1 Construction Stage

Provided the above mitigation measures and management procedures are incorporated during the construction phase, the residual impact on the local receiving environment will be *'short-term'* in nature and '*negative'* in terms of quality of effects. The potential residual impact of construction stage activities is predicted to be *'Slight'* as there will be a small increase in HGV's on the surrounding road network due to excavation plant and dumper trucks involved in site development works and material delivery vehicles.

6.8.2 Operational Stage

The implementation of the mitigation measures outlined above, including the MMP, will ensure that the residual effect on the local receiving environment is both managed and minimised. Accordingly, the potential residual impact can be described as *'Negative'* but *'Not Significant'* and will be *'permanent'*.

6.9 Worst Case Scenario

The analysis undertaken above represents a worst-case appraisal of a typical weekday as it is focused upon the two busiest periods of the day (i.e. AM and PM peak hours). During the remaining 22 hours of the day, traffic flows are predicted to be significantly lower resulting in the network operating with additional reserve capacity to that forecast for the peak hour periods. Similarly, over

the weekend periods both the site generated traffic and the external road network traffic flows are generally lower compared to the weekday peak hour periods that have been assessed.

6.10 Monitoring

6.10.1 Construction Stage

During the construction stage, the following monitoring exercises are proposed;

- Compliance with construction vehicle routing practices;
- Compliance with construction vehicle parking practices;
- Internal and External road conditions; and
- Timings of construction activities in terms of start / finish times.

6.10.2 Operational Stage

As part of the MMP process, bi-annual post occupancy surveys are recommended to be carried out in order to determine the success of the measures and initiatives as set out in the proposed MMP document. The information obtained from the monitoring surveys will be used to identify ways in which the MMP measures and initiatives should be taken forward in order to maintain and further encourage sustainable travel characteristics.

6.11 References and Sources

- TII (NRA) Traffic & Transportation Assessment Guidelines; (May 2014)
- TII Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections (PE-PAG-02017); TII (May 2019)
- Kilcock Local Area Plan 2015-2021
- Kildare County Council Development Plan 2017-2023
- Meath County Development Plan 2013-2019
- Greater Dublin Area Cycle Network Plan; National Transport Authority (2013); www.nta.ie
- Dublin Bus Website; www.dublinbus.ie
- Irish Rail Website; www.irishrail.ie
- Ordnance Survey Ireland; www.osi.ie
- Transport Infrastructure Ireland; www.tii.ie
- Transport for Ireland; www.transportforireland.ie
- Central Statistics Office census data; https://census.cso.ie/sapmap/

CHAPTER 7
MATERIAL ASSETS: BUILT SERVICES

DECEMBER 2019

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7 Material Assets: Built Services

7.1 Introduction

This chapter of the EIAR comprises of an assessment of the likely impacts of the proposed development on existing surface water, water supply, foul drainage, and utility services in the vicinity of the site as well as identifying proposed mitigation measure to minimise any impacts.

The material assets considered in this chapter of the EIAR include Surface Water Drainage, Foul Drainage, Water Supply, Power, Gas and Telecommunications.

Refer to Chapter 2 (Description of Development) for a detailed site and development description.

7.1.1 Statement of Competence

In accordance with Article 5(3)(a) of the EU Directive, by appointing DBFL, the applicant has ensured that this chapter has been prepared by "competent expert".

This Chapter has been prepared Brendan Manning BEng (Hons) CEng MIEI, who has over 10 years' experience in civil engineering and the construction industry.

7.2 Proposed Development

7.2.1 Surface Water Drainage

A surface water drainage network plan is shown in DBFL Consulting Engineers drawing 072116-3500 is included in **Appendix 7.1**, showing the location of existing surface water drainage services in the vicinity of the site. The subject lands benefit from core infrastructure constructed under An Bord Pleanála (ABP) planning reference PL17.238370 (preceding Meath County Council reference 'MCC DA/1000614').

The site is predominantly greenfield and discharges in a southerly direction to the Rye Water River and 'Upper Ditch'. It is proposed to outfall the attenuated surface water collected from the main residential development to the existing Rye Water River and Upper Ditch via a hydrobrake manhole and downstream defender unit which ultimately discharges to the River Liffey.

Proposed surface water drains have been designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS) and BS EN 752: 2008 Drain and Sewer Systems Outside Buildings.

Surface water calculations are based on an allowable outflow / greenfield runoff rate of 33.9 l/sec resulting in a total attenuation volume of 3,522 m³, as determined in Chapter 9 (Water: Hydrogeology & Hydrology).

The proposed surface water drainage networks will collect surface water runoff from the site via a piped network. Attenuation of surface water will be provided in two separate attenuation facilities before discharging to the Upper Ditch and Rye Water River via a hydrobrake manhole and a downstream defender unit. A non-return valve will be provided at outlet locations to prevent flood waters from entering the surface water drainage network.

Surface water runoff from the site's road network will be directed to the proposed pipe network via conventional road gullies while surface water runoff from driveways will be captured by permeable paving.

Surface water runoff from roofs will be routed to the proposed surface water pipe network via the porous aggregates beneath permeable paved driveways (providing an additional element of attenuation and treatment).

It is also proposed to culvert approximately 20 m of the exiting Upper Ditch to the south of the northern section as part of internal road construction.

7.2.2 Foul Water Drainage

A foul water drainage network plan is shown on DBFL drawing 072116-3500 is included in **Appendix 7.1**. This foul sewer network, ranging from 375mm to 450m in diameter, was constructed under An Bord Pleanála (ABP) planning reference PL17.238370 (preceding Meath County Council reference 'MCC DA/1000614') and the subject lands benefit from this foul sewer infrastructure as the internal foul drainage networks will discharge to same. The existing site is greenfield and therefore has no foul loading at present. As mentioned above there is an existing 375/450mm diameter foul sewer on the link road which runs along the sites southern/western boundary. This discharges to the public Irish Water 600mm diameter foul sewer immediately to the south of the subject lands. This in turn discharges to the existing Kilcock Foul Pump Station located immediately to the south of the subject lands.

The proposed internal foul drainage network comprises of a network of 225mm diameter sewers designed based on the topography of the site. The foul drainage system will be completely separate from the surface water drainage system. The internal foul drainage network will discharge to the existing 375mm/450mm foul sewer already constructed in the link road.

Individual houses will be connected to the proposed 225mm diameter internal foul drainage system via individual 100mm pipe connections as per Irish Water Code of Practice for Wastewater Infrastructure.

The foul drainage network for the proposed development has been designed in accordance with the Building Regulations and specifically in accordance with the principles and methods as set out in the Irish Water Code of Practice, IS EN752 (2017), IS EN12056: Part 2 (2000) and the recommendations of the 'Greater Dublin Strategic Drainage Study (GDSDS)'.

A daily foul discharge volume for the proposed development of 256.2m³ and a maximum total Biological Oxygen Demand (BOD) loading of 98 kg/day has been calculated as outlined in Irish Water's Code of Practice for Wastewater Infrastructure.

A Pre-Connection Feedback Letter has been received from Irish Water outlining that a wastewater connection can be facilitated for the proposed development and is included in **Appendix 7.2**.

A Statement of Design Acceptance has also been received from Irish Water stating that the proposed foul sewer design within the proposed development is in compliance with Irish Water's code of practice and standard details and is included in **Appendix 7.3**.

7.2.3 Water Supply

A watermain plan is shown on DBFL drawing 072116-3500-1 which is included in **Appendix 7.4**, showing the location of existing surface watermain services in the vicinity of the site.

There is an existing 280mm/315mm PE 100 watermain which was constructed under An Bord Pleanala consent reference PL17.238370 (preceding Meath County Council application reference 'MCC DA/1000614') and the subject lands benefit from this watermain infrastructure. The existing 280/315mm is located in the link road along the subject sites southern and western boundaries and will serve as a connection for the proposed site. The internal watermain layout will consist of 160mm/180mm PE watermains with a number of 110mm/125mm PE loops supplied along Local Streets.

All connections, valves, hydrants, meters etc. have been designed and are to be installed in accordance with Irish Water's Code of Practice / Standard Details.

Individual houses will have their own connections from the distribution main via service connections and boundary boxes. Individual service boundary boxes will be of the type to suit Irish Water and to facilitate domestic meter installation.

An average daily domestic demand for the proposed development of approximately 232.9m³ and an average day in peak week demand of 291.1m³ has been calculated as outlined in the Irish Water Code of Practice for Water Infrastructure.

A Pre-Connection Feedback Letter has been received from Irish Water outlining that a water connection can be facilitated for the proposed development and is included in **Appendix 7.2**.

A Statement of Design Acceptance has also been received from Irish Water stating that the proposed watermain design within the proposed development is in compliance with Irish water's code of practice and standard details and is included in **Appendix 7.3**.

7.2.4 Power

Kilcock is connected to the national ESB grid network. The proposed development will result in existing overhead line (OHL) infrastructure being relocated underground or redirected along linear green space corridors. An ESB Networks plan is included in **Appendix 7.5** showing the location of existing electrical services in the vicinity of the site.

There are records of medium and high voltage overhead power lines traversing through the site. These overhead lines will be relocated underground and will be located in green space areas and underneath footpaths within the proposed development. Two 38kV lattice mast structures will be erected in the south of the site to facilitate the transition from underground cable to overhead line infrastructure. Exact routing and location of sub-stations to be agreed with ESB. ESB will produce proposed layouts prior to construction. There are also medium and low voltage underground cable routes running through the existing residential development to the west of the subject site constructed as part of Phase 1.

7.2.5 Gas

Gas Networks Ireland (GNI) plans are included in **Appendix 7.6** showing the location of existing gas services in the vicinity of the site.

There are no recorded distribution gas mains running through the site. However, there is a medium pressure distribution pipe located on the R148 Maynooth Road to the south of the subject site. The existing Millerstown residential development adjacent to the subject site is also serviced by a medium pressure distribution pipe. The proposed development site would be provided with connections from the existing gas network outlined above and in Appendix 7.6. Gas networks and associated pipes/ducting will be located underneath proposed footpaths and roads within the proposed development. The exact routing of same will be agreed with GNI prior to any construction works commencing. GNI will produce a proposed gas network drawing for same.

7.2.6 Telecommunications

Eir plans are included in **Appendix 7.7** and Virgin Media network plans are included in **Appendix 7.8** which indicates existing telecommunications infrastructure in the vicinity of the site.

Virgin Media have an existing network running along the R148 to the south of the site. Eir also have an existing network running along the R148 and in the existing Millerstown residential development adjacent

to the subject site. A range of voice and broadband fixed and wireless services are available in the area. Ducting for proposed telecommunications infrastructure within the development will generally be located within the proposed developments footpaths. Eir and Virgin Media will provide proposed telecommunications layouts prior to commencement of the development.

7.3 Methodology

As part of assessing the likely impact of the proposed development, surface water runoff, foul drainage discharge and water usage calculations were carried out in accordance with the following guidelines:

- Greater Dublin Strategic Drainage Study (GDSDS).
- Method outlined in Irish Water's Code of Practice for Wastewater Infrastructure.
- Method outlined in Irish Water's Code of Practice for Water Infrastructure.

Assessment of the likely impact of the proposed development on existing material assets in the vicinity of the site included:

- Review of Irish Water utility plans (surface water drainage, foul drainage and water supply).
- Consultation with Irish Water and Meath County Council.
- Submission of a Pre-Connection Enquiry Application to Irish Water.
- Review of ESB Networks Utility Plans.
- Review of Gas Networks Ireland Service Plans.
- Review of Eircom E-Maps.
- Review of Virgin Media Maps.

7.4 Difficulties Encountered

There were no difficulties encountered in compiling and assessing the data for this section of the EIAR.

7.5 Impact Assessment

7.5.1 Do Nothing Scenario

There are no predicted impacts should the proposed development not proceed.

7.5.2 Impact Assessment Methodology

An analysis of the predicted impacts of the proposed development on the services and utilities during and after the construction phase, as per Annex IV of Directive 2014/52/EU, EPA Guidance notes (2017) and Appendix C of the IGI EIS Preparation Guidelines (IGI 2013), is presented in the following section.

The impact assessment was undertaken using the following considerations:

- **Quality of an Impact:** Described as being Positive, Neutral or Negative.

- **Significance of an Impact:** The significance of each impact was considered as having either an Imperceptible/Not Significant, Slight, Moderate, Significant/Very Significant or Profound impact.

- **Duration of Impacts:** The duration of each impact was considered to be either brief, temporary, short-term, medium-term, long-term or a permanent impact. Brief construction impacts are considered to last a day or so, Temporary impacts last less than one year. Short-term impacts

are seen as impacts lasting one to seven years. Medium-term impacts are impacts lasting seven to 15 years. Long-term impacts are impacts lasting 15 to 60 years and Permanent impacts are impacts lasting over 60 years

7.5.3 Construction Phase Impacts

The lands comprising the proposed development are in the ownership of the applicant. There are no known rights of way across the proposed development site. The office of Public Works (OPW) retain right of access for maintenance purposes along the Rye Water River. Potential impacts that may arise during the construction phase include:

- Contamination of surface water runoff due to construction activities.
- Improper discharge of foul drainage from contractor's compound.
- Cross contamination of potable water supply to construction compound.
- Damage to existing underground and over-ground infrastructure and possible contamination of the existing systems with construction related materials.
- Diversion of existing ESB lines may lead to loss of connectivity to and / or interruption of supply from the electrical grid.
- Potential loss of connection and/or interruption to the Gas Networks Ireland; and
- Potential loss of connection and/or interruption to the Telecommunications infrastructure while carrying out works to provide service connections.

Without the consideration of mitigation measures the construction phase of the proposed development will likely have a neutral, short-term, moderate impact.

7.5.4 Operational Phase Impacts

Potential operational phase impacts on the water infrastructure are noted below:

- Increased impermeable surface area will reduce local ground water recharge.
- Accidental hydrocarbon leaks and subsequent discharge into piped surface water drainage network (e.g. along roads and in driveway areas).
- Increased maximum discharge to foul drainage network (Maximum Daily Foul Discharge Volume = 256.2m^3).
- Increased potable water consumption (Average Day / Peak Week Demand = 232.9m^3/291.1 m^3).
- Contamination of surface water runoff from foul sewer leaks.

Demand from the proposed development during the operational phase is not predicted to impact on the existing power, gas and telecoms network.

Without the consideration of mitigation measures the operational phase of the proposed development will likely have a neutral, permanent, slight impact.

7.5.5 Human Health

From the perspective of the end user of the networks the risks to human health include:

- Contamination of potable water supply. Further consideration of this risk is provided in Chapter 9 of this report.
- Gas leaks or explosions. The installation of services is tightly monitored and controlled by Gas Networks Ireland to ensure the protection of human health. Therefore, the risk of effect on human health is not considered significant.
- Loss of supply of utilities. This is a managed process that is the responsibility of the individual utility supplier and emergency plans will be in place. The effect is therefore considered brief and not significant.

7.5.6 Unplanned Events

The following accidents & disasters involving built services during the construction phase could potentially give rise to a serious incident putting people at risk:

- Excavation works coming into contact with live electricity lines.
- Excavation works causing damage and leaks to gas mains.

A site-specific Construction and Environmental Management Plan (CEMP) will be developed and implemented during the construction phase to mitigate the risks associated with accidents and disasters. The following accidents & disasters involving built services during the operation phase could potentially give rise to a serious incident putting end users at risk:

- Gas explosions.
- Damaged overhead / underground power lines.
- Severe Storms.

7.5.7 Cumulative Impacts

The proposed surface water drainage infrastructure has been designed in accordance with the relevant guidelines. Any other future development in the vicinity of the site would have to be similarly designed in relation to permitted surface water discharge, surface water attenuation and SuDS, therefore, no potential cumulative impacts are anticipated in relation to surface water drainage and flooding.

No potential cumulative impacts are anticipated in relation to wastewater as Irish Water have advised that provision of a wastewater connection is feasible.

No potential cumulative impacts are anticipated in relation to water supply as Irish Water have advised that provision of a water connection is feasible.

There are 2 No. granted planning applications in close proximity to the development granted under ABP reference PL17.246141 (preceding MCC Reference RA150205) (150 No. units) and MCC reference RA161443 (130 No. Units). They are likely to have similar impacts during the construction phase in relation to Material Assets - Built Services. Should the construction phase of these developments coincide with the development of this proposed site, potential cumulative impacts are not anticipated once similar mitigation measures are implemented. It is anticipated that any construction overlap will likely be in the short term as Phase 1 of Millerstown is anticipated to be completed by Q3 2020.

Without the consideration of mitigation measures the construction phase of the proposed development will likely have a neutral, short-term, slight cumulative impact.

Without the consideration of mitigation measures the operational phase of the proposed development will likely have a neutral, permanent, imperceptible cumulative impact.

7.6 Mitigation

7.6.1 Construction Phase

Please refer to section 9.6 – Water Hydrogeology and Hydrology for mitigation measures associated with the surface water treatment.

Mitigation measures proposed in relation to the drainage and water infrastructure include the following:

- A site-specific Construction and Environmental Management Plan (CEMP) will be developed and implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the CEMP.
- Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate.
- The construction compound will include adequate staff welfare facilities including foul drainage and potable water supply. Foul drainage discharge from the construction compound will be tinkered off site to a licensed facility until a connection to the public foul drainage network has been established.
- The construction compound's potable water supply shall be located where it is protected from contamination by any construction activities or materials.

Relocation of existing ESB infrastructure will be fully coordinated with ESB Networks to ensure interruption to the existing power network is minimized (e.g. agreeing power outage to facilitate relocation of cables). Ducting and / or poles along proposed relocated routes (to be agreed with ESB) will be constructed and ready for rerouting of cables in advance of decommissioning of existing medium and high voltage power lines to minimize outage durations.

Similarly, relocation of overhead telecommunication lines running through the site will be coordinated with Eir to minimize interruption and ensure that all works are carried in a safe manner. As there are no gas networks running through the site relocation will not be necessary.

7.6.2 Operational Phase

Please refer to section 9.6 – Water Hydrogeology and Hydrology for mitigation measures associated with the surface water treatment.

All new foul drainage pipes will be pressure tested and will be subject to an internal CCTV survey in order to identify any possible defects prior to being made operational.

No additional mitigation measures are proposed in relation to water supply, however water conservation measures such as dual flush water cisterns and low flow taps will be included in the design.

On completion of the construction phase no further mitigation measures are proposed in relation to the electrical, gas and telecommunications infrastructure.

7.7 Residual Impact

7.7.1 Construction Phase

Implementation of the measures outlined in Section 9.6 will ensure that the potential impacts of the proposed development on water supply, drainage and utilities do not occur during the construction phase and that any residual impacts will be moderate, short term and will have a neutral effect on the proposed development. Refer to table 3.3 of the EPA document 'Guidelines on the information to be contained in Environmental Impact Assessment Reports (2017)' for more information.

7.7.2 Operational Phase

As surface water drainage, foul water drainage and watermain design has been carried out in accordance with the relevant guidelines, there are no predicted residual impacts on the drainage and water supply arising from the operational phase.

All utilities ducting and diversion will be carried out as per the supplier standards and instructions, therefore the residual impacts are expected to be permanent but imperceptible from the operational phase and will have a neutral impact on the development.

7.7.3 Worst Case Scenario

The following accidents & disasters involving built services during construction could potentially give rise to a serious incident putting people at risk:

- Excavation works coming into contact with live electricity lines.
- Excavation works causing damage and leaks to gas mains.
- Excavation works causing damage to wastewater pipelines and resulting in contamination of the surrounding ground and surface water network.

A site-specific CEMP will be developed and implemented during the construction phase to mitigate the risks associated with accidents and disasters.

The following accidents & disasters involving built services during operation could potentially give rise to a serious incident putting end users at risk:

- Gas explosions. The installation of services is tightly monitored and controlled by Gas Networks Ireland to ensure the protection of human health. The probability of this event occurring is unlikely. Therefore, the risk of effect on human health is not considered significant.
- Contamination of potable water supply. This risk is not considered significant as water quality is tightly monitored by Irish Water. The probability of this event occurring is unlikely Further consideration is given to this in Chapter 9 of this report.

7.7.4 Monitoring

Please refer to section 4.6 – Water Hydrogeology and Hydrology for the proposed monitoring in relation to the surface water.

No specific monitoring is proposed in relation to the remaining material assets infrastructure.

7.8 References

- Greater Dublin Strategic Drainage Study (2005)

- IS EN 752 (2017) Drain and sewer systems outside buildings - sewer system management
- IS EN 12056 (2000) Gravity drainage systems inside buildings. Sanitary pipework, layout and calculation
- Irish Water Code of Practice for wastewater infrastructure
- Irish Water Standard Details for wastewater infrastructure
- Irish Water Code of Practice for water infrastructure
- Irish Water Standard Details for water infrastructure
- Directive 2014/52/EU of the European parliament and of the council of 16 April 2014
- Guidelines on the information to be contained in environmental impact assessment reports (2017)
- Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (2013)

CHAPTER 8
LAND & SOILS

DECEMBER 2019

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8 Land & Soils

8.1 Introduction

This chapter of the EIAR comprises of an assessment of the likely impact of the proposed development on soils and the geological environment as well as identifying proposed mitigation measures to minimize any impacts.

Refer to Chapter 2 (Description of Development) for a detailed site and development description. This Chapter should be read in conjunction with Chapter 6 (Material Assets – Traffic & transport), Chapter 7 (Material Assets – Built Services and Chapter 9 (Water & Hydrology).

8.1.1 Statement of Competence

In accordance with Article 5(3)(a) of the EU Directive, by appointing DBFL, the applicant has ensured that this chapter has been prepared by "competent expert".

This Chapter has been prepared Brendan Manning BEng (Hons) CEng MIEI, who has over 10 years' experience in civil engineering and the construction industry.

8.2 Proposed Development

Site development works will include stripping of the 0.2m to 0.4m thick topsoil layer. It is expected that all stripped topsoil will be reused on site, incorporated into landscaping of back gardens and public open spaces. Excavation of subsoil layers will be required in order to allow road construction, foundation excavation, drainage and utility installation and provision of underground attenuation of surface water. Where feasible, excavated material will be reused as part of the site development works (e.g. use as fill material). Where bedrock is encountered in excavations, the rock will be crushed, screened and tested for use within the designed works as fill material for road construction and backfill to service trenches.

8.3 Methodology

An analysis of the predicted impacts of the proposed development on the land and soils/geology during and after the construction phase, as per Annex IV of Directive 2014/52/EU, EPA Guidance notes (2017) and Appendix C of the IGI EIS Preparation Guidelines (IGI 2013), is presented in the following section.

- The impact assessment was undertaken using the following considerations: **Quality of an Impact:** Described as being Positive, Neutral or Negative.

- **Significance of an Impact:** The significance of each impact was considered as having either an Imperceptible/Not Significant, Slight, Moderate, Significant/Very Significant or Profound impact.

- **Duration of Impacts:** The duration of each impact was considered to be either brief, temporary, short-term, medium-term, long-term or a permanent impact. Brief construction impacts are considered to last a day or so, Temporary impacts last less than one year. Short-term impacts are seen as impacts lasting one to seven years. Medium-term impacts are impacts lasting seven to 15 years. Long-term impacts are impacts lasting 15 to 60 years and Permanent impacts are impacts lasting over 60 years

This assessment meets the requirements for an EIAR, as outlined in the relevant National and EU 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports legislation,

and has been prepared in accordance with the Environmental Protection Agency (EPA) guidance documents, 2017'

The appraisal methodology considered a description of the impact i.e. the "quality" of the effects (i.e. whether it is adverse or beneficial), the "significance" of the effects (i.e. the magnitude of the effect in terms of the environment), the "probability" of the event occurring, and the "duration" of the effects (i.e. whether it is short or long term) and also considers the significance/sensitivity of the existing environment. Terminology for describing the quality, significance, extent, probability and duration of effects is set out in Section 3.7.3 of the EPA EIAR guidance.

Description of the baseline environment and the assessment of the likely impact of the proposed development on soils and the geological environment included the following activities:

- Preliminary Ground Investigations.
- Review of information available on the Geological Survey of Ireland (GSI) online mapping service.
- Preliminary Ground Investigations for the proposed development were carried out by Ground Investigations Ireland Limited in April 2019 and included the following scope of work within the subject site:
- 7 No. Trial Pits.
- 7 No. Infiltration Tests.

Refer to **Appendix 8.1** Ground Investigation Report (Ground Investigations Ireland Limited, Issue Date 29 April 2019).

8.4 Existing Environment (Baseline)

8.4.1 Soils

The Soil Map of Ireland (1980) indicates the predominant soil type in the Kilcock area as Gleys, which is a waterlogged grey soil. Review of information available on the Geological Survey Ireland (GSI) online mapping service (Teagasc Soils and Subsoils Map) shows that the majority of the site's topsoil layer consists of a "mineral poorly drained (mainly basic)", while the southern end of the site consists of a topsoil layer described as "shallow poorly drained mineral (mainly basic)". The vast majority of the site is underlain by a subsoil layer described as "till derived from limestones" except for the southern end of the site which is underlain by a subsoil layer described as 'gravels derived from Limestones' and "Alluvium". Refer to **Figure 8.1** and **Figure 8.2** below.

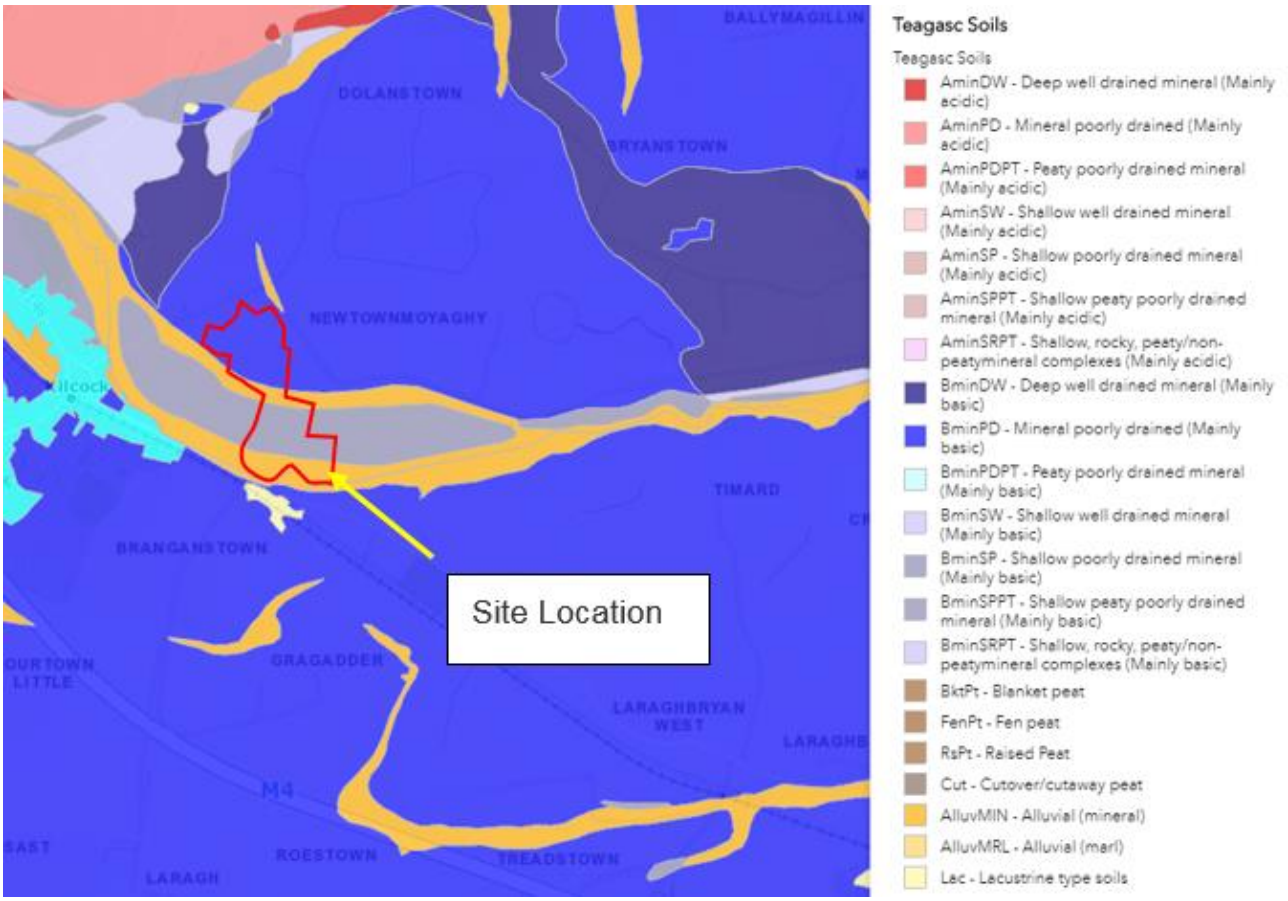

FIGURE 8-1 EXTRACT FROM TEAGASC SOIL MAP

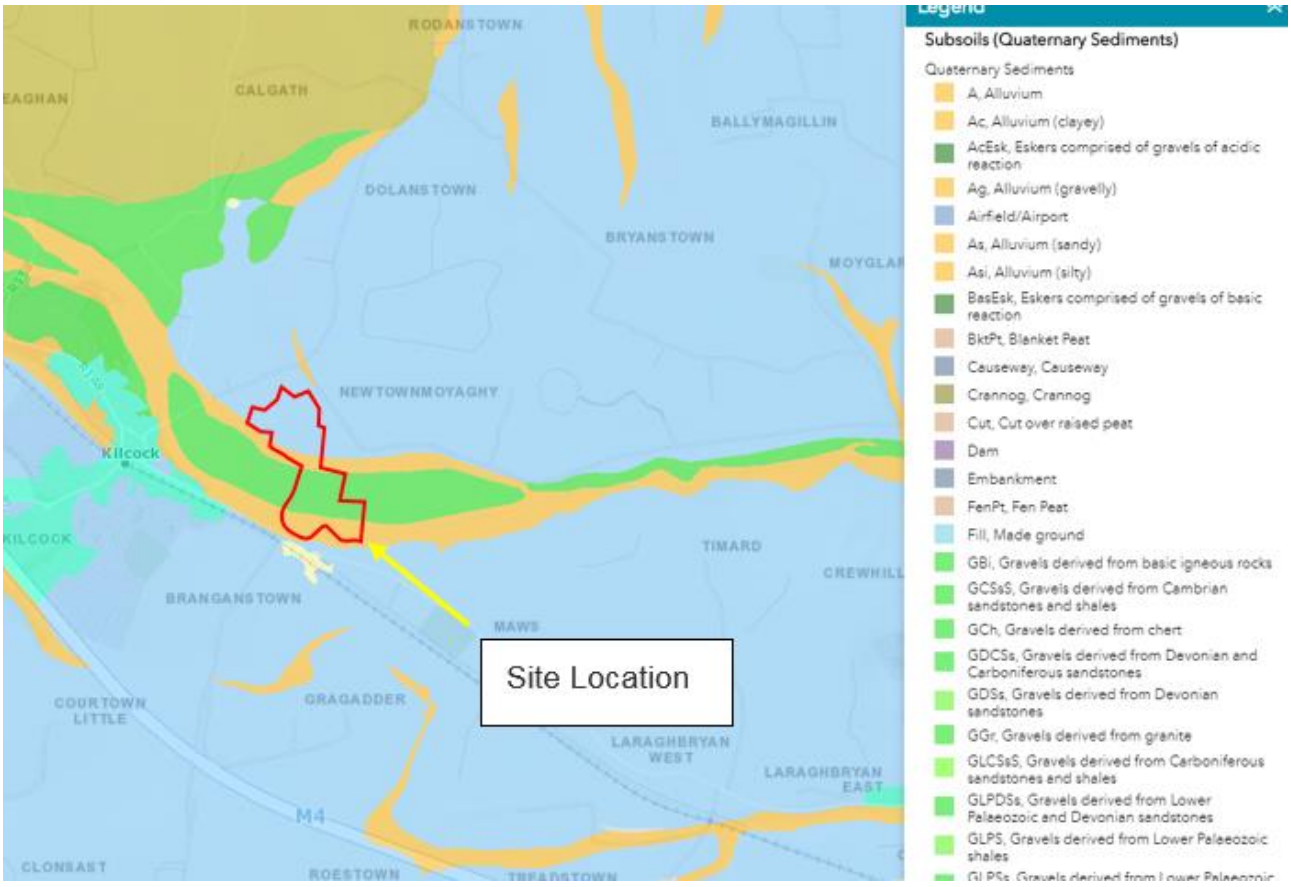

FIGURE 8-2 EXTRACT FROM TEAGASC SUBSOIL MAP

A Preliminary Site investigation carried out by Ground Investigations Ireland indicate that the subsoil material generally comprises brown sandy gravely clay. This brown gravely clay generally overlies brown fine to coarse gravel and is interspersed elsewhere with upper layers of both soft and firm sandy brown clay. The Preliminary Ground Investigation (**Appendix 8.1**) is summarized as follows;

- Maximum topsoil depths of 0.3m were encountered.
- Made ground up to a depth of 0.45m was encountered in SA07.
- Cohesive Deposits were encountered between made ground described typically as brown sandy gravelly CLAY
- Granular deposits were encountered at the base of the cohesive deposits and are typically described as fine to coarse gravel.
- Groundwater was encountered at trial pit 03 and 04 at a depth of 1.80m and 2.10m
- Rock was not encountered in the Preliminary Site Investigation.
- All Infiltration tests carried out indicated negligible soakage rates.

Broad Physiographic Divisions	Number	Principal Soil	Associated Soils	Correlation with Soil Map of Europe	Parent Material
Flat to undulating lowland	25	Gleys *	Grey Brown Podzolics	Dystric Gleysols, Gleyic Luvisols	Limestone-Sandstone-Shale Till
* Dominantly influenced by surface water impedance.					

TABLE 8-1 EXTRACT FROM SOIL MAP OF IRELAND TABLES (RELEVANT TO KILCOCK)

8.4.2 Geology

The proposed development site is underlain by “Calp” Limestone (dark grey to black limestone and shale), as indicated on the Geological Survey of Ireland, Geology of Kildare and Wicklow, Sheet 16. The term “Calp” is used to refer generally to the various units of basinal limestone and shale within the map area (i.e. GSI Sheet 16).

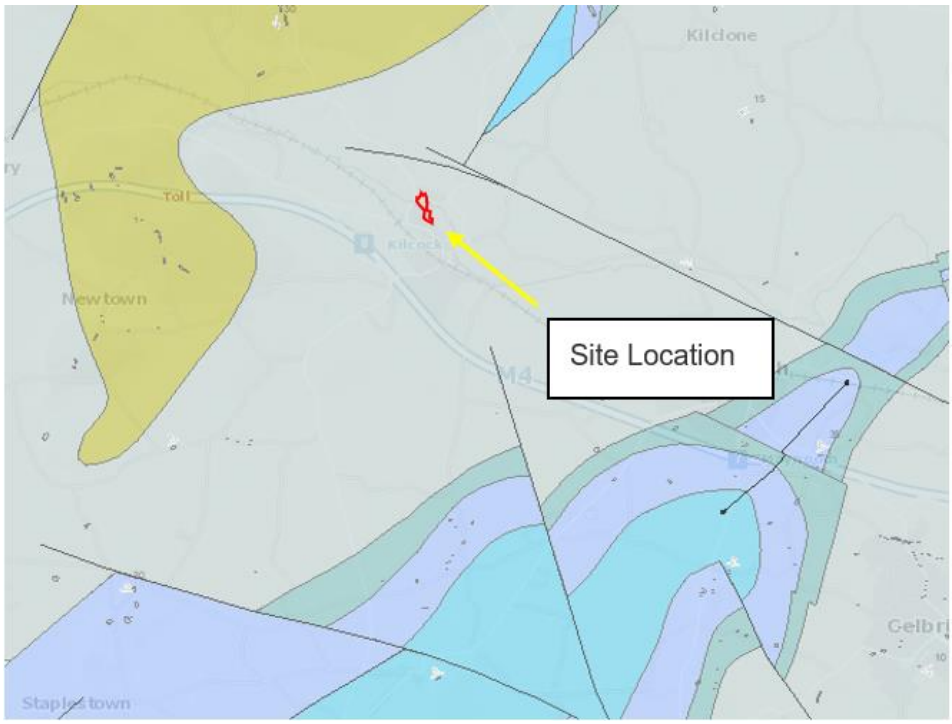

FIGURE 8-3 BEDROCK GEOLOGY MAP FOR KILCOCK

The “Calp” represents the basinal facies of the post Waulsortian / Ballysteen / Boston Hill succession. This is a very variable interval but is dominated by low permeability, fine grained and argillaceous limestone and shales. It is generally unproductive. There are more permeable strata within this unit that are thought to be responsible for the higher than expected well yield that are encountered in different parts of the outcrop area.

The GSI bedrock aquifer map indicates an ‘LI Aquifer’, Locally Important Aquifer, bedrock which is Moderately Productive only in Local Zones, as shown on the figure below.

FIGURE 8-4 AQUIFER CLASSIFICATION MAP FOR KILCOCK

The groundwater vulnerability map for County Meath indicates a general vulnerability rating for the road development lands as high.

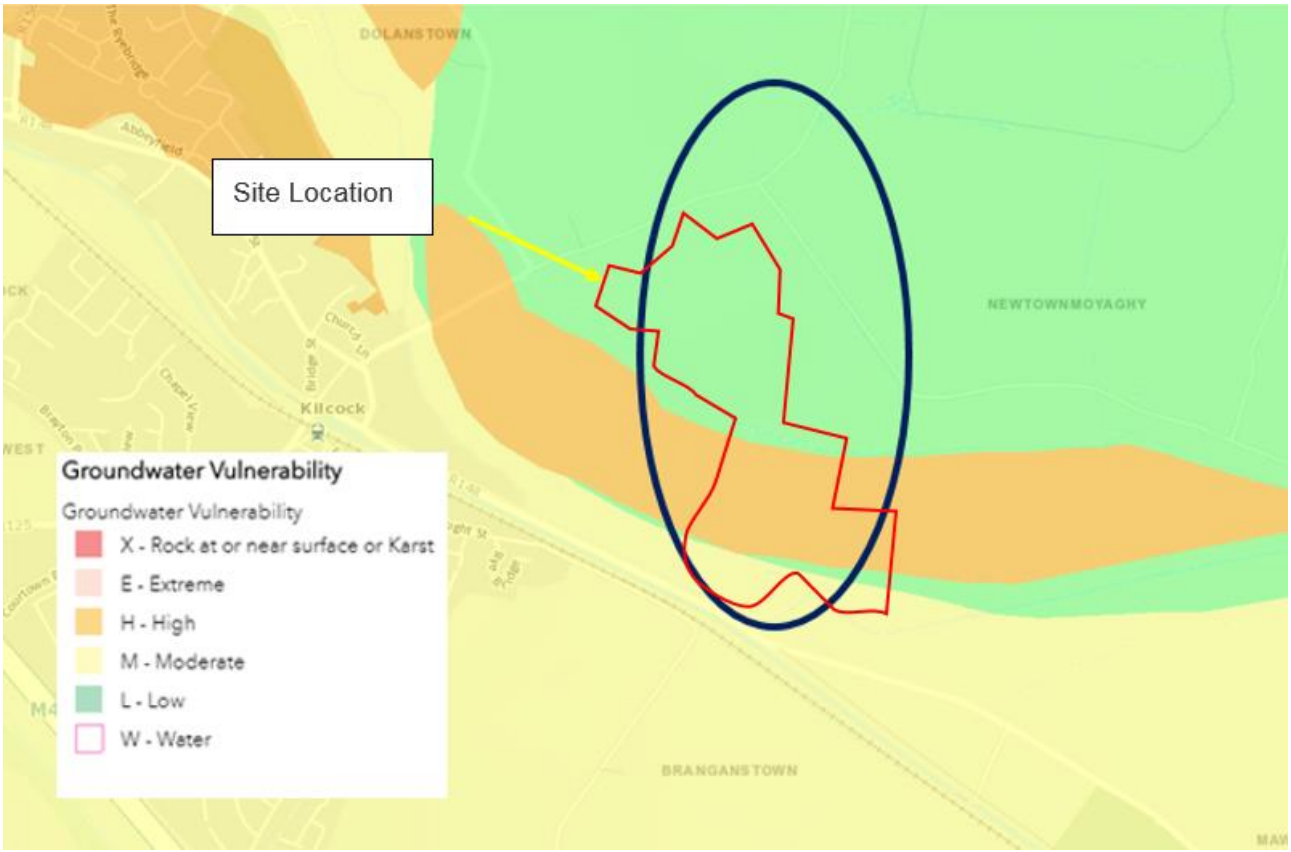

FIGURE 8-5 EXTRACT FROM GSI MAPPING SERVICE (GROUNDWATER VULNERABILITY)

As part of the ground investigation trial pits up to a depth of 3m did not encounter bedrock for the development. Additionally, a borehole sunk on the southern end of the distributor road down to a maximum drilling depth of 5.3m, did not encounter bedrock.

