

Proposed Large Scale Residential
Development at Rathgowan, Mullingar,
Co. Westmeath
Applicant: Marina Quarter Ltd.

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Volume II

Main Statement

CHAPTER 6

Hydrology & Hydrogeology



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6 Hydrology and Hydrogeology

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6.1 Introduction

This chapter of the EIAR was prepared to assess the potential significant effects of the Proposed Development on the receiving hydrology and hydrogeology (water) environment at Rathgowan, Mullingar, Co. Westmeath (hereafter referred to as the site) and sets out any required mitigation measures where appropriate.

The principal objectives of this chapter are to identify:

- Hydrological and hydrogeological characteristics of the receiving environment at the site.
- Potential impacts that the Proposed Development may have on the receiving water environment.
- Potential constraints that the environmental attributes may place on the Proposed Development.
- Required mitigation measures which may be necessary to minimise any adverse impacts related to the Proposed Development; and
- Evaluate the significance of any residual impacts.

This chapter of the EIAR should be read in conjunction with Chapter 4 Population and Human Health, Chapter 5 Land, Soil and Geology, Chapter 13 Material Assets – Service Infrastructure and Utilities and Chapter 14 Biodiversity of the EIAR and other information provided by the Applicant pertaining to the design proposals for the Proposed Development.

6.2 Expertise & Qualifications

This chapter of the EIAR has been prepared by Gareth Carroll, a Principal Consultant of Enviroguide Consulting.

Gareth Carroll holds a BA in Mathematics and a BAI in Civil, Structural and Environmental Engineering from Trinity College Dublin. Gareth Carroll, with over 10 years' experience as an Environmental Consultant, has carried out environmental assessments for a range of project types and geological and hydrogeological site settings and been involved in the preparation of EIARs for the following projects:

- Strategic Housing Development at Wayside, Enniskerry Road and Glenamuck Road, Kiltarnan, Dublin 18;
- Large-Scale Residential Development at White Car Park site (Site A) at Blanchardstown Town Centre, Coolmine, Dublin 15; and
- Strategic Housing Development at Claremont, Howth Road, Howth, Co. Dublin

6.3 Proposed Development

The full description of the Proposed Development is outlined in Chapter 2 'Development Description' of this EIAR.

6.3.1 Aspects Relevant to this Assessment

The Proposed Development will include the following components which are of particular relevance with respect to hydrology and hydrogeology.

6.3.1.1 Construction Phase

The Construction Phase of the Proposed Development will include:

- Cut and fill to maintain the maximum and minimum road gradient of 1/21 and 1/200 and to ensure units are level.
 - Maximum fill depths up to 1.6m, typically 0.5 to 1.0m.
 - Maximum cut depths up to 1.2m
- Excavation to reduce the levels to construction the building foundations to a maximum depth of 1.0 meter below ground level (mbGL).
- Excavation for construction of drainage infrastructure to a maximum depth of 3.5mbGL.
- It is anticipated that groundwater will not be encountered during excavations and thus the requirement for dewatering during the Construction Phase of the Proposed Development is not anticipated.
- Construction of new foul and mains water connections in accordance with UE Code of Practice for Wastewater Infrastructure (IW-CDS-5030-03), UE's Code of Practice for Water Infrastructure (IW-CDS-5020-03).
 - There will be two (2No.) foul water connections; one (1No.) gravity and one (1No.) pumped. The gravity network will convey foul water from circa. 99No. units to the existing UE 225mm sewer to the south of the Proposed Development. The remaining 82No. units will discharge via a 110mm PE rising main along the C-Link Road, to the existing UE 525mm foul sewer.
 - There will be one (1No.) main water connection to the existing UE 400mm watermain located along the R394 to the northwest of the entrance to the Proposed Development, and a second connection to the existing UE 100mm watermain located within Ashe Road in the southern corner of the site.
- Temporary stockpiling of excavated material for the re-use on site.
- Construction of new surface water drainage designed in accordance with Sustainable Drainage Systems (SuDS) principals. Connection to the surface water network for the approved Phase 3 development (Planning Reference No. 22/515) located along the R394-C Link Road.

6.3.1.2 Operational Phase

Surface Water Drainage

As outlined in the Civil Works Design Report (Tobin Consulting Engineers Ireland, 2023c included in Volume 3 of this EIAR), surface water from the Proposed Development will be managed in accordance with the principles and objectives of Sustainable Drainage Systems (SuDS) and the Greater Dublin Sustainable Drainage System (GSDSDS) to treat and attenuate water.

The Proposed Development has been divided into four (4No.) catchment areas (A, B, C and D). These networks will each direct flow through a petrol interceptor before discharging into the four (4No.) proposed soakaways designed in accordance with BRE Digest 365, Soakaway Design, 2007 Edition.

Controlled overflow from the proposed soakaways will flow via gravity to the northern boundary of the site before discharging at green field runoff rates to the surface water network for the approved Phase 3 residential development (Planning Reference No. 22/515) located along the R394-C Link Road. It is understood by Enviroguide Consulting, that surface water from the Proposed Development will ultimately discharge to the Brosna River (River Waterbody Code: IE_SH_25B090100).

The surface water drainage for the Proposed Development has been designed to cater for surface water runoff from all hard surfaces including roadways, carparks, and roofs, and will adequately accommodate the 1 in 100year rainfall event plus 20% to account for the effects of climate change.

The following attenuation and sustainable drainage systems (SuDs) measures will be incorporated into the Proposed Development as detailed in the Civil Works Design Report (Tobin Consulting Engineers Ireland, 2023c as included in Volume 3 of this EIAR),

- Water butts;
- Rain gardens;
- Tree pits;
- Permeable Paving;
- Drainage kerbs with infiltration trenches/swales;
- Petrol / Oil Separators; and
- Soakaways.

Foul Water

As outlined in the Civil Works Design Report (Tobin Consulting Engineers Ireland, 2023c included in Volume 3 of this EIAR), the proposed foul network has been divided into two (2No.) networks prior to discharging offsite as follows:

- Foul water for two thirds the Proposed Development will discharge under gravity to the existing UE 225mm foul sewer at the point of connection in the southwest corner of the site.
- Foul water for the remaining one third of the Proposed Development will be pumped via the pumping station located in the north of the site (previously granted planning by WCC (Planning Reference No. 22/515)) to a 110mm PE rising main on the R394 C-Link Road along the northwest boundary of the site before discharging to the existing UE 525mm foul sewer located circa. 80m north of the Proposed Development. It is noted that the pump station has been designed with consideration to the Proposed Development to ensure that there is sufficient capacity to accept foul water from the Proposed Development.

The UE Confirmation of Feasibility (CoF) letter dated 3rd of August 2023 states that the foul water connection is feasible subject to upgrades (Ref: CDS23002571). The UE CoF letter notes the following in relation to the WWTP connection:

“We can confirm that there is sufficient capacity in the wastewater treatment facility to cater for this development.

The Development can be facilitated at the existing 525mm sewer north west of the site on the R394. This will require a rising main of approximately 470m along the R394. If feasible a gravity connection

to the sewer should be considered. If this proposed development proceeds to application when all the foul water entering the pumpstation must be pumped to the north.”

As documented in the Civil Design Report (Tobin Consulting Engineers 2023c included in Volume 3 of this EIAR) foul water from the Proposed Development will be pumped via the pump station previously granted planning by WCC (Planning Reference No. 22/515) to a 110mm PE rising main on the R394 C-Link Road before discharging to the existing UE 525mm foul sewer. Thereby meeting the UE requirements outlined in the UE CoF letter (Ref: CDS23002571).

Foul water from the Proposed Development will be treated at the Mullingar Wastewater Treatment Plant (WWTP) (EPA Licence No. D0008-01) before ultimately discharging to Brosna River (River Waterbody Code: IE_SH_25B090100).

Water Supply

As outlined in the Civil Works Design Report (Tobin Consulting Engineers Ireland, 2023c included in Volume 3 of this EIAR), water supply to the Proposed Development will be from the two (2No.) existing UE watermains as follows:

- The existing UE 400mm Asbestos watermain located within the R394 C-Link Road to the northwest of the entrance to the Proposed Development; and
- The existing UE 100mm uPVC watermain located within Ashe Road in the southern corner of the site.

The UE Confirmation of Feasibility letter dated the 3rd August 2023 (COF Reference: CDS23002571) states that the water supply connections are ‘feasible subject to updates’. The UE CoF letter notes the following in relation to the watermain connection.

“There is sufficient capacity in the water treatment facility to facilitate the proposed development. Please note, the proposed connection point is off the 400AC main to the north of the proposed development. A new meter and PRV will have to be installed.”

As outlined in the Civil Design Report (Tobin Consulting Engineers Ireland, 2023 included in Volume 3 of this EIAR) the upgrades will take place as per UE requirements.

As documented in the Civil Design Report (Tobin Consulting Engineers 2023c included in Volume 3 of this EIAR) the Proposed Development will include a 150mm watermain connection from the existing 400mm watermain which runs along the R394-C Link Road. The proposed 150mm watermain will also connect directly to the existing UE 100mm watermain on Ashe Road. This interconnectivity will fortify the water network in the area as advised by UE, and thereby meeting the UE requirements outlined in the UE CoF letter (Ref: CDS23002571).

6.4 Methodology

6.4.1 Relevant Legislation & Guidance

The methodology adopted for this assessment takes cognisance of the relevant guidelines in particular, the following:

- Council Directive 2006/118/EEC, 2006. On the protection of groundwater against pollution and deterioration. European Parliament and the Council of European Communities;
- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy with amendments 2455/2001/EC, 2008/32/EC and 2008/105/EC (Water Framework Directive, WFD);
- European Commission, 2022. WFD Reporting Guidance 2022. Final Draft V4;
- Local Government, October 2021. No. 1.1977. Local Government (Water Pollution (Amendment) Act);
- Local Government, October 2007. No. 30.2007. Water Services Act 2007;
- Local Government, July 1990. No. 21.1990. Local Government (Water Pollution) (Amendment) Act, 1990;
- Local Government, March 1977. No. 01/1977. Local Government (Water Pollution) Act, 1977 with amendments;
- S.I. No. 722/2003 – European Communities (Water Policy) with amendment S.I. No. 413/2005;
- S.I. No. 489/2011 – European communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011;
- S.I. No. 122/2010 – European Communities (Assessment and Management of flood Risks) Regulations 2010 including amendment S.I. No. 495/2015;
- S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019;
- S.I. No. 9 of 2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010 including amendments S.I. No. 149 of 2012 and S.I. No. 366 of 201; and
- WFD Working Group, 2005. Guidance on the Assessment of the Impact of Groundwater Abstractions (WFD, 2005).

Other guidance used in the assessment of potential impacts on the receiving water environment are referenced where relevant in this EIAR Chapter and include:

- Construction Industry Research and Information Association, 2001. Control of Water Pollution from Construction Sites (CIRIA – C532);
- Construction Industry Research and Information Association, 2015. Environmental Good Practice on Site Guide (CIRIA – C741);
- Construction Industry Research and Information Association, 2016. Groundwater Control: Design and Practice (CIRIA – C750);
- Department of the Environment, Heritage and Local Government, Environmental Protection Agency and Geological Survey of Ireland, 1999. Groundwater Protection Schemes (DEHLG/EPA/GSI, 1999);
- Department of the Environment, Heritage and Local Government, 2009. Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (DEHLG, 2009);
- Department of Housing, Planning and Local Government, August 2018. Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DHPLG, 2018);

- Environmental Protection Agency, 2014. Guidance on the Authorisation of Direct Discharges to Groundwater;
- Environmental Protection Agency, 2013. Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites;
- Environmental Protection Agency, 2013. Storage and Transfer of Materials for Scheduled Activities; and
- Environmental Protection Agency, May 2022. Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022).

6.4.2 Phased Approach

A phased approach was adopted for this EIAR in accordance with Environmental Protection Agency (EPA) and Institute of Geologists of Ireland (IGI) guidelines as set out above and is described in the following sections.

Element 1: An initial Assessment and Impact Determination stage was carried out by Enviroguide Consulting to establish the project location, type and scale of the Proposed Development, the baseline conditions, and the type of hydrological and hydrogeological environment, to establish the activities associated with the Proposed Development and to undertake an initial assessment and impact determination. This element of the assessment also included developing the Conceptual Site Model (CSM) for the site of the Proposed Development and receiving environment.

This stage of the assessment included a desk top study that comprised a review of published environmental information for the site. The study area, for the purposes of assessing the baseline conditions for the Hydrology and Hydrogeology Chapter of the EIAR, extends beyond the site boundaries and includes a 2.0km radius of the site and potential receptors outside of this radius that are potentially hydraulically connected with the site were also considered. The extent of the wider study area was based on the Institute of Geologists of Ireland (IGI) Guidelines (IGI, 2013) that recommends a minimum distance of 2.0km radius from the site. The purpose of this increased search radius was to ensure that any potential hydrogeological / hydrological connections to sensitive receptors including habitats were identified.

The desk study involved collecting all the relevant data for the site of the Proposed Development and surrounding area including published information and details pertaining to the Proposed Development provided by the Applicant and design team.

A site walkover survey to establish the environmental site setting and baseline conditions at the site of the Proposed Development relevant to the hydrological and hydrogeological environment was undertaken by Enviroguide Consulting on the 21st April 2023

The Element 1 stage of the assessment was completed by Enviroguide Consulting and included the review of the following sources of information:

- Environmental Protection Agency (EPA) web mapping (EPA, 2023).
- Geological Survey Ireland (GSI) Datasets Public Viewer and Groundwater web mapping (EPA, 2023).
- National Parks and Wildlife Services (NPWS) web mapping (NPWS, 2023).

- Ordnance Survey Ireland (OSI) web mapping (OSI, 2023).
- Water Framework Directive Ireland (WFD) web mapping (WFD, 2023).
- Office of Public Works (OPW) database on historic flooding and the Catchment Flood Risk Assessment and Management (CFRAM) maps (OPW, 2023); and
- Information provided by the Applicant including:
 - Information pertaining to the design proposals for the Proposed Development, and
 - IGSL Ltd., 2020. Report on a Site Investigation for a Proposed Housing Development at Rathgowan, Mullingar (IGSL, 2020) including trial pit and borehole logs, infiltration tests and site map.

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Element 2: Involves Direct and Indirect Site Investigation and Studies stage where necessary to refine the CSM developed as part of Element 1 and evaluate the potential impacts associated with the Proposed Development. It was determined that there was adequate site-specific scientific data available for the assessment and no additional ground investigation in relation to hydrology and hydrogeology was undertaken.

Element 3: Evaluation of Mitigation Measures, Residual Impacts and Final Impact Assessment were based on the outcome of the information gathered in Element 1 of the assessment. Mitigation measures to address all identified adverse impacts that were identified in Element 1 of the assessment were considered in relation to the Construction and Phase and Operational Phase of the Proposed Development. These mitigation measures were then considered in the impact assessment to identify any residual impacts.

Element 4: Completion of the Hydrology and Hydrogeology sections of the EIAR in this Chapter which includes all the associated figures and documents.

6.4.3 Description of Importance of Receiving Environment

The National Roads Authority (NRA) criteria for estimation of the importance of hydrogeological features at the site during the Environmental Impact Assessment (EIA) stage, as documented by IGI (IGI, 2013) are summarised in Table 6.1

Table 6.1 Criteria for Rating Site Importance of Hydrogeological Features (Source: IGI, 2013)

Importance	Criteria	Typical Example
Extremely High	Attribute has a high quality or value on an international scale.	Groundwater supports river, wetland or surface water body ecosystem protected by European Union (EU) legislation e.g., SAC or SPA status.
Very High	Attribute has a high quality or value on a regional or national scale.	Regionally Important Aquifer with multiple wellfields. Groundwater supports river, wetland, or surface water body ecosystem protected by national legislation – e.g., NHA status. Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source.

Importance	Criteria	Typical Example
High	Attribute has a high quality or value on a local scale.	Regionally Important Aquifer. Groundwater provides large proportion of baseflow to local rivers. Locally important potable water source supplying >1000 homes. Outer source protection area for regionally important water source. Inner source protection area for locally important water source.
Medium	Attribute has a medium quality or value on a local scale.	Locally Important Aquifer Potable water source supplying >50 homes. Outer source protection area for locally important water source.
Low	Attribute has a low quality or value on a local scale.	Poor Bedrock Aquifer. Potable water source supplying <50 homes.

6.4.4 Description and Assessment of Potential Impact

Impacts will vary in quality from negative, to neutral or positive. The effects of impacts will vary in significance on the receiving environment. Effects will also vary in duration. The terminology and methodology used for assessing the 'impact' significance and the corresponding 'effect' throughout this Chapter are described in Table 6.2 as per EPA, 2022 Guidelines on the information to be contained in Environmental Impact Assessment Reports.

Table 6.2. Criteria Assessment of Potential Impacts Terminology and Methodology (Source: EPA, 2022)

Quality of Effects / Impacts	Definition
Negative	A change which reduces the quality of the environment
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment
Significance of Effects / Impacts	Definition
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration, or intensity alters a sensitive aspect of the environment.

Quality of Effects / Impacts	Definition
Very Significant	An effect which, by its character, magnitude, duration, or intensity significantly alters a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics.
Duration of Effects / Impacts	Definition
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting one year or less
Short-term	Effects lasting one to seven years
Medium-term	Effects lasting seven to fifteen years
Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration

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6.5 Difficulties Encountered

There were no difficulties were encountered in the preparation of this Chapter of the EIAR.

6.6 Baseline Environment

6.6.1 Site Location and Surrounding Land Use

The site of the Proposed Development, which is 5.95 hectares (HA) in area, is located at Rathgowan, Mullingar, Co. Westmeath. The site is accessed via the existing entrance off the roundabout on the R394 Regional Road (known locally as the ‘c-link’ road) which adjoins the northwest boundary of the site.

The area surrounding the site is characterised by a mix of land uses. The site is bound to the northwest by the R394 or C-Link with agricultural land beyond, to the southwest the R393 (known locally as ‘Ashe Road’) and an ESB substation with b, and to the northeast and southeast by residential lands comprising two-storey detached and semi-detached dwellings.

The site location is presented in Figure 6.1.

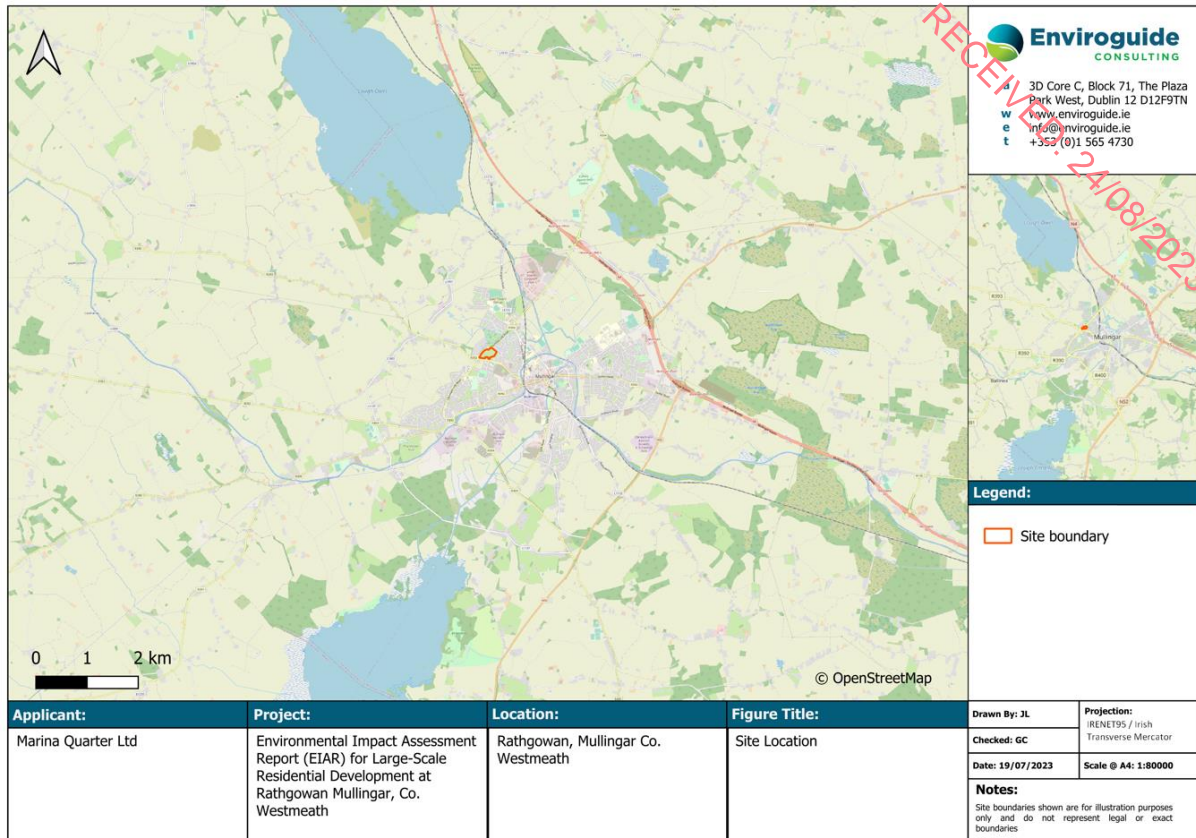


Figure 6.1. Site Location

6.6.2 Current Land Use

The primary land use at the site is currently agricultural farmland within two fields under grass pasture.

6.6.3 Topography

The site is relatively flat with gentle undulations and a slight sloping gradient to the northwest.

The topographic survey, presented in the site investigation report (IGSL, 2020) available in Volume 3 of this EIAR, identified that ground elevation across the site range from approximately 98.5m to 99m along the R394 at the northwest boundary of the site, rising to approximately 105mOD in the south-east corner of the site.

6.6.4 Soil and Geology

The soils and geology at the site are described and assessed in Chapter 5 of this EIAR and summarised as follows:

- The majority of the site is underlain by grey, brown Podzolics, brown Earths (medium-high base status) (IFS Soil Code: BminDW). A small area along the southwest boundary of the site is underlain by surface water Gleys, ground water Gleys (IFS soil code: BminPD).
- The quaternary sediments beneath the site are mapped by the GSI (GSI, 2023) as ‘till derived from limestones’ (TLs);

- The bedrock underlying the site is mapped as the Lucan Formation (GSI, 2023). The ground investigation (IGSL, 2020 included in Volume 3 of this EIAR) did not encounter bedrock (i.e., bedrock is greater than 5.7 mbGL); and
- There are no karst features within the site boundary or within a 2km radius of the site (GSI, 2023). The closest karst feature to the site is a spring located approximately 4.5km southeast of the site.