8.4.3 Radon Risk

A review of the EPA's online mapping service ("Radon Map") shows that between five and ten per cent of the homes in this 10km grid square are estimated to be above the reference level of 200 bequerel per cubic metre (Bq/m3). Refer to figure 8.6 below. development lands as high.

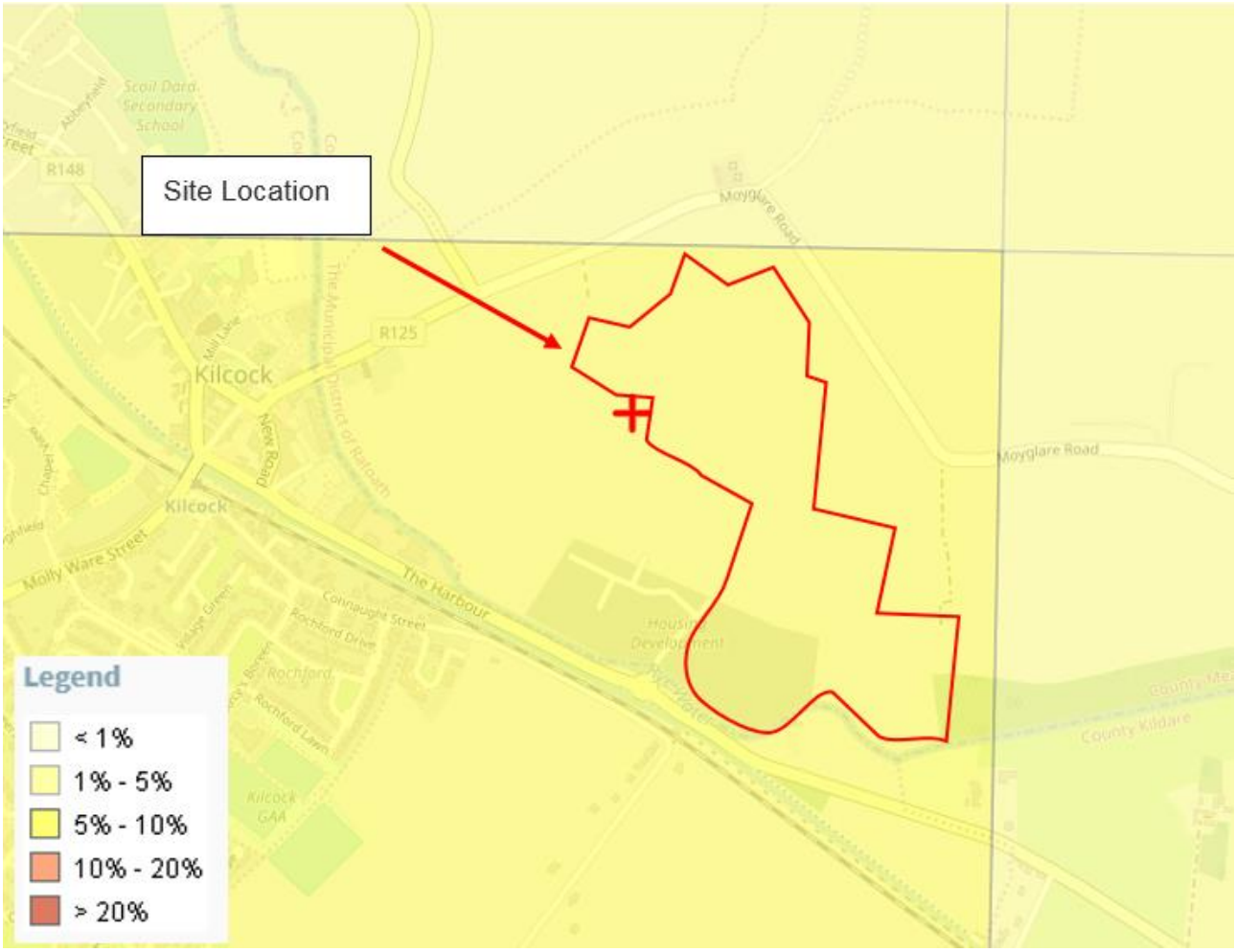

FIGURE 8-6 EXTRACT FROM EPA MAPPING SERVICE (RADON MAPPING)

8.5 Difficulties Encountered

There were no difficulties encountered in compiling and assessing the data for this section of the EIAR.

8.6 Impact Assessment

8.6.1 Do Nothing Scenario

There will be no impact on soils and the geological environment if the development does not proceed.

8.6.2 Construction Phase Impacts

This section identifies a list of likely and significant impacts to the soil and geology of the subject site caused by the construction of the proposed development in Kilcock.

8.6.2.1 Stripping of Topsoil

Removal of the existing topsoil layer will be required across the site. As noted previously, it is expected that all stripped topsoil will be reused on site (incorporated into landscaping of back gardens and public open spaces). **Table 8.2** gives the approximately topsoil material volumes to be handled.

Stripping of topsoil will result in exposure of the underlying subsoil layers to the effects of weather and construction traffic and may result in subsoil erosion and generation of sediment laden runoff. The impact of these works will have a slight impact and negative effect over the short term. Mitigation measures outlined in section 8.7 will be employed to reduce the residual effect on stripping of topsoil.

	Volume (m^3)
Topsoil Strip (300mm thick layer)	72,000
Topsoil Reuse (landscaping of open spaces etc.)	65,000

TABLE 8-2 PRELIMINARY ESTIMATED TOPSOIL VOLUMES (APPROXIMATE)

8.6.2.2 Excavation of Subsoil Layers

Excavation of existing subsoil layers will be required in order to allow road construction, foundation excavation, drainage and utility installation and provision of surface water attenuation facilities. **Table 8.3** gives the approximately cut and fill material volumes to be handled.

Where feasible, excavated material will be reused as part of the site development works (e.g. use as fill material beneath houses and roads) however, unsuitable excavated subsoil is expected and will have to be removed to an approved landfill. The impact of these works will have a slight impact and negative effect over the short term. Mitigation measures outlined in section 8.7 will be employed to reduce the residual effect on excavation of topsoil layers.

	Volume (m^3)
Cut	50,000
Fill	36,000
Removal of Unsuitable Material	14,000

TABLE 8-3 ESTIMATED CUT/FILL VOLUMES (APPROXIMATE)

To negate the need for soil and sub-soil to be removed or imported for the proposed works finished building levels etc for the subject lands have been optimized, to maximize the reuse of excavated material and to minimize where possible the volume of material requiring disposal from and importation to the site.

The level of the local access roads and floor levels has been raised in the vicinity of the Rye Water and Upper Ditch flood plains of the Upper Ditch so that an adequate freeboard exists above the 100 year flood levels associated with that watercourse. The distributor road and development area has also been raised at the southern end of the site so that it ties in with the existing R148 and also to provide sufficient freeboard above the flood level identified along the Rye Water River at that location.

8.6.2.3 Construction Traffic

Earthworks plant (e.g. dump trucks) and vehicles delivering construction materials to site (e.g. road aggregates, concrete deliveries etc.) have potential to cause rutting and deterioration of the topsoil layer and any exposed subsoil layers, resulting in erosion and generation of sediment laden runoff. This issue can be particularly noticeable at site access points (resulting in deposition of mud and soil on the surrounding road network). Dust generation can also occur during extended dry weather periods as a result of construction traffic.

The impact of these works will have a slight impact and neutral effect over the short term. Mitigation measures outlined in section 8.7 will be employed to reduce the residual effect on stripping of topsoil.

8.6.2.4 Accidental Spills and Leaks

During the construction phase there is a risk of accidental pollution from the sources noted below. Accidental spills and leaks may result in contamination of the soils underlying the site.

- Storage of oils and fuels on site
- Oils and fuels leaking from construction machinery
- Spillage during refueling and maintenance of construction machinery
- Use of cement and concrete during construction works

It is considered that impact of any accidental spills or leaks could have a significant negative effect over the short term. However, with the implementation of mitigation measures outlined in section 8.7 the residual effect is minimized and it is considered unlikely that any accidental spills or leaks would occur.

8.6.2.5 Geological Environment

Rock was not encountered in any of the trial pits excavated as part of the preliminary ground investigation. Additionally, rock was not encountered on boreholes taken from the link road previously to depths of up to 5.3m. Therefore, it is not expected that the installation of drainage will require excavation of bedrock. Notwithstanding this, excavations associated with development of the site have been designed as shallow as possible in the unlikely event that rock is encountered. Where bedrock is encountered it will be crushed, screened and tested for use within the designed works.

A more detailed Ground Investigation will be undertaken prior to construction to verify the Preliminary Ground Investigation.

Based on the above and the fact that rock was not encountered it is considered unlikely that there will be any effect on the bedrock geology during construction.

Without the consideration of mitigation measures the construction phase of the proposed development will likely have a Neutral, Short Term, Moderate cumulative impact.

8.6.2.6 Operational Phase Impacts

On completion of the construction phase, there will be no further impact on soils and the geological environment.

8.6.2.7 Cumulative Impacts

There are 2 No. granted planning applications in close proximity to the development granted under ABP reference PL17.246141 (preceding MCC Reference RA150205) (150 No. units) and RA161443 (130 No. Units). Given the scale of the proposed development and the capacity of the surrounding environment to accommodate developments of this nature, it is considered that the overall cumulative development in this area will have a moderate, long term impact on the land, soils and geology of the area via the proposed structures, roads, infrastructure etc for residential development on the subject site. However, with the detailed mitigation measures in place, as required under this EIAR and in the following section, the overall impact on land and soils will be permanent, not significant and have a neutral effect.

8.7 Mitigation

8.7.1 Construction Phase

8.7.1.1 Stripping of Topsoil

Stripping of topsoil will be carried out in a controlled and carefully managed way and coordinated with the proposed staging for the development.

At any given time, the extent of topsoil strip (and consequent exposure of subsoil) will be limited to the immediate vicinity of active work areas.

Topsoil stockpiles will be protected for the duration of the works and not located in areas where sediment laden runoff may enter existing surface water drains. These stockpiles will be monitored throughout the construction phase.

Topsoil stockpiles will also be located so as not to necessitate double handling.

8.7.1.2 Excavation of Subsoil Layers

The design of road levels and finished floor levels has been carried out in such a way as to minimize cut/fill type earthworks operations.

The duration that subsoil layers are exposed to the effects of weather will be minimized. Disturbed subsoil layers will be stabilized as soon as practicable (e.g. backfill of service trenches, construction of road capping layers, construction of building foundations and completion of landscaping).

Similar to stripped topsoil, stockpiles of excavated subsoil material will be protected for the duration of the works. Stockpiles of subsoil material will be located separately from topsoil stockpiles. These stockpiles will be monitored throughout the construction phase. Monitoring of ground conditions and stability of excavations will be monitored on an on-going basis.

Measures will be implemented to capture and treat sediment laden surface water runoff (e.g. sediment retention ponds, surface water inlet protection and earth bunding adjacent to open drainage ditches).

8.7.1.3 Weather Conditions

Typical seasonal weather variations will also be taken account of when planning stripping of topsoil and excavations with an objective of minimising soil erosion and silt generation. The approach of extreme weather events will be monitored to inform near-term operational activities.

8.7.1.4 Surface Water Runoff

Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate. Monitoring of these sediment control measures will be undertaken throughout the construction phase.

Discharge from any vehicle wheel wash areas is to be directed to on-site settlement ponds.

On-site settlement ponds are to include geotextile liners and riprapped inlets and outlets to prevent scour and erosion.

Concrete batching will take place off site, wash down and wash out of concrete trucks will take place off site and any excess concrete is not to be disposed on site

Surface water discharge points during the construction phase are to be agreed with Meath County Council's Environment Section prior to commencing works on site

8.7.1.5 Water Pumped From Excavations

Rainwater pumped from excavations is to be directed to on-site settlement ponds.

Groundwater pumped from excavations is to be directed to on-site settlement ponds.

On-site settlement ponds are to include geotextile liners and riprapped inlets and outlets to prevent scour and erosion. Monitoring of same will be undertaken.

Surface water discharge points during the construction phase will be agreed with Meath County Council prior to commencing works on site.

8.7.1.6 Construction Traffic

Earthworks plant and vehicles delivering construction materials to site will be confined to predetermined haul routes around the site.

Vehicle wheel wash facilities will be installed in the vicinity of any site entrances and road sweeping implemented as necessary in order to maintain the road network in the immediate vicinity of the site. The cleanliness of the adjacent road network will be monitored throughout the construction phase.

Dust suppression measures (e.g. dampening down) will be implemented as necessary during dry periods.

A construction traffic management plan will be prepared by the contractor prior to any works commencing on site.

8.7.1.7 Accidental Spills and Leaks

In order to mitigate against spillages contaminating underlying soils, all oils, fuels, paints and other chemicals will be stored in a secure bunded hardstand area.

Refueling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any surface water inlets and outlets (when not possible to carry out such activities off site).

A response procedure shall be put in place to deal with any accidental pollution events and spillage kits shall be available and construction staff will be familiar with the emergency procedures and use of the equipment.

Monitoring of all fuel / oil storage areas will be undertaken and spill kits will be available on site.

8.7.1.8 Geological Environment

A more detailed Ground Investigation will be undertaken prior to construction to verify the Preliminary Ground Investigation and where possible the works will be designed to minimize the bedrock excavation required. At any given time, the extent of exposed bedrock will be limited to the immediate vicinity of active work areas. Where bedrock is encountered, it will be crushed, screened and tested for use within the designed works to reduce the volume of material required to leave site. This will also reduce the volume of material to be imported to the site.

With the consideration of mitigation measures the construction phase of the proposed development will likely have an overall Neutral, Short Term, imperceptible residual impact.

8.7.2 Operational Phase

For the operational phase no specific mitigation measures are proposed as there will be no further impact on soils and the geological environment.

8.8 Residual Impact

8.8.1 Construction Phase

Implementation of the mitigation measures outlined in Section 8.7 will ensure that the potential impacts of the proposed development on soils and the geological environment will be minimised. The residual impact is considered to be not significant for the construction phase and any residual impacts will be short term, and neutral.

The primary residual impact is the removal of material unsuitable for reuse as fill material. This impact is unavoidable given the nature of the proposed development. With the implementation of all mitigation measures these effects will be slight short-term effects that should have a neutral impact on the surrounding environment.

8.8.2 Operational Phase

There are no predicted impacts arising from the operational phase.

8.8.3 Do Nothing Scenario

There are no predicted impacts should the proposed development not proceed.

8.8.4 Worst Case Scenario

The ‘Worst Case Scenario’ in terms of land and soil would be accidental fuel loss from machinery or spillage of fuel during the re-fuelling of construction machinery. This would impact on soil quality which

could contaminate sub-soil and potentially contaminate groundwater. Considering the nature of the proposed development and the absence of a requirement to store large volumes of fuel on site this scenario is considered unlikely.

Another potential 'worst case scenario' would be the collapse of soil from excavations or stockpiles which would pose a risk to human health. This scenario is deemed very unlikely once steep excavations are correctly supported and stockpile heights are managed as per the Construction and Environmental Management Plan (CEMP).

8.9 Monitoring

Proposed monitoring by the main contractor during the construction phase in relation to the soil and geological environment are as follows:

- Adherence to the Construction and Environmental Management Plan (CEMP).
- Construction monitoring of the works (e.g. inspection of existing ground conditions on completion of cut to road sub-formation level in advance of placing capping material, stability of excavations etc.).
- Inspection of fuel / oil storage areas and having spill kits available to hand.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and provision of vehicle wheel wash facilities.
- Monitoring of contractor's stockpile management (e.g. protection of excavated material to be reused as fill, protection of soils for removal from site from contamination).
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.).

No ongoing monitoring is proposed on completion of the construction phase.

8.10 References

- Directive 2014/52/EU of the European parliament and of the council of 16 April 2014
- Guidelines on the information to be contained in environmental impact assessment reports (2017)
- Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (2013)
- Geological Survey Ireland Map Viewer (https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx)
- Environmental Protection Agency (EPA) Map Viewer (https://gis.epa.ie/EPAMaps/)
- Teagsc Map Viewer (http://gis.teagasc.ie/soils/map.php)

CHAPTER 9
WATER & HYDROLOGY

DECEMBER 2019

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9 Water & Hydrology

9.1 Introduction

This chapter of the EIAR comprises of an assessment of the likely impact of the proposed development on the surrounding surface water and hydrogeological environments, as well as identifying proposed mitigation measure to minimize any impacts.

The assessment must consider the potential for non-conformance with the EU Water Framework Directive (WFD) (Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for the Community action in the field of water policy) objectives and ensure that:

- The need for the avoidance and reduction of impacts on the water environment is taken fully into account in the environmental evaluation; and
- The selection of appropriate means of preventing any significant predicted impact is made through modification of the drainage design, choice of discharge location(s) and/or adoption of runoff treatment methods, with the objective of designing-out potential adverse environmental impacts.

It describes water, hydrology and flooding issues associated with the proposed development in accordance with the requirements of the relevant EIA Regulations and guidance on preparation and content of an EIAR, as outlined in Section 9.4.

9.1.1 Statement of Competence

In accordance with Article 5(3)(a) of the EU Directive, by appointing DBFL, the applicant has ensured that this chapter has been prepared by “competent expert”.

This Chapter has been prepared Brendan Manning BEng (Hons) CEng MIEI, who has over 10 years’ experience in civil engineering and the construction industry.

9.2 Proposed Development

Refer to Chapter 2 (Description of Development) for a detailed site and development description. Chapter 9 should be read in conjunction with Chapter 6 (Material Assets – Traffic & transport), Chapter 7 (Material Assets – Built Services), and Chapter 8 (Land & Soils). The proposed development consists of 575 residential units (467 houses, 66 apartments and 42 duplexes), creche, GAA clubhouse, street layout, access and associated site services on a greenfield site. The proposed development is served by enabling infrastructure approved by An Bord Pleanála (ABP) under case reference PL17.238370 (preceding Meath County Council (MCC) planning reference DA/100614).

The proposed surface water drainage network accords with SUDS principles, divides the site into two drainage sub-catchments for the Northern and Southern sites (see **Figure 9.1**). It is proposed to outfall the attenuated surface water collected from the main residential development to the existing Rye Water River and Upper Ditch at a controlled greenfield runoff rate of 33.9 l/sec.

The proposed development’s foul drainage network discharges to an existing 375/450mm diameter foul sewer located in the Link Street, constructed as part of phase 1 of Millerstown (ABP Ref PL 17.246141 (preceding MCC REF RA 150205)). Irish Water in their Confirmation of Feasibility Letter, dated 18th of April 2019, have confirmed capacity is available to serve the proposed development subject to the applicant entering into a connection agreement.

There is an existing public 280/315mm diameter PE 100 water main located in the new link street which runs along the subject sites southern and western boundaries. This 315 diameter PE 100 watermain was constructed as part of the granted development located to the west and east of the new link road (Millerstown Phase 1).

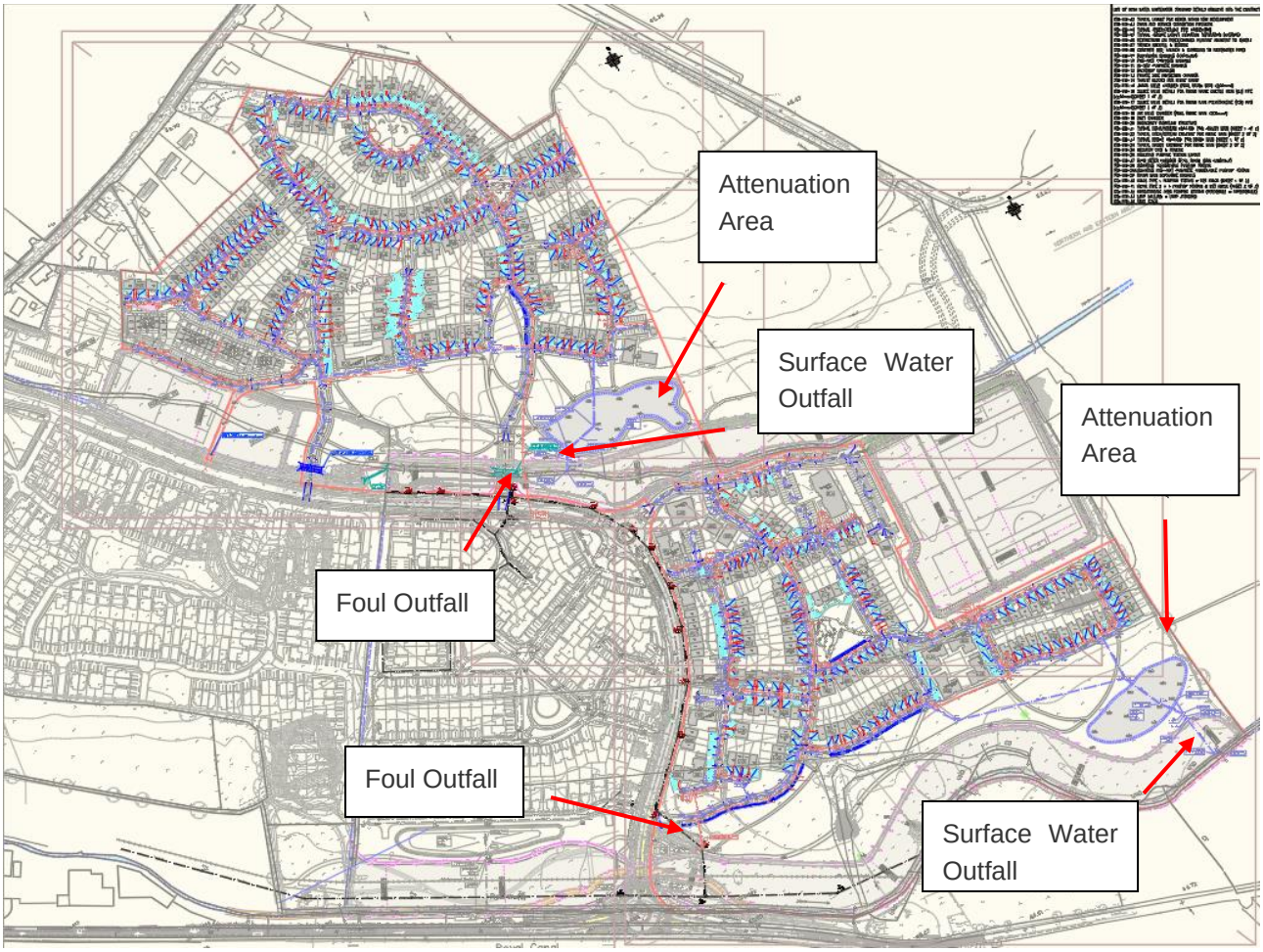

FIGURE 9-1 PROPOSED FOUL AND SURFACE WATER DRAINAGE NETWORKS

9.3 Methodology

This assessment meets the requirements for an EIAR, as outlined in the relevant National and EU legislation, and has been prepared in accordance with the Environmental Protection Agency (EPA) draft guidance documents 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2017'.

The appraisal methodology considered a description of the impact i.e. the "quality" of the effects (i.e. whether it is adverse or beneficial), the "significance" of the effects (i.e. the magnitude of the effect in terms of the environment), the "probability" of the event occurring, and the "duration" of the effects (i.e. whether it is short-term, long-term, etc.) and also considers the significance/sensitivity of the existing environment as required by the EPA EIAR guidance.

Assessment of the likely impacts of the proposed development on the surrounding surface water and hydrogeological environments included the following:

- Site inspection / walkover undertaken on 08th August 2019. No flooding or poor ground conditions observed. We would note the weather was sunny on day of walkover survey
- Review of existing topographic survey information.

- Preliminary ground investigation carried out by Ground Investigations Ireland Limited in April 2019 of 7 No. trial pits and 7 No. infiltration tests.
- Review of utility records obtained from Meath Co. Co. (MCC) and Kildare Co. Co. (KCC).
- Review of Planning Applications in the area with the use of the MCC/KCC Online Planning Applications Service.
- Review of information available on the Environmental Protection Agency (EPA) online mapping service. Use of the 'Water Features' layer to determine the water bodies in the vicinity of the site.
- Review of information available on the Geological Survey of Ireland (GSI) online mapping service. Use of the 'Groundwater Aquifer' and 'Groundwater Vulnerability' layers to determine the groundwater features
- Review of Office of Public Works (OPW) National Flood Hazard Mapping and Catchment Flood Risk Assessment and Management Studies (CFRAM Studies).
- Review of Kilcock Local Area Plan 2015-2021.

Surface water runoff calculations were carried out in accordance with the following guidelines:

- Greater Dublin Strategic Drainage Study (GDSDS). http://www.greaterdublindrainage.com/wp-content/uploads/2011/11/GDSDS-Final-Strategy-Report-April-051.pdf

9.3.1 Impact Assessment Methodology

An analysis of the predicted impacts of the proposed development on the water and hydrology during and after the construction phase, as per Annex IV of Directive 2014/52/EU, EPA Guidance notes (2017) and Appendix C of the IGI EIS Preparation Guidelines (IGI 2013), is presented in the following section.

The impact assessment was undertaken using the following considerations:

- **Quality of an Impact:** Described as being Positive, Neutral or Negative.

- **Significance of an Impact:** The significance of each impact was considered as having either an Imperceptible/Not Significant, Slight, Moderate, Significant/Very Significant or Profound impact.

Duration of Impacts: The duration of each impact was considered to be either brief, temporary, short-term, medium-term, long-term or a permanent impact. Brief construction impacts are considered to last a day or so, Temporary impacts last less than one year. Short-term impacts are seen as impacts lasting one to seven years. Medium-term impacts are impacts lasting seven to 15 years. Long-term impacts are impacts lasting 15 to 60 years and Permanent impacts are impacts lasting over 60 years.

9.4 Baseline Scenario

9.4.1 Hydrology

The subject site is within the Rye Water River Catchment which is a tributary of the River Liffey. The Rye Water River is located immediately to the south of the subject site and the River Liffey is located approximately 15km to the southeast of the subject site (refer to **Figure 9.2** below which is an extract from the Kilcock 2015-2021 LAP). The Rye water River forms part of a Natura 2000 site approximately 5km downstream (Rye Water River/ Carton SAC). It is proposed to outfall the attenuated surface water from the southern site to the Rye Water to the south of the site. The surface water network from the north site outfall to the Upper Ditch which is acts as an overflow for the Rye Water.

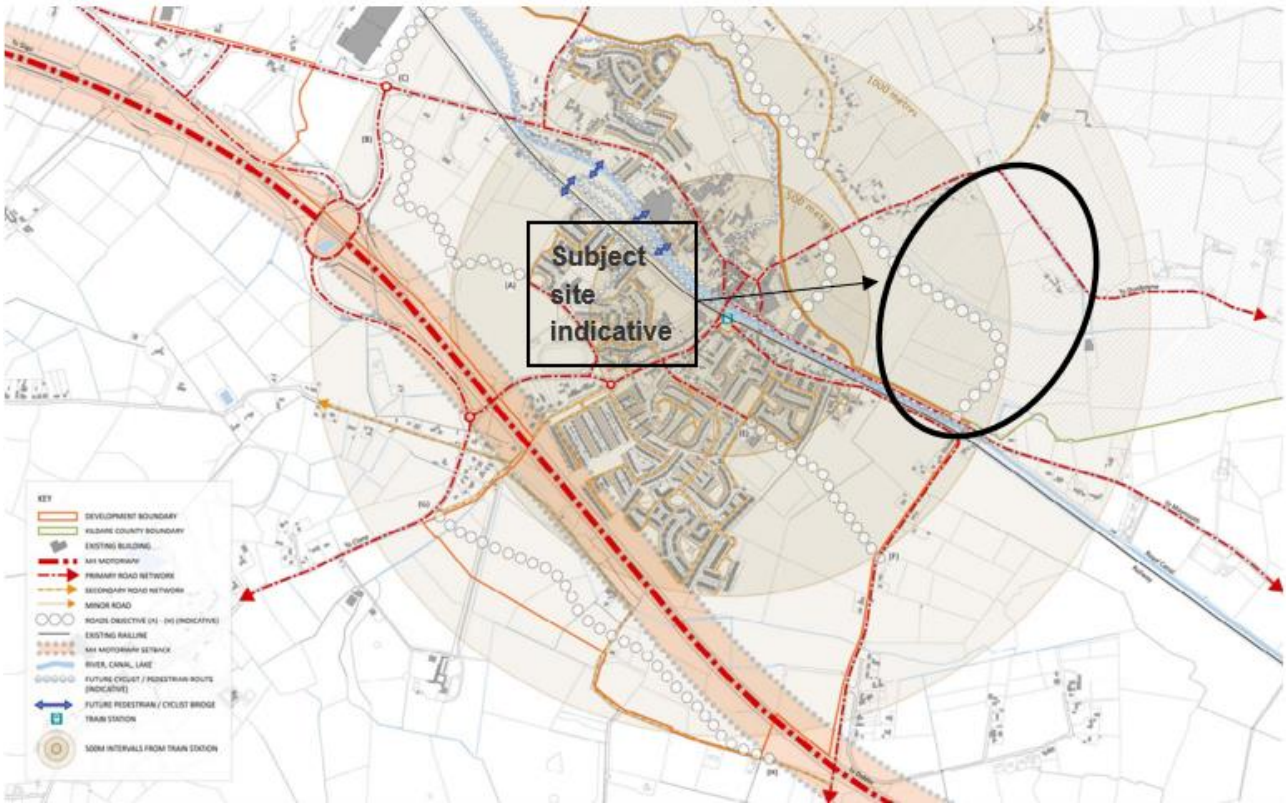

FIGURE 9-2 AQUIFER CLASSIFICATION MAP FOR KILCOCK

The nearest Environmental Protection Agency (EPA) designated watercourse is the Rye River which is located immediately to the west of the subject site and flows in an easterly direction. This a tributary of the River Liffey. The site is within the Rye Water River Water Framework Directive (WFD) Sub-catchment. The River Liffey is approximately 15km to the south east and the coast is approximately 50km to the east.

A topographical survey of the site indicates that the southern site generally slopes to the south towards the Rye Water River, with some of the northern portion of the site sloping towards the 'Upper Ditch', and the northern site slopes in a southerly direction towards the 'Upper Ditch'. Refer to **Figure 9.3** for existing overland flow routes. The site is part of a single surface water catchment as shown in **Figure 9.4** below and is currently drains to the Rye Water River and associated 'Upper Ditch'.

The proposed surface water drainage infrastructure has been designed in accordance with the GDSDS. Please refer to Chapter 7 (Material Assets -Built Services) and a separate Infrastructure Design Report submitted as part of the overall planning submission for further information on drainage. There are 2 No. granted planning applications in close proximity to the development granted by ABP under reference PL17.246141 (preceding MCC Reference RA150205) (150 No. units) and RA161443 (130 No. Units). Both of these consented developments are currently under construction and infrastructure works are substantially complete. For the 150 No. Unit development infrastructure works are substantially complete will well over half of the units occupied. The development is expected to be completed by Q3 2020. The 130No. Unit development commenced in June 2019 and works are expected to be completed by Q3 2021.

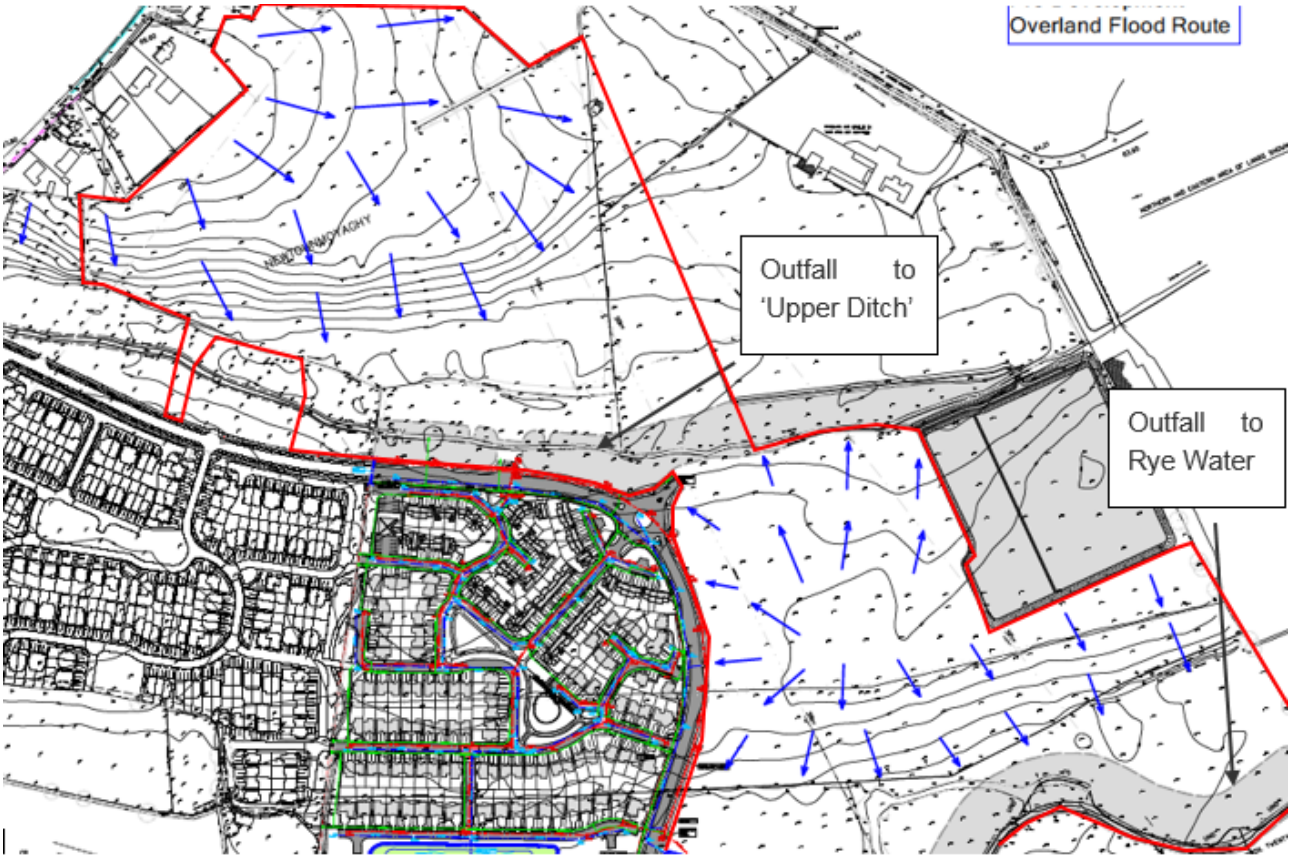

FIGURE 9-3 EXISTING OVERLAND FLOW ROUTES

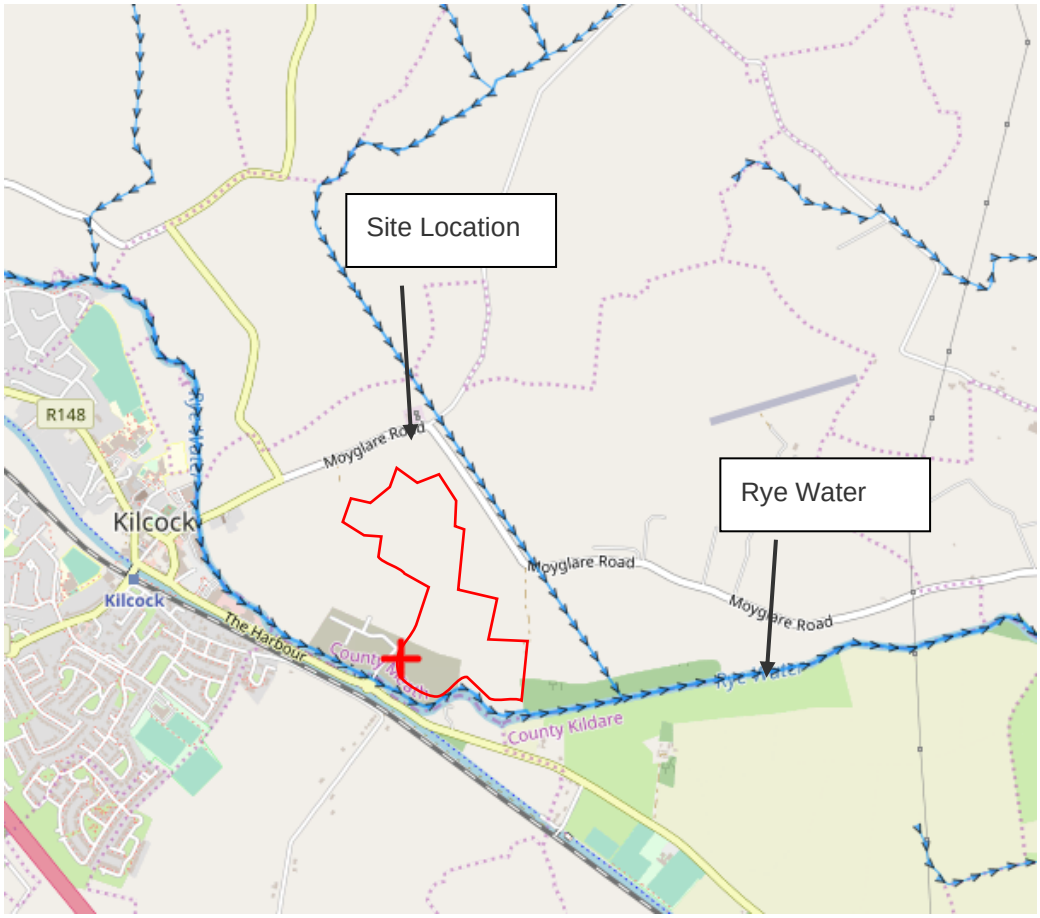

FIGURE 9-4 EXTRACT FROM EPA ONLINE MAPPING SERVICE

The development works include the attenuation of surface water flows to greenfield runoff rates. The proposed development will be attenuated using vortex flow control devices (Hydrobrake or equivalent) at the outfall, limiting the discharge rate to greenfield runoff rates in accordance with the Greater Dublin Strategic Drainage Strategy (GDSDS). SUDs measures, such as permeable paving, swales and detention basins, have been incorporated into the design.

In order to adhere to this requirement, the calculated allowable surface water runoff for the northern site has been calculated as 20.1 l/s and 13.8 l/s for the southern site. It has been determined that a total attenuation volume of 1937 m^3 for the northern site and 1585 m^3 will therefore be required to accommodate for the 100-year storm event (a 20% provision for climate change included), as required by the GDSDS.

The surface water drainage network, attenuation storage and site levels are designed to accommodate a 100-year storm event (a 20% provision for climate change included). Floor levels of houses are set above the 100-year flood levels by a minimum of 0.5m. For storms in excess of 100 years, the development has been designed to provide overland flood routes along the various development roads towards the surface water drainage outfalls at the Rye Water River and associated 'Upper Ditch'. These overland flood routes also reduces the development's vulnerability to climate change.

9.4.2 Hydrogeology

The Geological Survey Ireland (GSI) Online Data Services classifies the aquifer at the subject site as "Locally Important Aquifer – Bedrock which is moderately productive only in local zones".

GSI classifies the site's groundwater vulnerability from low to high as illustrated in **Figure 9.5**. Groundwater Vulnerability is a term used to represent the natural ground characteristics that determine the ease with which groundwater may be contaminated by human activities. Low vulnerability is located in the majority of the subject site. There is a small portion of Moderate to High vulnerability in the southern section of the subject site.