6.6.5 Rainfall

The soils and geology at the site are described and assessed in Chapter 5 of this EIAR and summarised as follows:

Monthly rainfall data available for 1km x 1km grids (for the period 1981 to 2010) was sourced from Met Éireann (Walsh, 2012) and is presented in Table 6.3.

Table 6.3 Long Term Mean Monthly Rainfall Data (Source: Walsh, 2012)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Long Term Avg.
94	71	78	66	70	75	73	88	80	107	90	97	990
Note: 1km x 1km Irish Grid Coordinates selected for the site of the Proposed Development = X (Easting): 243000, Y (Northing): 253000												

The closest synoptic meteorological station to the site is Mullingar station located approximately 0.78km northeast of the site. A summary of the long-term average potential evapotranspiration (PE) at Mullingar station for the period 2020-2023 (Met Éireann, 2023) is presented in Table 6.4.

Table 6.4 Average Potential Evapotranspiration (Source: Met Eireann, 2023)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Long Term Avg.
10.3	17.4	31.0	51.4	71.9	80.5	79.1	65.0	44.0	22.9	10.3	7.5	491.3

The long-term average annual potential evaporation (PE) at the Casement Aerodrome is 491.3mm/year (refer to Table 6.4).

6.6.6 Regional Hydrogeology

6.6.6.1 Groundwater Body

The bedrock aquifer of the Lucan Formation beneath the majority of the site is reported to be within the Inny Groundwater Body (GWB) (EU Code: IE_SH_G_110), with a minor portion of the site (in the southwest corner) located within the Clara GWB (EU Code: IE_SH_G_240).

Groundwater flow paths in the Inny GWB will be short, in general between 30m and 300 m, with groundwater discharging locally to rivers and streams. The majority of groundwater flow is likely to

circulate in the upper tens of metres of bedrock, recharging and discharging in local zones. The dominant recharge process will be diffuse recharge from water percolating through the overlying tills and into the aquifer. Groundwater discharge will be local to the River Inny, located 12.5km northwest of the site at its closest point, and its tributaries (GSI, 2023).

Groundwater flow paths in the Clara GWB are generally short, on the order of 30m to 300m, with groundwater discharging to the streams and rivers that traverse the aquifer and to small springs. Local groundwater flows are determined by the local topography. There is no regional flow system in these aquifers. The majority of groundwater flow is likely to circulate in the upper 15m metres of the bedrock aquifer. The dominant recharge process will be diffuse recharge from water percolating through the overlying tills and into the aquifer. Groundwater discharge will be to gaining streams and rivers crossing the GWB (GSI, 2023).

Based on the topography, regional groundwater flow in the vicinity of the site of the Proposed Development is likely to flow in a north to northeast direction towards the River Brosna.

6.6.6.2 Recharge

The GSI groundwater recharge map provides an estimate of the average amount of rainwater that percolates down through the subsoils to the water table over a year. The map accounts for rainfall that percolates diffusely through soils and subsoils, it does not consider what that enters the aquifer at points (e.g., sinkholes) or along linear fractures (e.g., along sinking streams/rivers). Groundwater recharge amounts are estimated by considering soil drainage, subsoil permeability, thickness and type, the ability of the aquifer to accept the recharge and rainfall.

The GSI (GSI, 2023) have calculated an average annual capped recharge of 336mm/year for the aquifer beneath the site of the Proposed Development based on the effective rainfall (ER) value of 560mm/year and a recharge coefficient of 60%. The low recharge potential is due to the presence of low permeability subsoil beneath the site.

6.6.6.3 Aquifer Classification and Groundwater Vulnerability

The bedrock aquifer within the Lucan Formation beneath the site is classified by the GSI (GSI, 2023) as a Locally Important Aquifer (LI) which is moderately productive only in local zones. There are no reported gravel aquifers beneath or in the vicinity of the site (GSI, 2023).

The vulnerability categories, and methods for determination, are presented in the Groundwater Protection Schemes publication (DEHLG/EPA/GSI, 1999) and summarised in Table 6.5. The publications state that 'as all groundwater is hydrologically connected to the land surface, it is the effectiveness of this connection that determines the relative vulnerability to contamination. Groundwater that readily and quickly receives water (and contaminants) from the land surface is considered to be more vulnerable than groundwater that receives water (and contaminants) more slowly and in lower quantities. The travel time, attenuation capacity and quantity of contaminants are a function of the following natural geological and hydrogeological attributes of any area.

Table 6.5 Vulnerability Mapping Criteria (Source: DEHLG/EPA/GSO, 1999)

Subsoil Thickness	Hydrogeological Requirements				
	Diffuse Recharge			Point Recharge	Unsaturated Zone
	Subsoil Permeability & Type			(Swallow holes, losing streams)	(sand & gravel aquifers only)
	High permeability (sand & gravel)	Moderate permeability (sandy subsoil)	Low permeability (clayey subsoil, clay, peat)		
0-3m	Extreme	Extreme	Extreme	Extreme (30m radius)	Extreme
3-5m	High	High	High	N/A	High
5-10m	High	High	Moderate	N/A	High
>10m	High	Moderate	Low	N/A	High

Notes: (i) N/A = not applicable (ii) Permeability classifications relate to the material characteristics as described by the subsoil description and classification method.

The GSI (GSI, 2023) has assigned a groundwater vulnerability rating of 'High' (H) for the groundwater beneath the site. The anticipated depth to bedrock based on the low permeability subsoil encountered and the 'high' groundwater vulnerability rating is between 3mbGL and 5mbGL. It is noted that bedrock was not encountered during site investigations at the site to the maximum depth of drilling at 5.7mbGL. Therefore, a groundwater vulnerability rating of 'Moderate' (M) may be considered applicable to the site.

The bedrock aquifer classification and groundwater vulnerability rating maps are provided in Figure 6.2 and Figure 6.3 respectively.

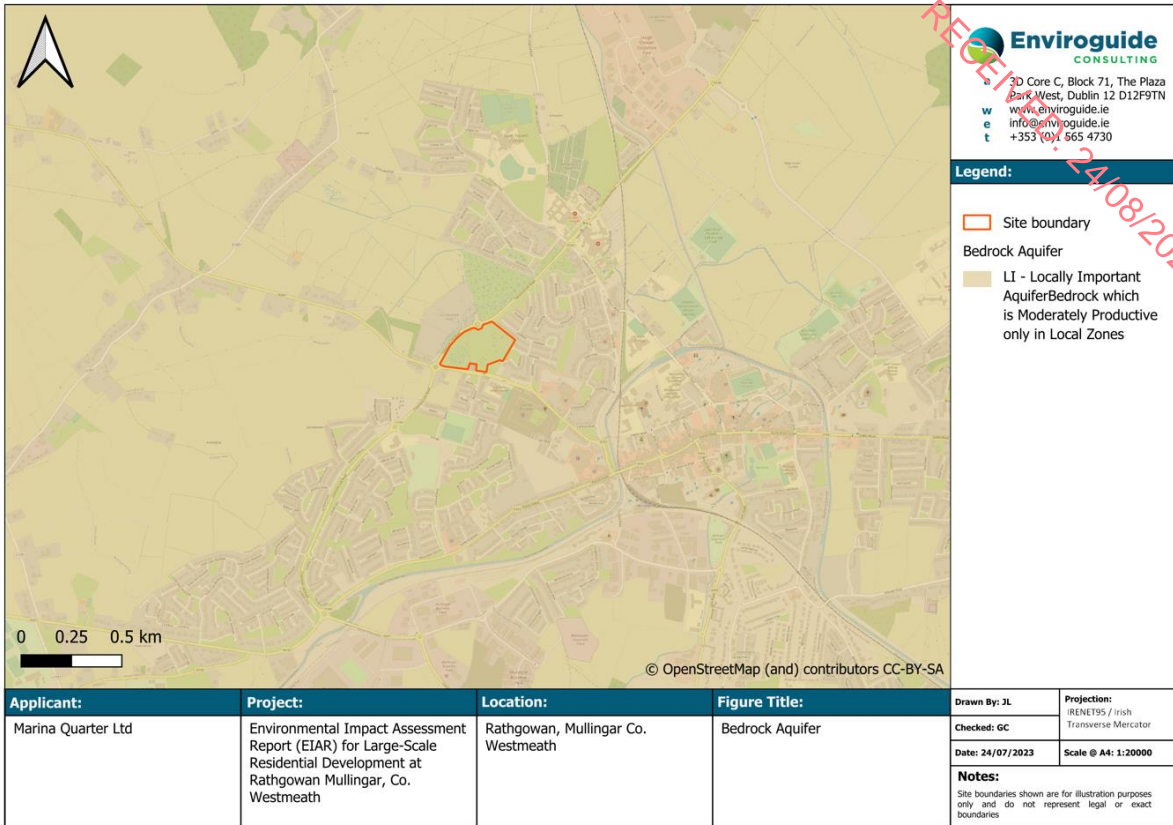


Figure 6.2 Bedrock Aquifer

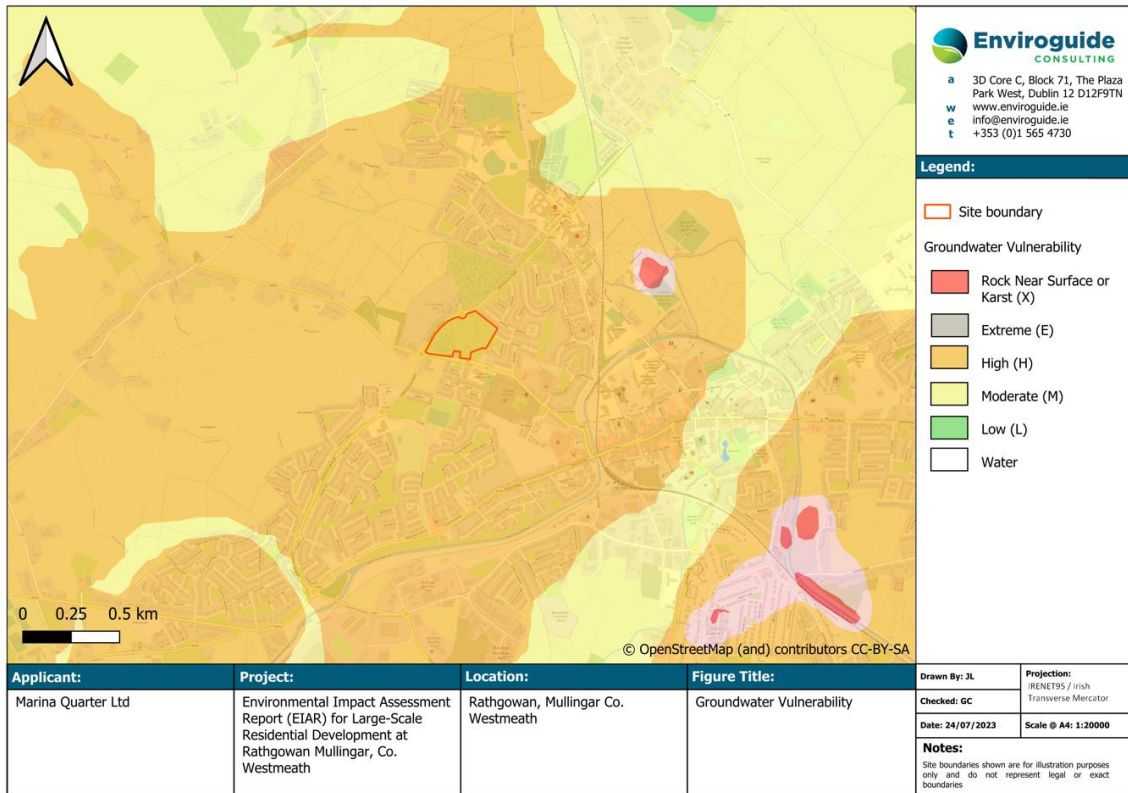


Figure 6.3 Groundwater Vulnerability

6.6.7 Site Hydrogeology

As documented in the ground investigation report (IGSL, 2020 included in Volume 3 of this EIAR), a groundwater strike at 95.46 meters above Ordnance Datum (mOD) / 4.2mbGL was recorded during drilling of borehole BH07. Groundwater was not encountered at remaining borehole and trial pit locations advanced across the site. However, groundwater strikes were also encountered at borehole locations BH02 (96.36mOD / 3.2mbGL) and BH04(95.46mOD / 3.9mbGL) advanced within the lands to the west of the R394 Regional Road in Mullingar (i.e., Phase 3 of the larger development).