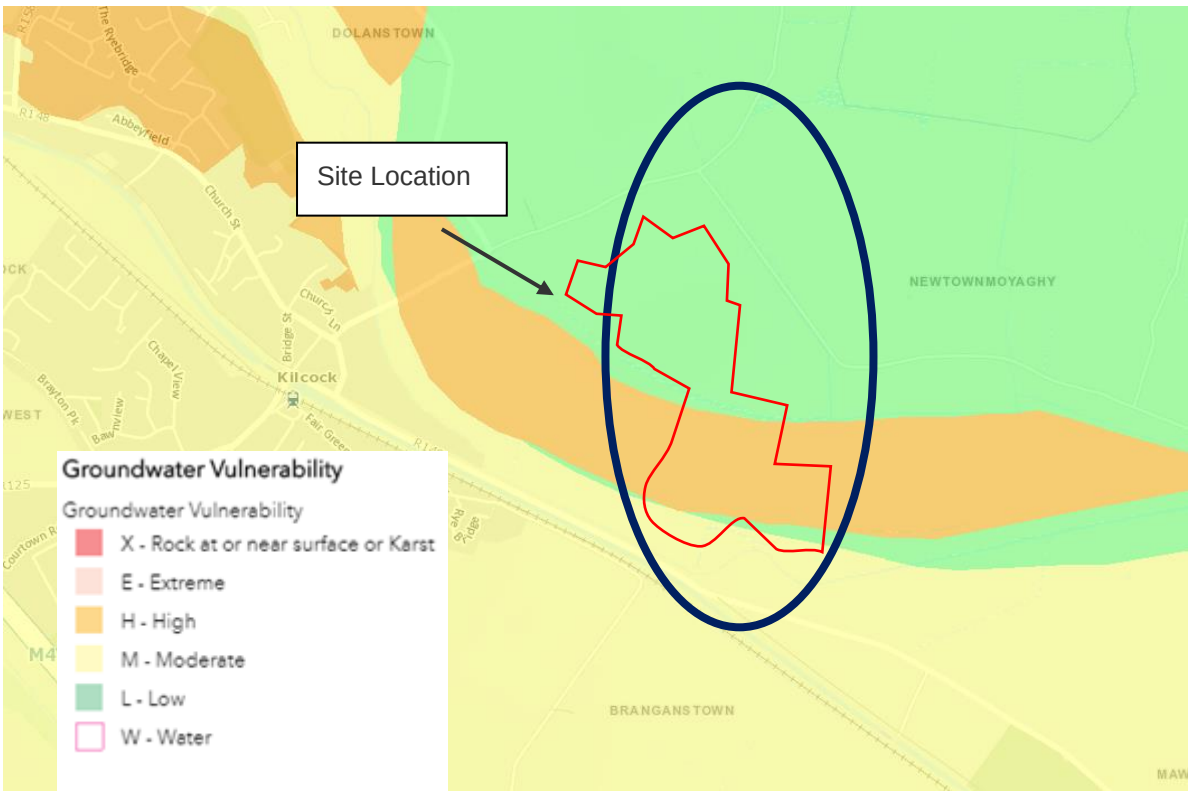

FIGURE 9-5 EXTRACT FROM GSI MAPPING SERVICE (GROUNDWATER VULNERABILITY)

Figure 9.6 below shows the existing groundwater aquifer associated with the proposed development. An aquifer is described as an underground layer of permeable rock, sediment or soil that yields water. Upon review of the GSI mapping service it can be seen that the aquifer in the proposed site is a Bedrock Aquifer which is moderately productive only in local zones.

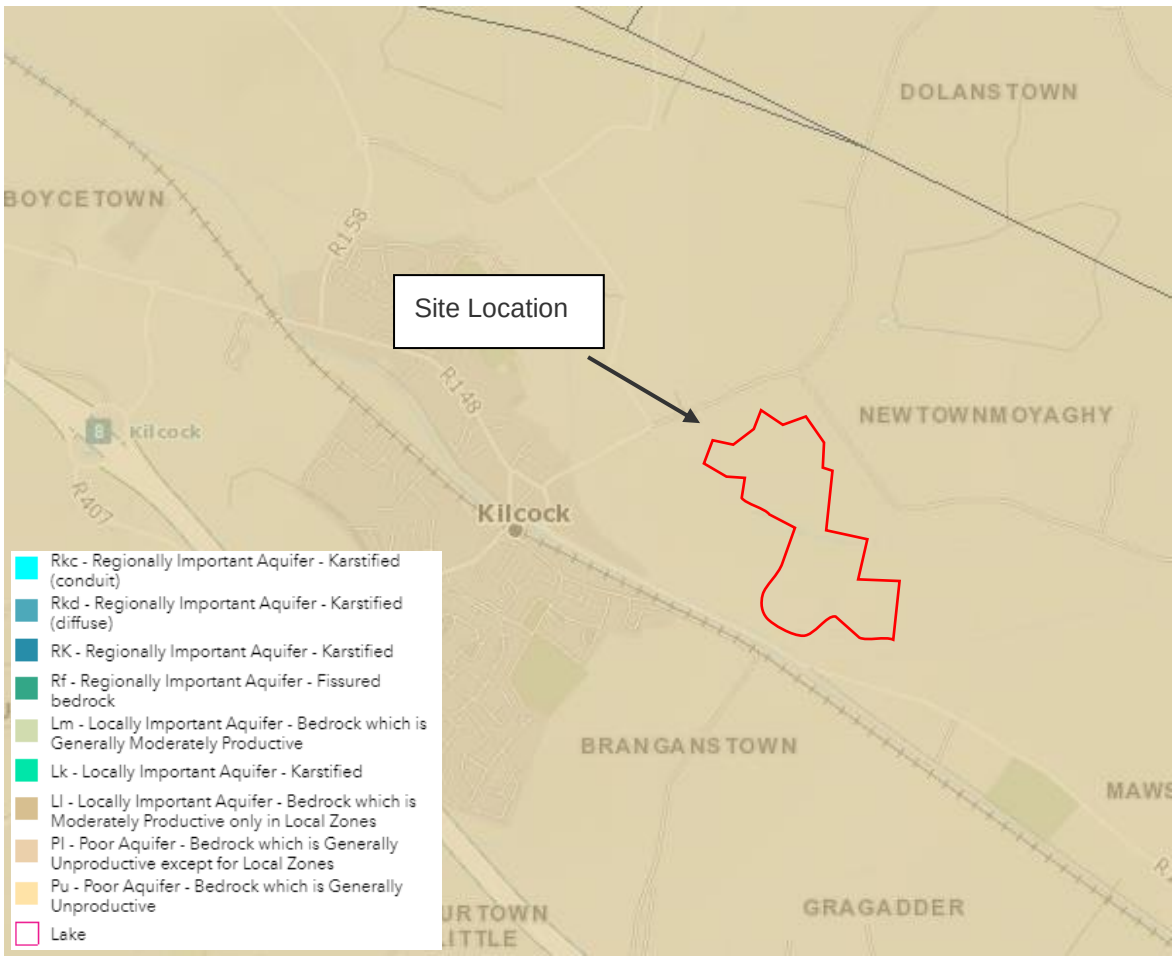

FIGURE 9-6 EXTRACT FROM GSI MAPPING SERVICE (GROUNDWATER AQUIFERS)

From a site investigation was completed in 2019, excavations at 7 soakaway test locations and 7 trial pits locations were carried out to depths ranging from 1.1m to 3m below existing ground level. Groundwater was encountered in SA01, TP03 and TP04 at depths of 2.65m, 2.1m and 1.8m below ground level respectively. Each of the soakpits had poor infiltration so, to err on the side of caution and present a worst case scenario, an infiltration rate of 0 for all attenuation systems proposed was used for this assessment.

During construction, it is anticipated that the deepest excavations will be for the installation of surface water drainage lines and attenuation tanks (up to approximately 4.0m deep).

9.4.3 Flood Risk

DBFL Consulting Engineers has undertaken a separate site-specific flood risk assessment (SSFRA), which is included with the planning application documentation. The SSFRA included a review of information from the Office of Public Works (OPW) National Flood Hazard Mapping (www.floods.ie), the Eastern Catchment Flood Risk Assessment and Management (CFRAM) mapping, Kilcock Flood Risk Assessment and Management Study (FRAMS), Kilcock Local Area Plan (LAP) 2015 and Meath County Development Plan (CDP) 2013 to 2019.

Based on historical Eastern CFRAMs flood mapping some small areas of the sites adjacent to the Rye Water and Upper Ditch are located in the Flood Zones A and B with the vast majority of the site in Flood Zone C (i.e. not at risk of flooding). This mapping was produced prior to the approved flood mitigation works being completed in 2018, refer to **Figure 9.7** below for historical Eastern CFRAMs flood mapping prior to approved flood mitigation works being completed.

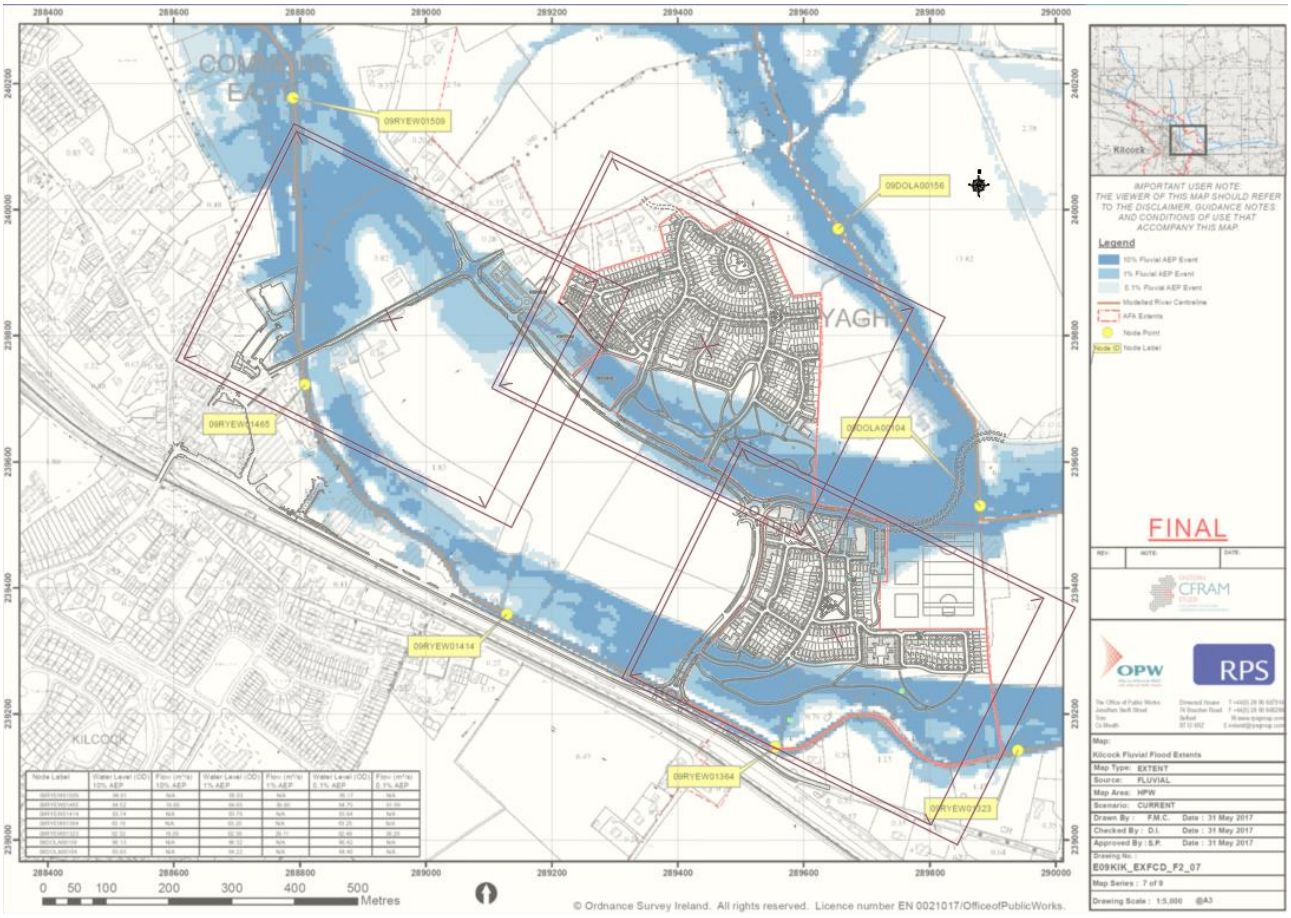

FIGURE 9-7 EASTERN CFRAMS FLOOD MAPPING PRIOR TO FLOOD MITIGATION WORKS

Further to the recommendations of the Kilcock FRAMS for the River Rye Water and it's tributary 'The Upper Ditch', the proposed development site at Newtownmoyaghy, Kilcock is facilitated by the design & implementation of approved flood mitigation measures under ABP Ref PL17.246141. All flood mitigation works were completed in 2018 and these works were confirmed as compliant with the planning permission by Meath County Council. The development is zoned for residential use, has been subjected to a detailed flood risk assessment under this application and the Kilcock FRAMS. Flood mitigation works have been designed and implemented, are in accordance with the consent and Flood Risk Management Guidelines and all flood mitigation works have been approved by Meath Co. Co. Refer to **Figure 9.8** below of Post Flood Mitigation Works Flood Extents Mapping which was produced by RPS. This mapping clearly indicates that all proposed dwellings post approved flood mitigation works are within Flood Zone C (i.e. not at risk of flooding).

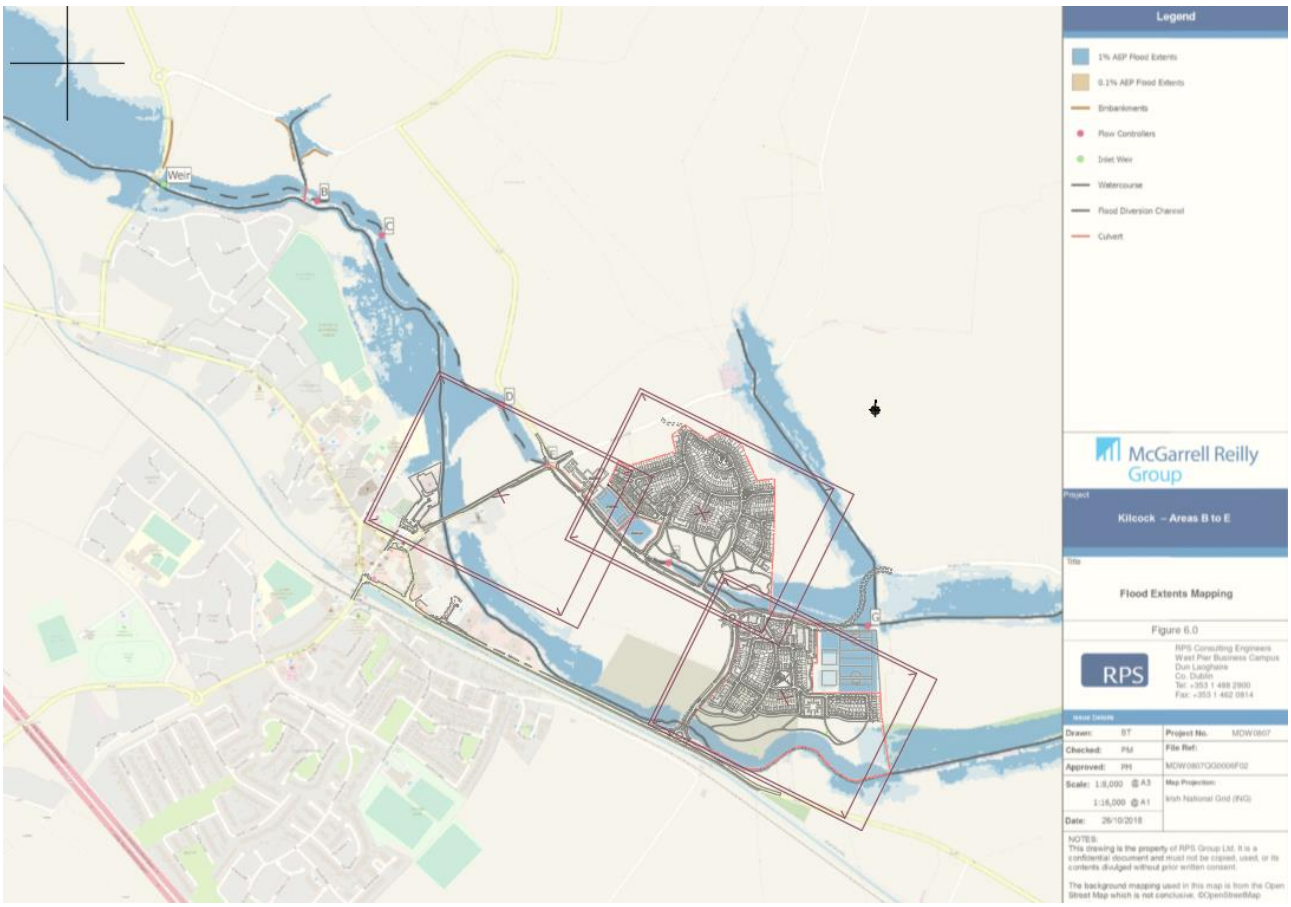

FIGURE 9-8 POST FLOOD MITIGATION WORKS FLOOD EXTENTS MAPPING

Finished floor levels within the proposed development have been set in excess of 500mm above the design 1 in 100 year flood levels of the Rye Water and Upper Ditch. This is in compliance with Policy FR POL 4 of the of the written statement for the Kilcock Environs contained in Volume 5 of the Meath County Development Plan 2013-2019. This is also as per the recommendations of the Kilcock FRAMS, the GDSDS and Flood Risk Management Guidelines.

Sustainable Drainage Systems (SuDS) will be employed to serve the proposed development, ensuring that only clean attenuated surface water from the development will discharge to the Rye Water and the Upper Ditch. Discharge will be restricted to greenfield runoff levels via flow control devices. The proposed development layout design is in accordance with the required standards and will attenuate run-off by providing approximately 3520m^3 of storm-water storage. Therefore, the design will not cause impacts or increase the risk of flooding elsewhere or in adjacent areas.

The development is designed such that new buildings will have freeboard substantially above predicted pluvial flood levels and above potential overland flow paths along roads etc. The development's drainage design provides a significant volume of underground attenuation storage for the 1% AEP return event and, together with various design mitigation measures, meets the drainage design requirements of the Greater Dublin Strategic Drainage Study. Should extreme pluvial flooding occur that is in excess of the development's drainage capacity then overland flood routes to the drainage outfall will protect the development and houses with lower floor levels. Refer to **Figure 9.9** and **9.10** below of Proposed Overland Flow Routes.

FIGURE 9-9 PROPOSED OVERLAND FLOW ROUTE (NORTH SITE)

FIGURE 9-10 PROPOSED OVERLAND FLOW ROUTE (SOUTH SITE)

The development's layout and drainage design have been considered within the context of flood risk and mitigation measures have been recommended for the operation and maintenance of the surface water system. Proposed mitigation measures for flood risk include regular maintenance of the of the proposed drainage system to prevent blockages and overland flow routes are to be provided in the event of any storms exceeding the 1 in 100 Year return period event. These together with provision of attenuated outlets, attenuation storage volume, SUDS drainage features, building and road levels above expected drainage flood levels have been considered in the development's layout and drainage design. The development will not increase flood risk elsewhere and therefore it is concluded that the requirements of the Sequential Test as contained in The Planning System and Flood Risk Management, Guidelines for Planning Authorities are passed for the proposed development layout in the subject Site.

Based on the above all proposed dwellings in the north and south sites are considered to have a very low probability of flooding. We also note that all proposed dwellings are located in zoned lands and all proposed dwellings are located in Flood Zone C (i.e. not at risk of flooding).

9.5 Difficulties Encountered

There were no material difficulties encountered in compiling and assessing the data for this EIAR chapter.

9.6 Impact Assessment

9.6.1 Do Nothing Scenario

There are no predicted impacts should the proposed development not proceed.

9.6.2 Potential Construction Phase Impacts

The Potential impacts for the construction phase of the proposed development are noted below:

- Surface water runoff may contain increased silt levels (e.g. runoff across areas stripped of topsoil) or become polluted by construction activities (Run off from vehicles, cement, oil spills etc).
- Discharge of rainwater pumped from excavations containing increase levels of silt, oil, cement, etc.
- Accidental spills and leaks associated with storage of oils and fuels, leaks from construction machinery and spillage during refuelling and maintenance contaminating the surrounding surface water and hydrogeological environments.
- Concrete runoff, particularly discharge of wash water from concrete trucks.
- Discharge of vehicle wheel wash water containing high silt levels, oil and fuels, cement (potential impact on existing hydrology e.g. discharge to existing surface water drainage infrastructure).
- Discharge of foul water drainage from contractor's compound (impact on existing hydrology e.g. cross-contamination of existing surface water drainage).
- Infiltration of groundwater into excavations.
- Cross-contamination of temporary potable water supply to construction compound.

Without the consideration of mitigation measures the construction phase of the proposed development will likely have a Neutral, Short Term, Moderate impact.

9.6.3 Potential Operational Phase Impacts

Potential operational phase impacts are noted below:

- Increased impermeable surface area will reduce local groundwater recharge rate.
- Increased impermeable surface area will potentially increase surface water runoff rate (if not attenuated to greenfield run-off rate).
- Accidental hydrocarbon leaks and subsequent discharge into piped surface water drainage network (e.g. along roads and in driveway areas).

As noted surface water outflow from the site ultimately discharges to the River Liffey which is the water source for the greater Dublin region. If surface water is not adequately treated and managed in accordance with the GDSDS it has the potential to impact human health.

Surface water drainage for the development has been designed in accordance with the GDSDS therefore the risk to human health has been mitigated.

These impacts are likely and are expected to be slight, permanent and have a neutral effect on the environment.

9.6.4 Potential Risks to Human Health

There is a risk to human health from contamination of the potable water supply from surface water or ground water. The ground water and supply network would present possible pathways such as damaged or incorrectly installed pipes. The risks are considered below.

Groundwater Supply

Considering the low infiltration rates obtained as part of the preliminary site investigation undertaken, by Ground Investigations Ireland, the risk to the contamination of ground water from surface water run-off from the development is considered for each development phase. During the construction phase the impact is considered to be a moderate, neutral short term effect. During the operational phase the impact is considered to be a moderate, neutral permanent effect.

Potable Water Network Supply

The water supply network will not become operational until after construction of the road network. Therefore, there is no risk of contamination at this stage.

The potable water supply will be delivered in new pipework infrastructure in accordance with Irish Water's specification. Therefore, the risk to human health through the water supply network from the road in operation will be very low. The installation of new water supply network will also provide a positive effect to human health in the surrounding areas by way of a controlled network. The overall impact is considered to be a positive, long term, and moderate.

9.6.5 Cumulative Impacts

No potential cumulative impacts are anticipated in relation to foul drainage and water supply. Irish Water have confirmed that wastewater and water connections are feasible with any infrastructure upgrades required. See **Figure 9.11** below for location of Kilcock WWTP.

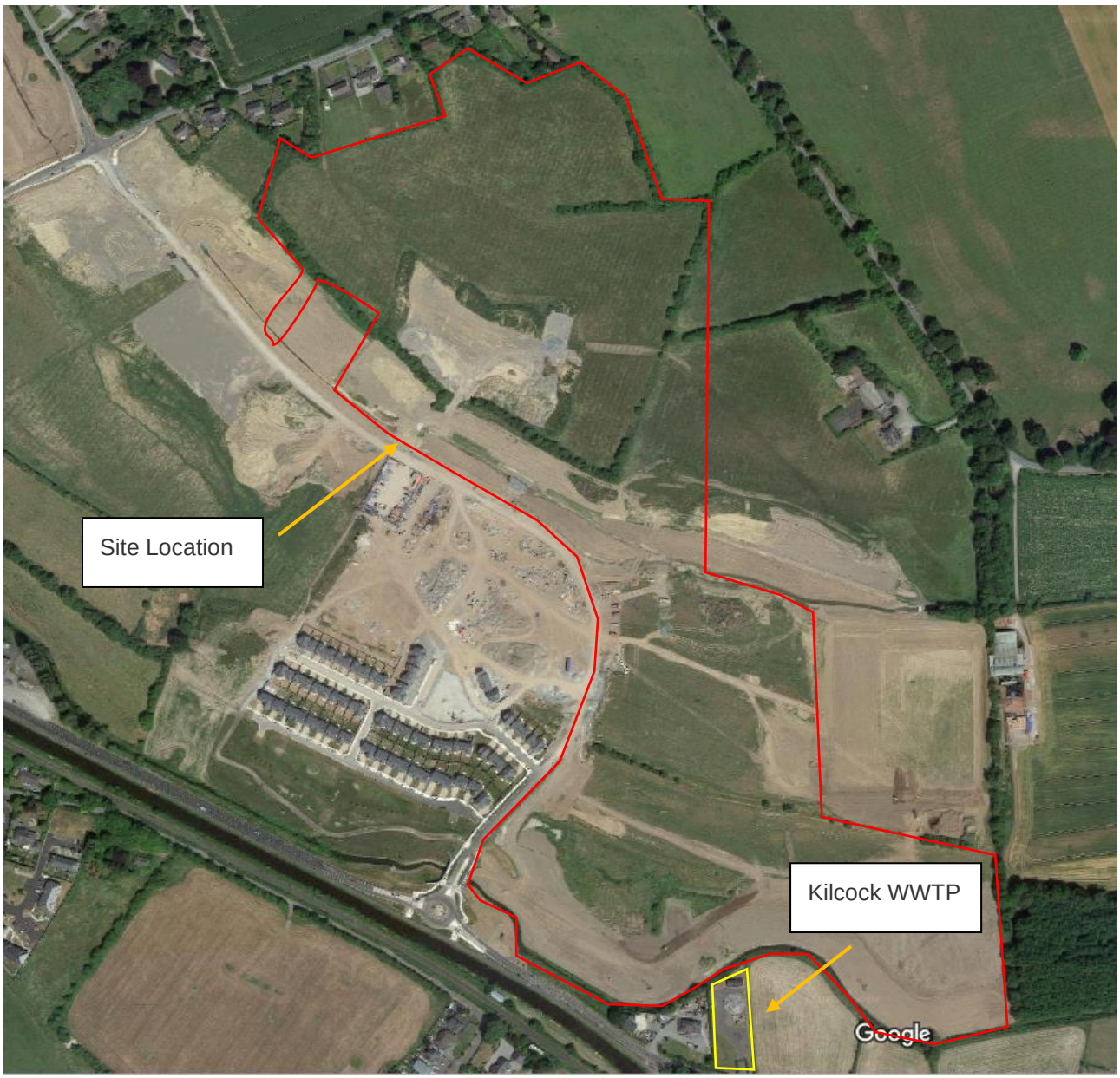

FIGURE 9-11 EXISTING KILCOCK WWTP

9.7 Mitigation Measures

9.7.1 Construction Phase

- A Construction and Environmental Management Plan will be submitted with the application documentation and will be implemented by the contractor during the construction phase. Site inductions will include reference to the procedures and best practice as given in the CEMP.
- All water pumped from excavations will be directed to on-site settlement ponds for treatment to reduce pollution to acceptable levels before being discharged to the local environment at a controlled rate.
- Surface water runoff from areas stripped of topsoil, from the construction compound, and from access tracks will be directed to on-site settlement ponds for treatment to reduce pollution to acceptable levels before being discharged to the local environment at a controlled rate.
- Weather conditions and seasonal weather variations will be taken into account when planning stripping of topsoil and excavations, with an objective of minimizing soil erosion and silt run-off. Short term weather forecasts will also be taken into account.

- In order to mitigate against spillages contaminating the surrounding surface water and hydrogeological environments, all oils, fuels, paints and other chemicals shall be stored in a secure bunded hardstand area in the construction compound. Refuelling and servicing of construction machinery will take place in a designated hardstand area which will be remote from any surface water inlets and outlets (where it is not possible to carry out such activities off site). Hydrocarbon spill kits will be available and to hand for refuelling crews in the event of any spills.
- Concrete batching will take place off site and wash out of concrete chutes will take place at designated locations in the site and the washout of truck drums will take place after back at the batching plant to minimise pollution release within the subject site.
- Discharge from any vehicle wheel wash areas will be directed to on-site settlement ponds for treatment prior to discharge to the local environment.
- Groundwater pumped from excavations is to be directed to on-site settlement ponds for treatment prior to discharge to the local environment.

9.7.2 Operational Phase

The design of proposed site levels (roads, finished floor levels etc.) was completed to replicate existing surface contours, break lines etc., therefore replicating existing overland surface water flow paths, to minimise changes to the site characteristics and not concentrating water run-off in any particular location(s).

Surface water runoff from the site will be attenuated to the existing greenfield runoff rate as outlined in the Greater Dublin Strategic Drainage Study (GDSDS). Surface water discharge rates will be controlled by 2No. Hydrobrake type vortex flow control devices, located at both the northern and southern section outfalls, in conjunction with attenuation storage in both locations.

The design of the proposed development incorporates the following SuDS surface water treatment train solutions:

- Permeable paving in driveway areas.
- Surface water runoff from roofs will be routed to the proposed surface water pipe network via the porous aggregates beneath permeable paved driveways.
- Surface water runoff from roads, where allowable, will drain to swales for treatment and runoff reduction.
- Attenuation of the 100-year return event storms with a 20% allowance for climate change.
- Installation of 2No. flow control devices (Hydrobrake or similar) limiting surface water discharge from the site to greenfield runoff rates at the outfalls to the ‘Upper Ditch’ and Rye Water respectively.
- Surface water discharge to pass via 2No. Class 1 fuel / oil separator (sized in accordance with permitted discharge from the site).
- Non-Return Valve fitted at outlet locations to prevent any water from The Rye Water River or the drainage ditch from draining back into the systems.

9.8 Residual Impacts

Construction Phase

Implementation of mitigation measure outlined in Section 9.7 will ensure that the potential impacts of the proposed development on water and the hydrogeological environment do not occur during the construction phase and that any residual impacts will be slight, short-term and have a neutral impact on the environment.

Operational Phase

As the surface water drainage design has been carried out in accordance with the GDSDS, and SuDS methodologies will be implemented as part of a treatment train approach, the predicted residual impacts on the water and hydrogeological environment arising from the operational phase are expected to be slight, long term and have a neutral effect on the development.

Overall, the impact on the hydrological environment as a result of the wider developments in the area are considered to be permanent and imperceptible. The overall impact is expected to be neutral.

9.9 Worst Case Scenario

The following unplanned events could potentially give rise to impact on the receiving water and hydrology:

- Flooding of the road network, preventing access by emergency services to all parts of the proposed development.
- Should the above event occur it would be considered significant brief or short term and have a negative effect on the site. However, if the mitigation measures outlined in section 9.7 are adhered to then these issues will not likely occur.
- The attenuation areas for the site are designed to accommodate flood events up to 1% (100 year) AEP (Annual Exceedance Probability) with an additional 20% allowance for climate change. In events above this risk level, the surface water network is designed to provide overland flood routes along the various development roads towards the surface water drainage outfall therefore mitigating the risk.

9.10 Monitoring

Proposed monitoring in relation to the water and hydrogeological environment are as follows:

- Inspection and maintenance of fuel / oil separators.
- Inspection and maintenance of the internal road network for wear and tear that could cause silt release.
- Inspection and maintenance of attenuation and hydrobrake infrastructure.
- During the operational phase an inspection and maintenance contract is to be implemented in relation to the proposed Class 1 fuel / oil separators, hydrobrakes and attenuation facilities.

9.11 References

- Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (2000).
- Greater Dublin Strategic Drainage Study. Dublin Drainage (2005).
- Geological Survey Ireland Maps – Groundwater Aquifer and Groundwater Vulnerability Maps.
- Office of Public Works (OPW) National Flood Hazard Mapping – Fluvial Flood Maps.
- Environmental Protection Agency (EPA) Maps – Water Features Map.
- Kilcock Local Area Plan (2015-2021) Meath County Council.
- OPW (November 2009) Guidelines for Planning Authorities – The Planning System and Flood Risk Management.
- Guidelines on the information to be contained in environmental impact assessment reports. Environmental Protection Agency (Draft 2017).
- Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements. Institute of Geologists of Ireland (2013).
- Directive 2014/52/EU (16 April 2014) European Parliament.

- 190009-rep-001 Infrastructure Design Report submitted by DBFL.
- Kilcock Flood Risk Assessment and Management Study (FRAMS)
- Meath County Development Plan (2013 to 2019)

CHAPTER 10
BIODIVERSITY

DECEMBER 2019

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10 Biodiversity

10.1 Introduction

This report has been prepared by Padraic Fogarty of OPENFIELD Ecological Services. Pádraic Fogarty has worked for over 20 years in the environmental field and in 2007 was awarded an MSc from Sligo Institute of Technology for research into Ecological Impact Assessment (EcIA) in Ireland. OPENFIELD is a full member of the Institute of Environmental Management and Assessment (IEMA).

This report provides for an assessment of the potential impacts to biodiversity of the proposed development.

Article 3 of the EIA Directive requires that "The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:… (b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;"

And

Annex IV point 4 of the EIA Directive requires "A description of the factors specified in Article 3(1) likely to be significantly affected by the project: … biodiversity (for example fauna and flora) …

Under Article 6(3) of the Habitats Directive (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora) a screening for 'appropriate assessment' of projects must be carried by the competent authority to assess, in view of best scientific knowledge, if that proposed development, individually or in combination with another plan or project is likely to have a significant effect on the European site. A full AA is required if it cannot be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site. The Habitats Directive has been transposed into Irish law by European Communities (Birds and Natural Habitats) Regulations 2011 – 2015.This assessment is carried out by the competent authority, in this case An Bord Pleanála. The AA Screening report is presented separately.

10.2 Proposed Development

The proposed project is for the construction of a residential development of 575 houses, apartments, and duplex units, a creche, along with access roads, open space and connections to infrastructure.

The construction phase will see the clearance of grassland and approximately 1,040m of hedgerow habitats.

A new surface water drainage system will be installed and will be fully complaint with sustainable drainage principles and is shown in DBFL Consulting Engineers drawing 072116-3500 in Appendix 7.1. The subject lands benefit from core infrastructure constructed under constructed under Meath County Council/ An Bord Pleanála (ABP) planning reference PL17.238370 (preceding Meath County Council infrastructure application reference 'MCC DA/1000614' and ABP Reference 'PL17.238370).

The foul drainage system (wastewater) will be completely separate from the surface water drainage system. Wastewater will flow from the subject site to the mains sewer network and onto the municipal treatment plant at Leixlip. A foul water drainage network plan is shown on DBFL drawing 072116-3500 is included in Appendix 7.2. Irish Water were consulted by DBFL in the design phase and capacity is available in the network (see Appendix 7.2).

Freshwater will be supplied from the mains network, which originates from reservoirs at Ballymore Eustace. Post-construction, the site will be landscaped. Irish Water were consulted by DBFL in the design phase and capacity is available in the network (see Appendix 7.2)

The proposed site layout is given in **Figure 10.1**. Refer to Chapter 2 (Description of Development) for a detailed site and development description.

FIGURE 10-1 SITE LAYOUT

10.3 Methodology

The assessment was carried out in accordance with the following best practice methodology: draft 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Environmental Protection Agency, 2017) and 'Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland' by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018).

A site visit was carried out on the 3rd of March 2019, the 25th of June 2019 in fair weather. The site was surveyed in accordance with the Heritage Council's Best Practice Guidance for Habitat Survey and Mapping (Smith et al., 2011. Habitats were identified in accordance with Fossitt's Guide to Habitats in Ireland (Fossitt, 2000).

The nomenclature for vascular plants is taken from The New Flora of the British Isles (Stace, 2010) and for mosses and liverworts A Checklist and Census Catalogue of British and Irish Bryophytes (Hill et al., 2008).

June lies within the optimal survey period for general habitat surveys (Smith et al., 2010) and so a full description of habitats has been made. March is within the optimal period for mammal surveying (with the exception of bats) as tracks and other field signs can easily be read. A separate series of bat surveys was undertaken during the optimal survey period by Wildlife Surveys Ireland. Both March and June are within the season for surveying breeding bird activity. It was possible to classify all habitats on the appropriate level.

10.4 Baseline Scenario

10.4.1 Zone of Impact

Best practice guidance suggests that an initial zone of influence be set at a radius of 2km for non-linear projects (IEA, 1995). However, some impacts are not limited to this distance and so sensitive receptors further from the project footprint may need to be considered as this assessment progresses. This is shown in **Figure 10.2**.

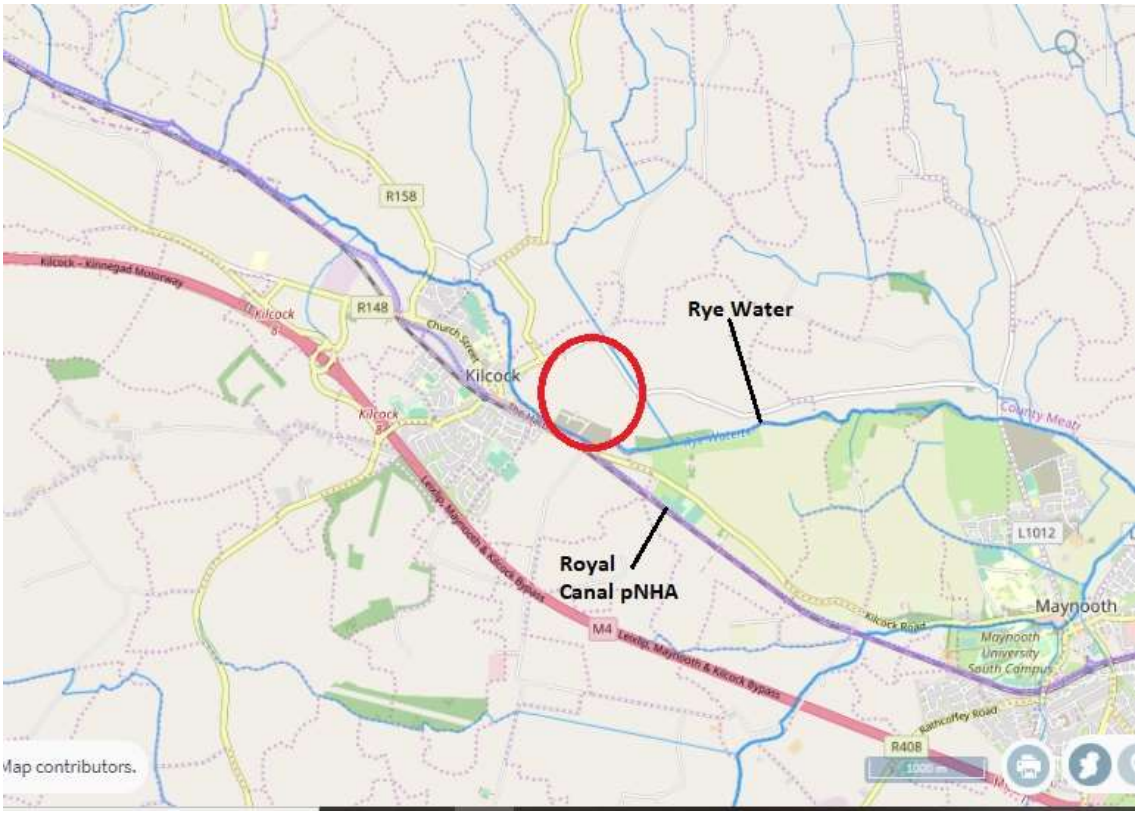

FIGURE 10-2 SITE LOCATION (RED CIRCLE) SHOWING WATER COURSES AND AREAS DESIGNATED FOR NATURE CONSERVATION (FROM WWW.EPA.IE)

There are a number of designations for nature conservation in Ireland including National Park, National Nature Reserve, RAMSAR site, UNESCO Biosphere reserves, Special Protection Areas (SPA – Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (Birds Directive), Special Areas of Conservation (SAC – Habitats Directive); and Natural Heritage Areas. The mechanism for these designations is through national or international legislation. The Birds Directive has been transposed into Irish law by the European Communities (Birds and Natural Habitats) Regulations 2011 – 2015 Proposed NHAs (pNHA) are areas that have yet to gain legislative protection. They are generally protected through the relevant County Development Plan. There is no system in Ireland for the designation of sites at a local or county level. The following area was found to be located in proximity to the application site:

Royal Canal pNHA (site code: 2104): The Royal Canal was constructed in the 18th century and links Dublin to the River Shannon. It is a nationally valuable wildlife corridor and is home to a wide range of plants and animals, many of conservation value, including the Otter *Lutra lutra*. The Royal Canal can be found close to (~30m) the southern site boundary. It passes to the south of the Rye Water and the R148 road in this location.