Based on the site topography (refer to Section 6.6.3) and the regional groundwater flow, groundwater flow likely is to the north / northeast towards the River Brosna.

As documented in the ground investigation report (IGSL, 2020 included in Volume 3 of this EIAR), infiltration tests were carried out at four locations (SA05 to SA08 at 1.5mbGL) in accordance with BRE digest 365 'Soakaway' design tests. Infiltration rates were recorded as 'low' (IGSL, 2020). The infiltrations test rate ranged from no infiltration to a maximum rate of 1.05×10^{-3} m/min (IGSL, 2020). The result indicates that the soil and subsoil is of low permeability with limited to no infiltration capacity from the ground surface to the underlying aquifer through the clay subsoils present on site.

6.6.8 Hydrology

The site is located within the Lower Shannon Water Framework Directive (WFD) Catchment (Catchment I.D.: 25A) and the Brosna_SC_010 sub-catchment (Sub-Catchment I.D.: 25A_10). There is a river sub-basin catchment divide at the very most southern corner of the site. The majority of the site is within the Brosna_020 river sub-basin (EU Code: IE_SH_25B090006) and the southeast corner of the site is within the Brosna_030 river sub-basin (EU Code: IE_SH_25B090100) (EPA, 2023). Therefore, flow from the site will ultimately be toward the Brosna River.

The EPA records a number of surface waterbodies with a potential hydraulic connection to the site of the Proposed Development including the following:

- The Brosna River (River Waterbody Code: IE_SH_25B090006) is located approximately 1.27km southeast of the site at its closest point. The Brosna River flows southwest before discharging into Lough Ennel (EU Code: IE_SH_25_188) located approximately 3.94km southwest of the site at its closest point.
- The Brosna North River (River Waterbody Code: IE_SH_25B280390) is located approximately 2.06km northeast of the site at its closest point. The Brosna North River flows southeast before converging with the Brosna River approximately 2.13km northeast of the site.
- The Farranistick Stream (River Waterbody Code: IE_SH_25B280390) is located approximately 1.18km northeast of the site at its closest point and flows north before converging with the Brosna North River approximately 2.06km north east of the site.
- The Irishtown 26 Stream (River Waterbody Code: IE_SH_25B280390) is located approximately 1.27km northeast of the site at its closest point and flows north before converging with the Brosna North River approximately 2.10km north east of the site.
- The Sarsanstown Stream (River Waterbody Code: IE_SH_25B090100) is located approximately 1.14km south of the site. The Sarsanstown Stream flows south before converging with the Brosna River approximately 2.93km south of the site.

- The Royal Canal Main Line (Lower Shannon) (EU Code: IE_25A_AWB_RCMLW) is located approximately 0.57km southeast of the site at its closest point.
- There are also a number of land drains in the area which were constructed as part of the Brosna Arterial Drainage Scheme under the 1945 Arterial Drainage Act. These land drains ultimately discharge to the Brosna River.

The surface water courses and relevant other water bodies to the site are presented in Figure 6.4.

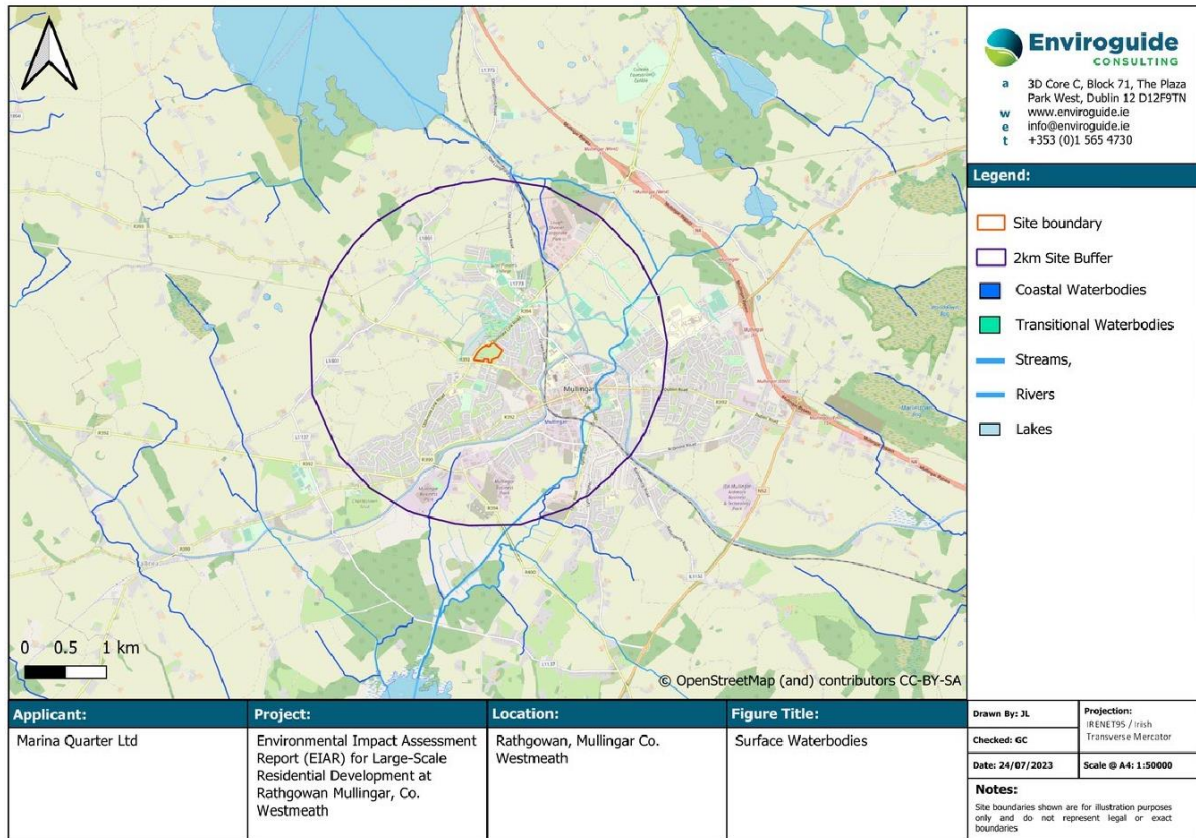


Figure 6.4 Surface Waterbodies within 2km of the site

6.6.8.1 Site Drainage

There is an existing 225mm UE foul sewer located within the site along the southwest boundary of the site. The foul water sewer is connected to the Mullingar WWTP (EPA Licence No. D0008-01) located approximately 1.28km south of the site. Treated effluent from the Mullingar WWTP ultimately discharges to Brosna River.

There are no other surface water drains, drainage ditches or watermains within the site boundary.

6.6.9 Flooding

The detailed flood risk assessment report (FRA) was produced (Tobin Consulting Engineers as included in Volume 3 of the EiAR Flood Risk Assessment - Phase 1 & 2 Residential Development at Rathgowan, Mullingar, County Westmeath; also included in Volume 3 of this EiAR) for the site and Proposed

Development which assessed the potential flood risk associated with fluvial, groundwater, coastal and pluvial flooding.

The FRA, which takes into account the impacts of climate change by allowing a 20% increase in rainfall intensities and flow and 0.5m sea level rise, concludes that the site is located in Flood Zone C where the risk of pluvial flooding to the Proposed Development is minimal, the risk of fluvial flooding is imperceptible and there is no risk of groundwater and coastal flooding.

6.6.10 Water Quality

6.6.10.1 Published Regional Surface Water Quality

The EPA surface water quality monitoring database was consulted and relevant data pertaining to the site was reviewed. There is available EPA water quality monitoring data published for the 'BROSNA - Mullingar- Canal Crossing' (Station Code: RS25B090010), the 'Mullingar: Indust Est Br' (Station Code: RS25B090040) and the 'Butler's Br' (Station Code: RS25B090100) located downstream of the site on the Brosna River (approximately 1.37km east, 1.46km southeast and 3.24km south of the site respectively). There is also available EPA water quality monitoring data published for 'Br SW of Culleen Beg on R394 (u/s Mgr STW)' (Station Code: RS25B280390) located upstream of the site on the Brosna North River (approximately 2.28km northeast of the site).

Table 6.6 EPA Surface Water Quality Data (Source: EPA, 2023)

River I.D.	Location	EPA WFD Parameter Quality & Trend Analysis				
		Parameter	Indicative Quality	Trend	Baseline Conc. (2018)	Q-Value (WFD Status)
Brosna North River (2.28km Upstream)	Br SW of Culleen Beg on R394 (u/s Mgr STW)	Ammonia – Total (as N)	Moderate	Upward	0.175	Poor (2-3) in 2021
		Orthophosphate (as P)- unspecified	Good	Downward	0.037	
Brosna River (1.37km East and Downstream)	BROSNA - Mullingar- Canal Crossing	Ammonia – Total (as N)	No Published Data Available			Poor (3) in 1993
		ortho-Phosphate (as P)- unspecified	No Published Data Available			
Brosna River (1.46km Southeast and Downstream)	Mullingar: Indust Est Br	Ammonia – Total (as N)	No Published Data Available			Poor (3) in 2021
		ortho-Phosphate (as P)- unspecified	No Published Data Available			
Brosna River (3.24km South and Downstream)	Butler's Br	Ammonia – Total (as N)	Good	Downward	0.039	Poor (3) in 2021
		ortho-Phosphate (as P)- unspecified	Moderate	Downward	0.046	

6.6.10.2 Published Regional Groundwater Quality

The EPA (EPA, 2023) groundwater monitoring data was reviewed and there are no groundwater quality monitoring stations within a 2km radius of the site or that are hydraulically connected to the site (EPA, 2023).

6.6.10.3 Receiving Water Quality – Mullingar

The most recent available Annual Environmental Report (AER) for Mullingar WWTP is 2022 (Irish Water, 2022). The AER identified the final effluent was compliant with the Emission Limit Values (ELV) specified in the discharge license (D0008-01). Importantly the 2022 AER notes:

‘Based on ambient monitoring results a deterioration in Ortho-P concentrations downstream of the effluent discharge is noted.

A deterioration in water quality has been identified, however it is not known if it is or is not caused by the WWTP.