Rye Water Valley/Carton SAC (site code: 1398): The Rye Water is a tributary of the Liffey and the SAC boundary stretches from east of Maynooth as far as Leixlip village. The boundary of the SAC is approximately 5km east of the development site boundary. The Rye Water flows west to east and at its nearest point is located approximately 25m south of the development lands. Approximately 5km to the east the Rye Water passes through the Carton demesne which is wooded with specimen native and non-native trees. The river is dammed in a number of locations and this has created a series of small lakes. The SAC covers an area of nearly 73 ha. The reasons why this area falls under the SAC designation are set out in the qualifying interests. They are either

habitat types listed in Annex I or species listed in Annex II of the Habitats Directive. This information is provided by the National Parks and Wildlife Service (NPWS):

- Petrifying Springs (7220 – priority habitat): These are very localised habitats that arise from the precipitation of excess calcium carbonate in supersaturated running water. They are associated with characteristic bryophytes. They are vulnerable to changes in water quality, flow regime and intensification of land use practices.
- Narrow-mouthed Whorl Snail (1014). This whorl snail is present in a wide variety of habitats from dunes and coastal grasslands, to fens, salt-marshes and floodplains. The principle threats to its habitat derives from undergrazing and overgrazing.
- Desmoulin's Whorl Snail (1016) is a tiny mollusc that is particularly sensitive to changes in water level. It occurs in swamps, fens and marshes. The greatest threats have been drainage of wetlands and riparian management of canals.

The NPWS web site (www.npws.ie) contains a mapping tool that indicates historic records of legally protected species within a selected Ordnance Survey (OS) 10km grid square. The Kilcock site is located within the N83 square and no protected species are highlighted. It must be noted that this cannot be seen as exhaustive as suitable habitat may be available for important and protected species which are not noted in this database. Table 10.1 shows records of protected species of mammal from this 10km square. Those cells that are greyed out indicate no records for this species in the N83 Square (www.biodiversityireland.ie; Harris & Yalden, 2008).

TABLE 10-1 PROTECTED MAMMALS IN IRELAND AND THEIR KNOWN STATUS WITHIN THE N83 10KM SQUARE.

Species	Level of Protection	Habitat	Red List Status[1]
Otter *Lutra lutra*	Annex II & IV Habitats Directive; Wildlife (Amendment) Act, 2000	Rivers and wetlands	Near Threatened
Lesser horseshoe bat *Rhinolophus hipposideros*		Disused, undisturbed old buildings, caves and mines	Least Concern
Grey seal *Halichoerus grypus*	Annex II & V Habitats Directive; Wildlife (Amendment) Act, 2000	Coastal habitats	Not assessed
Common seal *Phocaena phocaena*			Not assessed
Whiskered bat *Myotis mystacinus*	Annex IV Habitats Directive; Wildlife (Amendment) Act, 2000	Gardens, parks and riparian habitats	Least Concern
Natterer's bat *Myotis nattereri*		Woodland	Least Concern
Brown long-eared bat *Plecotus auritus*		Woodland	Near Threatened

[1] Marnell et al., 2009

Leisler's bat *Nyctalus leisleri*		Woodlands and buildings	Least Concern
Common pipistrelle *Pipistrellus pipistrellus*		Farmland, woodland and urban areas	Least Concern
Soprano pipistrelle *Pipistrellus pygmaeus*		Rivers, lakes & riparian woodland	Least Concern
Daubenton's bat *Myotis daubentonii*		Woodlands and bridges associated with open water	Least Concern
Nathusius' pipistrelle *Pipistrellus nathusii*		Parkland, mixed and pine forests, riparian habitats	Least Concern
Irish hare *Lepus timidus hibernicus*	Annex V Habitats Directive; Wildlife (Amendment) Act, 2000	Wide range of habitats	Least Concern
Pine Marten *Martes martes*		Broad-leaved and coniferous forest	Least Concern
Hedgehog *Erinaceus europaeus*	Wildlife (Amendment) Act, 2000	Woodlands and hedgerows	Least Concern
Pygmy shrew *Sorex minutus*		Woodlands, heathland, and wetlands	Least Concern
Red squirrel *Sciurus vulgaris*		Woodlands	Near Threatened
Irish stoat *Mustela erminea hibernica*		Wide range of habitats	Least Concern
Badger *Meles meles*		Farmland, woodland and urban areas	Least Concern
Red deer *Cervus elaphus*		Woodland and open moorland	Least Concern
Fallow deer *Dama dama*		Mixed woodland but feeding in open habitat	Least Concern
Sika deer *Cervus nippon*		Coniferous woodland and adjacent heaths	Not assessed

Water quality in rivers is monitored on an on-going basis by the Environmental Protection Agency (EPA). It assesses the pollution status of a stretch of water by analysing the invertebrates living in the substrate as different species show varying sensitivities to pollution. They arrive at a 'Q-Value' where Q1 = pristine quality and Q5 = grossly polluted (Toner et al., 2005). OS and EPA mapping show that no significant water courses flow through, or close to, the site boundary. The site is located within the catchment of the Rye Water, which flows close to the southern boundary of the

development project. The nearest EPA monitoring station is 500m downstream of Kilcock and here Q3 (moderate pollution) was most recently measured in 2002. More recently, Q3-4 (slight pollution) was measured at the Anne's Bridge station, further downstream of the development site, in 2016.

Under the EU's Water Framework Directive (WFD) all water bodies were to have attained 'good status' by 2015. According to the www.catchments.ie website, the development site is located within the Rye Water Subcatchment (SC_010). The subcatchment report states that currently 9 out of 14 (64%) water bodies are attaining 'good status'. However, it also states that the entire catchment is 'at risk' and that "Predominantly the subcatchment is agricultural with heavy wet soils and agriculture and septic tanks are significant pressures with nutrients and sediment as a significant issues". The Rye Water has been classified as 'moderate' or 'poor' under the WFD reporting period 2010-15 (from www.epa.ie).

In 2018 a second River Basin Management Plan was published and which heighted 190 'priority areas for action' where resources are to be prioritised over the 2018-2021 period. This includes a number of tributaries of the River Liffey (e.g. the Tolka and the Dodder) but not the Rye Water.

10.4.2 Stakeholder Consultation

Inland Fisheries Ireland (IFI) was contacted for fisheries observations. A response was received from Roisin O'Callaghan on 17th October 2019 stating:

"The River Rye Water supports Atlantic salmon and Sea trout in addition to resident Brown trout populations.

An electrofishing survey carried out in 2018 recorded Brown Trout, Minnow, Pike, Stickleback and Lamprey upstream of Carton house.

A recent electrofishing survey during the summer found brown trout, stoneloach, minnow and stickleback at Millerstown Estate on the Rye Water in Kilcock. At another location at Riversdale Estate both juvenile and mature Brown Trout were recorded. Protected crayfish *Austropotamobius pallipes* is also present in the Rye Water.

The Rye Water is not in great condition and the main pressures in the Kilcock area is from agriculture inputs. The river is very open, channelised with very little riparian habitat to provide shade."

10.4.3 Site Survey

Aerial photography from the OSI shows that land use in this area has been predominantly agricultural albeit close to the centre of Kilcock Town. Since 2000 however it has been subject to change with new housing developments completed and under construction.

10.4.4 Flora

Habitats are described here in accordance with Ireland's standard classification system (Fossitt, 2000). The lands can be described as remnants of agricultural fields as detailed in the following paragraphs. The development site is split into two areas; a northern area and a southern area.

The southern area was a combination of **bare soil – ED2** and **arable crops – BC1** (see **Figure 10.3**). Vegetation was minimal with predominantly annual plants such as Fumitory *Fumaria sp.,* Groundsel *Senecio vulgaris,* Common Mouse-ear *Cerastium fontanum* as well as the grasses

Yorkshire Fog *Holcus lanatus* and Cock's-foot *Dactylis glomerata.* A short length (~150m) of **hedgerow – WL1** is composed of Hawthorn *Crataegus monogyna,* Elder *Sambucus nigra,* Ash *Fraxinus excelsior,* Cow Parsley *Anthriscus sylvestris* and Lesser Celandine *Ficaria verna.* Although this is a native hedgerow, it is structurally poor, with minimal connectivity to wider countryside habitats. Using methodology from the Heritage Council it can be assessed as 'lower significance' (Foulkes et al., 2013). An open **drainage ditch – FW4** was found along the southern boundary of this area but had minimal vegetation. A separate drainage ditch flows to the east, separating the two development site areas. This has been highly modified and at the time of survey had little riparian vegetation with dense growths of Water-cress *Nasturtium officinale* and Brooklime *Veronica beccabunga.*

The northern area retains its agricultural character and is composed of fields of **improved agricultural grassland – GA1** dominated with swards of Perennial Rye *Lolium perenne.* Surrounding hedgerows are variable in quality with Hawthorn, Elder, Brambles *Rubus fruticosus agg.,* Ivy *Hedera helix,* Dog Violet *Viola riviniana* and the ferns Hart's-tongue *Asplenium scolopendrium* and Soft-shield Fern *Polystichum setiferum.* Some hedgerows in this area are of higher significance due to their age, structure and connectivity to wider countryside features.

The Rye Water flows south of the southern portion of the development lands. The riparian zone was composed of bare soil during surveys and the river has been highly modified as a result. This is a **lowland river – FW2** and leads to the Rye Water/Carton SAC approximately 5km to the east.

10.4.5 Fauna

The site survey included incidental sightings or proxy signs (prints, scats etc.) of faunal activity, while the presence of certain species can be concluded where there is suitable habitat within the known range of that species. Table 10.1 details those mammals that are protected under national or international legislation in Ireland. Rabbits *Oryctolagus cuniculus* were seen as were Fox *Vulpes vulpes*. There were signs of Badger activity to the east of the southern development lands (footprints) recorded during the March 2019 survey and these emerged from the woodland further east (and outside the site boundary). No set was found within the hedgerows within the site boundary. There are nevertheless records of Badgers from this vicinity from the database of the National Biodiversity Data Centre.

Features on the site are considered to be of moderate suitability for bat roosting (i.e. with no suitable buildings – and few old trees with cavities) (Hundt, 2013). Individual bats can roost temporarily in very small crevices that may be present in mature trees. Hedgerows, particularly those of 'higher significance' are suitable for foraging bats and a variety of species are likely to be present. A dedicated bat survey was carried out by Brian Keeley of Wildlife Surveys Ireland in July 2019 – the optimal flight period for bats. This found no evidence of bats roosting within the development site area. Four species were recorded foraging/commuting including Common Pipistrelle, Soprano Pipistrelle, Leisler's Bat and Brown Long-eared Bat. Bat activity is strongly aligned with hedgerows and in particular higher significance hedges to the north of the site recorded high levels of activity for Common and Soprano Pipistrelle.

Suitable habitat for Otter is present along the Rye Water. The river banks were searched for signs of Otter activity (spraints, prints etc.) during both March and June but no such evidence was found. Records of Otter along this stretch of the river are present from the National Biodiversity Data Centre and so their presence can be assumed.

No evidence of Irish Hare was found although they are recorded from the Kildare area and avail of a variety of habitats (Reid et al., 2007). Small mammals such as Irish Stoat *Mustela erminea hibernica*, Hedgehog *Erinaceus europaeus* and Pygmy Shrew *Sorex minutus* are considered widespread and are assumed to be present (Lysaght & Marnell, 2016).

Rabbit and Fox are confirmed to be present while other non-protected species such as House Mouse *Mus domesticus*, Wood Mouse *Apodemus sylvaticus* and Brown Rat *Rattus norvegicus* may also be found.

March and June are within the bird breeding season. The following birds were noted: Pied Wagtail *Moticilla alba*, Wood Pigeon *Columba palumbus*, Robin *Erithacus rubecula*, Blue Tit *Parus caeruleus*, Hooded Crow *Corvus corone,* Chiffchaff *Phylloscopus collybita,* Chaffinch *Fringilla coelobs*, House Sparrow *Passer domesticus* and Reed Bunting *Emberiza schoeniclus* were recorded during the site survey and these are all listed as 'low conservation concern' by BirdWatch Ireland (Colhoun & Cummins, 2013). Hedgerows in particular provide breeding habitat for common garden and woodland species. A single Snipe *Gallinago Gallinago* was flushed from the banks of the Rye Water during the March survey and this bird is of 'medium conservation concern' (the Snipe population is boosted in winter with birds which would habitually breed in countries to the north).

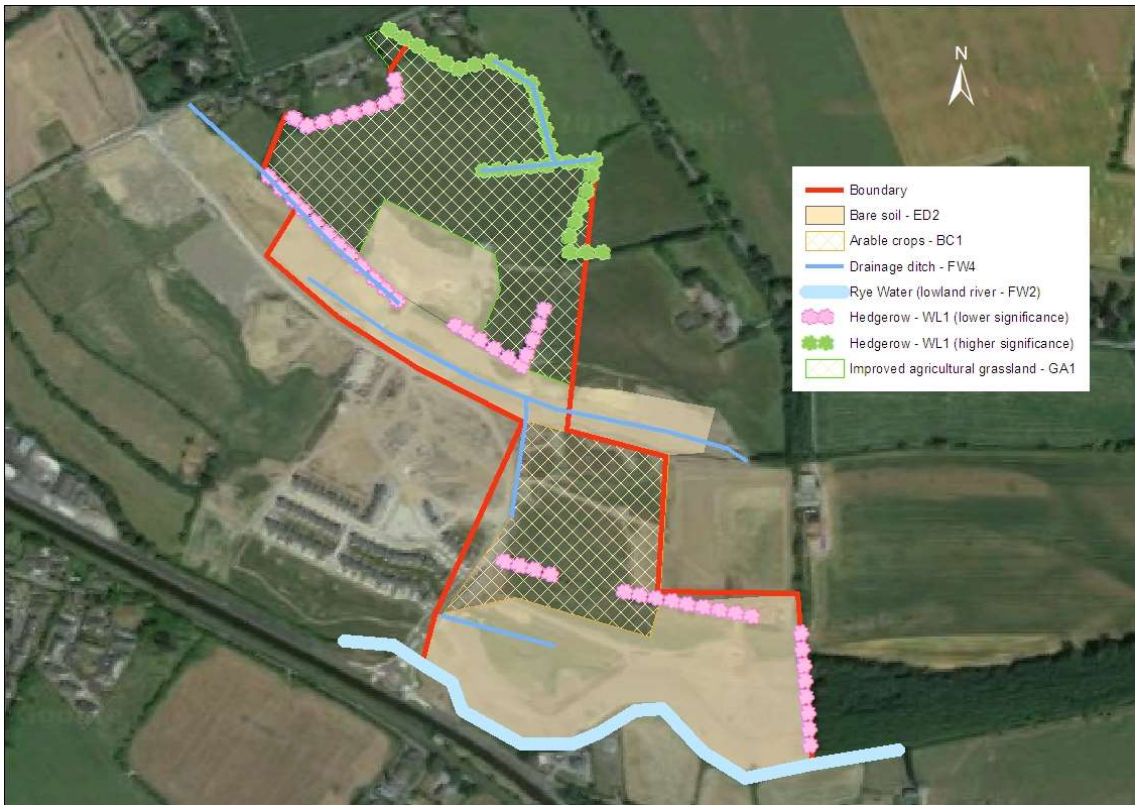

FIGURE 10-3 HABITAT MAP OF THE DEVELOPMENT SITE LANDS (AERIAL IMAGE FROM GOOGLE).

Common Frog *Rana temporaria* and Common Lizard *Lacerta vivipara* are protected under the Wildlife Act 1976 and may be present on this site. March is within the frog spawning season however no spawn was noted in drainage ditches. Smooth Newts *Lissotriton vulgaris* are to be found in Kildare but there are no permanent ponds on this site in which they are likely to be breeding.

Water courses on the development site are not of fisheries significance. They are not suitable for salmonids (Atlantic Salmon *Salmo salar* or Trout *S. trutta*) Eels *Anguilla anguilla*, or Lamprey *Lampetra sp*. as they are too shallow and are likely prone to drying out. Drainage ditches lead to the Rye Water. According to Inland Fisheries Ireland (www.wfdfish.ie), the Rye Water is of fisheries value with runs of Brown Trout *Salmo trutta* as well as other fish of conservation value (Lampreys, Eel). It also holds a population of the White-clawed Crayfish.

10.4.6 Overall Evaluation of the Context, Character, Significance and Sensitivity of the Proposed Development Site

In summary it has been detailed that the development site is not within, or adjacent to, any area that has been designated for nature conservation at a national or international level. There are no examples of habitats listed on Annex I of the Habitats Directive or records of rare or protected plants. There are no plant species which are listed as alien invasive species under SI No. 477 of 2011 (European Communities (Birds and Natural Habitats) Regulations 2011 – 2015). The site is close to the Rye Water which is a river of fisheries value while the Rye Water/Carton SAC is found approximately 5km downstream.

Significance criteria are available from guidance published by the National Roads Authority (NRA, 2009). These are reproduced in **Table 10.2**. From this an evaluation of the various habitats and ecological features on the site has been made and this is shown in **Table 10.3**.

TABLE 10-2 SITE EVALUATION SCHEME TAKEN FROM NRA GUIDANCE 2009

Site Rating	Qualifying criteria
A - International importance	SAC, SPA or site qualifying as such. Sites containing 'best examples' of Annex I priority habitats (Habitats Directive). Resident or regularly occurring populations of species listed under Annex II (Habitats Directive); Annex I (Birds Directive); the Bonn or Berne Conventions. RAMSAR site; UNESCO biosphere reserve; Designated Salmonid water
B - National importance	NHA. Statutory Nature Reserves. Refuge for Flora and Fauna. National Park. Resident or regularly occurring populations of species listed in the Wildlife Act or Red Data List 'Viable' examples of habitats listed in Annex I of the Habitats Directive
C - County importance	Area of Special Amenity, Tree Protection Orders, high amenity (designated under a County Development Plan) Resident or regularly occurring populations (important at a county level, defined as >1% of the county population) of European, Wildlife Act or Red Data Book species Sites containing semi-natural habitat types with high biodiversity in a county context, and a high degree of naturalness, or populations of species that are uncommon in the county

D - Local importance, higher value	Sites containing semi-natural habitat types with high biodiversity in a county context, and a high degree of naturalness, or populations of species that are uncommon in the locality Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
E - Local importance, lower value	Sites containing small areas of semi-natural habitat that are of some local importance for wildlife; Sites or features containing non-native species that are of some importance in maintaining habitat links.

TABLE 10-3 EVALUATION OF THE IMPORTANCE OF HABITATS AND SPECIES ON THE KILCOCK SITE

Rye Water (lowland river – FW2)	County Importance (C)
Higher significance Hedgerows – WL1 with or without Drainage Ditches – FW4	Local Importance (higher value - D)
Lower significance Hedgerow – WL1 Drainage ditches – FW4	Local importance (lower level - E)
Improved agricultural grassland – GA1 Arable crops – BC1 Spoil and bare ground – ED2	Negligible value

10.5 Difficulties Encountered

No difficulties were encountered in making this assessment. Site surveys were undertaken during the appropriate seasons.

10.6 Impact Assessment

10.6.1 Do Nothing Scenario

The development site is currently disturbed in some areas and in the absence of the development project, these would regain natural vegetation cover. Areas where farming activities are currently underway would be likely to continue under this scenario. No significant changes to the biodiversity of the site would occur in the absence of the development project.

10.6.2 Construction Phase

The following potential impacts are likely to occur during the construction phase in the absence of mitigation:

1. Habitat loss: agricultural grassland and disturbed ground habitats are to be lost along with approximately 465m of 'higher significance' hedgerow and 575m of lower significance hedgerow. Approximately 60m of hedgerows are to be retained. **Figure 10.4** shows the trees and hedges that will be retained and those that will be removed. The loss of this habitat will affect common and widespread species including commuting routes for protected species of bat. New landscaping (discussed under the mitigation heading) will offset some of this loss.

This impact is a **likely, negative, permanent moderate effect.**

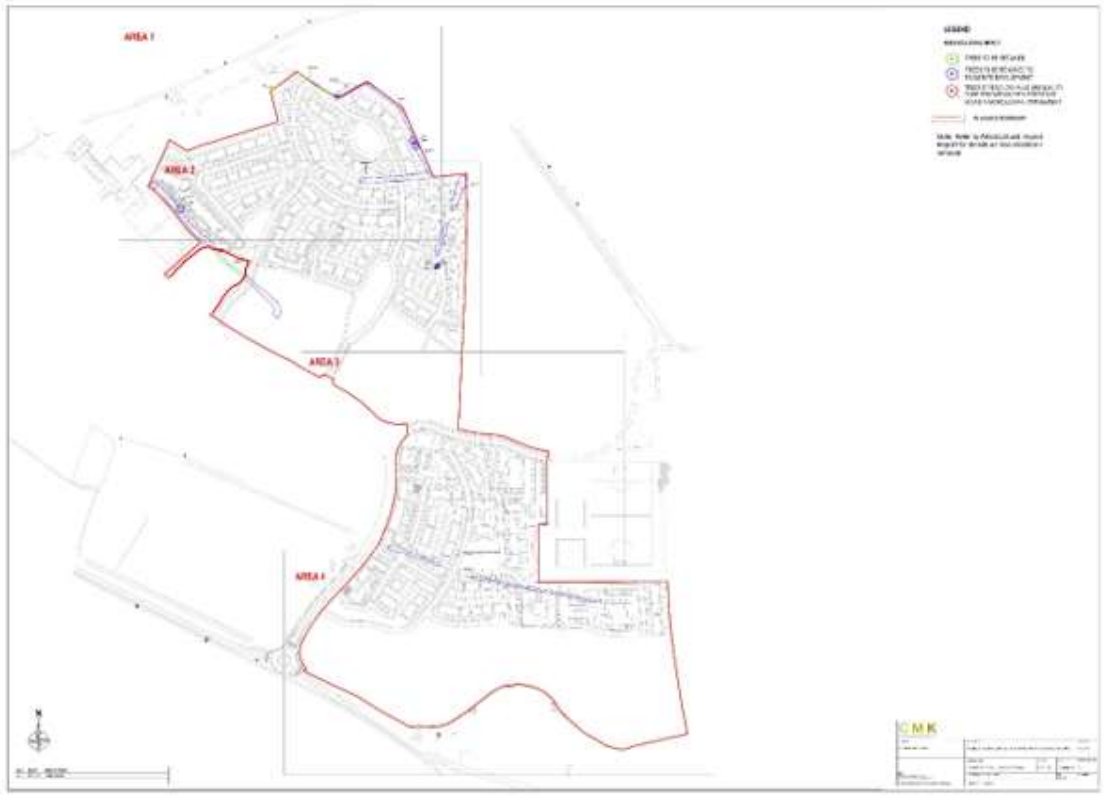

FIGURE 10-4 – TREE REMOVAL AND TREE RETENTION (FROM CMK HORTICULTURE AND ARBORICULTURE LTD.

2. The direct mortality of species during land clearance or tree felling. This impact is especially acute during the bird nesting season, but can also affect small mammals and other fauna. Under the Wildlife Act 1976 (as amended, 2000) it is prohibited to remove 'uncultivated' vegetation between the months of March and August inclusive.

According to the bat survey report: "Tree removal creates a risk of roost loss. This could lead to injury or death to a species protected under the Wildlife Act and Habitats Directive (if a roost were present and not identified) and would therefore constitute a breach of the Irish and EU legislation. There is no evidence that the trees within the site are in use as bat roosts from the survey of July 2019. The houses on the perimeter of the site may serve as roosts at some stage in the year. Bats move in and out of roosts on a regular basis and individuals may be present at times other than a specific survey without any evidence. This impact is likely to moderate and long-term if there is roost loss and no obvious equivalent replacement for the roost loss."

This impact is assessed as **a likely, negative, permanent moderate effect.**

3. Pollution of water courses through the ingress of silt, oils and other toxic substances. The construction of the proposed development will cross the main drainage ditch which runs in an east-west direction across the development site at three separate points (2x vehicle crossings and 1x pedestrian). No new/additional crossings of the Rye Water are planned. Each vehicle crossing will be set 300mm below the upper ditch bed level to allow for the passage of fish, although it should be noted that this ditch is prone to drying out and is not fish passable further upstream. Ditches nevertheless provide a direct pathway from the site to the Rye Water, a significant water course. The ingress of sediment, as well as potentially harmful substances such as concrete, can affect aquatic life and fish spawning habitat for a considerable distance downstream. Best practice site management, as per guidelines from Inland Fisheries Ireland (2016), will minimise the risk of pollution. The recommended mitigation measures are detailed further in section 10.7.

This impact is assessed as **a likely, negative, short-term, significant effect.**

10.6.3 Operational Phase

The following potential impacts are likely to occur during the operation phase in the absence of mitigation:

4. Disturbance to species from increased human activity (lighting, etc.). The species/habitats present on this site are not considered sensitive to disturbance from noise or general human activity given that this is already present from nearby residential and agricultural uses. According to the bat survey report: "Species such as Leisler's bat and common pipistrelles are less affected than almost all other Irish bat species and this would not be a significant impact. At worst, it would be a permanent moderately negative impact."

This impact is assessed to be likely, negative, permanent, **moderate.**

5. Pollution from surface water. Surface water attenuation measures will comply with Local Authority standards. The system will be fully compliant with the Greater Dublin Strategic Drainage Study and will utilise Sustainable Drainage Systems (SUDS) to minimise the volume of surface water entering the sewer. This will include:

- Permeable paving in driveway areas.
- Surface water runoff from roofs will be routed to the proposed surface water pipe network via the porous aggregates beneath permeable paved driveways.
- Surface water runoff from greenlinks will drain to swales for treatment and runoff reduction.
- Attenuation of the 100-year return event storms.
- Installation of a Hydrobrake limiting surface water discharge from the site to greenfield runoff rates.
- Surface water discharge to pass via a Class 1 fuel / oil separator (sized in accordance with permitted discharge from the site).
- Non-Return Valve fitted at outlet locations to prevent any water from The Rye River.

This impact is assed to be a likely, neutral, permanent, **imperceptible effect.**

6. Pollution of water from foul wastewater arising from the development. Wastewater will be sent to the municipal treatment plant at Leixlip. In 2017 this plant was reported as meeting its effluent quality standards under the Urban Wastewater Treatment Directive and is operating within its design capacity. It discharges treated water into the River Liffey downstream of the Rye Water. It is licenced for this discharge by Irish Water (licence no.: D0004-02). The most recent Annual Environmental Report (AER), for the calendar year 2017, showed that the discharge was fully compliant with emission limit standards for this period. Monitoring of the receiving environment both upstream and downstream of the discharge point indicates that the plant is 'not having an observable negative impact on water quality'.

This impact is a **likely, neutral, permanent, imperceptible effect.**

7. Impacts to protected areas. The nearest area designated for nature conservation is the Royal Canal pNHA. At its closest point the canal is approximately 25m from the site and the two areas are separated by the Rye Water river and a public road. Due to this separation distance, and the fact that there is no direct hydrological connection between the two areas, there is no pathway for effects to occur to the Royal Canal pNHA. Due to these reasons no impact can arise to this pNHAs from the proposed project.

A separate screening report for Appropriate Assessment has been presented and this concludes that negative effects to Natura 2000 areas could not be ruled out. This conclusion was reached based on the potential for sediment and other pollution to reach the Rye Water/Carton SAC during the construction phase. A separate Natura Impact Statement was prepared and this outlines mitigation measures which are to be undertaken to ensure that no effects to the integrity of this SAC occur. These measures mirror those which are presented in section 8.7 of this report to avoid pollution to the Rye Water.

This impact is a likely, negative, short-term, **significant effect.**

10.6.4 Cumulative

The Meath County Development Plan (CDP) 2013 - 2019 contains the Kilcock Environs Written Statement which has zoned the subject land 'to provide for residential communities'. This plan was subject to Strategic Environmental Assessment (see Meath CDP 2013 - 2019 in Volume 4 and in Variation No. 2). An SEA was also carried out for the Kilcock Local Area Plan 2015-2021 and this concluded "that its policies and objectives are acceptable and represent a balanced and fair approach to the sustainable development of Kilcock."

The EU's Water Framework Directive requires that all water bodies must attain 'good ecological status' by 2015. In 2010 a management plan was published for the Eastern River Basin District and this sets out a 'Programme of Measures' that was to address water quality issues in order to meet these high standards. The status of the Rye Water is currently unsatisfactory and a target of 2027 has been set to achieve good status. In 2018 a second River Basin Management Plan was published which identified 190 'priority areas for action' where resources are to be focussed over the 2018-2021 period. A number of tributaries of the Liffey are among these areas, including the Lyreen, the Dodder and the Tolka.

Sufficient capacity exists at the wastewater treatment plant in Osberstown and no pollution issues are being experienced. The discharge from the Osberstown plant could combine with other similar discharges which enter Dublin Bay. This includes point and diffuse pollution from across the catchment and, in particular, the Ringsend wastewater treatment plant, which discharges to Dublin Bay.

Rainwater run-off from paved and impermeable surfaces can carry hydrocarbons and particulate matter into surface waters. These features can also accelerate the discharge of rainwater off land and so accentuate the effects of flash flooding (Mason, 1996). This impact is particularly pronounced in urban locations where significant areas can be paved or built on. As such, incremental increases in hard surfaces, such as when land use changes from agriculture to housing, can result in cumulative effects to water quality. In this case, sustainable drainage systems (SUDS) have been included in the project design and no negative effects to water quality are anticipated. The removal of agriculture from the land may result in a loss of diffuse pollution such as fine sediment or animal nutrient. There is likely therefore to be a net positive effect to surface water quality.

This development project can be seen alongside existing and underway projects in this immediate vicinity as shown in **Figure 10.1**.

10.7 Mitigation

10.7.1 Incorporated Design Mitigation

Habitat loss

The loss of mature trees or hedgerows has been avoided where possible. Where this cannot be avoided, the landscaping scheme has been designed to compensate for the loss of habitat. In liaison with the landscape architects, this entails biodiversity-friendly planting of predominantly native species throughout the scheme but especially in areas of open space including near the Rye Water. This is shown in an extract from the landscaping design strategy in **Figure 10.5**. Biodiversity value will be enhanced by installing bird nesting boxes and artificial bat roosts.

FIGURE 10-5 – EXTRACT FROM THE PROPOSED KILCOCK STRATEGIC HOUSING DEVELOPMENT LANDSCAPE DESIGN STATEMENT PREPARED BY CONROY CROWE KELLY AND SHOWING THE AREAS FOR ENHANCED BIODIVERSITY PLANTING.

10.7.2 Construction Phase Mitigation

Mortality to Species

The removal of vegetation will not take place between March and August inclusive as per section 40 of the Wildlife Act. Where this cannot be avoided, vegetation must first be inspected by a suitably qualified ecologist for signs of nesting. Where no nesting is observed, vegetation can be removed within 48 hours. Where nesting is underway, vegetation cannot be removed unless under licence from the NPWS.

The following mitigation is taken from the bat survey report:

"Tree removal creates a risk of roost loss and could lead to injury or death to any bat roosting within a felled tree protected under the Wildlife Act and Habitats Directive (if a roost were present and not identified) and would therefore constitute a breach of the Irish and EU legislation. There is no evidence that the trees within the site are in use as bat roosts from the survey of 12th July 2019. The houses on the perimeter of the site may serve as roosts at some stage in the year including

both derelict and occupied houses. Bats move in and out of roosts on a regular basis and individuals may be present at times other than during a specific survey. Given that the arborist report (Arboricultural Assessment Report Residential Development, Newtownmoyaghy, Kilcock, Co. Meath by CMK Horticulture and Arboriculture Ltd.) states that the condition of the hedgerows within the survey boundary is moderate to poor overall with most unmanaged or poorly maintained. This impact (tree roost loss) is likely to be moderate and long-term were it to occur and there was no obvious equivalent replacement for the roost loss. No significant roost loss is considered likely based on the tree loss proposed for the site and as no buildings would be removed for the proposal."

Pollution during construction

Construction activities will be carried out in accordance with best practice standards from Inland Fisheries Ireland (2016). This will include the installation of a robust silt barrier along riparian margins of water courses to ensure the protection of the Rye Water river. A Construction and Environmental Management Plan (CEMP) has been prepared which details the location of the site compound and all construction pollution prevention measures. This includes the storage of dangerous substances in bunded areas and the training of personnel in the importance of avoiding pollution. Only water treated on-site in settlement ponds to reduce pollution to acceptable levels will be permitted to leave the site or enter water courses and this will be achieved by the use of silt traps or settlement ponds. The site manager will be responsible for the prevention of pollution and in monitoring pollution prevention measures throughout the lifetime of the project.

Installation of the bridges across the drainage ditch will be installed to minimise disturbance to the banks (this water course is highly modified). Installation will be done in the dry (i.e. when the ditch itself is dry, or, if necessary, the ditch will be dammed and water pumped around the works area to prevent scouring and excessive loss of silt.

10.7.3 Operational Phase Mitigation

Disturbance from Artificial Lighting

The following is taken from the Bat Report and these mitigation measures will be implemented:

Lighting should be controlled to avoid light pollution of green areas and should be targeted to areas of human activity and for priority security areas.

- Motion-activated sensor lighting is preferable to reduce light pollution.
- None of the remaining mature trees shall be illuminated.
- Dark corridor for movement of bats along the grounds of the site. Lighting should be directed downwards away from the treetops.
- All luminaires shall lack UV elements when manufactured and shall be LED.
- A warm white spectrum (ideally <2700Kelvin but as low as the Council limitations allow) shall be adopted to reduce blue light component
- Luminaires shall feature peak wavelengths higher than 550nm
- Tree crowns shall remain unilluminated
- Planting shall provide areas of darkness suitable for bats to feed and commute through the site.

10.8 Residual Impact

10.8.1 Construction Phase

With mitigation measures in place during the construction phase, residual impacts to biodiversity which will occur are neutral or negative, short-term, not significant.

10.8.2 Operational Phase

With mitigation measures in place during the operational phase, residual impacts to biodiversity which will occur are neutral or negative, short-term, not significant.

10.9 Cumulative Impact

Cumulative impacts from overlap of the construction phase of the adjacent consented residential development with proposed development is possible. The duration of the any construction overlap will likely be temporary. The Kilcock Environs Written Statement forms part of the Meath County Development Plan 2013-2019 includes an objective to provide for a primary school in a site of 1.6 hectares and consideration of pedestrian and cyclist connectivity. The proposed school site is identified adjacent to the western most extent of the proposed development boundary and is shown in the Site Layout Plan (drawing no.1829-P-104) and is likely comprise of a school building with 24 class rooms, parking and sports facilities. The cumulative impacts are assessed to be not significant.

10.10 Worst Case Scenario

In a worst-case scenario pollution from the project during the construction phase could result in significant effects to the Rye Water and its aquatic life. Any such impact would be temporary in nature.

10.11 Monitoring

Monitoring will be required during the construction phase to ensure pollution of water courses does not occur. Inspections of silt-traps and barriers should be carried out at least daily.

Monitoring will be required during the operational phase to ensure the oil separators are maintained and functioning to specification.

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CHAPTER 11
NOISE & VIBRATION

DECEMBER 2019

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11 Noise and Vibration

11.1 Introduction

This chapter of the EIAR has been prepared by AWN Consulting Ltd. (AWN) to assess the potential noise and vibration impacts of the proposed development in the context of current relevant standards and guidance.

This assessment has been prepared by Mike Simms BE MEngSc MIOA MIET, Senior Acoustic Consultant at AWN, who has worked in the field of acoustics for over 15 years and has been a consultant since 1998. He has extensive experience in all aspects of environmental surveying, noise modelling and impact assessment for various sectors including, energy, industrial, commercial and residential.

This chapter includes a description of the receiving ambient noise climate in the vicinity of the subject site and an assessment of the potential noise and vibration impact associated with the proposed development, during both the short-term construction phase and the permanent operational phase, on its surrounding environment. The assessment of direct, indirect and cumulative noise and vibration impacts on the surrounding environment have been considered as part of the assessment.

Mitigation measures are included, where relevant, to ensure the proposed development is constructed and operated in an environmentally sustainable manner in order to ensure minimal impact on the receiving environment.

11.2 Proposed Development

A full description of the proposed development is presented in Chapter 2 of this EIAR. When considering a development of this nature, the potential noise and vibration impact on the surroundings is considered for each of two distinct stages (as there is no distinct commissioning phase for the proposed development):

- Construction Phase; and
- Operational Phase.

The construction phase will involve site clearing and excavations, services installations, construction of building frame and envelope landscaping and construction of internal roads. This phase will generate the highest potential noise impact due to the works involved, however, the phase is short term and expected to be completed within 312 weeks (6 years).

The primary sources of outward noise in the operational context are permanent and will comprise traffic movements to site using the existing road network and building services plant noise. These issues are discussed in the following sections.

11.3 Methodology

The assessment of impacts has been undertaken with reference to the most appropriate guidance documents relating to environmental noise and vibration which are set out within the relevant sections of this chapter. In addition to specific guidance documents for the assessment of noise and vibration impacts which are discussed further in the relevant sections, the following guidelines were considered and consulted for the purposes of this chapter:

- 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)

The study has been undertaken using the following methodology:

- An environmental noise survey has been undertaken in the vicinity of the subject site in order to characterise the existing baseline noise environment;
- A review of the most applicable standards and guidelines has been conducted in order to set a range of acceptable noise and vibration criteria for the construction and operational phases of the proposed development;
- Predictive calculations have been performed during the construction phase of the project at the nearest sensitive locations to the development site;
- Predictive calculations have been performed to assess the potential impacts associated with the operational of the development at the most sensitive locations surrounding the development site; and
- A schedule of mitigation measures has been proposed to reduce, where necessary, the identified potential outward impacts relating to noise and vibration from the proposed development.

11.3.1 Construction Phase Assessment Criteria

11.3.1.1 Noise

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local Authorities typically control construction activities by imposing limits on the hours of operation and consider noise limits at their discretion.

In order to set appropriate construction noise limits for the development site, reference has been made to BS 5228 2009+A1 2014 Code of practice for noise and vibration control on construction and open sites. Part 1 of this document Noise provides guidance on selecting appropriate noise criteria relating construction works.

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 11.1** sets out the values which, when exceeded, signify a significant effect at the facades of residential receptors.

Assessment category and threshold value period (L_{Aeq})	**Threshold value, in decibels (dB)**		
	Category A [A]	**Category B [B]**	**Category C [C]**
Daytime (08:00 – 19:00) and Saturdays (08:00 – 14:00)	65	70	75
Evenings and weekends [D]	55	60	65
Night-time (23:00 to 07:00hrs)	45	50	55

Table 11.1 Example Threshold of Significant Effect at Dwellings

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.

D. 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

For the appropriate assessment period (i.e. daytime in this instance) the ambient noise level is determined and rounded to the nearest 5dB. If the construction noise exceeds the appropriate category value, then a significant effect is deemed to occur.

11.3.1.2 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 property 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 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above. The standard also notes that below 12.5 mm/s PPV the risk of damage tends to zero. It is therefore common, on a cautious basis to use this lower value. Taking the above into consideration the vibration criteria in **Table 11.2** are recommended.

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 15Hz	15 to 40Hz	40Hz and above
12 mm/s	20 mm/s	50 mm/s

Table 11.2 Recommended Vibration Criteria During Construction Phase

Expected vibration levels from the construction works will be discussed further in Section 11.5.

11.3.2 Operational Phase Assessment Criteria

11.3.2.1 Traffic Noise

There are no specific guidelines or limits relating to traffic related sources along the local or surrounding roads. Given that traffic from the development will make use of existing roads already carrying traffic volumes, it is appropriate to assess the calculated increase in traffic noise levels that will arise because of vehicular movements associated with the development. In order to assist with the interpretation of the noise associated with additional vehicular traffic on public roads, **Table 11.3**, taken from Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, Part 7, HD 213/11 (UK Highways Agency et al, 2011) offers guidance as to the likely degree of impact associated with any long-term change in traffic noise level.

Change in Sound Level (dB)	**Subjective Reaction**	**DMRB Magnitiude of Impact**	**EPA Significance of Effect**
0	Inaudible	No impact	Imperceptible
0.1 – 2.9	Barely Perceptible	Negligible	Not significant
3 – 4.9	Perceptible	Minor	Slight, Moderate

5 – 9.9	Up to a doubling of loudness	Moderate	Significant
10+	Doubling of loudness and above	Major	Very significant

Table 11.3 Significance in Change of Noise Level

The guidance outlined in **Table 11.3** will be used to assess the predicted increases in traffic levels on public roads associated with the proposed development and comment on the likely long-term impacts during the operational phase.

11.3.2.2 Building Services Plant Noise

During the operational phase, potential noise sources relate to building and mechanical services plant required for the apartment buildings within the development.

In order to set appropriate operational noise criteria for these potential sources, guidance has been taken from BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings. The recommended internal noise levels for dwellings are set out in **Table 11.4**.

Activity	**Rooms**	**Design Range, $L_{Aeq,T}$ dB**	
		Daytime $L_{Aeq,16hr}$ (07:00 to 23:00hrs)	**Night-time $L_{Aeq,8hr}$ (23:00 to 07:00hrs)**
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 $L_{Aeq,8hr}$

Table 11.4 Recommended Internal Residential Noise Levels

To set an external noise level limit based on the internal criteria noted above, the degree of noise reduction afforded by a partially open window has been considered, which is suggested in BS 8233 as a 15dB reduction. Using this value, external noise levels of 50 and 45dB $L_{Aeq,T}$ are considered appropriate for day and night-time periods respectively. The time period for day-time noise levels has been set over a 1-hour period to provide a robust criterion. Given the higher sensitivity of people to noise at night, the time period for night-time levels is set as 15mins. In this instance, the following criteria relate to noise from building service plant at the nearest noise sensitive properties external to the site.

- Daytime (07:00 to 23:00hrs) 50dB $L_{Aeq,1hr}$
- Night-time (23:00 to 07:00hrs) 45dB $L_{Aeq,15min}$

There shall be no audible tonal or impulsive noise at noise sensitive locations arising from operation of the building services plant.

11.3.2.3 Vibration

The development is a residential in nature, therefore it is not anticipated that there will be any impact associated with vibration.

11.3.3 Inward Noise Impact Criteria

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 UK or Irish government document, since it's

publication 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, and;
  - Element 4 - Other Relevant Issues.

A summary of the ProPG approach is illustrated in **Figure 11.1**.

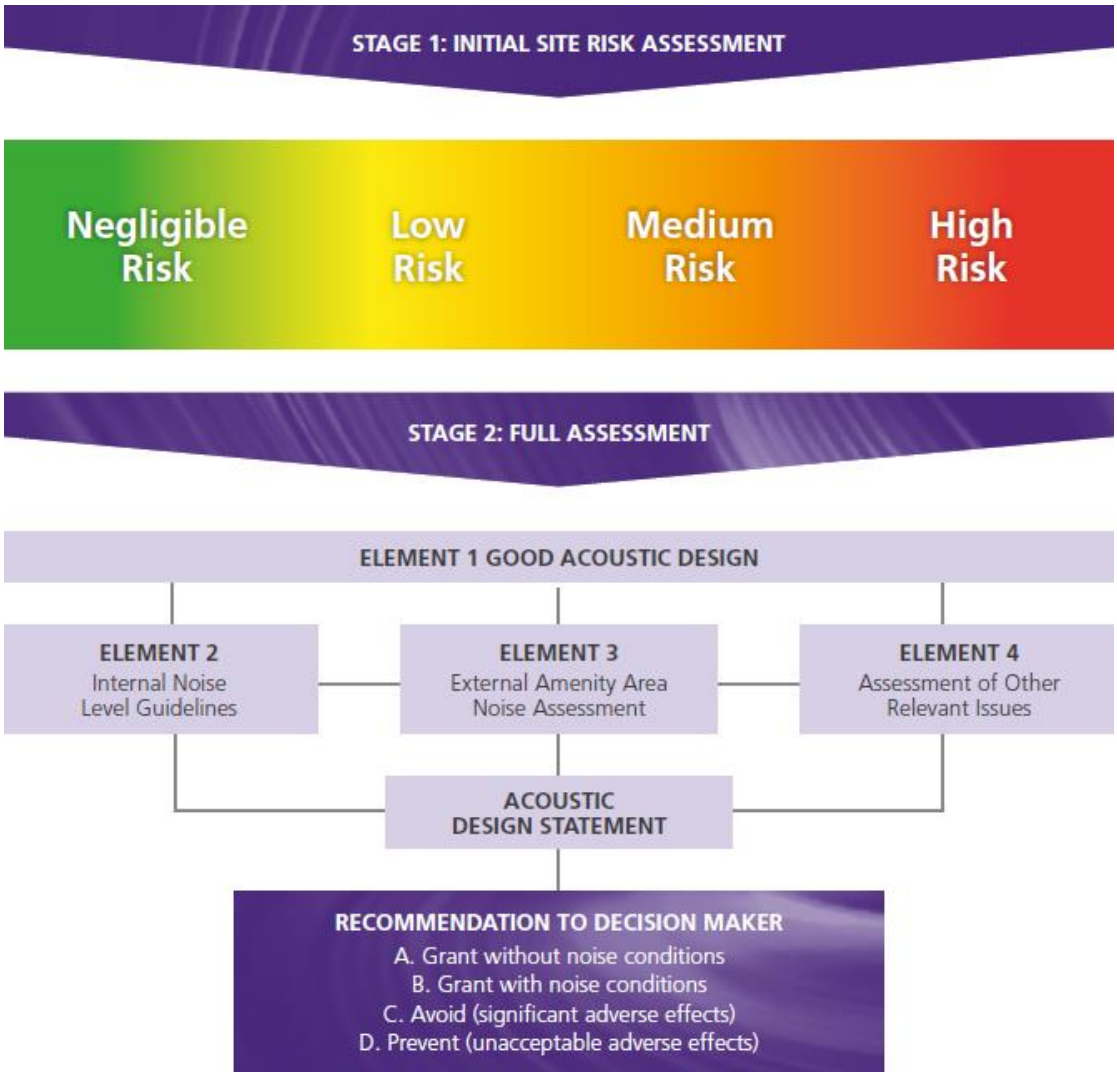

Figure 11-1 ProPG Approach (Source: ProPG)

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 11.2** 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."

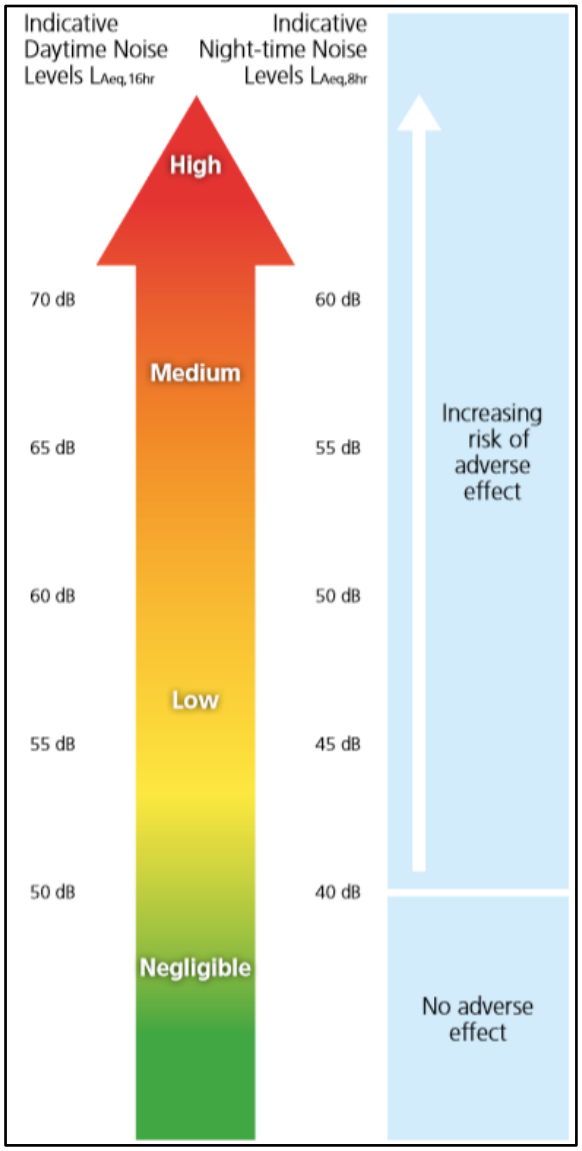

Figure 11-2 Initial Noise Risk Assessment

11.4 Baseline Scenario

11.4.1 Site Location

The site is located on lands at Newtownmoyaghy in Kilcock, Co. Meath as shown in **Figure 11.3**.

Figure 11-3 Existing Site

11.4.2 Baseline Noise Environment

An environmental noise survey has been conducted at the site in order to quantify the existing noise environment. The survey was conducted in general accordance with ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.

11.4.3 Noise Survey

11.4.3.1 Survey Locations

The noise measurement locations were selected to represent the noise environment at Noise sensitive location surrounding the proposed development. The selected locations are shown in **Figure 11.4** and described as below:

AN1 – Attended noise measurements undertaken at the southwestern end of the Millerstown housing estate.

AN2 – Attended noise measurements undertaken near the eastern boundary of the site near Newtownmoyahgy.

AN3 – Attended noise measurements undertaken near the south eastern corner of the site.

AN4– Attended noise measurements undertaken near the northern edge of the site, at a location representing the noise environment at the houses at Knockatulla but avoiding the noise due to construction activity nearby.

Figure 11-4 Noise Monitoring Locations

11.4.3.2 Survey Periods

Attended surveys were conducted from 11:00 to 12:15 on Monday 8 April and from 12:10 to 15:00 on Tuesday 9 April 2019. Over the course of the survey the weather was generally dry, calm and mild. Temperatures were approximately 10°, wind speeds were approximately 4 to 5 m/s.

11.4.3.3 Personnel and Instrumentation

AWN installed and collected the noise and vibration monitoring equipment. The following instrumentation detailed in **Table 11.5** were used in conducting the noise and vibration surveys.

Equipment	Type	Serial Number	Calibration Date
Sound Level Meter	Brüel & Kjær 2250	2818091	October 2017
Sound Level Meter	Brüel & Kjær 2250	2818080	August 2017

Equipment	Type	Serial Number	Calibration Date
Sound Calibrator	Larson Davis CAL200	13533	November 2017

Table 11.4 Instrumentation Details

11.4.3.4 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_{A10} is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.

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 maximum sound level measured during the sample period using the 'F' time weighting.

L_{AFmin} is the instantaneous minimum sound level measured during the sample period using the 'F' time weighting.

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 $2x10^{-5}$ Pa.

11.4.3.5 Survey Results

Noise level measurements of 15 minutes' duration were taken at locations AN1 to AN4. The results are presented in **Table 11.6** to **Table 11.9**.

Start Time	Subjective Impression of Noise Environment	Measured Noise Levels (dB re. $2x10^{-5}$Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
11:03	• Traffic Noise from R148 • Birdsong	48	60	50	44
13:24	• Traffic Noise from R148 • Birdsong • Distant aircraft • Train pass-by • Local activity in nearby houses	51	67	54	45

Table 11.6 Summary of Results for Location AN1

Start Time	Subjective Impression of Noise Environment	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
11:29	• Traffic Noise from R148 • Birdsong • Dogs barking (distant)	46	59	49	42
12:43	• Traffic Noise from R148 • Birdsong • Sheep • Dogs barking	47	60	50	43

Start Time	Subjective Impression of Noise Environment	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
13:34	• Traffic Noise from R148 • Birdsong • Distant construction noise • Aircraft	47	59	49	43
13:56	• Traffic Noise from R148 • Birdsong • Distant construction noise • Aircraft • 1x tractor pass-by	47	65	49	42

Table 11.7 Summary of Results for Location AN2

Time	Subjective Impression of Noise Environment	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
11:57-	• Traffic Noise from R148 • Birdsong	43	59	45	40
12:10	• Birdsong • Distant construction noise	46	64	49	41
13:09	• Traffic Noise from R148 • Birdsong • Distant aircraft • Train pass-by • Local activity in nearby houses	48	65	47	40

Table 11.8 Summary of Results for Location AN3

Time	Subjective Impression of Noise Environment	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
13:00	• Local road traffic on R125 • Birdsong • Aircraft	62	78	65	41
13:56	• Local road traffic on R125, dominant though intermittent • Birdsong • Distant aircraft every 5-6 mins	58	77	61	41
14:41	• Local road traffic on R125 • Birdsong • Aircraft	58	75	62	43

Table 11.9 Summary of Results for Location AN4

At locations AN1 to AN3 the typical noise environment was noted as a combination of traffic along the R148 regional road, occasional rail noise and aircraft noise. During survey noise levels ranged from 43 to 51dB $L_{Aeq,15mins}$ and from 40 to 45dB LA90 at these locations.

At location AN4, the noise environment was governed by traffic on the R125 road and occasional aircraft noise. During the day period noise levels ranged from 58 to 62 dB $L_{Aeq,15mins}$ and from 41 to 43 dB L_{A90} at this location.

11.4.3.6 Assessment of Inward Noise Impact

The noise levels measured during the 15-minute intervals at AN1 to AN3 as described in the previous section suggest that the $L_{Aeq16hr}$ values are likely to be in the negligible-to-low risk region of **Figure 11.2.** L_{Aeq} values at AN4 were higher, however the noise climate here was influenced by birdsong near the measurement position. L_{A90} noise levels were similar to those at the remaining three locations. Taking these considerations into account is indicates that an assessment of inward noise impact is not necessary in this instance.

11.5 Difficulties Encountered

No difficulties were encountered during the preparation of the EIAR chapter.

11.6 Impact Assessment

The potential impacts of the proposed development are considered for the short-term construction phase and permanent operational phase. These are set out in the following sections.

11.6.1 Do Nothing Scenario

In the absence of the proposed development being constructed, the noise environment at the nearest noise sensitive locations and within the development site will remain largely unchanged resulting in a neutral impact in the long-term.

11.6.2 Construction Phase

11.6.2.1 Noise

The nearest inhabited dwellings are the Millerstown housing estate, approximately 25m from the proposed development at the nearest point (see **Figure 11.5**). For the purpose of assessing a worst-case scenario, we have assumed the nearest noise-sensitive location from the proposed development is located at this distance of 25m from the boundary of the site.

Figure 11-5 Representative Noise-sensitive Location (NSL)

Considering the construction noise criteria threshold values detailed in **Table 11.1** and the measured baseline noise levels on the proposed site described in Section 11.4, the Category A value (i.e. 65dB(A)) is deemed appropriate for all the assessed noise sensitive receivers and other receivers in their respective vicinities.

During the construction phase of the proposed development, a variety of items of plant will be in use, such as excavators, dumper trucks, compressors and generators. Due to the nature of activities undertaken on a construction site of this nature, there is potential for generation of significant levels of noise. The potential for vibration at neighbouring sensitive locations during construction is typically limited to excavation works and lorry movements on uneven road surfaces.

Indicative construction noise levels have been calculated using guidance set out in BS 5228-1:2009+A1:2014. **Table 11.10** outlines typical plant items and associated noise levels that are anticipated for various phases of the construction programme.

Activity	Item of Plant *(BS5228 Ref)*	L_{Aeq} at 10m
Site Clearance/Demolition	Tracked excavator (C2.21)	71
	Dump Truck (C2.30)	79
	Diesel Generator (C4.76)	61
General Construction	Dump Truck (C2.30)	79
	Tracked excavator (C2.21)	71
	Compressor (D7.8)	70
	Telescopic Handler (C4.54)	79
	Hand Held Circular Saw (C4.72)	79
	Diesel Generator (C4.76)	61
	Internal Fit out	70
Road Works/Landscaping	Asphalt Paver & Tipping Lorry (C5.30)	75
	Electric Water Pump (C5.40)	68
	Vibratory Roller (C5.20)	75

Table 11.5 Reference Construction Plant Noise Emissions

For the purposes of the assessment it has been assumed that standard good practice measures for the control of noise from construction sites will be implemented. These issues are commented upon in further detail in the mitigation section of this chapter.

Error! Reference source not found. presents the predicted daytime noise levels from an indicative c onstruction period on site at the nearest off-site receptors. The calculations also assume that the equipment will operate for 66% of the 12-hour working day (i.e. 8 hours) and that a standard site hoarding, typically 2.4m height will be erected around the perimeter of the construction site for the duration of works. It is assumed that construction works will take place during normal working hours only.

Construction noise levels have been predicted for the worst-case nearest residential noise sensitive locations on the existing Millerstown estate which are at a distance of approximately 25m from the site boundary. Noise levels are also presented for the distance of 50m for comparison.

Construction Phase	Item of Plant (*BS 5228-1* Ref)	L_{Aeq} at distance (m)	
		25m	50m
Site Clearance	Tracked excavator (C2.21)	56	50
	Dump Truck (D2.30)	64	58
	Diesel Generator (C4.76)	46	40
	Cumulative Site Clearance	65	59
General Construction	Dump Truck (C2.30)	64	58
	Tracked excavator (D2.21)	56	50
	Compressor (D7.08)	55	49
	Telescopic Handler (C4.54)	64	58
	Hand Held Circular Saw (C4.72)	64	58
	Diesel Generator (C4.76)	46	40
	Internal Fit out	55	49
	Cumulative General Construction	70	64
Road Works/ Landscaping	Asphalt Paver & Tipping Lorry (C5.30)	60	54
	Electric Water Pump (C5.40)	53	47
	Vibratory Roller (C5.20)	60	54
	Cumulative Landscaping and Road Works	64	58

Table 11.6 Predicted Construction Noise Levels

Taking into account the assessment assumptions and allowing for the attenuation of sound over distance, the worst-case construction noise levels at nearest sensitive properties at 25m form construction activity are predicted to be slightly above the threshold for significant impact during the general construction phase. The distance of 25m applies in the worst-case situation where works are being carried out close to the houses along the eastern edge of Millerstown estate, conditions which will apply to only part of the construction phase. At distances greater than 50m from noise-generating construction activity, the predicted levels are below the criterion for a significant noise impact.

For any noise sensitive locations within 25m of the proposed development potential ***negative***, ***significant*** and ***temporary*** effects are likely.

At greater distances greater than 50m the effects are expected to be ***negative, moderate and short-term***.

11.6.2.2 Vibration

In terms of construction vibration, it is anticipated that excavations will be made using standard excavation machinery, which typically do not generate appreciable levels of vibration close to the source. Taking this into account and considering the distance that these properties are from the works and the attenuation of vibration levels over distance, the resultant vibration levels are expected to be well below a level that would cause disturbance to building occupants or even be perceptible. The associated impact is considered neutral, imperceptible and short-term.

11.6.3 Operational Phase

11.6.3.1 Additional Traffic on Public Roads

During the operational phase of the proposed development, there will be an increase in vehicular traffic associated with the site and other planned developments on surrounding roads.

The predicted change in noise levels due to an increase in road traffic has been calculated for each of these roads. Projected traffic data used for the purpose of this assessment includes committed and planned developments in the vicinity of the project site as listed in Chapter 6 of this EIAR.

For the purposes of assessing potential noise impact, it is appropriate to consider the relative increase in noise level associated with traffic movements on existing roads surrounding the subject site with and without development using the Annual Average Daily Traffic (AADT) data.

The impact from the increase in traffic from the proposed development has been assessed for the year of 2021 and the year of 2036 relative to the Do nothing scenario along the sections of road detailed in **Table 11.11**.

In terms of the overall traffic data as described by the AADT parameter, in order to increase traffic noise levels by 1dB, traffic volumes would need to increase by the order of 25% approximately. A review of the potential traffic level increases attributable to the proposed development indicates that the development will not give rise to increases of this magnitude on the surrounding road network.

Road Name	**Noise level (dB $_{LA10}$) Increase between Do Nothing and Do Something based on AADT Traffic Data**	
	2021	**2036**
R148 East of site	0.8	0.2
R148 west of roundabout	0.3	1
R148 entering Kilcock from east	0.3	0.9
R148 west R125 junction	0.2	0.7
R148 east of bridge	0.2	0.7
Bridge at Kilcock	0.1	0.6
R148 (Beidge Street0	-1.7	0.2
R125 (School Street)	0.1	0
New Lane	0	0.1
New Road	0.1	0.2
The Square	0.1	0.1
R125 south of new crossroads	0.1	0.1
East of new crossroads	0.1	0.5
North of new crossroads	0	0.1
West of new crossroads	0	1.1
North of newly constructed road	1.9	2.6
North of newly constructed road	1.8	2.6

Table 11.7 Predicted Change in Noise Level associated with Vehicular Traffic

With the exception of the newly constructed roads, the predicted increase in traffic flows associated with the development in the years of 2021 and 2036 will result in an increase less than 1dB along all roads receiving traffic from the proposed development will have a negligible effect. The effect is therefore ***neutral***, ***imperceptible*** and ***permanent***.

At these newly constructed roads, the noise level increase is slightly higher. The effect is ***negative***, ***not significant*** and ***permanent***.

11.6.3.2 Building Services Plant

It is expected that the principal items of building and mechanical services plant will be for heating and ventilation of the buildings. These items and their location will be selected at the detailed design stage to ensure that noise emissions to sensitive receivers both external and within the development itself will be within the relevant criteria set out in Section 11.3.2.2. The effects are considered ***neutral***, ***not significant*** and ***permanent***.

11.6.4 Cumulative

11.6.4.1 Construction Phase

There are several proposed and permitted developments within the local area development scheme. Considering the distances between the proposed and permitted developments, there is potential for cumulative construction impacts should the construction phases of the subject sites coincide with other developments. However, as shown in Figure 11-5, the closest noise-sensitive location is the Millerstown housing estate and other potential construction works will be further from the Millerstown estate than the subject site, therefore the noise level will be commensurately lower.

For any noise sensitive locations within 25m of the proposed development potential ***negative***, ***significant*** and ***short-term*** effects are likely.

At greater distances greater than 50m the effects are expected to be ***negative, moderate and short-term***.

11.6.4.2 Operational Phase

The key potential noise source associated with the proposed development relates to additional traffic on the surrounding road network. The cumulative noise impacts associated with existing and development related traffic has been considered within this assessment and the effects are considered ***neutral***, ***not significant*** and ***permanent*** at all locations with the newly constructed roads where the impact is ***negative***, ***minor*** and ***permanent***.

11.7 Mitigation

11.7.1 Incorporated Design Mitigation

Incorporated design mitigation for noise is not applicable to the proposed development.

11.7.2 Construction Phase Mitigation

The assessment has found that predicted levels of construction noise at the nearest noise sensitive locations are likely to be above the proposed threshold values, mitigation measures are recommended to minimise or reduce any potential impacts.

Reference will be made to BS5228: 2009 + A1 *2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Part 1 Noise* for appropriate mitigation measures, which offers detailed guidance on the control of noise and vibration from construction activities. Various mitigation measures will be considered and applied during the construction of the proposed development to ensure noise and vibration limit values are complied with, such as:

- Limiting the hours during which site construction activities likely to create high levels of noise are permitted;
- Establishing channels of communication between the contractor/developer, Local Authority and residents;
- Appointing a site representative responsible for matters relating to construction noise and vibration;
- Monitoring levels of noise during critical periods and at sensitive locations;
- All site access roads will be kept even to mitigate the potential for noise and vibration from lorries.

Furthermore, it is envisaged that a variety of practicable construction noise control measures will be employed where necessary. These will include:

- Selection of plant with low inherent potential for generation of noise and/ or vibration;
- Erection of barriers as necessary around items such as generators or high duty compressors;
- Siting of noisy plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated support structures where necessary.
- Erection of construction site hoarding along noise sensitive boundaries where works are taking place in proximity to existing residential properties where no substantial screening exists.

11.7.3 Operational Phase Mitigation

11.7.3.1 Additional Traffic on Public Roads

During the operational phase of the development, noise mitigation measures with respect to the outward impact of traffic from the development are not deemed necessary.

11.7.3.2 Building Services Plant

With consideration at the detailed design stage the selection and location of plant items will ensure that noise emissions to sensitive receivers both external and within the development itself will be within the relevant criteria, therefore no further mitigation is required.

Considering that sensitive receivers within the development are much closer than off-site sensitive receivers, once the relevant noise criteria is achieved within the development it is expected that there will be no negative impact at sensitive receivers off site.

11.8 Residual Impact

11.8.1 Construction Phase

During the construction phase of the project there is the potential for significant and moderate impacts on nearby noise sensitive properties due to noise emissions from site activities. The application of binding noise limits, hours of operation, along with implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact are minimised. For any noise sensitive locations within 25m of the proposed development potential ***negative***, ***significant*** and ***short-term*** effects are likely.

At greater distances greater than 50m the effects are expected to be ***negative, moderate and short-term***.

11.8.2 Operational Phase

11.8.2.1 Additional Traffic on Public Roads

The predicted change noise levels associated with additional traffic is predicted to be of imperceptible impact along the existing road network. In the context of the existing noise environment, the overall effects from noise contribution of increased traffic is considered to be of ***neutral***, ***imperceptible to not significant*** and ***permanent*** effect to nearby noise sensitive locations.

11.8.2.2 Building Services Plant

Noise levels associated with operational plant are expected to be well within the adopted day and night-time noise limits at the nearest noise sensitive properties taking into account the site layout, the nature and type of units proposed and distances to nearest residences. Assuming the operational noise levels do not exceed the adopted design goals, the resultant residual noise effects from this source will be of ***neutral***, ***not significant***, ***permanent*** impact.

11.9 Worst Case Scenario

As noted throughout this report, this assessment is undertaken using worst-case scenario information and therefore impacts are conservative and reflect the impact under this scenario.

11.10 Monitoring

During the construction phase, noise and vibration monitoring shall be carried out by the contractor to ensure that the recommended threshold levels set out in the EIAR Chapter or any conditioned noise and vibration limits are not exceeded.

11.11 References and Sources

- 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);
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise.
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2 – Vibration.
- BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration;
- Design Manual for Roads and Bridges, 2011;
- ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.

CHAPTER 12
AIR QUALITY & CLIMATE

DECEMBER 2019

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12 Air Quality & Climate

12.1 Introduction

This chapter assesses the likely air quality and climate impacts, if any, associated with the proposed residential development on lands at Newtownmoyaghy in Kilcock, Co. Meath. A full description of the development can be found in Chapter 2 of this EIAR.

This chapter has been prepared by Claire Flynn of AWN Consulting. She is a Senior Air Quality Consultant with over 9 years of experience in assessing air quality and climate impacts for a wide range of projects. She holds a BA (Hons) in Environmental Science from Trinity College Dublin and has completed an MSc in Applied Environmental Science in UCD. She specialises in the fields of air dispersion modelling, ambient air monitoring and EIA co-ordination. She is a Full Member of the Institute of Air Quality Management (MIAQM).

12.2 Proposed Development

The proposed development is described in Chapter 2. When considering a development of this nature, the potential air quality and climate impact on the surroundings must be considered for each of two distinct stages:

- construction phase, and;
- operational phase.

During the construction stage the main focus in relation to air quality impacts will be from potential fugitive dust emissions from site activities. Emissions from construction vehicles and machinery have the potential to impact climate. The construction phase impacts will be short-term in duration.

The primary potential sources of air and climatic emissions during the operational phase of the proposed development are deemed permanent and will involve a change in traffic flows on road links nearby the proposed development.

12.3 Methodology

12.3.1 Relevant Criteria and Background Information

12.3.1.1 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 12-1** and Appendix 12.1).

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 NO_2, PM_{10}, $PM_{2.5}$, benzene and CO (see **Table 12-1**). 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 12.1).

Table 12-1 Ambient Air Quality Standards

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
		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
Benzene	2008/50/EC	Annual limit for protection of human health	5 µg/m^3
Carbon Monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health	10 mg /m^3 (8.6 ppm)

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

12.3.1.2 Dust Deposition Guidelines

The concern from a health perspective is focussed on particles of dust which are less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$) and the EU ambient air quality standards outlined in **Table 12-1** have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

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, Health & Local Government (DOEHLG, 2004) apply the Bergerhoff limit value of 350 mg/(m^2*day) to the site boundary of quarries. This limit value will also be implemented at the boundary of the development site with regard to potential dust impacts from construction of the proposed development.

12.3.1.3 Climate Agreements

Ireland ratified the United Nations Framework Convention on Climate Change (UNFCCC) in April 1994 and the Kyoto Protocol in principle in 1997 and formally in May 2002 (UNFCCC, 1997; UNFCCC, 1999). For the purposes of the EU burden sharing agreement under Article 4 of the Doha Amendment to the Kyoto Protocol, in December 2012, Ireland agreed to limit the net growth

of the six Greenhouse Gases (GHGs) under the Kyoto Protocol to 20% below the 2005 level over the period 2013 to 2020 (UNFCCC, 2012).

The UNFCCC is continuing detailed negotiations in relation to GHGs reductions and in relation to technical issues such as Emission Trading and burden sharing. The most recent Conference of the Parties to the Convention (COP24) took place in Katowice, Poland from the 4th to the 14th of December 2018 and focussed on advancing the implementation of the Paris Agreement. The Paris Agreement was established at COP21 in Paris in 2015 and is an important milestone in terms of international climate change agreements. The Paris Agreement was agreed by all 196 members of the UNFCCC and has a stated 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 annual 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 greenhouse gas 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 on elevating adaption onto the same level as action to cut and curb emissions.

The EU, in October 2014, agreed the "2030 Climate and Energy Policy Framework"(EU 2014). The European Council endorsed a binding EU target of at least a 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990. The target will be delivered collectively by the EU in the most cost-effective manner possible, with the reductions in the ETS and non-ETS sectors amounting to 43% and 30% by 2030 compared to 2005, respectively. Secondly, it was agreed that all Member States will participate in this effort, balancing considerations of fairness and solidarity. The policy also outlines, under "Renewables and Energy Efficiency", an EU binding target of at least 27% for the share of renewable energy consumed in the EU in 2030.

12.3.1.4 Gothenburg Protocol

In 1999, Ireland signed the Gothenburg Protocol to the 1979 UN Convention on Long Range Transboundary Air Pollution. The initial objective of the Protocol was to control and reduce emissions of Sulphur Dioxide (SO_2), Nitrogen Oxides (NO_X), Volatile Organic Compounds (VOCs) and Ammonia (NH_3). To achieve the initial targets Ireland was obliged, by 2010, to meet national emission ceilings of 42 kt for SO_2 (67% below 2001 levels), 65 kt for NO_X (52% reduction), 55 kt for VOCs (37% reduction) and 116 kt for NH_3 (6% reduction). In 2012, the Gothenburg Protocol was revised to include national emission reduction commitments for the main air pollutants to be achieved in 2020 and beyond and to include emission reduction commitments for $PM_{2.5}$.

European Commission Directive 2001/81/EC, the National Emissions Ceiling Directive (NECD), prescribes the same emission limits as the 1999 Gothenburg Protocol. A National Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005 (DEHLG, 2004; 2007). Data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO_2, VOCs and NH_3 but failed to comply with the ceiling for NO_X (EEA, 2012). Directive (EU) 2016/2284 "On the Reduction of National Emissions of Certain Atmospheric Pollutants and Amending Directive 2003/35/EC and Repealing Directive 2001/81/EC" was published in December 2016. The Directive will apply the 2010 NECD limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO_2, NO_X, NMVOC, NH_3, $PM_{2.5}$ and CH_4. In relation to Ireland, 2020 emission targets are 25 kt for SO_2 (65% on 2005 levels), 65 kt for NO_X (49% reduction on 2005 levels), 43 kt for VOCs (25% reduction on 2005 levels), 108 kt for NH_3 (1% reduction on 2005 levels) and 10 kt for $PM_{2.5}$ (18% reduction on 2005 levels). In relation to 2030, Ireland's emission targets are 85% below 2005 levels for SO_2, 69% reduction for NO_x, 32% reduction for VOCs, 5% reduction for NH_3 and 41% reduction for $PM_{2.5}$.

12.3.2 Local Air Quality Assessment – Impact from Road Traffic (DMRB Assessment)

The air quality assessment has been carried out using the methodology outlined in the guidance documents published by the UK DEFRA (2018; 2016) and also complies with EIAR guidance published by the EPA (2015, 2017). The assessment of air quality was carried out using a phased approach as recommended by the UK DEFRA (2018). The phased approach recommends that the complexity of an air quality assessment be consistent with the risk of failing to achieve the air quality standards. In the current assessment, an initial scoping of possible key pollutants was carried out and the likely location of air pollution "hot-spots" identified. An examination of recent EPA and Local Authority data in Ireland (EPA, 2019) has indicated that SO_2, smoke and CO are unlikely to be exceeded in the majority of locations within Ireland and thus these pollutants do not require detailed monitoring or assessment to be carried out. However, the analysis did indicate potential issues in regards to nitrogen dioxide (NO_2), PM_{10} and $PM_{2.5}$ at busy junctions in urban centres (EPA, 2019a). Benzene, although previously reported at quite high levels in urban centres, has recently been measured at several city centre locations to be well below the EU limit value (EPA, 2019a). Historically, CO levels in urban areas were a cause for concern. However, CO concentrations have decreased significantly over the past number of years and are now measured to be well below the limits even in urban centres (EPA 2019a; 2019b). The key pollutants reviewed in the assessments are NO_2, PM_{10}, $PM_{2.5}$, benzene and CO, with particular focus on NO_2 and PM_{10}.

Key pollutant concentrations will be predicted for nearby sensitive receptors for the following scenarios:

- The Existing Scenario (2019), for model verification;
- Opening Year (2021) Do-Nothing Scenario (DN), which assumes the retention of present site usage with no development in place;
- Opening Year (2021) Do-Something Scenario (DS), which assumes the proposed development is in place;
- Design Year (2036) Do-Nothing Scenario (DN), which assumes no development is in place; and
- Design Year (2036) of the Do-Something Scenario (DS), which assumes the proposed development is in place.

The assessment methodology involved air dispersion modelling using the UK DMRB Screening Model (Version 1.03c, July 2007), the NO_x to NO_2 Conversion Spreadsheet (Version 7.1, April 2019) (UK DEFRA, 2019), and following guidance issued by the TII (2011), UK Highways Agency (2007), UK DEFRA (2018; 2016; UK DETR 1998) and the EPA (2015; 2017).

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 guidance (UK Highways Agency, 2007), on which the TII guidance was based, states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the local air quality assessment:

- Road alignment change of 5 metres or more;
- Daily traffic flow changes by 1,000 AADT or more;

- HDV flows change by 200 vehicles per day or more;
- Daily average speed changes by 10 km/h or more; or
- Peak hour speed changes by 20 km/h or more.

Concentrations of key pollutants are calculated at sensitive receptors that have the potential to be affected by the proposed development. For road links which are deemed to be affected by the proposed development and within 200 m of the chosen sensitive receptors inputs to the air dispersion model consist of: road layouts, receptor locations, annual average daily traffic movements (AADT), percentage of heavy goods vehicles, annual average traffic speeds and background concentrations. The UK DMRB guidance states that road links at a distance of greater than 200 m from a sensitive receptor will not influence pollutant concentrations at the receptor. Using the 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 predicted ambient concentrations are then compared with the relevant ambient air quality standards to assess the compliance of the proposed development with those standards.

The TII 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, which can be applied to any project that causes a change in traffic flows. 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 and are detailed in Appendix 12.2, Table A12.1 to Table A12.3. The significance criteria are based on PM_{10} and NO_2 as these pollutants are most likely to exceed the annual mean limit values (40 $\mu g/m^3$). However, the criteria have also been applied to the predicted 8-hour CO, annual benzene and annual $PM_{2.5}$ concentrations for the purposes of this assessment.

12.3.2.1 Update to NO_2 Projections using DMRB

In 2011 the UK DEFRA published research 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 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 (HA) published an Interim advice note (IAN 170/12) in order to correct the DMRB results for future years.

12.3.2.2 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 HGVs 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 NO_x 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 NO_x to NO_2 calculator (2019) which was originally published in 2009 and is currently on version 7.1. This calculator (which can be downloaded in the form of an excel spreadsheet) accounts for the predicted availability of

O_3 and proportion of NO_x 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.

12.3.3 Regional Impact Assessment (Including Climate)

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 2 in the UK Design Manual for Roads and Bridges (2016). The assessment focused on determining the resulting change in emissions of volatile organic compounds (VOCs), nitrogen oxides (NO_x) and carbon dioxide (CO_2) associated with the proposed development. 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 development that results in a change in traffic volumes. The inputs to the air dispersion model consist of information on road link lengths, AADT movements and annual average traffic speeds.

12.3.4 Ecologically Sensitive Sites

For routes that pass within 2 km of a designated area of conservation (either Irish or European designation) the TII requires consultation with an Ecologist (2011). However, in practice the potential for impact to an ecological site is highest within 200 m of the proposed scheme and when significant changes in AADT (>5%) occur.

Transport Infrastructure Ireland's *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (2009) and Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (DEHLG, 2010) provide details regarding the legal protection of designated conservation areas.

If both of the following assessment criteria are met, an assessment of the potential for impact due to nitrogen deposition shall be conducted:

- A designated area of conservation is located within 200 m of the proposed development; and
- A significant change in AADT flows (>5%) will occur.

The Royal Canal proposed Natural Heritage Area (pNHA) is located within 200m of the proposed site boundary and is adjacent to the R148 road which will be impacted by increased traffic associated with the development. An assessment of the impact with regard to nitrogen oxide (NO_x) concentrations and nitrogen deposition on the Royal Canal pNHA was conducted. Dispersion modelling and prediction was carried out at typical traffic speeds for the affected parts of the road which will be nearest the designated site. Ambient NO_x concentrations were predicted for the worst-case year (opening year 2021) along a transect of up to 200 m within the pNHA. The road contribution to dry deposition of nitrogen along the transect was also calculated using the methodology outlined in Appendix 9 of the *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011).

12.4 Baseline Scenario

12.4.1 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). 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 Casement Aerodrome which is located approximately 17 km southeast of the site. For data collated during five representative years (2014 - 2018), the predominant wind direction is westerly to south-westerly, with generally moderate wind speeds (see **Figure 12.1**).

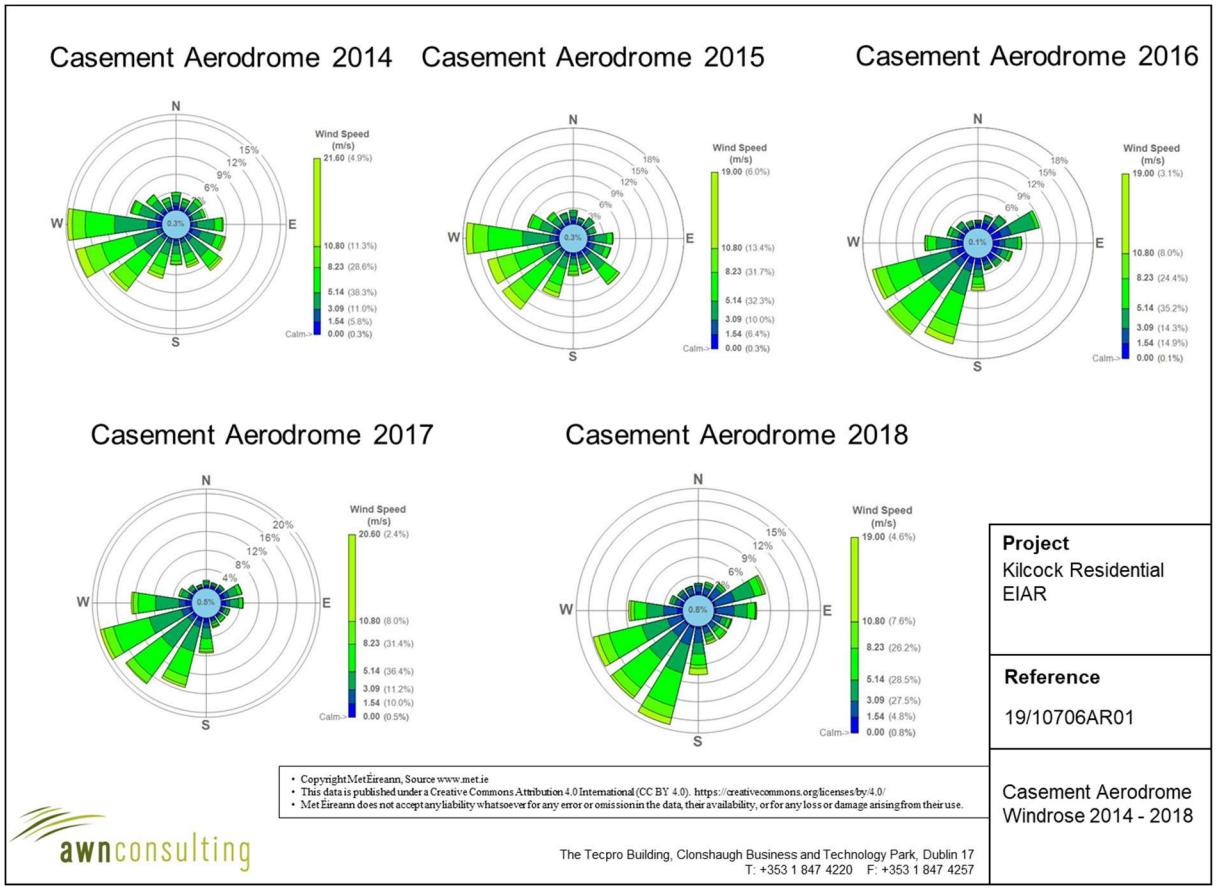

Figure 12.1 Casement Aerodrome Windroses 2014 - 2018

12.4.2 Trends in Air Quality

Air quality is variable and subject to both significant spatial and temporal variation. In relation to spatial variations in air quality, concentrations generally fall significantly with distance from major road sources (WHO, 2006). Thus, residential exposure is determined by the location of sensitive

receptors relative to major roads sources in the area. Temporally, air quality can vary significantly by orders of magnitude due to changes in traffic volumes, meteorological conditions and wind direction.