As per the 3rd Cycle Lower Shannon (Brosna) Catchment Report (HA 25A), the significant pressures on the At Risk Brosna_030 waterbody are Forestry and Urban Runoff. The Mullingar WWTP is not listed as a significant pressure in the Cycle 3 report.

The discharge from the wastewater treatment plant does not have an observable negative impact on the Water Framework Directive status.’

The Mullingar WWTP AER confirms the capacity of the plant will not be exceeded in the next three years.

6.6.11 Water Use and Drinking Water Source Protection

A review of the GSI wells and springs database (GSI, 2023) has identified one (1No.) groundwater well within a 2km radius of the site.

- Borehole (GSI Name: 2325SWW007) – Agri & Domestic Use with “Moderate” yield (65.5m³/day) located approximately 1.93km northwest of the site.

The site is located within an area serviced by mains water supply and there were no groundwater sources identified at the site during the site walkover.

The location of the groundwater sources recorded by the GSI (GSI, 2022) in the vicinity of the site is presented in Figure 6.5.

There are no mapped Groundwater Source Protection Areas (SPAs) located within a 2km radius of the site. The groundwater SPA is the Toberdaly Public Water Supply (PWS) ‘outer protection area’, located 21.6km southeast of the site.

There are no surface water drinking water sources, under Article 7 of the Water Framework Directive, identified by the EPA (EPA, 2022) within a 2km radius of the site. The closest surface water drinking water source to the site is identified by the EPA (EPA, 2023) as Lough Owel (EE Code: IE_SH_26_703) located approximately 2.84km northwest of the site. Lough Owel is the main source of drinking water for the town of Mullingar and surrounding areas. Lough Owel is groundwater fed and forms part of a

complex hydrological setting, where water levels on the lake cannot fall below 98.90 m O.D (as per the Lough Owel abstraction licence requirements). The lake also is linked to a feeder canal to the Royal Canal pNHA (Irish Water, 2021).

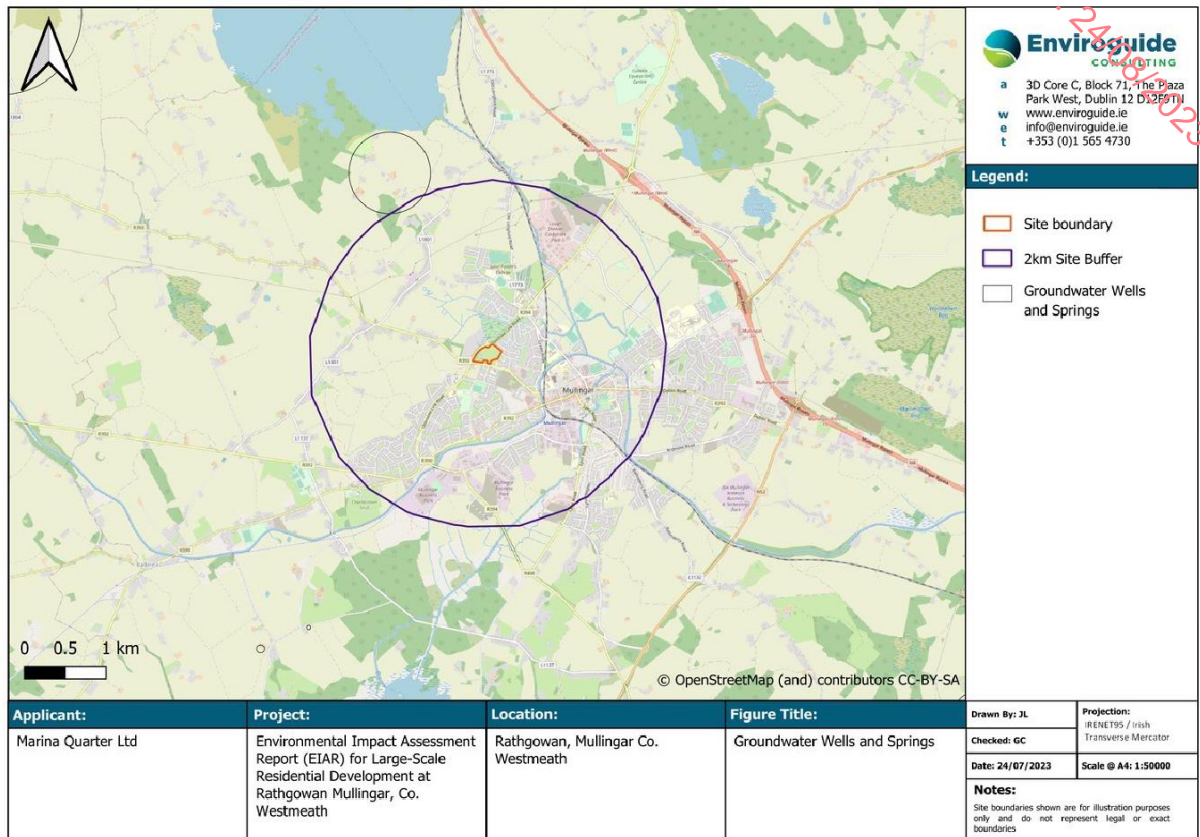


Figure 6.5. Groundwater Wells and Springs

6.6.12 Water Framework Directive Status

The WFD status for river, lake, groundwater, transitional and/or coastal water bodies that have a potential hydraulic connection to the site as recorded by the EPA (EPA, 2023) in accordance with European Communities (Water Policy) Regulations 2003 (SI no. 722/2003) are provided in Table 6.7 and presented in Figure 6.6.

It is noted that the Farranistick Stream and the Irishtown 26 Stream are part of the Brosna_010 WFD waterbody.

Table 6.7 WFD Risk and Waterbody Status (Source: EPA, 2023)

Waterbody Name	Water body; EU code	Location from Site	Distance from Site (km)	WFD water body status (for the period of 2016-2021)	WFD 3rd cycle Risk Status	Hydraulic Connection to the Site
Surface Water Bodies						
Brosna_010	IE_SH_25B28 0390	Northwest	1.18	Poor	At Risk	No, upstream of the site
Brosna_020	IE_SH_25B09 0006	Southeast	1.27	Poor	At Risk	Yes, downstream of the site
Brosna_030	IE_SH_25B09 0100	Southeast	1.53	Poor	At risk	Yes, downstream of the site
Brosna_040	IE_SH_25B09 0200	South	3.25	Moderate	At risk	Yes, downstream of the site
Lake Water Bodies						
Ennell	IE_EA_09L012 360	South	3.94	Good	Review	Yes, downstream of the site
Groundwater Bodies						
Inny	IE_SH_G_110	Underlying	n/a	Good	Not at Risk	Yes, underlying the majority of the site
Clara	IE_SH_G_240	Underlying	n/a	Good	Not at Risk	Yes, underlying the southwest corner of the site

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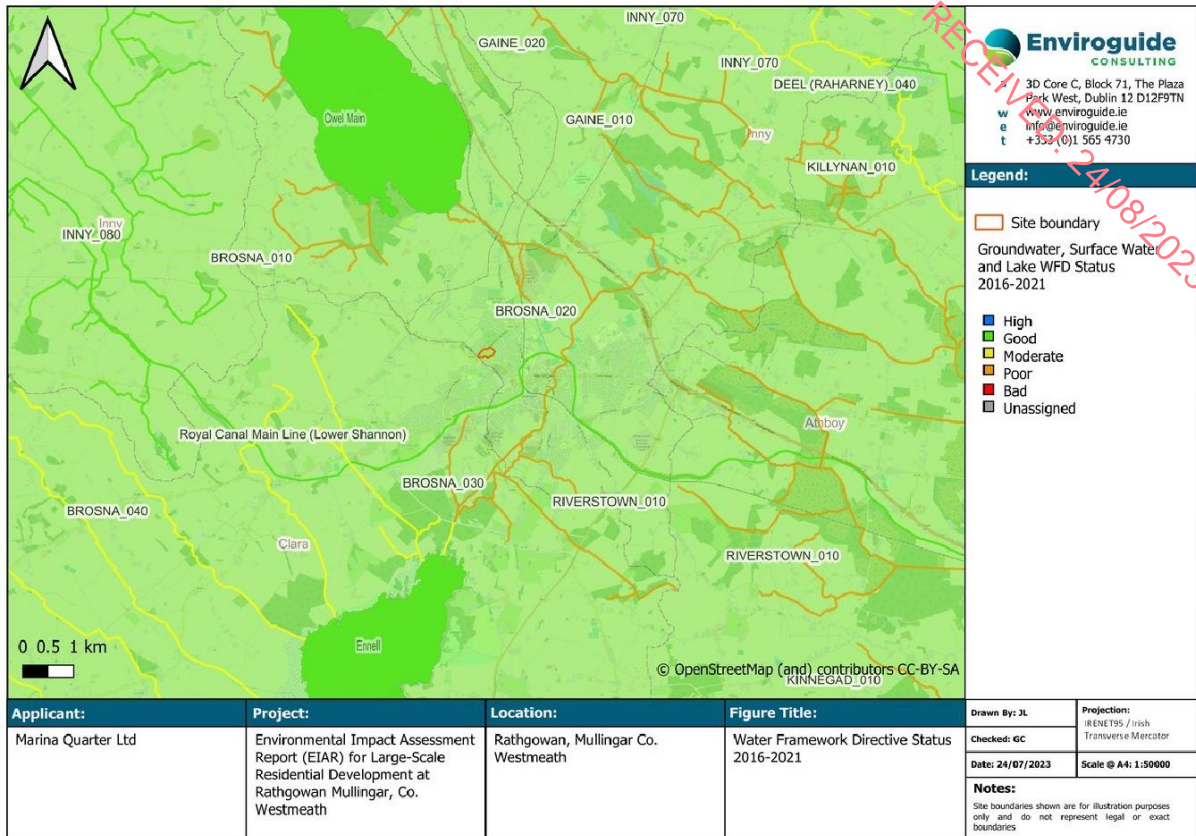


Figure 6.6. WFD Waterbody Status

6.6.13 Designated and Protected Sites

The Habitats Directive (92/43/EEC) seeks to conserve natural habitats and wild fauna and flora by the designation of Special Areas of Conservation (SACs) and the Birds Directive (2009/147/EC) seeks to protect birds of special importance by the designation of Special Protection Areas (SPAs). SACs and SPAs are collectively known as Natura 2000 or European sites (referred to hereafter as Natura 2000 site).

There are ten (5No.) sites located within a 15km radius of the site that are identified as SACs and five (5No.) sites that are identified as SPAs. There are also six (6No.) Natural Heritage Areas (NHA) and eight (8No.) proposed NHAs (pNHA).

The SACs, SPAs, , NHAs, and pNHAs with a potential hydraulic connection with the Proposed Development are highlighted in Table 6.8 and presented in Figure 6.7.

Chapter 8 (Biodiversity) of this EIAR provides further details regarding the designated and protected sites. For the purposes of this assessment, the closet hydraulically connected natura 2000 sites are considered to be Lough Ennell SAC (Site Code: 000685) and Lough Ennell SPA (Site Code: 004044).