In assessing baseline air quality, two tools are generally used: ambient air monitoring and air dispersion modelling. In order to adequately characterise the current baseline environment through monitoring, comprehensive measurements would be required at a number of key receptors for PM_{10}, NO_2 and benzene. In addition, two of the key pollutants identified in the scoping study (PM_{10} and NO_2) have limit values which require assessment over time periods varying from one hour to one year. Thus, continuous monitoring over at least a one-year period at a number of locations would be necessary in order to fully determine compliance for these pollutants. Although this study would provide information on current air quality it would not be able to provide predictive information on baseline conditions (UK DETR, 1998), which are the conditions which prevail just prior to opening in the absence of the development. Hence the impacts of the development were fully assessed by air dispersion modelling (UK DETR, 1998) which is the most practical tool for this purpose. The baseline environment has also been assessed using modelling, since the use of the same predictive technique for both the 'do-nothing' and 'do-something' scenario will minimise errors and allow an accurate determination of the relative impact of the development.

12.4.3 Baseline Air Quality – Review of Available Background Data

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality in Ireland is "Air Quality In Ireland 2018 – Indicators of Air Quality" (EPA, 2019a). 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, 2019b).

As part of the implementation of the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA, 2019a). 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, 2019b). The long-term EPA 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.).

NO_2 monitoring was carried out at two rural Zone D locations in Emo and Kilkitt in recent years, and in the urban Zone D town of Castlebar (EPA, 2019a). The NO_2 annual average in 2018 was 3 $\mu g/m^3$ at both rural sites, with the results for Castlebar averaging 8 $\mu g/m^3$. Hence long-term average concentrations measured at all locations were significantly lower than the annual average limit value of 40 $\mu g/m^3$. The maximum 1-hour limit value of 200 $\mu g/m^3$ (measured as a 99.8th percentile i.e. 18 exceedances are allowed per year) was not exceeded in any year for any of the Zone D locations. The average results at rural Zone D locations over the last five years suggests an average of 8 $\mu g/m^3$ as an urban background concentration (**Table 12.2**). Based on the above information, a conservative estimate of the current background NO_2 concentration for the region of the development is 8 $\mu g/m^3$.

Long term NO_X monitoring has been carried out at three Zone D locations in recent years: Castlebar, Kilkitt and Emo Court. Annual mean concentrations of NO_X at the monitoring sites over the period 2014 – 2018 ranged from 2 µg/m^3 for a purely rural area to 13 µg/m^3 in Castlebar (see **Table 12.3**). Based on this information, an appropriate conservative estimate for the current background NO_X concentration in the region of the proposed development is 13 µg/m^3.

Table 12.12-2 Trends in Zone D Air Quality - Nitrogen Dioxide (NO_2)

Station	Averaging Period Notes 1, 2	Year				
		2014	2015	2016	2017	2018
Castlebar	Annual Mean NO_2 (µg/m^3)	8	8	9	7	8
	99.8th %ile 1-hr NO_2 (µg/m^3)	71.2	-	65.6	59.8	- Note 3
Kilkitt	Annual Mean NO_2 (µg/m^3)	3	2	3	2	3
	99.8th %ile 1-hr NO_2 (µg/m^3)	26.9	-	26.1	17.0	- Note 3
Emo	Annual Mean NO_2 (µg/m^3)	3	3	4	3	3
	99.8th %ile 1-hr NO_2 (µg/m^3)	25.5	-	35.5	27.5	- Note 3

Note 1 Annual average limit value - 40 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Note 2 1-hour limit value - 200 µg/m^3 as a 99.8th%ile, i.e. not to be exceeded >18 times per year (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Note 3 Full ambient monitoring datasets for NO_2 in 2018 are not yet available from the EPA.

Table 12.12-3 Trends in Zone D Air Quality - Nitrogen Oxide (NO_X)

Station	Averaging Period Note 1	Year				
		2014	2015	2016	2017	2018
Castlebar	Annual Mean (µg/m^3)	12	11	13	11	11
Kilkitt	Annual Mean (µg/m^3)	3	2	4	3	5
Emo	Annual Mean (µg/m^3)	5	3	6	4	4

Note 1 Annual average limit value - 30 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Long-term PM_{10} measurements carried out at the rural Zone D location in Kilkitt in 2018 gave an average level of 9 µg/m^3 (EPA, 2019a). Long-term PM_{10} monitoring was carried out at the urban Zone D locations of Castlebar, Claremorris and Roscommon Town in 2018. The average annual mean concentrations measured at these three urban Zone D locations in 2018 ranged from

11 - 15µg/m^3 (see Table 12.4). Results are also available for the Castlebar, Claremorris and Kilkitt to observe the trend in concentrations over the last five years (see **Table 12.4**). Based on the above information a conservative estimate of the current background PM_{10} concentration for the region of the development is 13 µg/m^3.

Table 12.12-4 Trends in Zone D Air Quality - PM_{10}

Station	Averaging Period Notes 1, 2	Year				
		2014	2015	2016	2017	2018
Castlebar	Annual Mean PM_{10} (µg/m^3)	12	13	12	11	11
	24-hr Mean > 50 µg/m^3 (days)	2	2	1	1	0
Kilkitt	Annual Mean PM_{10} (µg/m^3)	9	9	8	8	9
	24-hr Mean > 50 µg/m^3 (days)	2	1	0	0	0
Claremorris	Annual Mean PM_{10} (µg/m^3)	10	10	10	11	12
	24-hr Mean > 50 µg/m^3 (days)	0	0	0	1	0
Roscommon Town	Annual Mean PM_{10} (µg/m^3)	-	-	-	-	12
	24-hr Mean > 50 µg/m^3 (days)	-	-	-	-	0

Note 1 Annual average limit value - 40 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Note 2 24-hour limit value - 50 µg/m^3 as a 90.4th%ile, i.e. not to be exceeded >35 times per year (EU Council Directive 1999/30/EC & S.I. No. 180 of 2011).

The results of $PM_{2.5}$ monitoring at Claremorris and Roscommon Town in 2018 indicated an average $PM_{2.5}/PM_{10}$ ratio ranging from 0.50 – 0.75. Based on this information, a conservative ratio of 0.75 was used to generate a background $PM_{2.5}$ concentration for the region of the development of 10 µg/m^3.

In terms of benzene, monitoring data for a Zone D location is not available since 2012. As an alternative, data from the Zone C location of Kilkenny for the period 2014 – 2018 showed an upper annual average concentration of no more than 0.2 µg/m^3, which is significantly below the 5 µg/m^3

limit value. Based on this monitoring data a conservative estimate of the current background concentration in the region of the development is 0.2 µg/m^3.

With regard to CO, annual averages at the Zone D location of Enniscorthy for the 2014 - 2016 period are low, peaking at 0.6 mg/m^3 or 6% of the limit value of 10 mg/m^3 (EPA, 2019a). More recent data for Zone D locations is not available. Data for the Zone C monitoring stations in Portlaoise and Dundalk gave annual mean concentrations of 0.2 mg/m^3 and 0.5 mg/m^3, respectively, in 2018. Based on this EPA data, a conservative estimate of the current background CO concentration in the region of the development is 0.6 mg/m^3.

Background concentrations for the opening (2021) and design (2036) years have been calculated using the current 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* and the UK Department for Environment, Food and Rural Affairs LAQM.TG (UK DEFRA 2018).

12.5 Difficulties Encountered

There were no difficulties encountered while carrying out this assessment.

12.6 Impact Assessment

12.6.1 Do Nothing Scenario

The Do Nothing scenario includes retention of the current site without the proposed residential development in place. In this scenario, 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 potential new developments in the surrounding area, changes in road traffic, etc). The “Do Nothing” scenario is modelled within the local air quality impact assessment, regional air quality impact assessment and climate impact assessment (see section 12.6.3) based on projected traffic data for local road links assuming the proposed development is not in place in future years.

12.6.2 Construction Phase

12.6.2.1 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 and PM_{10}/$PM_{2.5}$ emissions. The proposed development can be considered moderate in scale and therefore there is the potential for significant dust soiling 50m from the source (TII 2011) (**Table 12.5**). While construction dust tends to be deposited within 350m of a construction site, the majority of the deposition occurs within the first 50m (IAQM, 2014). There are a small number of sensitive receptors, predominantly residential properties and recreational areas in close proximity to the site. In order to minimise dust emissions during construction, a series of mitigation measures have been prepared in the form of a dust minimisation plan. Provided the dust minimisation measures outlined in the plan (see Appendix 12.3) are adhered to, the air quality impacts during the construction phase will be short-term, negative and not significant. These measures are also summarised in Section 12.7.2.1.

Table 12-5 Trends in Trends in Zone A Air Quality - PM_{10}

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 roads	100m	25m	25m
Moderate	Moderate sized construction sites, with moderate use of haul roads	50m	15m	15m
Minor	Minor construction sites, with limited use of haul roads	25m	10m	10m

12.6.2.2 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. However, the impact of the construction phase on climate is considered to be short-term, negative and imperceptible.

12.6.2.3 Human Health

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 air quality impact of construction of the proposed development will be short-term, negative and imperceptible with respect to human health.

12.6.3 Operational Phase

12.6.3.1 Local Air Quality

There is the potential for a number of emissions to the atmosphere during the operational phase of the development. In particular, the traffic-related air emissions may generate quantities of air pollutants such as NO_2, CO, benzene, PM_{10} and $PM_{2.5}$.

Cumulative effects have been assessed, as recommended in the EU Directive on EIA (Council Directive 97/11/EC) and using the methodology of the UK DEFRA (2016, 2018). Firstly, background concentrations (EPA 2019a) have been included in the modelling study. These background concentrations are year-specific and account for non-localised sources of the pollutants of concern (EPA 2019a). Appropriate background levels were selected based on the available monitoring data provided by the EPA (EPA 2019a) (see Section 12.4.3). Traffic flow information was obtained from the traffic consultant for this project and has been used to model pollutant levels under various traffic scenarios and under sufficient spatial resolution to assess whether any significant air quality impact on sensitive receptors may occur. Projected traffic data used for the purpose of this assessment includes committed and planned developments in the vicinity of the project site.

The impact of the proposed development has been assessed by modelling emissions from the traffic generated as a result of the development. The impact of emissions of CO, benzene, NO_2, PM_{10} and $PM_{2.5}$ for the baseline, 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 impact, to be determined.

The receptors modelled represent the worst-case locations close to the proposed development and were chosen due to their close proximity (within 200 m) to the road links impacted by proposed

development. The projected traffic data used for the local air quality assessment is shown in **Table 12.6**, with the percentage of HGVs shown in parenthesis below the AADT. Five sensitive residential receptors (R1 – R5) in the vicinity of the proposed development have been assessed. Sensitive receptors have been chosen as they have the potential to be adversely impacted by the development, these receptors are detailed in **Figure 12.2**.

Table 12-6 Traffic Data used in Modelling Assessment

Road Name	Base Year	Do-Nothing[Note 1]		Do-Something[Note 1]		Speed Assumed for Analysis (kph)
	2019	2021	2036	2021	2036	
	AADT (% HGV)	AADT (% HGV)	AADT (% HGV)	AADT (% HGV)	AADT (% HGV)	
Newtownmoyaghy Rd. (Link N)	3664 (1.4%)	3871 (1.4%)	4687 (1.4%)	1104 (1.4%)	3377 (1.4%)	50
New Development Road (Link O)	-	1104 (0%)	2601 (1%)	-	3855 (1.2%)	50
New Development Road (Link Q)	-	-	2162 (1.2%)	1845 (0.8%)	5276 (0.9%)	50
New Development Road (Link S)	305 (0%)	1201 (0%)	2930 (0.9%)	8510 (1.1%)	9936 (1.1%)	50
R148 (Link B)	6829 (1.1%)	7931 (1.1%)	7861 (1.1%)	8694 (1%)	8763 (1.1%)	50
R148 (Link A)	6817 (1.1%)	7195 (1.1%)	8416 (1.1%)	1858 (0.9%)	5380 (0.9%)	50
New Development Road (Link T)	317 (1.3%)	1215 (0.9%)	2958 (0.8%)	10562 (0.9%)	13257 (1%)	50
R148 Harbour Street (Link E)	9152 (0.9%)	10186 (0.9%)	11333 (0.9%)	11313 (1.1%)	14576 (1%)	50
Show Bridge (Link F)	10091 (1.1%)	10991 (1.1%)	12842 (1%)	1104 (1.4%)	3377 (1.4%)	50

Note 1 Projected traffic data used for the purpose of this assessment includes committed and planned developments in the vicinity of the project site

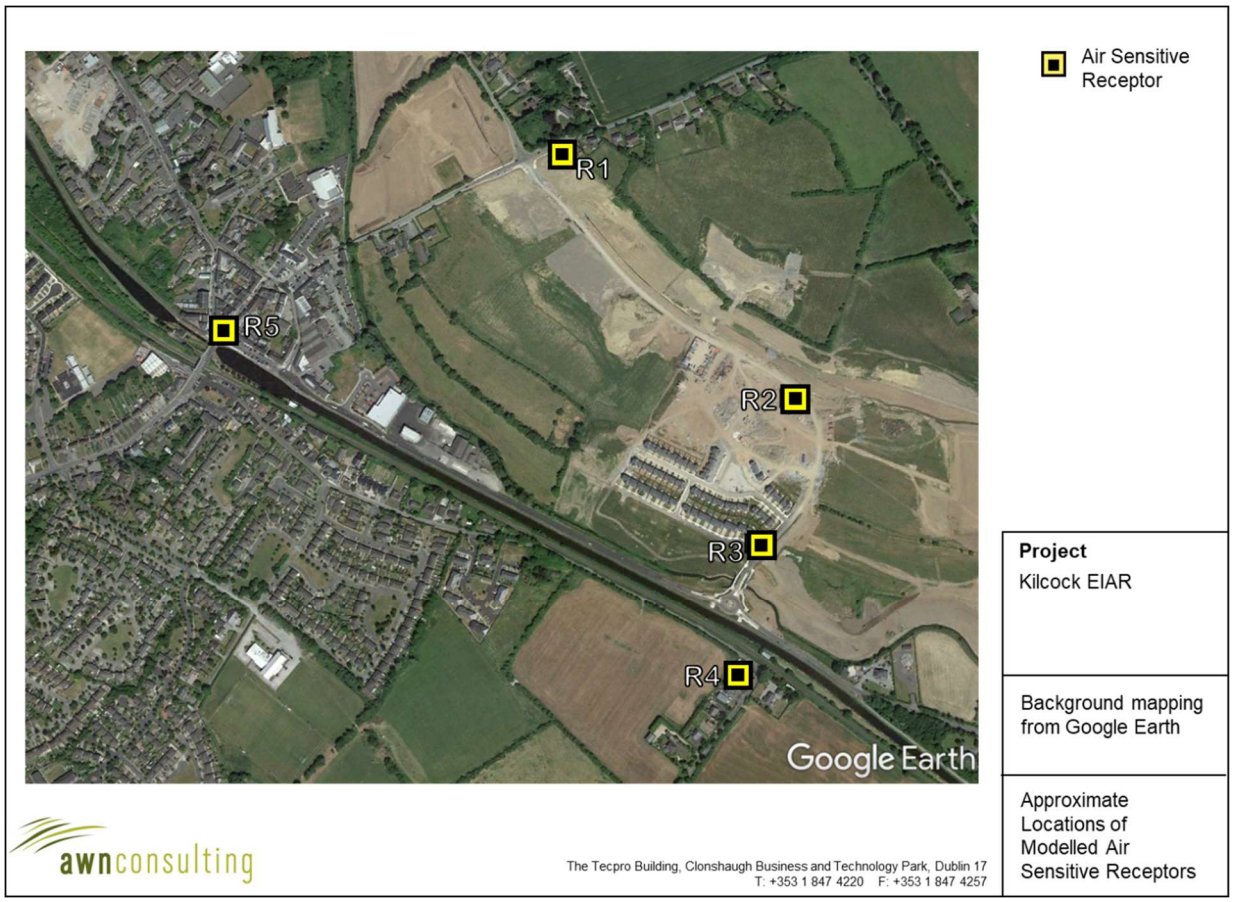

Figure 12.2 Approximate Location of Air Sensitive Receptors used in Modelling Assessment

12.6.3.2 Modelling Assessment

Transport Infrastructure Ireland *Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes* (TII, 2011) detail a methodology for determining air quality impact significance criteria for road schemes and has been adopted for this assessment, as is best practice. 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.

NO_2

The results of the assessment of the impact of the proposed development on NO_2 in the opening year 2021 are shown in **Table 12.7** for the Highways Agency IAN 170/12 and **Table 12.8** using the UK Department for Environment, Food and Rural Affairs technique, respectively. The annual average concentration is within the limit value at all worst-case receptors using both techniques. Levels of NO_2 are 31% of the annual limit value in 2021 using the more conservative IAN technique, while concentrations are 30% of the annual limit value in 2021 using the UK Department for Environment, Food and Rural Affairs technique. 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 using either technique (see **Table 12.9**).

The results of the assessment of the impact of the proposed development on NO_2 in the design year 2036 are shown in **Table 12.7** for the Highways Agency IAN 170/12 and **Table 12.8** using the UK Department for Environment, Food and Rural Affairs technique, respectively. The annual

average concentration is within the limit value at all worst-case receptors using both techniques. Levels of NO_2 are 32% of the annual limit value in 2036 using the more conservative IAN technique, while concentrations are 29% of the annual limit value in 2036 using the UK Department for Environment, Food and Rural Affairs technique. 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 using either technique (see **Table 12.9**).

The impact of the proposed development on annual mean NO_2 levels can be assessed relative to "Do Nothing (DN)" levels in 2021 and 2036. Relative to baseline levels, some small increases in pollutant levels are predicted as a result of the proposed development. With regard to impacts at individual receptors, the greatest impact on NO_2 concentrations will be an increase of 2% of the annual limit value at Receptor 5. Thus, using the assessment criteria outlined in Appendix 12.2 Tables A12.1 – A12.2, the impact of the proposed development in terms of NO_2 is negligible. Therefore, the overall impact of NO_2 concentrations as a result of the proposed development is permanent, negative and imperceptible at all of the receptors assessed.

PM_{10}

The results of the modelled impact of the proposed development for PM_{10} in the opening year 2021 are shown in **Table 12.10**. Predicted annual average concentrations at the worst-case receptor in the region of the development are at most 35% of the limit value in 2021. It is predicted that the worst case receptors will not experience any exceedances of the 50 µg/m^3 24-hour mean limit value with or without the proposed development in place (35 exceedances are permitted per year) (see **Table 12.11**).

The results of the modelled impact of the proposed development for PM_{10} in the design year 2036 are shown in **Table 12.10**. Predicted annual average concentrations at the worst-case receptor in the region of the development are at most 36% of the limit value in 2036. It is predicted that the worst case receptor (Receptor 2) will experience at most one exceedance of the 50 µg/m^3 24-hour mean limit value with the proposed development in place (35 exceedances are permitted per year) (see **Table 12.11**).

Relative to baseline levels, some imperceptible increases in PM_{10} levels at the worst-case receptors are predicted as a result of the proposed development. The greatest impact on PM_{10} concentrations in the region of the proposed development will be an increase of 0.4% of the annual limit value at Receptor 5. Thus, the magnitude of the changes in air quality are negligible at all receptors based on the criteria outlined in Appendix 12.2, Tables A12.1 – A12.3. Therefore, the overall impact of PM_{10} concentrations as a result of the proposed development is permanent, negative and imperceptible.

$PM_{2.5}$

The results of the modelled impact of the proposed development for $PM_{2.5}$ are shown in **Table 12.12**. Predicted annual average concentrations in the region of the proposed development are 43% of the limit value in 2021 and 44% in 2036 at the worst-case receptor.

Relative to baseline levels, imperceptible increases in $PM_{2.5}$ levels at the worst-case receptors are predicted as a result of the proposed development. None of the receptors assessed will experience an increase in concentrations of over 0.5% of the limit value. Therefore, using the assessment criteria outlined in Appendix 12.2, Tables A12.1 – A12.2, the impact of the proposed development with regard to $PM_{2.5}$ is negligible at all of the receptors assessed. Overall, the impact of increased $PM_{2.5}$ concentrations as a result of the proposed development is permanent, negative and imperceptible.

CO and Benzene

The results of the modelled impact of CO and benzene are shown in **Table 12.13** and **Table 12.14**, respectively. Predicted pollutant concentrations with the proposed development in place are below the ambient standards at all locations. Levels of benzene are 6% of the limit value in 2021 and 2036 with levels of CO reaching 34% of the limit value in 2021 and 2036.

Relative to baseline levels, some imperceptible increases in pollutant levels at the worst-case receptors are predicted as a result of the proposed development. The greatest impact on CO and benzene concentrations will be an increase of 0.6% of the CO limit and 0.3% of the Benzene limit value at Receptor 5. Thus, using the assessment criteria for NO_2 and PM_{10} outlined in Appendix 12.2 and applying these criteria to CO and benzene, the impact of the proposed development in terms of CO and benzene is permanent, negative and imperceptible.

Summary of Local Air Quality Modelling Assessment

Levels of traffic-derived air pollutants from the proposed development will not exceed the ambient air quality standards either with or without the proposed development in place. Using the assessment criteria outlined in Appendix 12.2, Table A12.1 – A12.3, the impact of the proposed development in terms of PM_{10}, $PM_{2.5}$, CO, NO_2 and benzene is permanent, negative and imperceptible.

12.6.3.3 Regional Air Quality Impact

The regional impact of the proposed development on emissions of NO_X and VOCs has been assessed using the procedures of Transport Infrastructure Ireland (TII 2011) and the UK Department for Environment, Food and Rural Affairs (2018). The results (see **Table 12.15**) show that the likely impact of the proposed development on Ireland's obligations under the Targets set out by Directive EU 2016/2284 “On the reduction of national emissions of certain atmospheric pollutants and amending Directive 2003/35/EC” are imperceptible and long-term. For the opening year 2021, the predicted impact of the changes in AADT is to increase NO_x levels by 0.0001% of the NO_x emissions ceiling and increase VOC levels by 0.00005% of the VOC emissions ceiling to be complied with in 2020. For the design year 2036, the predicted impact of the changes in AADT is to increase NOx levels by 0.0008% of the NOx emissions ceiling and increase VOC levels by 0.00024% of the VOC emissions ceiling to be complied with in 2030.

Therefore, the impacts on regional air quality during the operational stage of the proposed development are predicted to be permanent, negative and imperceptible.

12.6.3.4 Climate

The impact of the proposed development on emissions of CO_2 impacting climate were also assessed using the Design Manual for Roads and Bridges screening model (see **Table 12.15**). The results show that the impact of the proposed development will be to increase CO_2 emissions by 0.0001% of Ireland's EU Target in the opening year of 2021 and by 0.0006% in the design year of 2036. Thus, the impact of the proposed development on national greenhouse gas emissions will be insignificant in terms of Ireland’s obligations under the EU 2020 Target (EU, 2017).

Therefore, the impacts on climate during the operational stage of the proposed development are predicted to be permanent, negative and imperceptible.

12.6.3.5 Impact on Sensitive Ecosystems

The impact of NO_X (i.e. NO and NO_2) emissions resulting from the traffic along the R148 associated with the proposed development at the Royal Canal pNHA was assessed. Ambient NO_X concentrations were predicted for the worst-case year (opening year 2021) along a transect of up to 200m from the R148 and are given in Error! Reference source not found. **12.16**. The road

contribution to dry deposition along the transect is also given and was calculated using the methodology of TII (TII, 2011).

The predicted annual average NO_X level (including background) at the worst-case location in the designated site adjacent to the proposed development is well below the limit value of 30 µg/m^3 for both the "Do Nothing" and "Do Something" scenarios. Do Nothing NO_X concentrations are 57% of this limit (including background concentrations); with the proposed development in place NO_X concentrations only increase by 0.62 µg/m^3, reaching 59% of the limit (including background levels).

The road contribution to the NO_2 dry deposition rate along the 200m transect within the designated sites is also detailed in Error! Reference source not found. **12.16**. The maximum increase in the NO_2 dry deposition rate is 0.034 Kg(N)/ha/yr. This reaches only 0.7% of the critical load for inland and surface water habitats of 5 – 10 Kg(N)/ha/yr.

Therefore, the impact of the proposed development in terms NO_x impacts on sensitive ecosystems is permanent, negative and imperceptible.

12.6.3.6 Human Health

Air dispersion modelling of operational traffic emissions was undertaken to assess the impact of the development with reference to EU ambient air quality standards which are based on the protection of human health. As demonstrated by the modelling results, emissions as a result of the proposed development are compliant with all National and EU ambient air quality limit values and, therefore, the impact on human health will be permanent, negative and not significant.

12.6.3.7 Summary of Operational Phase Impacts

A summary of the operational phase impacts on air quality and climate is shown in **Table 12.17**.

Table 12-7 Annual Mean NO_2 Concentrations (µg/m^3) (using IAN 170/12 V3 Long Term NO_2 Trend Projections)

Receptor	Impact Opening Year 2021					Impact Design Year 2036				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	8.9	8.9	0.02	Imperceptible	Negligible Increase	8.6	8.7	0.08	Imperceptible	Negligible Increase
2	7.9	7.9	0.00	Imperceptible	Negligible Decrease	8.0	8.6	0.54	Small	Negligible Increase
3	8.4	8.5	0.19	Imperceptible	Negligible Increase	8.3	9.0	0.69	Small	Negligible Increase
4	8.4	8.5	0.10	Imperceptible	Negligible Increase	7.9	8.0	0.08	Imperceptible	Negligible Increase
5	12.2	12.4	0.14	Imperceptible	Negligible Increase	12.1	12.9	0.81	Small	Negligible Increase

Table 12-8 Annual Mean NO_2 Concentrations (µg/m^3) (using Defra's Technical Guidance)

Receptor	Impact Opening Year 2021					Impact Design Year 2036				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	8.5	8.5	0.02	Imperceptible	Negligible Increase	7.3	7.4	0.07	Imperceptible	Negligible Increase
2	7.5	7.5	0.00	Imperceptible	Negligible Decrease	6.7	7.1	0.45	Small	Negligible Increase
3	8.0	8.2	0.18	Imperceptible	Negligible Increase	7.0	7.5	0.58	Small	Negligible Increase e
4	8.0	8.1	0.10	Imperceptible	Negligible Increase	6.7	6.8	0.07	Imperceptible	Negligible Increase
5	11.9	12.0	0.14	Imperceptible	Negligible Increase	10.9	11.7	0.73	Small	Negligible Increase

Table 12-9 One Hour 99.8th%ile NO_2 Concentrations (µg/m^3)

Receptor	IAN 170/12 V3 Long Term NO2 Trend Projections Technique				Defra's Technical Guidance Technique			
	Opening Year 2021		Design Year 2036		Opening Year 2021		Design Year 2036	
	DN	DS	DN	DS	DN	DS	DN	DS
1	31	31.1	30.2	30.5	29.7	29.8	25.7	25.9
2	27.6	27.6	28.1	30	26.3	26.3	23.3	24.9
3	29.3	29.9	29.1	31.6	27.9	28.5	24.4	26.4
4	29.3	29.6	27.8	28.1	27.9	28.3	23.4	23.6
5	42.9	43.4	42.4	45.2	41.6	42.1	38.3	40.8

Table 12-10 Annual Mean PM_{10} Concentrations (µg/m^3)

Receptor	Impact Opening Year 2021					Impact Design Year 2036				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	13.1	13.1	0.00	Imperceptible	Negligible Increase	13.2	13.2	0.02	Imperceptible	Negligible Increase
2	12.9	12.9	0.00	Imperceptible	Negligible Decrease	13.1	13.2	0.10	Imperceptible	Negligible Increase
3	13.0	13.1	0.04	Imperceptible	Negligible Increase	13.1	13.3	0.14	Imperceptible	Negligible Increase
4	13.0	13.1	0.02	Imperceptible	Negligible Increase	13.1	13.1	0.02	Imperceptible	Negligible Increase
5	13.9	14.0	0.03	Imperceptible	Negligible Increase	14.1	14.3	0.18	Imperceptible	Negligible Increase

Table 12-11 No. days with PM_{10} concentration > 50 µg/m^3

Receptor	Opening Year 2021		Design Year 2036	
	DN	DS	DN	DS
1	0	0	0	0
2	1	1	1	1
3	0	0	0	0
4	1	1	1	1
5	0	0	0	0

Table 12-12 Annual Mean $PM_{2.5}$ Concentrations (µg/m^3)

Receptor	Impact Opening Year 2021					Impact Design Year 2036				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	10.1	10.1	0.00	Imperceptible	Negligible Increase	10.2	10.2	0.01	Imperceptible	Negligible Increase
2	9.9	9.9	0.00	Imperceptible	Negligible Decrease	10.0	10.1	0.08	Imperceptible	Negligible Increase
3	10.0	10.1	0.03	Imperceptible	Negligible Increase	10.1	10.2	0.11	Imperceptible	Negligible Increase
4	10.0	10.0	0.02	Imperceptible	Negligible Increase	10.0	10.1	0.01	Imperceptible	Negligible Increase
5	10.7	10.7	0.03	Imperceptible	Negligible Increase	10.8	11.0	0.14	Imperceptible	Negligible Increase

Table 12-13 Maximum 8-hour CO Concentrations (mg/m^3)

Receptor	Impact Opening Year 2021					Impact Design Year 2036				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	3.07	3.07	0.001	Imperceptible	Negligible Increase	3.09	3.10	0.005	Imperceptible	Negligible Increase
2	3.00	3.00	0.000	Imperceptible	Negligible Decrease	3.04	3.08	0.034	Imperceptible	Negligible Increase
3	3.04	3.05	0.013	Imperceptible	Negligible Increase	3.07	3.11	0.046	Imperceptible	Negligible Increase
4	3.04	3.04	0.008	Imperceptible	Negligible Increase	3.04	3.05	0.006	Imperceptible	Negligible Increase
5	3.34	3.35	0.011	Imperceptible	Negligible Increase	3.39	3.44	0.059	Imperceptible	Negligible Increase

Table 12-14 Annual Mean Benzene Concentrations (µg/m^3)

Receptor	Impact Opening Year 2021					Impact Design Year 2036				
	DN	DS	DS-DN	Magnitude	Description	DN	DS	DS-DN	Magnitude	Description
1	0.22	0.22	0.000	Imperceptible	Negligible Increase	0.22	0.22	0.001	Imperceptible	Negligible Increase
2	0.20	0.20	0.000	Imperceptible	Negligible Decrease	0.21	0.22	0.008	Imperceptible	Negligible Increase
3	0.21	0.21	0.003	Imperceptible	Negligible Increase	0.22	0.23	0.011	Imperceptible	Negligible Increase
4	0.21	0.21	0.002	Imperceptible	Negligible Increase	0.21	0.21	0.001	Imperceptible	Negligible Increase
5	0.28	0.28	0.003	Imperceptible	Negligible Increase	0.29	0.30	0.014	Imperceptible	Negligible Increase

Table 12-15 Regional Air quality and Climate Impact Assessment

Year	Scenario	VOC (kg/annum)	NO_X (kg/annum)	CO_2 (tonnes/annum)
2021	Do Nothing	657.3	1709.9	1109.6
	Do Something	686.5	1788.1	1159.1
2036	Do Nothing	756.8	1975.6	1285.9
	Do Something	881.3	2300.4	1497.3
Increment in 2021		29.1 kg	78.2 kg	49.4 Tonnes
Increment in 2036		124.4 kg	324.9 kg	211.4 Tonnes
Emission Ceiling (kilo Tonnes) 2021		**56.8 kilo-tonnes per annum**	**66.2 kilo-tonnes per annum**	**37,943 kilo-tonnes per annum**
Emission Ceiling (kilo Tonnes) 2036		**51.5 kilo-tonnes per annum**	**40.2 kilo-tonnes per annum**	**37,943 kilo-tonnes per annum**
Impact in 2021 (%)		0.00005 %	0.0001 %	0.0001 %
Impact in 2036 (%)		0.00024 %	0.0008 %	0.0006 %

Table 12-16 Assessment of NO_X Concentrations and NO_2 Dry Deposition Impact at the Royal Canal pNHA in 2021

Distance to Roads (m) Note 1	NO_X Concentration ($\mu g/m^3$)			NO_2 Dry Deposition Rate Impact
	Do Nothing	Do Something	Increase	Kg N ha^{-1} yr^{-1}
4.1m & 6.4m	17.08	17.69	0.62	0.034
14.1m & 16.4m	16.15	16.63	0.48	0.027
24.1m & 26.4m	15.25	15.61	0.37	0.021
34.1m & 36.4m	14.60	14.89	0.29	0.016
44.1m & 46.4m	14.12	14.34	0.22	0.012
54.1m & 56.4m	13.75	13.93	0.18	0.009
64.1m & 66.4m	13.47	13.61	0.14	0.007
74.1m & 76.4m	13.24	13.35	0.11	0.006
84.1m & 86.4m	13.06	13.15	0.09	0.005
94.1m & 96.4m	12.92	12.98	0.07	0.004
104.1m & 106.4m	12.80	12.85	0.05	0.002
114.1m & 116.4m	12.71	12.75	0.04	0.002
124.1m & 126.4m	12.65	12.68	0.03	0.002
134.1m & 136.4m	12.60	12.62	0.03	0.001
144.1m & 146.4m	12.56	12.58	0.02	0.001
154.1m & 156.4m	12.54	12.56	0.02	0.001
164.1m & 166.4m	12.53	12.55	0.02	0.001
174.1m & 176.4m	12.52	12.53	0.02	0.000
184.1m & 186.4m	12.50	12.51	0.01	0.001
194.1m & 196.4m	12.48	12.49	0.01	0.001

Note 1 Distances given are to centreline of R148 and New Development Road

Table 12-17 Summary of Operational Phase Impacts on Air Quality

Parameter Impacted	Description of Impact
Local Air Quality	Permanent, negative and imperceptible
Regional Air Quality	Permanent, negative and imperceptible
Air Quality Impact on Ecology	Permanent, negative and imperceptible
Air Quality Impact on Human Health	Permanent, negative and not significant
Climate	Permanent, negative and imperceptible

12.6.4 Cumulative Impact

12.6.4.1 Construction Phase

Air Quality

As with the proposed development, the primary source of air quality impacts during the construction phase of nearby committed developments will be the potential for nuisance dust impacts. The dust minimisation measures outlined for the proposed development should be implemented throughout the construction phase for all developments in the vicinity of the site to avoid any nuisance dust impacts occurring. Once these minimisation measures are in place the impact to air quality is considered short-term, negative and not significant.

Climate

Construction machinery and vehicles have the potential to impact climate through the release of GHG emissions. However, based on the nature and scale of the proposed works, the impact to climate is considered short-term, negative and imperceptible due to the low volumes of machinery and vehicles required for the construction of the proposed development as well as the construction phase of nearby committed developments.

Human Health

The mitigation measures that will be put in place during construction of the proposed development should be implemented throughout the construction phase for all developments in the vicinity of the site to ensure that the impact of the developments complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the cumulative impact of construction of the proposed development with nearby developments is likely to be short-term, negative and imperceptible with respect to human health.

12.6.4.2 Operational Phase

The local air quality impact assessment, regional air quality impact assessment and climate impact assessment described in section 12.6.3 have all been based on cumulative traffic data incorporating projected traffic from permitted developments in the vicinity of the project site as a worst-case. As the outcomes of those assessments concluded that impacts from the cumulative scenario will be permanent, negative and imperceptible with respect to air quality and climate, no further cumulative impact assessment is required for the proposed development.

12.7 Mitigation

12.7.1 Incorporated Design Mitigation

No specific mitigation measures relating to design of the proposed development are required based on the outcome of this assessment which demonstrates that the impact of the proposed development on air quality and climate is predicted to be permanent, negative and imperceptible with respect to the operational phase.

12.7.2 Construction Phase Mitigation

12.7.2.1 Air Quality

The pro-active control of fugitive dust will ensure the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released. The main contractor will be responsible for the coordination, implementation and ongoing monitoring of the dust management plan. The key aspects of controlling dust are listed below. Full details of the dust management plan can be found in Appendix 12.3.

- The specification and circulation of a dust management plan for the site and the identification of persons responsible for managing dust control and any potential issues;
- The development of a documentation system for managing site practices with regard to dust control;
- The development of a means by which the performance of the dust management plan can be monitored for efficacy through visual inspections, dust deposition monitoring at the site boundary (where necessary) and logging and investigation of any dust nuisance complaints received;
- The specification of effective measures to deal with any complaints received.

At all times, the procedures for dust mitigation measures will be strictly monitored for efficacy. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

12.7.2.2 Climate

Construction traffic and embodied energy of construction materials are expected to be the dominant source of greenhouse gas emissions as a result of the construction phase of the proposed development. Construction vehicles, generators etc., may give rise to some CO_2 and N_2O emissions. However, based on the short-term nature and small scale of the works, the impact on climate will be short-term, negative and imperceptible.

Nevertheless, some site-specific mitigation measures can be implemented during the construction phase of the proposed development to ensure emissions are minimised. In particular the prevention of on-site or delivery vehicles from leaving engines idling, even over short periods. Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the construction phase.

12.7.3 Operational Phase Mitigation

No additional mitigation measures are required during the operational phase of the proposed development as it is predicted to have an imperceptible impact on ambient air quality and climate.

12.8 Residual Impact

12.8.1 Construction Phase

12.8.1.1 Air Quality

When the dust minimisation measures detailed in the mitigation sections of this Chapter (Section 12.7.2.1 and Appendix 12.3) are implemented, the impact of fugitive emissions of dust from the site will be short-term, negative and not significant.

12.8.1.2 Climate

Impacts to climate during the construction phase are considered short-term, negative and imperceptible and therefore no residual impacts of significance are predicted.

12.8.2 Operational Phase

The results of the air dispersion modelling study demonstrate that the impact of the proposed development on air quality and climate is predicted to be permanent, negative and imperceptible with respect to the operational phase. Therefore, no residual impacts of significance for air quality and climate are predicted for the operational phase of the proposed development.

12.9 Worst Case Scenario

A number of conservative and worst-case assumptions were made as part of the air dispersion modelling assessment. The five receptors modelled are the worst-case receptors that are closest to the road links impacted by increased traffic as a result of the proposed development. All other receptors will experience lower impacts than those predicted for the five receptors modelled. In addition, conservative traffic data incorporating the cumulative traffic associated with committed and planned developments in the vicinity of the project site was used for the modelling assessment. Conservative background concentrations were also used in the air quality assessment in order to ensure a robust assessment. Thus, the predicted results of the air quality and climate impact assessment described within this chapter are worst-case and will not cause a significant impact on air quality or climate.

12.10 Monitoring

12.10.1 Construction Phase

Monitoring of construction dust deposition at the site boundary during the construction phase of the proposed development is recommended to ensure the mitigation measures are providing adequate dust minimisation. This shall 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 applicable limit value is the TA Luft limit value of 350 mg/(m^2*day) for a monitoring period of between 28 - 32 days. Two monitoring locations shall be selected along the site boundary as a minimum, one upwind (on south-western boundary) and one downwind (on north-eastern boundary) of the construction site.

12.10.2 Operational Phase

There is no monitoring recommended for the operational phase of the development.

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CHAPTER 13
CULTURAL HERITAGE

DECEMBER 2019

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13 Archaeology and Cultural Heritage

13.1 Introduction

Archer Heritage Planning Ltd. has prepared this Cultural Heritage and Archaeology assessment undertaken at a greenfield site in Newtownmoyaghy townland, Co. Meath situated on the north-eastern outskirts of the town of Kilcock, Co. Kildare (ITM 689530, 739680). This assessment seeks to identify and record the location, nature and dimensions of any archaeological or cultural heritage features, fabric or artefacts that may be impacted by the proposed works. This is composed of a desktop study, involving an examination of existing sources in tandem with a non-intrusive walkover survey of the site, and test-excavations, licence no. 19E0547, licensed by the Department of Culture, Heritage and the Gaeltacht in consultation with the National Museum of Ireland. The assessment gauges the level of impacts, recommends mitigation measures, and assesses the residual impacts from the proposed development including off-site and secondary projects as well as indirect, secondary and cumulative impacts.

The assessment was undertaken by Liam Coen BA, Archaeologist, Archer Heritage Planning Ltd, an excavation licence eligible archaeologist.

13.1.1 Site Description

The overall SHD application site comprises 24.24 ha, in the townland of Newtownmoyaghy, Co. Meath on the north-eastern outskirts of the town of Kilcock, Co. Kildare (**Figure 13.1 in Appendix 13.1**). The site is comprised of agricultural land to the north of the Rye River but with extensive ongoing construction work in the immediate area. The area zoned for residential, c. 14.45 ha in total size, is divided into two land-blocks. The northern block, c. 8.38 ha, comprises a series of pasture fields bounded by mature hedgerows overlooking a road and residential development under construction and the Rye Water River to the south. The southern block, c. 6.07 ha, comprises a large, relatively level, field and a second sloping field with an intervening mature hedgerow that lies to the east of the road. As part of the road and the neighbouring residential development, large-scale flood-relief works have been undertaken in the area between the two land-blocks and the southern block has been subject to construction traffic in the recent past.

13.2 Proposed Development

The overall development site of 24.24 ha covers three different planning zoning objectives: Open Space, Residential and Community. For the Community zoning will be car parking and changing rooms to serve the GAA pitch which is just east of the application boundary. On the Open Space zoning will be developed two parks.

Within the Residential zoning the proposed development comprises 575 No. residential dwellings within 2 No. area separated by a green belt with a combined area of 14.45 hectares of residential zoned land. The northern site (8.38 ha) will facilitate the development of 309 No. residential dwellings while the site to the south (6.07Ha) will provide for 266 No. residential units. The layout will provide for a mix of dwellings and will include 388 No. housing units in the form of detached, semi-detached and terraced houses, 121 No. duplex units and 66 No. 1 and 2-bedroom apartments. A net density of 39.8 units per hectare will be achieved across both sites. Refer to Chapter 2 (Description of Development) for a detailed site and development description.

13.3 Assessment Methodology

The following sources were consulted in the preparation of this report:

- Record of Monuments and Places (RMP)/ Sites and Monuments Record[1]
- Aerial photography
- Historical maps
- Documentary research
- Relevant on-line databases (e.g. Excavation Bulletin; NRA Archaeological Database).

13.3.1 Legislative Background

Archaeological and cultural heritage protection in Ireland is provided by a number of international and national mechanisms. These include but are not limited to:

- National Monuments Acts 1930-2006;
- Architectural Heritage & Historic Properties Act. 1999.;
- Planning & Development Act. 2000, as amended;
- European Convention on the Protection of the Archaeological Heritage. 1992.

The Framework and Principles for the Protection of the Archaeological Heritage (1999) outlines the State's general principles in relation to the management and protection of archaeological heritage. This document notes that avoidance of developmental impacts on archaeological heritage and preservation in situ of archaeological sites and monuments are always the preferred option. When a site, or part of a site, has to be removed due to development, then preservation by record must be undertaken, i.e. through excavation and recording.

13.3.2 Meath County Development Plan 2013- 2019

The Meath County Development Plan 2013-2019 (in section 9.6.9 Archaeological Heritage) sets out general policies and standards for development within the area. The current plan contains lists of cultural heritage sites, including national monuments[2], recorded monuments and protected structures[3] within the area. It is the Policy of Meath County Council to:

CH POL 6 To promote awareness of, and access to, the archaeological inheritance of County Meath.

CH POL 7 To ensure that development in the immediate vicinity of a recorded monument is sensitively sited and designed so that it does not significantly detract from the monument. Where upstanding remains exist, a visual impact assessment may be required. 218 Meath County Development Plan 2013–2019 9 Cultural and Natural Assets

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[1] Archive Unit National Monuments Service, Department of Culture, Heritage, and the Gaeltacht, Floor 2, Block 6, Irish Life Centre

[2] Appendix 11 National Monuments in State Care & Register of Historic Monuments, Volume 2 List of Development Plan Appendices, Meath County Development Plan 2013-2019.

[3] Appendix 8 Record of Protected Structures, Volume 2 List of Development Plan Appendices, Meath County Development Plan 2013-2019.

CH POL 8 To retain surviving medieval plots and street patterns in the villages and towns of Meath, where practicable, and in the course of development to record evidence of ancient boundaries, layouts, etc.

CH POL 9 To inform and seek guidance from the National Museum of Ireland if an unrecorded archaeological object is discovered, or the National Monuments Service of the Department of Arts, Heritage and the Gaeltacht in the case of the discovery of an unrecorded archaeological site, in accordance with National Monuments legislation.

The objectives of Meath County Council are:

CH OBJ 7 To protect archaeological sites and monuments, underwater archaeology, and archaeological objects, which are listed in the Record of Monuments and Places, and to seek their preservation in situ (or at a minimum, preservation by record) through the planning process.

CH OBJ 8 To seek to protect important archaeological landscapes from inappropriate development.

CH OBJ 9 To make the Record of Monuments and Places (RMP) available to the public in the Planning Office and maintain a link on the Meath website to the on-line edition at www.archaeology.ie.

CH OBJ 10 To establish in-house training programmes for Council staff carrying out repair and maintenance works to historic structures, subject to the availability of resources.

CH OBJ 11 To encourage and promote the appropriate management and maintenance of the County's archaeological heritage, including historical burial grounds, in accordance with conservation principles and best practice guidelines.

CH OBJ 12 To consider the establishment of a National Monuments Advisory Committee for Meath, subject to available resources

https://meathcountydevelopmentplan.files.wordpress.com/2013/12/meath-development-plan-volume-1-written-statement_lowres.pdf

The Local Area Plan for Kilcock sets out the planning policies and objectives for the future development of the town. It includes reference to the environs of Kilcock within the Meath County Council administrative boundary in which the subject site is located. The subject site is zoned a mixture of residential, open space and community in these plans and have been subject to a Strategic Environmental Assessment (SEA), a formal systematic evaluation of the likely significant environmental effects of implementing a plan or programme before a decision is made to adopt the plan or programme.

http://kildare.ie/CountyCouncil/Planning/DevelopmentPlans/LocalAreaPlans/KilcockLocalAreaPlan2015-2021/Adopted%20Kilcock%20LAP%2020152021.pdf

13.4 Baseline Scenario

13.4.1 Brief archaeological & historical background

The name Kilcock is derived from the Irish 'Cill Coca' or the Church of Coca who was an early Christian missionary who founded the first Church in Kilcock circa 550 A.D. The Church was built on high ground on the southern bank of the Rye Water River. The area has been inhabited since early prehistory. Early documentation concerning Kilcock dates from at least the 8th century, when a battle is recorded between rival kings near the church of St. Coca close to the county border (Costello 1988, 95). The High King Donnchad of the Ui Neill defeated Ruaidri mac Faelain and Laidcnen King of Ui

Cheinnselaig near Kilcock in 780 A.D. and then burned much of northern Kildare (Byrne 1973, 158). Although the exact position of the battle is unknown, the proposed development area is bordered to the south by the boundary with County Kildare. The county border also functioned as the border between the Kingdoms of Meath (Brega) and Leinster (Laigin). At the start of the 10th century, the area around Kilcock was in the territory of the Ui Cheitig, while the area to the north of the Rye Water lay within Brega (ibid). The continuing political importance of this border area can be seen in the numbers of annalistic references to the churches of Kilcock and nearby Kilglyn (from original testing report 10E0397ext).

The overall development site has been subjected to geophysical survey (Nichols 2010, **Appendix 13.2**) and archaeological testing (Bayley 2010) with only a portion of the southern block included in these assessments. No archaeological material was identified within the current site footprint during these works although two burnt spreads (probable fulachta fiadh) had been identified a short distance to the south-west. The testing indicated a low-moderate potential for the presence of sub-surface archaeology existing across the site, and it was noted that no testing was carried out in the central part of the development site. It was recommended that archaeological monitoring of all topsoil stripping and groundworks on the development site be carried out by a suitably qualified archaeologist.

13.4.2 Record of Monuments & Places

The Record of Monuments and Places (RMP) is a statutory inventory of archaeological sites protected under the National Monuments Acts 1930-2004 (Section 12, 1994 Act), compiled and maintained by the Archaeological Survey of Ireland (ASI). The inventory concentrates on pre-1700 AD sites and is based on a previous inventory known as the Sites and Monuments Record (SMR) which does not have legal protection or status (see www.archaeology.ie).

There are two RMP sites within the subject site, Ring-ditches ME049-A003001 & ME049-A003002. Both were initially identified through aerial photography and neither has an above surface expression. These are relatively common archaeological site types; funerary or burial monuments; primarily of the Bronze Age period (c.2200-800BC); with 189 other examples of these sites in the county of Meath[4]. A selection of RMP entries relevant to the wider area of the subject site are presented in **Table 13.1** below and **Figure 13.2 (in Appendix 13.1)**. These include the two RMP sites within the subject site and the remaining entries located outside the subject site.

TABLE 13-1 ARCHAEOLOGICAL SITES WITHIN VICINITY OF PROPOSED DEVELOPMENT

SMR No	Class	Townland	ITM
KD005-029	Font	Kilcock	688537, 739854
KD005-002003	Coffin resting stone	Kilcock	688621, 739814
KD005-002004	Children's burial ground	Kilcock	688646, 739830
KD005-002001	Church	Kilcock	688646, 739830
KD005-002	Ecclesiastical Site	Kilcock	688646, 739830
KD005-002002	Graveyard	Kilcock	688646, 739830

[4] From search of RMP/SMR database maintained by National Monuments Service http://webgis.archaeology.ie/historicenvironment/ [accessed 31/10/2019]

SMR No	Class	Townland	ITM
KD005-022	Ritual Site- Holy well	Kilcock	688692, 739800
KD005-030	Market Cross	Kilcock	688520, 739550
ME049A003001	Ring Ditch	Newtownmoyaghy	689563, 739510
ME049A003002	Ring Ditch	Newtownmoyaghy	689602, 739506
ME049A004001	Ring Ditch	Newtownmoyaghy	689961, 739490
ME049A004002	Ring Ditch	Newtownmoyaghy	689966, 739494
ME049A004003	Ring Ditch	Newtownmoyaghy	689908, 739418
KD005-003	Ring ditch	Branganstown	689404, 739061

13.4.3 Cartographic Sources

Analysis of historic mapping can show human impact on landscape over a prolonged period. Large collections of historical maps (pre- and early Ordnance Survey maps as well as estate or private maps) are held at the Glucksman Map Library, Trinity College and other sources (UCD Library, Ordnance Survey Ireland, local libraries and published material). The development of the site and its vicinity as recorded through the nineteenth and twentieth century cartography are described in **Table 13.2** below (and shown in **Figure 13.3 in Appendix 13.1**). No potential archaeological features were recorded within the subject site.

TABLE 13-2 CARTOGRAPHIC SOURCES RELATING TO THE SITE

Map	Date	Description
1st Edition OS Map	1838	The area in question looks similar to the modern layout with existing road and field boundaries in place
Ordnance Survey 25-inch map revision	1907-11	No significant change from earlier map.

13.4.4 Aerial photography

Aerial photography (or other forms of remote sensing) may reveal certain archaeological features or sites (earthworks, crop marks, soil marks) that for many reasons may not be appreciated at ground level (as shown in **Figure 13.4 in Appendix 13.1**). Online orthostatic photographs of the site were examined (Ordnance Survey Ireland 1995, 2000 & 2005; Google/Bing Maps 2018).

Two ring-ditches within the subject site, RMP no. ME049-A003001 & ME049-A003002, are visible on the OSi 1995 photograph.

A cluster of three ring-ditches outside the subject site, RMP nos. ME049A004001, ME049A004002 & ME049A004003 are visible on Google Earth 2018 in the field immediately to the east of the southern land-block.

13.4.5 Architectural Heritage

The National Inventory of Architectural Heritage (NIAH) was established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments

(Miscellaneous Provisions) Act 1999. Its purpose is to identify, record, and evaluate the post-1700 architectural heritage of Ireland, uniformly and consistently as an aid in the protection and conservation of the built heritage. It is intended to provide a basis for recommendations of the Minister of Culture, Heritage and the Gaeltacht (DCHG) to Local Authorities for the inclusion of particular structures in Records of Protected Structures (RPS).

Local Authorities have a statutory responsibility to safeguard architectural heritage in accordance with Part IV of the Planning and Development Act 2000. Under S.51 (1), a Council must compile a Record of Protected Structures (RPS), which lists all structures which are of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. The protection, unless otherwise stated, includes the exterior and interior of the structure, lands lying within its curtilage (boundary), other structures and their interiors within the curtilage, plus all fixtures and fittings which form part of the interior or exterior of any of these structures. Buildings can be added to, or deleted from the RPS at any time, though generally this occurs when the development plan is being reviewed.

The Planning and Development Act 2000 (as amended), provides that all development plans must now include objectives for preserving the character of Architectural Conservation Areas (ACAs). An ACA is a place, area, groups of structures or townscape of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest, or which contribute to the appreciation of protected structures, and whose character it is an objective of a development plan to preserve. In these areas, the protection of the architectural heritage is best achieved by controlling and guiding change on a wider scale than the individual structure, in order to retain the overall architectural or historic character of an area. The town of Kilcock has a defined boundary for its Architectural Conservation Area. This lies to the south of the Rye Water River; is over 400m to the south-west at its closest point to the subject site and will not be impacted by this development.

The closest Protected Structures are the Little Church of the Assumption (RPS no. ME049-103) and adjacent farmhouse (RPS no. ME049-102) which are located c. 350m to the south-west (see **Figure 13.2 in Appendix 13.1**).

TABLE 13-3 PROTECTED STRUCTURES WITHIN THE VICINITY OF THE PROPOSED DEVELOPMENT

Record of Protected Structures (RPS)	Address	Description	Architectural Conservation Area (ACA)
ME049-102	Newtownmoyaghy, environs of Kilcock	A 2 storey, 4 bay farmhouse with three stacks. There is an outbuilding to site.	n/a
ME049-103	Newtownmoyaghy, environs of Kilcock	Detached single-cell church, built c.1820, with four-bay north elevation, blank elevation to south and single-bay apse to east. Single-bay porch to north elevation. Pitched slate roof with limestone copings.	n/a

13.4.6 Previous Archaeological Investigations

Several archaeological investigations have been undertaken within and nearby the proposed

development producing evidence from the prehistoric to the medieval. **Table 13.4** below is comprised of entries from the Excavation Database www.excavations.ie.

There have been a number of archaeological investigations in association with the construction of the road, on-going construction of neighbouring residential developments and flood relief scheme for the Rye Water River. Following an EIA prepared by Arch Tech in 2009 (Arch Tech 2009) a geophysical survey (Nichols 2010, Licence 10R0138) identified a possible enclosure and areas of burning, south-west of the new link road. This geophysical survey, including the current development site and some adjacent areas, i.e. areas for both proposed infrastructural and residential works, was carried out by Target Geophysics in September/October 2010. A gradiometer scan of the entire site was conducted initially, and thirteen areas (Areas A-M, totalling 3.7 ha) were identified for further analysis by detailed gradiometer survey.

Test trenching (Bayley 2010) of the site comprising 49 trenches located to assess the geophysical anomalies from the geophysical survey was undertaken in October 2010. Two burnt spreads were identified in the area to the south-west (outside subject site) but no archaeological features were identified in the subject site including the proposed parkland areas subject to the flood relief scheme works in the centre and in the southern parts of the development site.

Monitoring of the southern section of the new Link road was carried out in December 2013 – January 2014 (Walsh 2014) and failed to uncover any archaeological features.

Monitoring of the north-west/south-east portion of the new Link road from the R148 to R125 took place in March 2016 (O'Connell 2016). No archaeological features or material were identified.

Monitoring of the groundworks for a neighbouring residential development to the south-west of the Link road took place between January and March 2017 (O'Connell 2017). No archaeological features or material were identified.

Archaeological monitoring took place under licence number 18E0296 (Coen 2018a) over a period of 1 month from 4th June – 29th June 2018 associated with flood relief works for the river in the townlands of Newtownmoyaghy, Balfeaghan and Dolanstown running along the northern bank of the Rye River.

One potential archaeological feature was observed during the topsoil strip monitoring comprising the remains of a disturbed Fulacht Fia on the edge of the Mill Race in Dolanstown. This feature was excavated from 16th-20th July under licence no. 18E0377 (Coen 2018b). Metal detection of a sample of material from the Rye River was carried out under licence number 18R0126 with a small number of positive responses of modern material (e.g. drink cans) noted.

The excavation of the disturbed fulacht fia site under licence no. 18E0377 revealed scattered, adulterated, burnt mound material (i.e. heat-shattered stone in a charcoal-rich soil) mixed up in peaty soil. It was deemed to be ex-situ material, possibly thrown up by the excavation of the adjacent mill-race in the nineteenth century or more recent works to the Rye Water River.

TABLE 13-4 PREVIOUS ARCHAEOLOGICAL EXCAVATIONS IN THE WIDER AREA

Excavation Licence No.	RMP	OS Ref	Location	Ex. Bulletin Ref.	Author
03E1905	N/A	688510, 739520	Fairgreen, Kilcock	2004:0828	K. Wiggins
No material of archaeological significance was noted throughout the development area.					

Excavation Licence No.	RMP	OS Ref	Location	Ex. Bulletin Ref.	Author
02E1842	N/A	689923, 740025	The square, Kilcock	2004:0829	E. Kiernan
No material of archaeological significance was noted throughout the development area.					
04E0764	N/A	688932, 741725	Calgath, Meath	2004:1193	S. Linnane
No material of archaeological significance was noted throughout the development area.					
05E0672	N/A	688515, 739594	Boycetown, Commons East, Kilcock	2005:755	E. O'Carroll
No material of archaeological significance was noted throughout the development area.					
06E0156	N/A	688574, 739745	Kilcock, Meath	2006:1591	D. Sweetman
No material of archaeological significance was noted throughout the development area.					
07E0589	N/A	689682, 739775	The Square, Kilcock	2007:821	C. Ni Lionain
Excavations revealed a 19th-century floor surface and a brick wall which may be associated with a distillery that was depicted as located on the site on the first-edition OS map.					
10E0397; 10R139	N/A	713427, 770518	Newtownmoyaghy, Kilcock	2010:530	D. Bayley
Testing was undertaken in advance of a proposed distribution road and associated works at Newtownmoyaghy, Kilcock, Co. Meath. The work was untaken on behalf of McGarrell Reilly Homes between 11 and 14 October 2010. The proposed distributor road traverses both the Rye Water flood-plain and the higher flat ground. Testing was carried out in conjunction with a geophysical survey of the site undertaken by John Nichols of Target Geophysics (10R138). A total of 49 trenches were excavated within the area of proposed development. Testing was confined to the limit of the proposed distribution road and associated flood mitigation works. The anomalies highlighted in the geophysical survey as being of archaeological potential appear to have been from natural sources, as no archaeological remains were identified in the test-trenches excavated across the anomalies. A metal-detection assessment of the material dredged from the Rye Water yielded nothing of archaeological significance. Two areas of archaeological activity, burnt spreads, were identified during the testing programme. The first burnt spread measured 7.14m x 6.52m x 0.1m deep. The second measured 10.4m x 10.9m x 0.15m deep. These comprised black silty clay with charcoal and heat-affected stone inclusions. The proposed flood alleviation works will have an adverse impact on these burnt spreads, so it was recommended that they be fully excavated prior to the development works. An area in the south and south-west of the test area was not tested, as the ground had been severely disturbed during recent sewerage pipe-laying works. These sewerage works also appear to have disturbed a large length of what the EIS identified as mounds of up-cast riverine silts on the banks of the Rye Water River.					

Excavation Licence No.	RMP	OS Ref	Location	Ex. Bulletin Ref.	Author
10D44; 10R146	N/A	689287, 739269	Newtownmoyaghy, Meath	2010:531	E. Kiernan
Moore Marine Services was commissioned by Irish Archaeological Consultancy (IAC) on behalf of McGarrell Reilly Homes to carry out an impact assessment of a proposed distribution road bridge across the Rye River at Newtownmoyaghy, Kilcock, Co. Meath. The underwater assessment was commissioned in order to locate, define and ascertain the character, condition and extent of any archaeological features, deposits or objects which may be affected by the development. It took place on 20 October 2010. Weather on the day was clear and dry, with few clouds and periodic sunshine. Water flow at the time of the survey was moderate with a generally firm riverbed and good visibility. The maximum recorded water depth was 0.4m and the average was 0.3m. The site of the proposed crossing of the Rye River comprised a 250m stretch of the third order Rye River at Newtownmoyaghy, Co. Meath. This west–east-orientated stretch of the river was situated c. 500m to the east of Kilcock town, adjacent to the R148 and the Royal Canal. It was flanked to the north by agricultural grassland and to the south by the R148 and Royal Canal. The desktop assessment concluded that, whilst there have been no artefacts recovered from the site, no previous excavations carried out in the immediate vicinity and there are no recorded monuments or places at the proposed development, it is situated in a wider landscape which is of significant archaeological and historical importance. The field survey recorded that the likelihood of the project impacting on archaeology was very low. This was due to the fact that the river had been dredged in the recent past. The presence of a large dredge spoil heap on the northern banks of the river, the vertical mechanically excavated riverbanks and the paucity of recorded finds, both modern and ancient, indicated that a programme of dredging appeared to have removed any archaeology which may have been present.					
10E0402	N/A	689132, 739775	Newtownmoyaghy, Meath	2010:532	A.Giacometti
Test-trenching for a proposed infrastructural development in a large field to the east of Kilcock was conducted in September–October 2010. The testing programme identified a large number of 18th-, 19th- and 20th-century features, mostly agricultural but also including three brick kilns, gravel-quarrying pits and sewerage drains. The brick kilns were recorded and none of the features were considered to be of significant archaeological significance.					
11E239; 11R87	N/A	688582, 740625	Dolanstown, Kilcock	2011:474	F.Walsh
No material of archaeological significance was noted throughout the development area.					
11E109	N/A	688842, 739940	Newtownmoyaghy, Kilcock	2011:492	D. Bayley

Excavation Licence No.	RMP	OS Ref	Location	Ex. Bulletin Ref.	Author
Testing was undertaken within the site of a proposed distribution road and associated works at Newtownmoyaghy, Kilcock, in April 2011. Fifteen test trenches were excavated across the development area. The remains of two walls, a brick-lined hearth and cobbled surfaces were identified in four of the trenches (Trenches 4, 5, 14 and 15), located outside the infrastructural works but within the wider development area. These most likely represent the remains of structures shown on Larkin's map of 1812 and the first-edition OS map. Nothing of archaeological significance was identified in any of the remaining trenches.					
10E0397ext	N/A	698363, 739558	Newtownmoyaghy, Kilcock	2013:194	F. Walsh
Monitoring is ongoing as part of the development of a distribution road within the townland of Newtownmoyaghy, which is located to the east of Kilcock town. Monitoring of topsoil stripping was recommended in a testing assessment that was undertaken by IAC Ltd in 2010 (2010:530). During testing no features were identified within the wayleave of the proposed distribution road. Monitoring of topsoil stripping commenced at the site in December 2013 and lasted for 11 days into January 2014. No archaeological features or deposits were located during the course of works.					
14E0378	KD005-002002, KD005-002004	688696, 739886	Commons East, Kilcock	2014:009	M. McGonigle
At the base of the fill material was a metalled surface, which proved on excavation to date to the 19th century and may have been associated with a corn mill just north of the site. Four fragments of disarticulated human bone were retrieved from the uppermost layer of overburden (topsoil).					
13E0467	KD005-002002, KD005-002004	688696, 739886	Commons East, Kilcock	2014:245	M.McGonigle
Some disarticulated bone, thought to be human, was uncovered in one of the trenches (T1) closest to the adjacent graveyard. Test trenches excavated beyond this area produced nothing of archaeological significance					
17E0158	Adjacent to KD005-003	688903, 738974	Branganstown, Co. Kildare	2017:102	J. Stirland

Excavation Licence No.	RMP	OS Ref	Location	Ex. Bulletin Ref.	Author

A total of 12 test trenches were excavated. The testing strategy targeted anomalies and features identified during the geophysical survey. For the purposes of the test trenching the site of the proposed development was subdivided into the four fields that make up the overall development site.

Field 1

The earlier geophysical survey identified the presence of a weakly defined large curving anomaly, the general appearance of which suggested that it is of possible geological origin. Two test trenches (10-11) were excavated across this feature and confirmed that the anomaly was not of an archaeological nature and appears to represent underlying geological formations.

The geophysical survey also identified the presence of three linear type responses within this field. These features are also visible on the ground and represent agricultural field boundaries, one of which is indicated on the first edition OS map. A single test trench (9), was excavated across one of these boundaries. The test trench confirmed that these features are relativity modern field boundaries/drainage ditches.

Fields 2-3

A large oval/sub-circular enclosure, which was truncated by a modern hedgerow, was identified as a result of the geophysical survey. This large enclosure measures approximately 100m in diameter and appears to have an attached annex located to the north, with evidence of an internal smaller circular enclosure to the south. There is also a suggestion of another internal ditch along the south-west. The survey also identified evidence of two further possible enclosing ditches located west of the main enclosure.

A total of 5 test trenches (1-4, 12) were excavated across the large oval/sub-circular enclosure and confirmed these features were archaeological in nature. A quantity of medieval pottery retrieved from the features indicates that the enclosure represents medieval settlement activity, possibly a Norman ringwork. The enclosing ditches vary from 2m to 6m in width and 1 to 2m in depth. A number of internal and external features were also identified.

Field 4

Three linear-type anomalies were identified within this field during the geophysical survey and appear to represent agricultural field boundaries. A total of three trenches (6-8) were excavated across the anomalies. Their appearance within the trenches suggests that they were formed by underlying geological formations and are not of an archaeological nature.

The results of an earlier geophysical survey and the targeted test trenching strategy clearly indicates that Fields 2-3 contains the presence of a large enclosure. The sections excavated through the enclosing features confirmed that they are archaeological in nature. Pottery retrieved from the features indicated that the enclosure represents medieval settlement activity and may represent a possible Norman ringwork. The targeted test trenching carried out within Fields 1 and 4 identified no potential archaeological features or deposits. However, because of the limited nature of the testing and the presence of the enclosure within Fields 2-3, it is recommended that further, more intensive testing be carried out throughout the site of the proposed development.

The proposed development will impact on the enclosure site. A portion of the enclosure extends below green space at the centre of the development and it may be possible to preserve that portion of the site in situ. The remainder of the enclosure should be preserved by record where preservation in situ is not possible which will involve a full archaeological excavation of the site.

Excavation Licence No.	RMP	OS Ref	Location	Ex. Bulletin Ref.	Author
17E0068	n/a	688655, 739857	Super Valu, Kilcock	2017:208	David Murphy

Two separate phases of archaeological mitigation were carried out under licence 17E0068 at the site of a carpark extension at Super-Valu, Kilcock, Co. Kildare. The site lies partially within the zone of notification of the late medieval St Coca's church (KD005-002001-) and graveyard (KD005-002002-) site (located to the immediate south-west of the subject site). In late February 2017 testing was undertaken at the site. In total 180m² of test trenching was completed. The tested areas of the site proved to be heavily disturbed with extensive deposits of 20th-century construction/demolition-related debris present across the site; less contaminated 19th-century infill deposits were also evident, particularly at lower levels within the trenches. The northern cluster of test trenches demonstrated that this portion of the site was substantially composed of relatively recent construction related debris as well as 19th-century infill deposits, these infill deposits were more evident to the west of the area. No human bone or anything of archaeological interest was encountered in any of the trenches in the northern portion of the site (Trenches 1/4, 2, 3) and no further archaeological mitigation was deemed necessary in this area.

A similar stratigraphy was evident across the majority of the trenches in the southern portion of the site (Trenches 5, 6, 7). However, the north-western end of Trench 5 proved to be less disturbed by the modern demolition debris and here at a depth of 0.7-0.8m a concentration of disarticulated human bone was revealed. The bones (which included skull, mandible and femur fragments) that became loose during trench excavation were retrieved and the area was investigated for the presence of a grave cut or any articulated remains. Although investigation proved that the bones were disarticulated and ex-situ, it was deemed appropriate that due to the concentration evident, with greater amounts likely to be revealed beneath, the remaining disarticulated bones be left in-situ with no further excavation of the trench undertaken.

A further concentration of disarticulated human bone was identified within the topsoil at the planned Trench 10 location, again, loose bones were retrieved, and the trench was not excavated. Subsequent osteological examination of the retrieved bone revealed that the comingled remains consisted of at least two adults and one juvenile. Several bones from the assemblage had pathological conditions. The remains could not be sexed accurately but based on the size there was one possible male. Disarticulated bone concentrations uncovered in Trenches 5 and 7 were identified as animal.

The archaeological testing phase had identified the southern portion of the site as possessing higher potential for disarticulated human bone concentrations, with a more moderate potential identified across the central portion of the site, particularly underlying the disturbed upper levels. Based on the recommendations outlined in the subsequent JCA testing report, and approved by the National Monuments Service, a redesigned carpark layout and landscaping plan was devised and implemented. The revised plan reduced the number of parking spaces from 70 to 53, with the vast majority of the spaces now focused on the northern and north-central portions of the site. As part of the revised plan a larger area in the southern portion of the site, adjacent to St Coca's church and graveyard site, remained undeveloped and was instead rehabilitated with an enhanced and non-intrusive landscaping plan. The revised plans ensured that no significant excavations were undertaken across the land parcel, with the only ground reductions being the clearance of overburden and debris to a general depth of 0.2m. This was the formation level for the new carpark and introduced material was built up from this level.

In the extreme southern portion of the site, only vegetation and overlying debris were removed to allow for the introduction of topsoil prior to landscaping. A further phase of archaeological mitigation was undertaken at the site during October and November 2017. These works were carried out under an extension to licence 17E0068. On this occasion, all ground clearance and reduction work across the southern and central portions of the carpark extension site was monitored. A further seven fragments (four from the southern area, three from the central area) of disarticulated, potentially human, bone was retrieved during this phase of monitoring. All fragments were recovered from the heavily disturbed upper 0.2m of soil. No evidence of grave cuts, articulated remains or anything else of archaeological significance was revealed during this phase of monitoring. The retrieved bone fragments have been added to the existing analysed sample of human bone recovered from the site during previous mitigation phases.

All development work at the site has now been completed and no further archaeological mitigation is scheduled. It has been recommended by John Cronin and Associates that the combined bone sample, containing the analysed human bone from the previous mitigation phases and the seven fragments of disarticulated, potentially human, bone retrieved during the recent monitoring phase, be reinterred, with religious blessing, in the landscaped green area, adjacent to the walls of St Coca's church and graveyard site, at the southern end of the completed development.

13.4.7 Walk-over survey

The site visit and walk-over survey took place on 22nd February 2019 in dry and sunny conditions. The northern block comprises a large pasture field bounded by mature hedgerows with portions of two fields to the east. The site boundary is otherwise composed of the rear gardens of neighbouring houses that front onto a local road in this north-western corner. The northern residential area is located to the north of the new link road and neighbouring residential development under construction. The Rye Water River is located further to the south and south-east. A small portion of the northern residential block has been subject to construction traffic and the storing of spoil from the adjacent construction works (see **Figure 13.1** and Google Earth 2018, **Figure 13.4 in Appendix 13.1**). The northern residential block is otherwise untouched by construction works but thick grass growth obscured any identification of possible archaeological features on the ground.

The southern residential area comprises a large, relatively level, field and a second sloping field with an intervening mature hedgerow that lies to the east of the road and neighbouring residential development. Aerial photographs (see Google Earth 2018, **Figure 13.4 in Appendix 13.1**) show that parts of the southern residential block have been subject to construction traffic in the recent past, associated with construction works for a flood relief scheme, part of which lies in the proposed green belt between the two residential land-blocks within the proposed development. During the site visit and walk-over survey no evidence was identified of the two ring-ditches, RMP nos. ME049-A003001 & ME049-A003002, located in the southern land-block. The level field of the southern land-block may have been recently ploughed as there are no significant wheel ruts and thin but even grass growth while the sloping southern field of the southern block is overgrown with tall grass and abundant evidence along its margins of construction traffic and debris.

Both the northern and southern land-blocks contain overhead power-lines and recently disturbed ground. These factors will reduce the available land for any potential geophysical survey.

No further archaeological material, features or obvious areas of potential were identified during the walk-over survey.

13.4.8 Test Excavation

13.4.8.1 Methodology

Test trenching was completed under licence No. 19E0547 and the reader is also referred to the Detailed

Archaeology Impact Assessment report submitted with the application documentation. A total of 20 trenches (approx. 2805 linear metres) were excavated by mechanical excavator under archaeological supervision. All trench locations were agreed in advance with the Department of Culture, Heritage and the Gaeltacht. A 16-ton tracked excavator with a 2.4m grading bucket was used to excavate the trenches. The trenches were targeted on assessing the archaeological potential of the general area with two trenches specifically located to assess the archaeological potential of two potential ring-ditches, RMP no.'s ME049-A003001 & ME049-A003002, identified as crop-marks in aerial photography. Excavation proceeded in level spits no greater than 0.2m to the top of the first archaeological horizon if present. Each revealed surface was inspected for archaeological remains and any features identified within the trenches were tested to determine their extent, composition and depth and to ascertain potential dating material.

13.4.8.2 Results

The subsoil of the southern block comprised mottled brown and grey clay with extensive areas of sand and gravel likely as a consequence of the proximity to the Rye Water River. Minor changes to the Method Statement trench layout were implemented due to the presence of construction spoil, some flooded areas and overhead powerlines (**Figure 13.5, Plates 1-8 in Appendix 13.1**). The subsoil of the northern block comprised mottled brown boulder clay of the Straffan soil association[5]. Two areas of archaeological interest were identified during the test excavation, areas 1 & 2.

Area 1

Area 1 consists of two ring-ditches; RMP no. ME049A003001- and ME049A003002-; identified previously as crop-marks and now confirmed as archaeological features in Trenches 3 and 4 (**Figure 13.6 in Appendix 13.1**). The cut, F1, of the first ring-ditch, ME049A003001-, is circular in plan, has an external diameter of 15.75m north-west/south-east and contains a single fill, F2, comprising a friable brown sandy clay with frequent small stone inclusions. The cut varies from 1.05-2.70m in width, has a V-shaped profile and the test-slot in the southern arc of the cut revealed a depth of 0.80m. No break in the cut signifying an entrance was identified with c. 50% of the circuit uncovered. No evidence for internal features or potential cremation material was identified.

The second ring-ditch, ME049A003002-, lies 23.5m to the east. Its cut, F3, also circular in plan, was 12.3m east/west in external diameter and varies in width from 0.85-1.15m and the test slot in the southern arc revealed a depth of 0.30m. Its only fill, F4, comprised a friable brown sandy clay with frequent small stone inclusions. The northern arc of the cut was not clearly delineated in the test-trench due to the presence of the overlying plough-zone however no obvious break in the cut signifying an entrance was identified with c. 65% of the circuit uncovered and no evidence for internal features or potential cremation material was identified.

Ring-ditches are prehistoric funerary or ritual monuments; usually containing cremated material in the interior or in the ditch fills though examples absent of burial evidence are not unknown (Waddell 1998 161). They share similarities with a variety of barrow-types (Newman 1997 155-170), and some examples discovered under the topsoil with no above surface expression may even be degraded barrows.

Area 2

Area 2 consists of the remains of a plectrum shaped enclosure, F5, with an entrance gap of 2.95m in the south-east (**Figure 13.7 in Appendix 13.1**). It was identified in Trenches 10, 11 and 12 with five smaller test trenches and three extensions of Trenches 11 and 12 excavated to establish its orientation. The enclosure measures c. 57m NW/SE x 55m NE/SW. The south-western, south-eastern and northern portions are relatively straight with sharp turns identified at the north-western, north-eastern and southern arcs. The width varies from 2.00-2.50m and two test-slots in the northern and south-eastern parts revealed depths of 0.95m and 1.20m respectively. The upper fill, F6, of the enclosure ditch is uniform throughout and comprises a friable brown silty clay with small and

[5] http://gis.teagasc.ie/soils/map.php [accessed 03rd September 2019]

medium stone inclusions with a depth of 0.55m. The lower fill comprised a friable greyish brown silty clay with occasional snail shell and frequent small and medium sized stone inclusions. Two small fragments of animal bone were retrieved from the lower fill of the south-western test slot.

The remains of a smelting pit, F7, was identified c. 8.5m to the north of the enclosure. It measured 0.20m in diameter and contained a dark brown silty sand fill, F8, with charcoal and oxidized clay around its perimeter and several small pieces of slag.

An east-north-east/west-south-west orientated ditch, F9, extended off the northern portion of the enclosure**.** It was identified in Trenches 11 and 12 and extended for at least 116m. Its northern extent couldn't be established due to the proximity of overhead power-lines. The width varies from 1.0-1.8m and a test-slot in Trench 12 revealed a depth of 0.35m. Its fill, F10, comprises a friable brown sandy clay with small & medium sized stone inclusions.

The form and dimensions of the enclosure would suggest that it is from the Early Medieval period and such sites are commonly called ring-forts. The smelting pit, F7, and ditch, F9, are features commonly associated with such enclosures.

13.5 Difficulties Encountered

Portions of the site had been subject to construction activity prior to assessment. This principally comprised a rectangular area, c. 0.9 ha, in the northern land block used for storage of topsoil and subsoil and numerous over-head power-lines that restricted the location of test trenches.

13.6 Impact Assessment

This cultural heritage assessment has employed a variety of sources in conjunction with non-intrusive walkover survey and licensed test excavations to make a coherent assessment of the cultural heritage impacts associated with the proposed development. The combined pre-development archaeological and cultural heritage assessment identified two areas of archaeology comprising two ring-ditches (Area 1) and an Early Medieval enclosure and associated features (Area 2). The assessment, based on Environmental Protection Agency Guidelines (EPA 2017, Table 3.3) concludes that absent mitigation measures detailed below then groundworks associated with the development will result in **likely**, **negative**, **profound** and **permanent** impacts on the identified archaeological material.

13.6.1 Do Nothing Scenario

If the proposed development were not undertaken, any sites/objects of archaeological or Cultural Heritage significance on the subject lands would be preserved in-situ beneath the existing ground surface.

13.6.2 Construction Phase

The greatest threat to unrecorded, buried archaeological sites/ features occur during the construction stage and include all ground disturbance works undertaken at this stage (excavations and other groundworks including the provision of access roads and service trenches), movement of machines and storage of material.

The potential impact assessment is based on Environmental Protection Agency Guidelines (EPA 2017, 50-1, Table 3.3) and Appendix 4 of the Guidelines for the Assessment of Archaeological Heritage Impact of National Road Schemes (Anon. 2006, 54). It is concluded that, in the absence of the mitigation measures described below, significant impacts on the archaeological remains at the site would be **likely**, **negative**, **profound** and **permanent.**

13.6.3 Operational Phase

No potential impacts are identified during the operational phase as it is anticipated that issues of archaeological and cultural heritage interest will have been resolved prior to or during the construction phase. It is concluded that, in the absence of the mitigation measures described below, significant impacts on the archaeological remains at the site would be **likely**, **negative**, **profound** and **permanent.**

13.6.4 Cumulative Impacts

No potential cumulative impacts are identified as it is anticipated that matters of archaeological and cultural heritage interest at the subject site will have been resolved prior to or during the construction phase of this proposal and there will be no anticipated impacts arising from interactions with neighbouring developments as these have been subject to previous mitigation measures (Nichols 2010; Walsh 2014; O'Connell 2016 & 2017). There is no anticipated impact on neighbouring RMP sites. In terms of the visual impact on Protected Structures; ME049-102, a farmhouse; and ME049-103, a Church; using criteria from the *Revised Guidelines on the Information to be contained in Environmental Impact Assessments, Draft 2017*, issued by the Environmental Protection Agency it may be stated that there will be a **neutral visible impact** on these adjacent structures from this residential development.