Table 6.8. Designated and Protected Sites (Source: NPWS, 2023)

Site Name (Site Code)	Distance to the Site	Hydraulic Connection to the Site
Special Area of Conservation		
Lough Owel SAC (000688)	2.84km northwest	No identified hydraulic connection. It is noted that Lough Owel is the main source of drinking water for the town of Mullingar and surrounding areas.
Garriskil Bog SAC (000679)	14.00km northwest	No identified hydraulic connection.
Wooddown Bog SAC	5.20km east	No identified hydraulic connection.
River Boyne And River Blackwater SAC	13.00km east	No identified hydraulic connection.
Lough Ennell SAC (000685)	3.94km south	Yes, will receive surface water flow from the site via the Brosna River.
Split Hills and Long Hill Esker SAC (001831)	17.07km southwest	Yes, will receive surface water flow from the site via the Brosna River ad Lough Ennel. However, given the distance from the site significant dilution will occur.
Special Protection Areas (SPA)		
Lough Owel SPA (004047)	2.84km northwest	No identified hydraulic connection. It is noted that Lough Owel is the main source of drinking water for the town of Mullingar and surrounding areas.
Lough Iron SPA (004046)	8.96km northwest	No identified hydraulic connection.
Garriskil Bog SPA (004102)	14.00km northwest	No identified hydraulic connection.
Lough Derravaragh SPA (004043)	7.80km northwest	No identified hydraulic connection.
Lough Ennell SPA (004044)	3.94km south	Yes, will receive surface water flow from the site via the Brosna River.
Natural Heritage Areas (NHA)		
Lough Garr NHA (001812)	14.10km northwest	No identified hydraulic connection.
Garriskil Bog NHA (000679)	14.00km northwest	No identified hydraulic connection.
Lough Derravaragh NHA (000684)	7.80km northwest	No identified hydraulic connection.
Nure Bog NHA (001725)	10.20km southwest	No identified hydraulic connection.
Wooddown Bog NHA (000694)	4.09km east	No identified hydraulic connection.
Cloncrow Bog (New Forest) NHA (000677)	14.7km south	No identified hydraulic connection.
Proposed Natural Heritage Areas (pNHA)		
Royal Canal pNHA (002103)	0.55km east	Yes, located within Inny and Clara GWB. While there are no surface water pathways, there is a potential for groundwater discharge.

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Site Name (Site Code)	Distance to the Site	Hydraulic Connection to the Site
Walshestown Fen pNHA (001731)	3.06km west	No identified hydraulic connection.
Lough Sheever Fen/Slevin's Lough Complex (000690)	3.06km northeast	No identified hydraulic connection.
Lough Owel pNHA (000688)	2.84km northwest	No identified hydraulic connection. It is noted that Lough Owel is the main source of drinking water for the town of Mullingar and surrounding areas.
Lough Iron pNHA (000687)	8.96km northwest	No identified hydraulic connection.
Scragh Bog pNHA (000692)	4.87km northwest	No identified hydraulic connection.
Ballynafid Lake And Fen pNHA (000673)	6.52km northwest	No identified hydraulic connection.
Lough Ennell pNHA (000685)	3.94km south	Yes, will receive surface water flow from the site via the Brosna River.

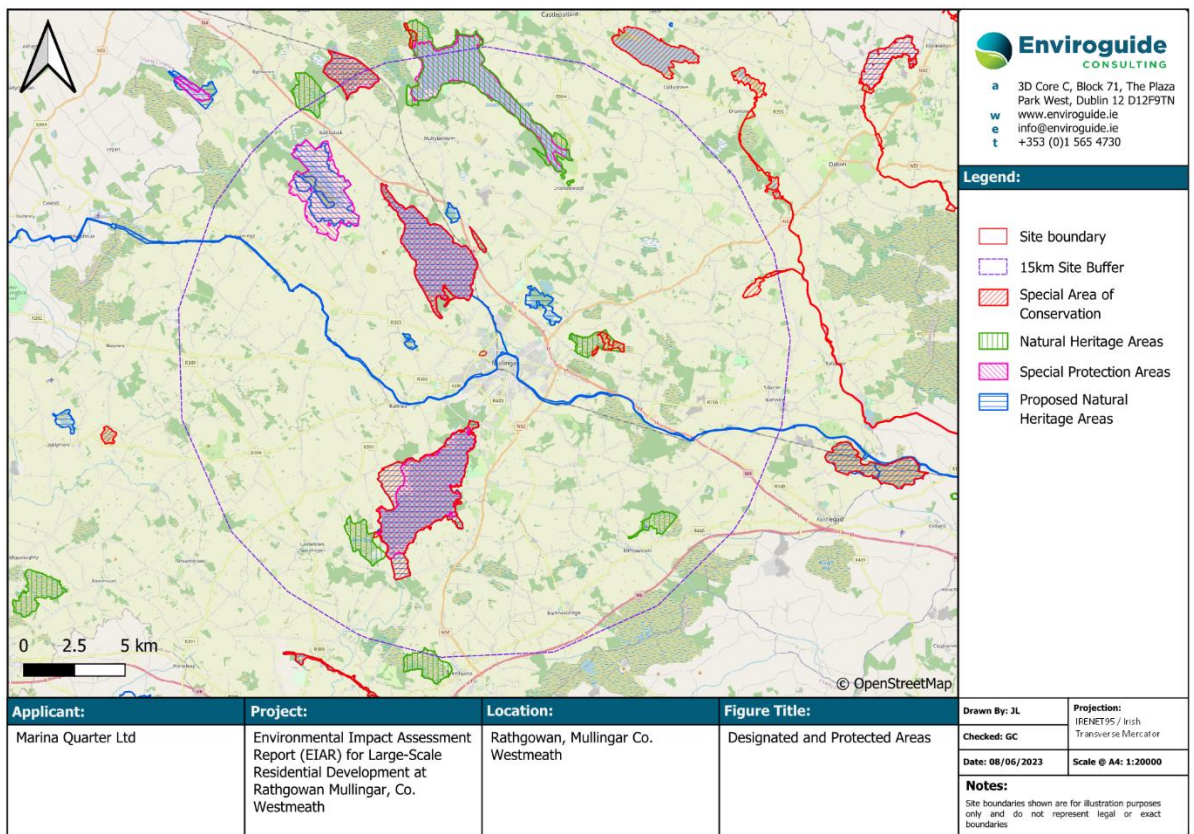


Figure 6.7. Designated and Protected Sites

6.6.14 Summary of Receiving Environment

The site of the Proposed Development comprises undeveloped lands sloping gently to the northwest.

The site is located within the Brosna_SC_010 sub-catchment. The closest surface water feature to the site is the Brosna River located approximately 1.27km southeast of the site at its closest point. The Brosna River flows southwest before discharging into Lough Ennel approximately 3.94km southwest of the site at its closest point.

The soils beneath the site are mapped as having 'low' permeability. The subsoils are mapped as 'till derived from limestones'. The ground investigation (IGSL, 2020 included in Volume 3 of this EIR) encountered silt / clay to the maximum extent of investigation (up to 5.7mbGL). Bedrock was not encountered (i.e., the depth to bedrock is greater than 5.7 mbGL) is mapped by the GSI (GSI, 2023) as the Lucan Formation.

The Lucan formation is classified by the GSI (GSI, 2023) as a Locally Important Aquifer (LI) which is moderately productive only in local zones. The aquifer beneath the majority of the site is reported to be within the Inny GWB, with a minor portion of the site (in the southwest corner) located within the Clara GWB.

The GSI (GSI, 2023) has assigned a groundwater vulnerability rating of 'High' (H) for the groundwater beneath the site. However, given that the depth to bedrock across the site is greater than 5.7mbGL, it is considered that a groundwater vulnerability rating of 'Moderate' (M) may be considered applicable to the site where the depth to bedrock is expected between 5mbGL and 10mbGL.

The recharge coefficient for rainfall to site is 60%. The majority of rainfall to the site will discharge to the drains on site as overland flow, the drainage channels are connected to the Brosna River.

The GSI (GSI, 2023) have calculated an average annual capped recharge of 336mm/year for the aquifer beneath the site due to the presence of low permeability subsoil beneath the site. The majority of rainwater across the site will percolate through the overlying tills and into the aquifer before discharging to streams and rivers crossing the GWBs. Based on the topography, regional groundwater flow in the vicinity of the site of the Proposed Development is likely to flow in a north to northeast direction towards the Brosna River.

There is only one (1No.) groundwater source (agricultural and domestic use) identified within a 2km radius of the site (GSI, 2023).

The WFD Status has been assigned as 'good' for the underlying Inny GWB and Clara GWB. The WFD status has been assigned as 'poor' to moderate for the Brosna River downstream of the site (i.e., the Brosna_010 through Brosna_040) and 'good' for Lough Ennel to which the Brosna River discharges.

The closest hydraulically connected Natura 2000 sites are considered to be Lough Ennell SAC (Site Code: 000685) and Lough Ennell SPA (Site Code: 004044).

6.6.15 Importance of Receiving Environment

In accordance with Table 6.1 and taking account of the receiving hydrological and hydrogeological environment, the importance of the site is considered to be of "medium" importance given that the bedrock aquifer of the Lucan Formation is classified as a Locally Important Aquifer (LI) and considering there is only one recorded water well within a 2km radius of the site (i.e., potable water is supplying less than 50 homes).

6.7 The 'Do nothing' Scenario

The procedure for determination of potential impacts on the receiving hydrology and hydrogeology is to identify potential receptors within the site boundary and surrounding environment and use the information gathered during the desk study and site walkover to assess the degree to which these receptors will be impacted upon in the absence of mitigation.

If the Proposed Development did not proceed the site would remain as undeveloped lands. There would be no change to the drainage at the site or to the hydrological and hydrogeological regime at the site.

6.8 Potential Significant Effects

The procedure for determination of potential impacts on the receiving hydrology and hydrogeology is to identify potential receptors within the site boundary and surrounding environment and use the information gathered during the desk study and site walkover to assess the degree to which these receptors will be impacted upon in the absence of mitigation.

The assessment will identify the likely impacts during the Construction Phase and Operational Phase of the Proposed Development. This will involve assessing the significance of any potential effects by determining the sensitivity of the receptors and the magnitude of the potential effect.

6.8.1 Construction Phase

Hydrogeological Flow Regime

While dewatering to lower groundwater levels in the aquifer is not anticipated, there may be a requirement for sump dewatering of localised shallow groundwater to enable working in dry excavations, any drawdown which will occur is considered to be localised in the immediate area surrounding excavations and temporary.

During the Construction Phase, soil and subsoils will be exposed and excavated with temporary increased potential for infiltration of rainfall to the underlying aquifer. This will be reduced over the course of the construction of the Proposed Development with an overall increase in impermeable areas and reduced infiltration potential. Infiltration tests carried out across the site indicate 'low' infiltration potential. Overall, it is considered that the impact of the Proposed Development on the hydrogeological regime within the aquifer will be 'neutral' 'imperceptible' and 'permanent'.

Water Quality

Sources of contamination that could impact on water quality from the construction of the Proposed Development include:

- Storage and use of fuels, oils and chemicals used during the construction which in the event of an accidental release could infiltrate the underlying groundwater or migrate via surface water runoff to offsite water bodies;

- Use of concrete and cementitious materials or other potential hazardous material during the construction in particular for below ground structures and foundations where shallow groundwater may be encountered;
- Accidental release of wash-water or foul water from facilities at the site (e.g., wheel wash and temporary welfare facilities); and
- Release of foul water from existing foul water drainage during connection to live sewers.