The structures are in a semi-rural landscape, on the north-eastern margin of Kilcock town. The area is characterized by crop and pasture fields, mature hedgerows and one-off housing on the northern approach (R125 and Moyglare Road) to the bridge over the Rye Water River, beyond which lies the town of Kilcock. As best as can be ascertained none of the few one-off houses located to the north would have a sight-line to the Church interrupted by the development. The moderate numbers of commuters using the surrounding roads would have a broken view of the structures due to the hedgerows while there is no available evidence that the structures would be a place that would draw significant numbers of tourists.

The visual amenity value of the structures may be harmed if the view would be blocked or framed by intervening or nearby developments or if the character of the surrounding area was measurably altered or impacted. As this development lies over 350m to the north-west of these protected structures and considering their location beside an urban centre this risk is not considered significant. Taking into account the photomontages provided by GNet 3D Ireland, no significant impact can be discerned on these structures from this development in Newtownmoyaghy.

13.7 Mitigation

The Framework and Principles for the Protection of the Archaeological Heritage (1999) outlines the State's general principles in relation to the management and protection of archaeological heritage. This document notes that avoidance of developmental impacts on archaeological heritage and preservation in situ of archaeological sites and monuments are always the preferred option. However, in this case, there are significant constraints on the design and layout of the proposed scheme from relevant planning guidelines. Avoidance of the archaeological sites recorded in this assessment would require a very substantial revision of the layout of the development, which would be difficult to achieve given the nature and type of development proposed.

13.7.1 Incorporated design mitigation

Mitigation measure

Should this development proceed, the archaeological sites identified in this assessment will be subject to full archaeological excavation in advance of construction and carried out under licence to the Department of Culture, Heritage and the Gaeltacht (DCHG) in consultation with the National Museum of Ireland. **A licence to excavate the two areas of archaeology (Ring Ditches and Enclosure) identified in the test-excavation (Licence no. 19E0547) has been issued (Licence No. 19E0686, 17th October 2019) by the DCHG**.

13.7.2 Construction phase mitigation

Mitigation measure

Following mitigation of any impacts to the identified archaeological features, all ground disturbance works across the remainder of the development site will be monitored by a suitably qualified archaeologist. Should any further archaeological features or material be identified then an appropriate area surrounding the archaeology will be cordoned off from construction activity and the Department of Culture, Heritage and the Gaeltacht will be notified and an appropriate mitigation strategy, *i.e.* preservation in situ or full archaeological excavation, will be agreed.

13.7.3 Operational phase mitigation

Any archaeology uncovered will be resolved before the operational stage of the proposed redevelopment. There is no requirement for operational phase mitigation measures.

13.8 Residual Impacts

Any archaeology uncovered will be resolved prior to or during the construction stage of the proposed redevelopment. The residual impacts on the archaeological remains at the site will be **likely**, **negative**, **profound** and **permanent** in the absence of the mitigation measures described above. If the mitigation measures are implemented then a likely, positive, significant and permanent impact will occur due to the production of a full archaeological excavation report for any archaeological sites and material uncovered.

13.9 Worst case scenario

If the development proceeded without the mitigation measures being implemented then the impact on the identified archaeology would be **likely**, **negative**, **profound** and **permanent.**

13.10 Monitoring

Archaeological excavation, as proposed in the mitigation measures (see 13.7.1 & 13.7.2), can only be undertaken upon receipt of a licence issued by the Department of Culture, Heritage and the Gaeltacht in consultation with the National Museum of Ireland. Conditions of awarding of an excavation licence include the production of a Preliminary Report within four weeks and a Final Report within twelve months of the completion of the excavation. The production of these reports ensures compliance with the proposed mitigation measures.

13.11 References

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CHAPTER 14
INTERACTIONS OF THE FOREGOING

DECEMBER 2019

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14 Interactions of the Foregoing

The construction, operational and cumulative impacts of the proposed development have been assessed within each chapter of the EIAR. This chapter considers the significant interactions of impacts between each of the separate disciplines.

In practice many impacts have slight or subtle interactions with other disciplines. This chapter highlights in **Table 14.1** (located at the end of this section) those interactions which are considered to potentially be of a significant nature. Discussions of the nature and effect of the impact is primarily undertaken within each of the relevant chapters, while this chapter identifies the most important potential interactions.

This chapter was prepared by Adrian Toolan of McCutcheon Halley Chartered Planning Consultants, who graduated from University College Dublin with a BA Hons in Geography, Planning and Environmental Policy in 2009 and a Masters' Degree in Regional and Urban Planning in 2011. Adrian is currently a Planning Consultant in the Practice and is experienced in the field of planning and development consultancy, which has included providing consultancy services in respect of major urban regeneration projects.

14.1 Population and Human Health

During the construction phase, the following aspects would interact with population and human health and in the absence of mitigation may give rise to likely significant effects.

- **Material Assets - Traffic and Transport:** There is potential for impact on human health from increased traffic flow for construction vehicles in the local area and this has potential to impact upon road safety.
- **Noise & Vibration**: There is potential for impact on human health associated with noise during the construction phase.
- **Air Quality and Climate:** There is potential for impact on human health from dust associated with construction activities.

During the operational phase the potential interactions are;

- **Landscape**: The landscape plan will impact on the quality of the private and public open spaces, which could impact on people's health and well-being.
- **Material Assets - Traffic and Transport:** Traffic flows within the site will have the potential to create safety risks for pedestrians and cyclists.
- **Air Quality and Climate:** There is potential for impact on human health from a deterioration in air quality associated with emissions from vehicles.

The potential significant impact on human health have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

14.2 Landscape and Visual

During the construction phase, the following aspects would interact with landscape and visual and in the absence of mitigation may give rise to likely significant effects.

- **Land and Soils:** There is potential for impact on landscaping from the reuse of fill material and the appropriateness of available soils during the construction phase.

During the operational phase the potential interactions are:

- **Population and Human Health:** The landscape plan will impact on the quality of the private and public open spaces, which will impact on people's health and well-being.
- **Biodiversity:** The landscaping has significant interaction with biodiversity in relation to the planting scheme.

The potential significant impacts of landscape and visual have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

14.3 Material Assets: Traffic and Transport

During the construction phase, the following aspects would interact with traffic and transport and in the absence of mitigation may give rise to likely significant effects.

- **Noise and Vibration:** Construction traffic may give rise to localised noise and vibration effects.
- **Air Quality and Climate:** Emissions from construction traffic may impact local air quality and climate in terms of increased emissions of greenhouse gases from vehicles.

During the operational phase the potential interactions are;

- **Air Quality and Climate:** Emissions from traffic associated with future occupants may impact local air quality and climate in terms of increased emissions of greenhouse gases from vehicles.

The potential significant impacts of material assets of traffic and transport have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

14.4 Material Assets: Built Services

During the construction phase, the following aspects would interact with built services and in the absence of mitigation may give rise to likely significant effects.

- **Population and Human Health**: Connections to existing services may require a temporary interruption to existing services in the local area.
- **Land and Soils:** The construction of the proposed services (water supply, drainage, power, and telecommunications, etc.) may affect the local hydrological and hydrogeological environment as there is a risk of suspended solids run off.

During the operational phase the potential interactions are:

- **Water:** There will be an increased demand on potable water supply.
- **Air Quality and Climate**: The built services have an interaction with climate in the availability and use of non-greenhouse gas reliant power and heat sources. Emissions from the building heating systems may impact local air quality and climate in terms of increased emissions of greenhouse gases from development.

The potential significant impacts of built services have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

14.5 Land and Soils

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

- **Water:** Site preparatory works (i.e. demolition, site clearance, foundation excavation, etc.) during the construction stage have the potential to impact on the hydrology and hydrogeology due to the risk of suspended solids becoming entrained in surface water runoff and accidental spills etc.
- **Biodiversity:** Site preparatory works have the potential to cause impact on the biodiversity of the site, through removal and disturbance of habitats and species.
- **Cultural Heritage:** Site clearance works may impact on sub-surface archaeology.

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

- **Water:** The hard surfaces will have the potential to impact on the surface hydrogeology due to the introduction of higher run-off rates from these surfaces.

The potential significant impacts of land and soils have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

14.6 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, power, telecommunication, etc.) may affect the local hydrological and hydrogeological environment as there is a risk of suspended solids run off.
- **Land and Soils:** Site preparatory works (i.e. demolition, site clearance, foundation excavation, etc.) during the construction stage have the potential to impact on the hydrology and hydrogeology due to the risk of suspended solids becoming entrained in surface water runoff and accidental spills etc.
- **Biodiversity:** Any negative impact on water quality may impact biodiversity.

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 of water and hydrology have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

14.7 Biodiversity

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

- **Land and Soils:** Site preparatory works have the potential to cause impact on the biodiversity of the site, through removal and disturbance of habitats and species.
- **Water:** Any negative impact on water quality arising from accidental spillages etc. may impact biodiversity.

During the operational phase the potential interactions are:

- **Landscape and Visual**: They quality of the landscaping plan and appropriateness of the species may significantly impact biodiversity.

The potential significant impacts of biodiversity have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

14.8 Noise and Vibration

During the construction phase, the following aspects would interact with noise and vibration and in the absence of mitigation may give rise to likely significant effects:

- **Population and Human Health:** There is potential for impact on human health associated with noise and vibration generated during the construction phase.
- **Material Assets: Traffic and Transport:** Construction traffic may give rise to localised noise and vibration effects.

No potential operational interactions were identified.

The potential significant impacts of noise and vibration have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

14.9 Air Quality and Climate

During the construction phase, the following aspects would interact with air quality and climate and in the absence of mitigation may give rise to likely significant effects:

- **Population and Human Health:** There is potential for impact on human health from dust and vibration associated with construction activities.
- **Material Assets: Traffic and Transport:** Emissions from construction traffic may impact local air quality and climate in terms of increased emissions of greenhouse gases from vehicles.

During the operational phase the potential interactions are:

- **Population and Human Health:** There is potential for impact on human health from a deterioration in air quality associated with emissions from vehicles.
- **Material Assets: Traffic and Transport:** Emissions from traffic associated with future occupants may impact the local air quality and climate in terms of emissions of greenhouse gases from vehicles.
- **Material Assets: Built Services:** The built services have an interaction with climate in the availability and use of non-greenhouse gas reliant power and heat sources.

The potential significant impacts of air quality and climate have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

14.10 Cultural Heritage - Built Heritage Architectural and Archaeology

During the construction phase, the following aspects would interact with cultural heritage and in the absence of mitigation may give rise to likely significant effects.

- **Cultural Heritage**: Site clearance and excavation works may impact on two Record of Monuments and Places (RMP) structures (Ring-ditches ME049-A003001 & ME049-A003002) on-site.
- **Cultural Heritage:** Site clearance and excavation works may impact on sub-surface archaeology.

No potential operational interactions were identified.

The potential significant impacts of cultural heritage have been considered within the relevant discipline and mitigation measures outlined where required. With mitigation measures in place, no significant residual negative impacts are predicted.

Interaction	Population & Human Health		Landscape		Material Assets-Traffic		Material Assets-Built Services		Land & Soils		Water		Biodiversity		Noise & Vibration		Air Quality & Climate		Cultural Heritage	
	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.
Population & Human Health			✗	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✓	✗	✓	✓	✗	✗
Landscape and Visual					✗	✗	✗	✗	✓	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗
Material Assets-Traffic							✗	✗	✗	✗	✗	✗	✗	✗	✓	✗	✓	✓	✗	✗
Material Assets-Built Services									✓	✗	✗	✓	✗	✗	✗	✗	✗	✓	✗	✗
Land & Soils											✓	✓	✓	✗	✗	✗	✗	✗	✓	✗
Water													✓	✗	✗	✗	✗	✗	✗	✗
Biodiversity															✗	✗	✗	✗	✗	✗
Noise & Vibration																	✗	✗	✗	✗
Air Quality & Climate																			✗	✗
Cultural Heritage																				

Con. - Construction Phase | Op. - Operational Phase | ✓ - Potential Significant Interaction | ✗ - No Significant Interaction

TABLE 14-1 INTERACTIONS WITH POTENTIAL FOR SIGNIFICANT IMPACTS BEFORE THE IMPLEMENTATION OF MITIGATION MEASURES

CHAPTER 15
SUMMARY OF MITIGATION MEASURES

DECEMBER 2019

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15 Summary of Proposed Mitigation Measures

A key objective of the Environmental Impact Assessment (EIA) process is to identify likely significant environmental impacts at the pre-consent stage and where necessary to propose measures to mitigate or ameliorate such impacts. This chapter of the Environmental Impact Assessment Report (EIAR) summarises the proposed mitigation measures set out in Chapter 4 to Chapter 14 inclusive.

It is proposed that the appointed contractor will update the Construction and Environmental Management Plan (CEMP) to include any planning condition, legislative, or other relevant requirements prior to the commencement of works. All the mitigation measures proposed within the individual specialists' assessments will be incorporated into the CEMP.

15.1 Population and Human Health

15.1.1 Incorporated Design Mitigation

Well-designed residential units within the proposed development which allow year-round sunlight to penetrate, universal access, energy efficient measures and high-quality finishes and materials.

The design includes landscaped public open space and amenity space realm and including footpaths and seating for residential and public amenity.

Provision of extensive connections and permeability for pedestrians and cyclists throughout the development and between the adjoining road and pedestrian networks.

The inclusion of separate foul water and surface water management systems.

15.1.2 Construction Mitigation

DBFL Consulting Engineers (DBFL) have prepared a Construction and Environmental Management Plan (CEMP) to accompany the application for the proposed development. The CEMP will be further updated by the contractor and agreed with Meath County Council prior to commencement of any works on site.

The main purpose of a CEMP is to provide a mechanism for the management and oversight of the implementation of the mitigation measures described in this EIAR. All personnel will be required to understand and implement the requirements of the CEMP and shall be required to comply with all legal requirements and best practice guidance for construction sites. During the construction phase the CEMP procedures will be reviewed to ensure they remain 'fit for purpose'.

Project supervisors for the construction phase will be appointed in accordance with the Health, Safety and Welfare at Work (Construction Regulations) 2013, and a Preliminary Health and Safety Plan will be formulated during the detailed design stage which will address health and safety issues from the design stages, through to the completion of the construction phases.

Adherence to the construction phase mitigation measures presented in this EIAR will ensure that the construction of the proposed development will have an imperceptible and neutral impact in terms of health and safety.

15.1.3 Operation Mitigation

The proposed development has been designed to avoid and reduce negative impacts on population and human health through the following measures.

- Including a creche / childcare facility within the design of the proposed development.

- Incorporating extensive leisure and amenity facilities within the layout, including local play areas and extensive provision for walking and cycling throughout the development.
- Layout design incorporating considerations of natural daylighting, passive surveillance, and accessibility.
- Landscaping to enhance the amenity value of the proposed development for both humans and wider biodiversity.
- Including a foul water drainage system draining to an existing waste water treatment plant with adequate capacity.
- Including a separate surface water management and attenuation system.
- Including buildings that incorporate low energy consumption and energy efficient measures.
- Including buildings with high quality finishes and materials.
- Including house designs that can be adapted and extended to allow for general changes in family circumstances.

The proposed development was designed to modern standards that incorporate measures that reduce risks to and enhance amenity in terms of population and human health.

15.2 Landscape & Visual

15.2.1 Incorporated Design Mitigation

Some mitigation strategies which minimise visual impact or enhance the visual and aesthetic appearance of the proposed development were integrated into the design of the proposed development at an early stage. The architectural layout aims to create an appropriate and varied visual environment within the housing area by proposing variety in scale and massing of buildings and by creating high quality buildings. The roofscape is varied with pitched roofs and features to add interest to the skyline, particularly at important access road corners in the layout. Façade colours and materials also vary, resulting in a diverse and human-scale architectural environment.

15.2.2 Construction Mitigation

During the construction phase, site hoarding will be erected to restrict views of the site during construction. Hours of construction activity will also be restricted in accordance with local authority guidance.

15.2.3 Operation Mitigation

As noted above, despite the fact that the landscape architectural design proposals are integral to the scheme, for the purposes of this assessment, they are considered as mitigation strategies. The primary proposed ameliorative, remedial or reductive measures are as follows:

a) The architectural layout has addressed visual impact by proposing variety in scale and massing of buildings and by creating high quality buildings. The roofscape is varied with pitched roofs and features to add interest to the skyline. Façade colours and materials also vary, resulting in a diverse and human-scale architectural environment.
b) Planting of trees and shrubs to the proposed streetscapes, open spaces and boundary areas will create an attractive immediate visual environment and aid in the screening of the development and integration into the existing context.
c) Use of native trees, shrubs and wildflowers where possible, particularly in the boundary spaces will improve local biodiversity, in accordance with the All-Ireland Pollinator Plan and local county development plan policies. See Chapter 10 Biodiversity for further details.
d) It is proposed to protect and retain the existing hedgerows to the north and west of the development. It is noted that this is subject to detailed site investigation and setting out. If

it is deemed necessary by a Landscape Architect or Arborist to remove the hedgerow, then it will be re-planted following construction, in accordance with Meath Co. Council policy, with the same species and density and will be managed sustainably going forward.

e) The proposed landscape spaces will respect and enhance the water courses on the site, adding to amenity and visual values and creating a sustainable landscape around the water elements, allowing for flooding to occur without damaging the landscape, housing or towns/settlements up-stream or down-stream. The existing and proposed flood mitigation measures, including bunds, banks, basins are integrated with the landscape proposals for the open spaces.

The mitigation measure is the landscaping plan. This plan is detailed in the Landscape Design Statement produced by NMP Architecture and submitted with this application under separate cover. At time of planting, the proposed trees will be at least 3.5m in height with all plaza and street tree planting a minimum of 5m in height. The trees will reach a mature height of at least 10-12m within 10-15 years. Landscape tender drawings and specifications will be produced to ensure that the landscape work is implemented in accordance with best practice. This document will include tree work procedures, soil handling, planting and maintenance. The contract works will be supervised by a suitably qualified landscape architect and/or arboricultural consultant.

The planting works will be undertaken in the planting season after completion of the main civil engineering and building work.

15.3 Material Assets: Traffic and Transport

15.3.1 Incorporated Design Mitigation

The proposed development fully respects the below road infrastructure improvements permitted as part of neighbouring planning applications. The road infrastructure permitted with these schemes (as discussed below) will, once operational, help reduce the level of traffic movements within Kilcock Town Centre by providing an alternative route between locations in the north / west and those to the east.

- Infrastructure (to be constructed by others) 2026 – Completion of the Distributor Road between the R148 Maynooth Road and the R125. Whilst the completion of this section of the corridor provides benefits for the proposed development, it will also result in potential notable decreases in base and development traffic travelling through the town centre. Furthermore, the design of this emerging Distributor Road incorporates dedicated segregated cycle and pedestrian facilities on both sides of the corridor.
- Infrastructure (to be constructed by others) 2036 – Completion of the Distributor Road between the R148 Maynooth Road and the R158. Whilst the completion of this section of the corridor provides benefits for the proposed development, it will also result in potential notable decreases in base and development traffic travelling through the town centre.
- Infrastructure (permitted development) Before 2021 Opening Year – Upgrade of the existing New Road / Harbour Street from the current priority controlled junction arrangement to a signal controlled junction arrangement. This junction enhancement will result in reduced queues and delays at this junction which have been observed during the morning and evening peak hours.

15.3.2 Construction Mitigation

A Construction and Environmental Management Plan (CEMP) and the associated Construction Traffic Management Plan (CTMP) in addition to the application accompanying Construction and Waste Management Plan (CWMP) will be developed by the appointed contractor and submitted to Meath County Council for approval prior to commencement of works.

The CEMP will incorporate a range of integrated control measures and associated management initiatives with the objective of mitigating the impact of the proposed development's on-site construction activities.

In order to ensure satisfactory operation of the construction stage the following mitigation measures are proposed:

- Provision of sufficient on-site parking during the construction phase to ensure no potential overflow onto the local network.
- Members of the construction team will be brought to/from the site in vans/minibuses, which will serve to reduce the trip generation potential.
- The site construction compound will be able to accommodate employee and visitor parking throughout the construction period through the construction of temporary hardstanding areas.
- Truck wheel washes will be installed at construction site entrances to reduce the tracking of mud and dirt onto the local road network; and
- Any specific recommendations with regard to construction traffic management made by the Local Authority will be adhered to.

15.3.3 Operation Mitigation

With the objective of mitigating the potential impact of the proposed development as recommended in Section 6.7.3 above during its operational stage, the following initiatives have been identified and subsequently form an integral part of the subject development proposals.

- Infrastructure (Connectivity) – The design of the proposed development has sought to maximise the ability to provide attractive connections to the surrounding pedestrian / cycle network. Internally, dedicated pedestrian footways will be provided on all streets which will connect with the existing / future pedestrian facilities in the local public road network thereby facilitating excellent pedestrian permeability. As introduced previously, Map 1 of the Kilcock LAP 2015-2021 indicatively illustrates future pedestrian walkway proposals in the vicinity of the subject site, which, once complete will provide convenient pedestrian / cycle access to the Maynooth Road corridor and the Royal Canal Greenway and subsequently result in shorter walking / cycling distances between the subject development lands, Kilcock Town Centre, and Public Transport interchange locations (bus and train).
- Facilities – Cycle parking has been provided at a much higher rate to that proposed within the development management standards. Accordingly, this generous provision of cycle parking will help ensure cycling is a viable alternative mode of transport to private car travel thereby helping minimise private car trips generated by future residents.

15.4 Material Assets: Built Services

15.4.1 Incorporated Design Mitigation

There are no specific incorporated design mitigation measures above and beyond industry standards and best practice for the installation of the various built asset infrastructure (i.e. water, wastewater, gas, electricity, etc).

15.4.2 Construction Mitigation

Mitigation measures proposed in relation to the drainage and water infrastructure include the following:

- A site-specific Construction and Environmental Management Plan (CEMP) will be developed and implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the CEMP.
- Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate.
- The construction compound will include adequate staff welfare facilities including foul drainage and potable water supply. Foul drainage discharge from the construction compound will be tinkered off site to a licensed facility until a connection to the public foul drainage network has been established.
- The construction compound's potable water supply shall be located where it is protected from contamination by any construction activities or materials.

Relocation of existing ESB infrastructure will be fully coordinated with ESB Networks to ensure interruption to the existing power network is minimized (e.g. agreeing power outage to facilitate relocation of cables). Ducting and / or poles along proposed relocated routes (to be agreed with ESB) will be constructed and ready for rerouting of cables in advance of decommissioning of existing medium and high voltage power lines to minimize outage durations.

Similarly, relocation of overhead telecommunication lines running through the site will be coordinated with Eir to minimize interruption and ensure that all works are carried in a safe manner. As there are no gas networks running through the site relocation will not be necessary.

15.4.3 Operation Mitigation

All new foul drainage pipes will be pressure tested and will be subject to an internal CCTV survey in order to identify any possible defects prior to being made operational.

No additional mitigation measures are proposed in relation to water supply, however water conservation measures such as dual flush water cisterns and low flow taps will be included in the design.

On completion of the construction phase no further mitigation measures are proposed in relation to the electrical, gas and telecommunications infrastructure.

15.5 Land & Soils

15.5.1 Incorporated Design Mitigation

It is proposed that where soils are to be exported off-site, a local facility will be chosen where feasible, and hence reduce the carbon footprint associated with the transport and handling of the material.

15.5.2 Construction Mitigation

15.5.2.1 Stripping of topsoil

Stripping of topsoil will be carried out in a controlled and carefully managed way and coordinated with the proposed staging for the development.

At any given time, the extent of topsoil strip (and consequent exposure of subsoil) will be limited to the immediate vicinity of active work areas.

Topsoil stockpiles will be protected for the duration of the works and not located in areas where sediment laden runoff may enter existing surface water drains. These stockpiles will be monitored throughout the construction phase.

Topsoil stockpiles will also be located so as not to necessitate double handling.

15.5.2.2 Excavation of Subsoil Layers

The design of road levels and finished floor levels has been carried out in such a way as to minimize cut/fill type earthworks operations.

The duration that subsoil layers are exposed to the effects of weather will be minimized. Disturbed subsoil layers will be stabilized as soon as practicable (e.g. backfill of service trenches, construction of road capping layers, construction of building foundations and completion of landscaping).

Similar to stripped topsoil, stockpiles of excavated subsoil material will be protected for the duration of the works. Stockpiles of subsoil material will be located separately from topsoil stockpiles. These stockpiles will be monitored throughout the construction phase. Monitoring of ground conditions and stability of excavations will be monitored on an on-going basis.

Measures will be implemented to capture and treat sediment laden surface water runoff (e.g. sediment retention ponds, surface water inlet protection and earth bunding adjacent to open drainage ditches).

15.5.2.3 Weather Conditions

Typical seasonal weather variations will also be taken account of when planning stripping of topsoil and excavations with an objective of minimising soil erosion and silt generation. The approach of extreme weather events will be monitored to inform near-term operational activities.

15.5.2.4 Surface Water Runoff

Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate. Monitoring of these sediment control measures will be undertaken throughout the construction phase.

Discharge from any vehicle wheel wash areas is to be directed to on-site settlement ponds.

On-site settlement ponds are to include geotextile liners and riprapped inlets and outlets to prevent scour and erosion.

Concrete batching will take place off site, wash down and wash out of concrete trucks will take place off site and any excess concrete is not to be disposed on site

Surface water discharge points during the construction phase are to be agreed with Meath County Council's Environment Section prior to commencing works on site

15.5.2.5 Water Pumped from Excavations

Rainwater pumped from excavations is to be directed to on-site settlement ponds.

Groundwater pumped from excavations is to be directed to on-site settlement ponds.

On-site settlement ponds are to include geotextile liners and riprapped inlets and outlets to prevent scour and erosion. Monitoring of same will be undertaken.

Surface water discharge points during the construction phase will be agreed with Meath County Council prior to commencing works on site.

15.5.2.6 Construction Traffic

Earthworks plant and vehicles delivering construction materials to site will be confined to predetermined haul routes around the site.

Vehicle wheel wash facilities will be installed in the vicinity of any site entrances and road sweeping implemented as necessary in order to maintain the road network in the immediate vicinity of the site. The cleanliness of the adjacent road network will be monitored throughout the construction phase.

Dust suppression measures (e.g. dampening down) will be implemented as necessary during dry periods.

A construction traffic management plan will be prepared by the contractor prior to any works commencing on site.

15.5.2.7 Accidental Spills and Leaks

In order to mitigate against spillages contaminating underlying soils, all oils, fuels, paints and other chemicals will be stored in a secure bunded hardstand area.

Refueling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any surface water inlets and outlets (when not possible to carry out such activities off site).

A response procedure shall be put in place to deal with any accidental pollution events and spillage kits shall be available and construction staff will be familiar with the emergency procedures and use of the equipment.

Monitoring of all fuel / oil storage areas will be undertaken and spill kits will be available on site.

15.5.2.8 Geological Environment

A more detailed Ground Investigation will be undertaken prior to construction to verify the Preliminary Ground Investigation and where possible the works will be designed to minimize the bedrock excavation required. At any given time, the extent of exposed bedrock will be limited to the immediate vicinity of active work areas. Where bedrock is encountered, it will be crushed, screened and tested for use within the designed works to reduce the volume of material required to leave site. This will also reduce the volume of material to be imported to the site.

15.5.3 Operation Mitigation

For the operational phase no specific mitigation measures are proposed as there will be no further impact on soils and the geological environment.

15.6 Water and Hydrology

15.6.1 Incorporated Design Mitigation

There are no specific incorporated design mitigation measures above and beyond industry best practice.

15.6.2 Construction Mitigation

- A Construction and Environmental Management Plan will be submitted with the application documentation and will be implemented by the contractor during the construction phase. Site inductions will include reference to the procedures and best practice as given in the CEMP.
- All water pumped from excavations will be directed to on-site settlement ponds for treatment to reduce pollution to acceptable levels before being discharged to the local environment at a controlled rate.
- Surface water runoff from areas stripped of topsoil, from the construction compound, and from access tracks will be directed to on-site settlement ponds for treatment to reduce pollution to acceptable levels before being discharged to the local environment at a controlled rate.
- Weather conditions and seasonal weather variations will be taken into account when planning stripping of topsoil and excavations, with an objective of minimizing soil erosion and silt run-off. Short term weather forecasts will also be taken into account.
- In order to mitigate against spillages contaminating the surrounding surface water and hydrogeological environments, all oils, fuels, paints and other chemicals shall be stored in a secure bunded hardstand area in the construction compound. Refuelling and servicing of construction machinery will take place in a designated hardstand area which will be remote from any surface water inlets and outlets (where it is not possible to carry out such activities off site). Hydrocarbon spill kits will be available and to hand for refuelling crews in the event of any spills.
- Concrete batching will take place off site and wash out of concrete chutes will take place at designated locations in the site and the washout of truck drums will take place after back at the batching plant to minimise pollution release within the subject site.
- Discharge from any vehicle wheel wash areas will be directed to on-site settlement ponds for treatment prior to discharge to the local environment.
- Groundwater pumped from excavations is to be directed to on-site settlement ponds for treatment prior to discharge to the local environment.

15.6.3 Operation Mitigation

The design of proposed site levels (roads, finished floor levels etc.) was completed to replicate existing surface contours, break lines etc., therefore replicating existing overland surface water flow paths, to minimise changes to the site characteristics and not concentrating water run-off in any particular location(s).

Surface water runoff from the site will be attenuated to the existing greenfield runoff rate as outlined in the Greater Dublin Strategic Drainage Study (GDSDS). Surface water discharge rates will be controlled by 2No. Hydrobrake type vortex flow control devices, located at both the northern and southern section outfalls, in conjunction with attenuation storage in both locations.

The design of the proposed development incorporates the following SuDS surface water treatment train solutions:

- Permeable paving in driveway areas.

- Surface water runoff from roofs will be routed to the proposed surface water pipe network via the porous aggregates beneath permeable paved driveways.
- Surface water runoff from roads, where allowable, will drain to swales for treatment and runoff reduction.
- Attenuation of the 100-year return event storms with a 20% allowance for climate change.
- Installation of 2No. flow control devices (Hydrobrake or similar) limiting surface water discharge from the site to greenfield runoff rates at the outfalls to the 'Upper Ditch' and Rye Water respectively.
- Surface water discharge to pass via 2No. Class 1 fuel / oil separator (sized in accordance with permitted discharge from the site).
- Non-Return Valve fitted at outlet locations to prevent any water from The Rye Water River or the drainage ditch from draining back into the systems.

15.7 Biodiversity

15.7.1 Incorporated Design Mitigation

The loss of mature trees or hedgerows has been avoided where possible. Where this cannot be avoided, the landscaping scheme has been designed to compensate for the loss of habitat. This entails biodiversity friendly planting including native species. Biodiversity value will be enhanced by installing bird nesting boxes and artificial bat roosts.

The following measures are taken from the bat survey report in relation to artificial lighting. Lighting should be controlled to avoid light pollution of green areas and should be targeted to areas of human activity and for priority security areas.

- Motion-activated sensor lighting is preferable to reduce light pollution.
- None of the remaining mature trees shall be illuminated.
- Dark corridor for movement of bats along the grounds of the site. Lighting should be directed downwards away from the treetops.
- All luminaires shall lack UV elements when manufactured and shall be LED.
- A warm white spectrum (ideally <2700Kelvin but as low as the Council limitations allow) shall be adopted to reduce blue light component.
- Luminaires shall feature peak wavelengths higher than 550nm.
- Tree crowns shall remain unilluminated.
- Planting shall provide areas of darkness suitable for bats to feed and commute through the site.

The landscaping is taken from the bat survey report in relation to landscaping:

- Native hedgerow tree species
- Individual deciduous trees (in lines) that could potentially provide commuting corridors through the proposed development site
- Flower rich meadows, scrub and groups of trees
- Where possible, include water features connected to other green spaces
- Green roofs, communal wildlife friendly gardens and potentially living walls with climbing plants and creepers with a view of provide connected pockets of foraging habitat (linking in with other streetscape planting e.g. individual trees)
- Avoid the use of chemicals (weed killers, etc.) within the development zone.

15.7.2 Construction Mitigation

15.7.2.1 Mortality to Species

The removal of vegetation will not take place between March and August inclusive as per section 40 of the Wildlife Act. Where this cannot be avoided, vegetation must first be inspected by a suitably qualified ecologist for signs of nesting. Where no nesting is observed, vegetation can be removed within 48 hours. Where nesting is underway, vegetation cannot be removed unless under licence from the NPWS.

15.7.2.2 Mitigation from the Bat Survey Report

"Tree removal creates a risk of roost loss and could lead to injury or death to any bat roosting within a felled tree protected under the Wildlife Act and Habitats Directive (if a roost were present and not identified) and would therefore constitute a breach of the Irish and EU legislation. There is no evidence that the trees within the site are in use as bat roosts from the survey of 12th July 2019. The houses on the perimeter of the site may serve as roosts at some stage in the year including both derelict and occupied houses. Bats move in and out of roosts on a regular basis and individuals may be present at times other than during a specific survey. Given that the arborist report (Arboricultural Assessment Report Residential Development, Newtownmoyaghy, Kilcock, Co. Meath by CMK Horticulture and Arboriculture Ltd.) states that the condition of the hedgerows within the survey boundary is moderate to poor overall with most unmanaged or poorly maintained. This impact (tree roost loss) is likely to be moderate and long-term were it to occur and there was no obvious equivalent replacement for the roost loss. No significant roost loss is considered likely based on the tree loss proposed for the site and as no buildings would be removed for the proposal."

15.7.2.3 Pollution during construction

Construction activities will be carried out in accordance with best practice standards from Inland Fisheries Ireland (2016). This will include the installation of a robust silt barrier along riparian margins of water courses to ensure the protection of the Rye Water river. A Construction and Environmental Management Plan (CEMP) has been prepared which details the location of the site compound and all construction pollution prevention measures. This includes the storage of dangerous substances in bunded areas and the training of personnel in the importance of avoiding pollution. Only water treated on-site in settlement ponds to reduce pollution to acceptable levels will be permitted to leave the site or enter water courses and this will be achieved by the use of silt traps or settlement ponds. The site manager will be responsible for the prevention of pollution and in monitoring pollution prevention measures throughout the lifetime of the project.

Installation of the bridges across the drainage ditch will be installed to minimise disturbance to the banks (this water course is highly modified). Installation will be done in the dry (i.e. when the ditch itself is dry, or, if necessary, the ditch will be dammed and water pumped around the works area to prevent scouring and excessive loss of silt.

15.7.3 Operation Mitigation

15.7.3.1 Disturbance from Artificial Lighting

The following is taken from the Bat Report and these mitigation measures will be implemented:

Lighting should be controlled to avoid light pollution of green areas and should be targeted to areas of human activity and for priority security areas.

- Motion-activated sensor lighting is preferable to reduce light pollution.
- None of the remaining mature trees shall be illuminated.
- Dark corridor for movement of bats along the grounds of the site. Lighting should be directed downwards away from the treetops.
- All luminaires shall lack UV elements when manufactured and shall be LED.
- A warm white spectrum (ideally <2700Kelvin but as low as the Council limitations allow) shall be adopted to reduce blue light component.
- Luminaires shall feature peak wavelengths higher than 550nm.
- Tree crowns shall remain unilluminated.
- Planting shall provide areas of darkness suitable for bats to feed and commute through the site.

15.8 Noise and Vibration

15.8.1 Incorporated Design Mitigation

Incorporated design mitigation for noise is not applicable to the proposed development.

15.8.2 Construction Mitigation

The assessment has found that predicted levels of construction noise at the nearest noise sensitive locations are likely to be above the proposed threshold values, mitigation measures are recommended to minimise or reduce any potential impacts.

Reference will be made to BS5228: 2009 + A1 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Part 1 Noise for appropriate mitigation measures, which offers detailed guidance on the control of noise and vibration from construction activities. Various mitigation measures will be considered and applied during the construction of the proposed development to ensure noise and vibration limit values are complied with, such as:

- Limiting the hours during which site construction activities likely to create high levels of noise are permitted;
- Establishing channels of communication between the contractor/developer, Local Authority and residents;
- Appointing a site representative responsible for matters relating to construction noise and vibration;
- Monitoring levels of noise during critical periods and at sensitive locations;
- All site access roads will be kept even to mitigate the potential for noise and vibration from lorries.

Furthermore, it is envisaged that a variety of practicable construction noise control measures will be employed where necessary. These will include:

- Selection of plant with low inherent potential for generation of noise and/ or vibration;
- Erection of barriers as necessary around items such as generators or high duty compressors;
- Siting of noisy plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated support structures where necessary.

Erection of construction site hoarding along noise sensitive boundaries where works are taking place in proximity to existing residential properties where no substantial screening exists.

15.8.3 Operation Mitigation

15.8.3.1 Additional Traffic on Public Roads

During the operational phase of the development, noise mitigation measures with respect to the outward impact of traffic from the development are not deemed necessary.

15.8.3.2 Building Services Plant

With consideration at the detailed design stage the selection and location of plant items will ensure that noise emissions to sensitive receivers both external and within the development itself will be within the relevant criteria, therefore no further mitigation is required.

Considering that sensitive receivers within the development are much closer than off-site sensitive receivers, once the relevant noise criteria is achieved within the development it is expected that there will be no negative impact at sensitive receivers off site.

15.9 Air Quality and Climate

15.9.1 Incorporated Design Mitigation

No specific mitigation measures relating to design of the proposed development are required based on the outcome of this assessment which demonstrates that the impact of the proposed development on air quality and climate is predicted to be permanent, negative and imperceptible with respect to the operational phase.

15.9.2 Construction Mitigation

15.9.2.1 Air Quality

The pro-active control of fugitive dust will ensure the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released. The main contractor will be responsible for the coordination, implementation and ongoing monitoring of the dust management plan. The key aspects of controlling dust are listed below. Full details of the dust management plan can be found in Appendix 12.3.

- The specification and circulation of a dust management plan for the site and the identification of persons responsible for managing dust control and any potential issues;
- The development of a documentation system for managing site practices with regard to dust control;
- The development of a means by which the performance of the dust management plan can be monitored for efficacy through visual inspections, dust deposition monitoring at the site boundary (where necessary) and logging and investigation of any dust nuisance complaints received;
- The specification of effective measures to deal with any complaints received.

At all times, the procedures for dust mitigation measures will be strictly monitored for efficacy. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

15.9.2.2 Climate

Construction traffic and embodied energy of construction materials are expected to be the dominant source of greenhouse gas emissions as a result of the construction phase of the

proposed development. Construction vehicles, generators etc., may give rise to some CO2 and N2O emissions. However, based on the short-term nature and small scale of the works, the impact on climate will be short-term, negative and imperceptible.

Nevertheless, some site-specific mitigation measures can be implemented during the construction phase of the proposed development to ensure emissions are minimised. In particular the prevention of on-site or delivery vehicles from leaving engines idling, even over short periods. Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the construction phase

15.9.3 Operation Mitigation

No additional mitigation measures are required during the operational phase of the proposed development as it is predicted to have an imperceptible impact on ambient air quality and climate.

15.10 Cultural Heritage

The Framework and Principles for the Protection of the Archaeological Heritage (1999) outlines the State's general principles in relation to the management and protection of archaeological heritage. This document notes that avoidance of developmental impacts on archaeological heritage and preservation in situ of archaeological sites and monuments are always the preferred option. However, in this case, there are significant constraints on the design and layout of the proposed scheme from relevant planning guidelines. Avoidance of the archaeological sites recorded in this assessment would require a very substantial revision of the layout of the development, which would be difficult to achieve given the nature and type of development proposed.

15.10.1 Incorporated Design Mitigation

Should this development proceed, the archaeological sites identified in this assessment will be subject to full archaeological excavation in advance of construction and carried out under licence to the Department of Culture, Heritage and the Gaeltacht (DCHG) in consultation with the National Museum of Ireland. **A licence to excavate the two areas of archaeology (Ring Ditches and Enclosure) identified in the test-excavation (Licence no. 19E0547) has been issued (Licence No. 19E0686, 17th October 2019) by the DCHG**.

15.10.2 Construction Mitigation

Following mitigation of any impacts to the identified archaeological features, all ground disturbance works across the remainder of the development site will be monitored by a suitably qualified archaeologist. Should any further archaeological features or material be identified then an appropriate area surrounding the archaeology will be cordoned off from construction activity and the Department of Culture, Heritage and the Gaeltacht will be notified and an appropriate mitigation strategy, i.e. preservation in situ or full archaeological excavation, will be agreed.

15.10.3 Operation Mitigation

Any archaeology uncovered will be resolved before the operational stage of the proposed redevelopment. There is no requirement for operational phase mitigation measures.