The potential pathway and pollutant linkages for the construction phase are identified as:

- Infiltration of contaminated to the substrate and bedrock aquifer via potential conduits introduced through groundworks;
- Infiltration through subsoils during excavation where the groundwater vulnerability is increased (i.e., the thickness of low permeability materials is reduced this there is a more direct pathway for surface contaminates to underlying bedrock aquifer)
- Lateral migration within the bedrock aquifer; and
- Discharge of water (groundwater/ surface water runoff) to sewer, watercourses, or groundwater in accordance with all statutory requirements and obligations. Unauthorised discharge of water during the construction phase of the Proposed Development will not be permitted.

The potential receptors from the subject site include:

- Underlying Lucan Formation bedrock aquifer which is part of the Inny and Clara GWBs
- The land drains constructed as part of the Brosna Arterial Drainage Scheme;
- The Brosna River, Lough Ennel and downstream receiving waterbodies;
- The Royal Canal Main Line; and
- Groundwater users.

There is only one (1No.) groundwater user identified within a 2km radius of the site, which is located c. 1.93km to the northwest. The groundwater flow direction beneath the site is considered to be to the north/northeast. Both the Inny GWB and the Clara GWB beneath the site are considered to have short groundwater flow paths (in the order of 30 to 300m), with groundwater discharging to nearby streams, rivers (Inny GWB and Clara GWB) and springs (Clare GWB only). Therefore, there is no perceived pathway from groundwater beneath the site to the identified groundwater user and thus this receptor is not considered further.

The Royal Canal Main Line is not hydraulically connected to the site and thus this receptor is not considered further.

There is a potential risk to the underlying bedrock aquifer due to any accidental release deleterious materials (e.g., fuels, cementitious material or other hazardous materials), through the failure of secondary containment or a materials handling accident at the site, to exposed granular subsoils which may create a direct pathway to the bedrock aquifer. The groundwater vulnerability will temporarily be increased during the Construction Phase. In a worst-case scenario, and in the absence of mitigation, it is considered that this could result in a 'negative' 'moderate to significant' and 'long-term' impact on the receiving hydrogeological and hydrological environment depending on the nature of the incident.

There is a risk of contamination entrained in surface water run-off entering the land drains to the north of the site, discharging to the Brosna River, and tracking downstream. In the absence of mitigation measures, there is a potential 'negative' 'significant' and 'long term' impact on the receiving waterbodies including the Clare and Inny GWB, the Land Drains and the Brosna River. Based on the distance downstream and dilution which will occur in the land drains and Brosna River, there is no perceived risk to downstream waterbodies including the Lough Ennel.

The appointed contractor ensures that any run-off from the site or any areas of exposed soil will be managed as required with temporary pumping. Dewatering of excavation is not anticipated however where water must be pumped from excavations water will be discharged by the appointed contractor following appropriate treatment (e.g., settlement or hydrocarbon interceptor) to sewer, watercourses or groundwater in accordance with the necessary discharge licences issued by UE under Section 16 of the Local Government (Water Pollution) Acts and Regulations for any water discharges to sewer or from WCC under Section 4 of the Local Government (Water Pollution) Act 1977, as amended in 1990 for discharges to surface water / groundwater. There will be no unauthorised discharge of water (groundwater / surface water runoff) to sewer, watercourses or groundwater during the Construction Phase of the Proposed Development. Therefore, the potential impacts will have been adequately assessed and mitigated as part of the statutory consent and there will be 'neutral', 'negligible' and 'temporary' impact on the receiving water environment.

The appointed Contractor will ensure that any run-off from the site will be managed for the duration of the Construction Phase to ensure that surface water runoff is contained, attenuated and treated onsite prior to discharge to surface water / groundwater.

6.8.2 Operational Phase

Hydrogeological Flow Regime

The site is currently undeveloped greenfield lands. The construction of the Proposed Development will convert a percentage of the surface to impermeable surfaces due to the construction of buildings, roads and other infrastructure.

Infiltration tests carried out across the site indicate 'low' infiltration potential. The SuDS measures adopted across the site will allow discharge of surface water run-off from the site to ground. Thus, the overall change in recharge to the underlying aquifer will be negligible. Overall, it is considered that the impact of the Proposed Development on the hydrogeological regime within the aquifer will be 'neutral' 'imperceptible' and 'permanent'.

Drainage and Flood Risk

The Civil Works Design Report (Tobin Consulting Engineers, 2023c as included in Volume 3 of the EIAR) noted that the surface water drainage at the Proposed Development has been designed in accordance with principles of Sustainable urban Drainage Systems (SuDS) as embodied in the recommendations of the Greater Dublin Strategic Drainage Study (GSDSDS) to meet the following design criteria.

- Criterion 1 – River Water Quality Protection.
- Criterion 2 – River Regime Protection.
- Criterion 3 – Level of Service (Flooding) / Flood Risk Assessment; and

- Criterion 4 – River Flood Protection

The FRA (Toban Consulting Engineers, 2023d as included in Volume 3 of this EIAR) identifies that while the site is located within Flood Zone C where the risk of flooding is low and the Proposed Development will not result in displacement of any potential flood waters, will not obstruct important flow paths and will not adversely impact on the hydrological regime of the area or increase flood risk elsewhere.

Therefore, it is considered that the potential flooding impacts associated with the Proposed Development will be ‘neutral’, ‘imperceptible’ and ‘long-term’.

Water Quality

There will be no significant sources of contamination at site during the Operational Phase of the Proposed Development.

There will be no bulk storage of petroleum hydrocarbon- based fuels or other hazardous materials during the Operational Phase.

There will be no discharges to ground other than rainfall to unpaved landscaped areas and via limited recharge from SuDS measures incorporated into the surface water drainage network for the Proposed Development. As documented in the Civil Works Design Report (Tobin Consulting Engineers, 2023c as included in Volume 3 of the EIAR), prior to discharging to the surface water network for the approved Phase 3 residential development (Planning Reference No. 22/515) located along the R394-C Link Road and ultimately the Brosna River via the Brosna Arterial Drainage Scheme land drains identified to the north of the site, all surface water runoff will pass through a treatment train including natural based SuDs (i.e. water butts, rain gardens, infiltration trenches, permeable paving and soakaways etc. as detailed in Section 6.3.1.2) and proprietary system SuDS (i.e., by-pass interceptor). Therefore, it is considered that there will be a ‘neutral’, ‘imperceptible’, ‘long-term’ impact on to the quality of receiving hydrological receptors including the Brosna River.

However, In the worst-case scenario of accidental spillage from a car engine and failure of SuDS there is a potential risk to water quality in the receiving environment. In the absence of mitigation measures, there is a potential ‘negative’, ‘moderate’ and ‘medium term’ impact on the quality of the receiving water environment depending on the nature of the incident.

Foul water from the site will ultimately be treated at the Mullingar WWTP. The WWTP is operated under existing statutory consents and the most recent available data in the 2022 AER verifies that discharge from the WWTP was compliant. Foul water from the Proposed Development will only be discharged to public sewer under agreement from UE and other applicable statutory consents verifying capacity at the WWTP for the Proposed Development. Therefore, on the basis that the foul effluent from the Proposed Development will be treated to the required standard in accordance with relevant statutory consents, it is considered that there will be a ‘neutral’, ‘imperceptible’, ‘long-term’ impact on receiving water quality associated with the discharge of foul water from the Proposed Development. Furthermore, as noted in the 2022 AER and detailed in section 6.6.10.3, the discharge of treated effluent from the Mullingar WWTP will have no observable negative impact on the receiving WFD status.

6.8.3 Cumulative Effects

Cumulative Impacts can be defined as “impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project”. Effects which are caused by the interaction of effects, or by associated or off-site projects, are classed as indirect effects. Cumulative effects are often indirect, arising from the accumulation of different effects that are individually minor. Such effects are not caused or controlled by the project developer.

A search of planning applications located within a 2km radius of the Proposed Development was conducted using online planning resources including the National Planning Applications Database (MyPlan.ie) and Westmeath County Council’s online planning database. Any planning application listed as granted, application registered or application pending from within the last five years were assessed for their potential to act in-combination with the Proposed Development and cause likely significant effects on hydrology and hydrogeology. The larger-scale developments identified within the vicinity of the site of the Proposed Development and considered for potential cumulative effects are listed in Table 6.9.

Table 6.9: Planning Applications in the Vicinity of the Site

Planning reference	Location relative to the Proposed Development	Development description
22515	North of the C-Link Road	Permission for the following Large-Scale Residential Development comprising of the construction of 213 no. residential units, 1 no. creche, 1 no. pumping station and all associated ancillary development works including 2 no. ESB sub-stations, footpaths, cycle lane, car and bicycle parking, drainage, bin storage, landscaping/amenity areas and the undergrounding of existing 38KV overhead electricity lines at Rathgowan, Mullingar, Co. Westmeath. Access will be via the existing roundabout on the R394 (C-Link). This development will form Phase 3 of a larger (three-phase) residential development at this location.
Part 8 Application	0.3km east of the Proposed Development.	Part 8 application for the construction of 22 no. dwelling units adjacent to Ashfield/Abbeylands/Green Road and St. Bridget’s Terrace, Mullingar, Co. Westmeath.
Part 8 Application	2km east of the Proposed Development	The construction of 17 no. dwelling units on a site at the junction of Delvin & Robinstown Road, Springfield TD, Mullingar, Co. Westmeath.
Part 8 Application	0.8km south of the Proposed Development.	The construction of 15 no. single storey houses on four separate sites at Ennell Court and Trinity Cottages, Mullingar, Co. Westmeath.
Part 8 Application	1.3km east of the Proposed Development.	Proposed Housing Development of 32 no. dwelling units consisting of 19 no. 2 bed units and 13 no. 1 bed units at Friar’s Mill Road / Canal Avenue, Mullingar, Co. Westmeath.
21568	0.6 km northwest of the Proposed Development.	An extension of duration was sought for 16/6001: planning reference no: 11/5121 for the construction of a new housing development, consisting of 28 no. houses to be constructed in 3 phases made up of a combination of 26 no. detached 2 storey houses (as per condition no.5 of outline permission planning ref. no. 11/4121) with associated services.

Planning reference	Location relative to the Proposed Development	Development description
196159	This site lies 1.8km south of the Proposed Development.	Planning permission was sought for the construction of 98 no. residential units consisting of 14 no. 2 bed terraced houses, 10 no. 3 bed end-terraced houses, 12 no. 3 bed semi-detached houses, 8 no. 4 bed semi-detached houses and 54 no. duplex units (comprising 27 no. 1 bed units and 27 no. 3 bed units). Provision of a creche and community facility, 142 no. car parking spaces, 8 no. motorcycling spaces and 102 no. bicycle spaces. Access from the R390. All site development and servicing works, bin stores, ESB substation, pumping station, open space, landscaping and boundary treatments.
196121	Directly east of the Proposed Development.	Planning permission was sought for the construction of 18 Apartment units in 2 Blocks (Block A & B). Block A consists of 1 no. 1 bedroom units, 3 no. 2 bedroom units and 2 no. 3 bedroom duplex apartment units in 2 and 3 storey high building with private balconies and patios. Block B consists of 6 no. 1 bedroom units and 6 no. 2 bedroom duplex apartment units in 3 storey high building with private balconies and patios. The Proposed Development will also consist of a new site entrance, shared access road, footpaths, car parking spaces, boundary wall and fence, covered cycle rack, recycling bin storage area, public and private open spaces, partial removal and trimming of existing hedgerows to accommodate proposed site entrance, landscaping and all associated site works and services.

Water Resources:

The Proposed Development will be connected to the existing UE 400mm Asbestos watermain located within the R394 C-Link Road and to the existing UE 100mm uPVC watermain located within Ashe Road subject to agreement with UE. The UE COF dated the 3rd August 2023 states that the water supply connection is feasible subject to upgrades, which will be completed as part of the construction of the Proposed Development. The mains water supply is operated in accordance with relevant existing statutory consents and therefore there will be no cumulative impacts associated with the Proposed Development on the supply network and water resources.

Water Quality

As outlined in the Civil Design Report (Tobin Engineering Consulting 2023 provided in volume 3 of this EIAR). The UE CoF letter dated the 3rd of August 2023 states that the foul water connection is feasible. As documented in the Civil Design Report (Tobin Consulting Engineers 2023c included in Volume 3 of this EIAR) foul water from the Proposed Development will be pumped via the pump station previously granted planning by WCC (Planning Reference No. 22/515) to a 110mm PE rising main on the R394 C-Link Road before discharging to the existing UE 525mm foul sewer. Thereby meeting the UE requirements outlined in the UE CoF letter (Ref: CDS23002571). The Mullingar WWTP is operated with relevant statutory approvals and the available 2022 AER indicates that discharges from the WWTP were compliant with the ELVs specified in the discharge license. Therefore, there will be no identified impact on the receiving environment associated with foul discharges from the Proposed Development via Mullingar WWTP individually or in-combination.

There will be no cumulative impacts on the receiving surface water environment in terms of water quality and flood risk associated with surface water runoff from the Proposed Development and considered offsite developments.

There are no other potential cumulative impacts associated with the Proposed Development.

6.9 Mitigation

The mitigation measures, as outlined below, will ensure that there will be no significant impact on the receiving groundwater and surface water environment. Hence, the Proposed Development will not have any impact on compliance with the EU Water Framework Directive, European Communities (Environmental Objectives) Surface Water Regulations, 2009 (SI 272 of 2009, as amended 2012 (SI No 327 of 2012), and the European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010), as amended 2012 (SI 149 of 2012) and 2016 (S.I. No. 366 of 2016).

6.9.1 Construction Phase Mitigation

A preliminary Construction Environmental Management Plan (CEMP) has been prepared by Tobin Consulting Engineers (Tobin Consulting Engineers, 2023a). Following appointment, the contractor will be required to implement the measures set out CEMP and maintain environmental monitoring records for the duration of the project which shall be made available to representatives from Westmeath County Council for inspection on request. The CEMP is considered as a 'Live Document' and will be updated accordingly throughout the project as required.

Mitigation works will be adopted as part of the construction works for the Proposed Development. The measure will address the main activities of potential impact which include:

- Control and Management of water and surface runoff;
- Control of Management of works nears water courses;
- Control of Management of materials from off-site sources;
- Appropriate fuel and Chemical handling, transport and storage; and
- Management of accidental release of contaminants at the subject site.

The construction works will be managed in accordance with all statutory obligations and regulations and with standard international best practice. Good construction management practices will minimise the risk of pollution from construction activities at the subject site including but not limited to:

- Construction Industry Research and Information Association (CIRIA), 2001. Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors.
- CIRIA, 2015. Environmental Good Practice on Site (C741);
- Enterprise Ireland Oil Storage Guidelines (BPGCS005);
- Environmental Protection Agency (EPA), 2013. IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities;
- CIRIA, 2007. The SuDS Manual (C697);
- UK Environment Agency, 2004. UK Pollution Prevention Guidelines (PPG);
- CIRIA, 2006. Control of Water Pollution from Linear Construction Projects: Technical Guidance (C648); and

- Inland Fisheries Ireland (2016). Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters

Control and Management of Water and Surface Runoff

There will be no direct discharge to groundwater or surface water during the construction phase of the Proposed Development.

All run-off from the subject site or any areas of exposed soil will be managed as required with temporary pumping and following appropriate treatment as required. Dewatering to lower groundwater levels is not anticipated. However, where surface water runoff must be pumped from excavations, water will be managed in accordance with best practice standards (i.e., CIRIA C750), the CEMP and regulatory consents to minimise the potential impact on the local groundwater flow regime within the soil and bedrock.

Unauthorised discharge of water (groundwater / surface water runoff) to ground, drains or watercourses will not be permitted. The appointed Contractor will ensure that the discharge of water to ground, drains or watercourses will be in accordance with the necessary discharge licences issued by UE under Section 16 of the Local Government (Water Pollution) Acts and Regulations for any water discharges to sewer or from Westmeath County Council under Section 4 of the Local Government (Water Pollution) Act 1977, as amended in 1990 for discharges to surface water.

A buffer zone of 30m will be maintained between onsite drains of open water located on the site and any stockpiles of loose materials pending re-use onsite. Silt fences will be erected at the toe of stockpiles to prevent run-off. The silt fences will be monitored daily by the main contractor and silt will be removed from required.

A regular review of weather forecast will take place, insofar as possible, ground excavation works will be scheduled during period of dry weather to minimise potential for silt laden run-off.

Handling of Fuels and Hazardous Materials

Fuelling and lubrication of equipment will be carried out in a designated areas of the site away from any existing manholes or gullies. Fuelling and lubrication of equipment will only be carried out in a designated area of the site away from any existing manholes or gullies. At present, it is proposed that fuel and lubricants will be stored adjacent to the office compound.

Bunds will have regard to Environmental Protection Agency guidelines 'Amendment to IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities' (EPA, 2013c). All tank and drum storage areas will, as a minimum, be bunded to a volume not less than the greater of the following:

- 110% of the capacity of the largest tank or drum within the bunded area; or
- 25% of the total volume of substance that could be stored within the bunded area.

This bunded area will be roofed appropriately to exclude rainwater. Mobile fuel bowsers may be used for refuelling heavy equipment. Bowsers used will be double skinned and spill kit/drip tray equipment will be used during refuelling which will take place away from any nearby drains or watercourses and from any surface water drainage gully's (Tobin Consulting Engineers, 2023a).

The main contractor will maintain an emergency response action plan and emergency procedures will be developed by the appointed contractor in advance of any works commencing. Construction staff will be familiar with the emergency response plan.

As outlined in the CEMP (Tobin Consulting Engineers, 2023a), spill kits will be made available onsite and identified with signage for use in the event of an environmental spill or leak. A spill kit will be kept in close proximity to the fuel storage area for use in the event of any incident during refuelling or maintenance works. Heavy machinery used on the site will also be equipped with its own spill kit.

Concrete Works

The cementitious grout and other concrete works during the Construction Phase, will avoid any contamination of ground through the use of appropriate design and methods implemented by the Contractor and in accordance with the CEMP (Tobin Consulting Engineers, 2023a) and relevant industry standards.

All ready-mixed concrete will be delivered to the site by truck. Concrete mixer trucks will not be permitted to wash out on-site with the exception of cleaning the chute into a container which will then be emptied into a skip for appropriate compliant removal offsite.

A suitable risk assessment for wet concreting shall be completed prior to works being carried out.

Emergency Procedures

In the event of an environmental incident, the appointed Project Environmental Manager will be notified immediately, and absorbent materials used to prevent the spread of the spill/leak. The contaminated materials will be transferred to leak-proof storage containers and any contaminated soils or gravels excavated and removed off-site. A record of the incident will be kept, and Westmeath County Council will be notified.

Remedial action will be immediately implemented to address any potential impacts in accordance with industry standards and legislative requirements.

- Any required emergency vehicle or equipment maintenance work will take place in a designated impermeable area within the site;
- Emergency response procedures will be put in place, in the unlikely event of spillages of fuels or lubricants;
- Spill kits including oil absorbent material will be provided so that any spillage of fuels, lubricants or hydraulic oils will be immediately contained;
- In the event of a leak or spill from equipment in the instance of a mechanical breakdown during operation, any contaminated soil will be removed from the site and compliantly disposed off-site. Residual soil will be tested to validate that all potentially contaminated material has been removed. This procedure will be undertaken in accordance with industry best practice procedures and standards;
- All construction works staff will be familiar with emergency procedures for in the event of accidental fuel spillages; and
- All construction works staff on-site will be fully trained on the use of equipment.

This procedure will be undertaken in accordance with industry best practice procedures and standards. These measures will ensure that there is minimal risk to the receiving hydrology and Hydrogeology environment associated with the Construction Phase of the Proposed Development.

Welfare Facilities

Welfare facilities have the potential, if not managed appropriately, to release organic and other contaminants to ground or surface water courses. Portaloos will be provided in the compound initially, with a dedicated toilet block installed later. All waste from welfare facilities will be managed in accordance with the relevant statutory obligations by tankering of waste offsite by an appropriately authorised contractor.

6.9.1.1 Monitoring

During the construction phase of the Proposed Development the following monitoring measures will be considered:

- Inspections will be undertaken during excavations and other groundworks to ensure that measures that are protective of water quality are fully implemented and effective.
- Discharges to surface water / foul sewers will be monitored where required in accordance with statutory consents (i.e., discharge licence).
- Routine monitoring and inspections during refuelling, concrete works to ensure no impacts and compliance with avoidance, remedial and mitigation measures.

6.9.2 Operational Phase Mitigation

It is considered that the design of the Proposed Development is in line with the objectives of the Water Framework Directive (2000/60/EC as amended) (WFD) to prevent or limit any potential impact on water quality of the receiving environment.

Ongoing regular operational monitoring and maintenance of drainage and the SuDS measures will be incorporated into the overall management strategy for the Proposed Development. This will ensure that there are no impacts on water quality and quantity (flow regime) during the operational phase of the Proposed Development.

With regard to the Proposed discharge of treated operational surface water from the Proposed Development the land drains eventually discharging to the Brosna River waterbody, the potential for surface water generated at the Proposed Development to cause significant effects to downstream sensitivities during the operational phase would be considered negligible due in part to the SuDS measures and petrol interceptor incorporated in the overall design.

6.9.2.1 Monitoring

Ongoing regular operational monitoring and maintenance of drainage and the SuDS measures will be undertaken throughout the lifetime of the operational phase of the Proposed Development.

6.10 Water Framework Directive

There are identified potential impacts on the water quality associated with the Proposed Development in the absence of avoidance, remedial and reductive measures that could impact on the WFD Status of the receiving water bodies, taking account of a worst-case scenario.

The Potential impact on WFD status for water bodies was assessed based on the worst-case scenario, taking account of the baseline hydrological and hydrogeological conditions at the site, the WFD Status assigned by the EPA (EPA, 2023) to the waterbodies namely the Brosna River (Brosna_010 to Brosna_040), the Ennell lake waterbodies and the Inny and Clara groundwater bodies.

In the absence of mitigation measures, there could be a 'negative', 'significant' and 'long-term' impact to the WFD status or the potential to achieve 'good' status of the Brosna River waterbody. Taking account of the distance downstream and the dilution which will occur, it is considered there will potential 'negative', 'slight' and 'short-term' impact in the WFD status of the Ennell Lake. There is no perceived impact on any further downstream waterbodies.

The mitigation measures are outlined above, including the SUDS in accordance with the GSDS and construction mitigation measures, will prevent any impact on the receiving groundwater and surface water environment. Hence, the Proposed Development will not have any impact on compliance with the EU Water Framework Directive, European Communities (Environmental Objectives) Surface Water Regulations, 2009 (SI 272 of 2009, as amended 2012 (SI No 327 of 2012), and the European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010), as amended 2012 (SI 149 of 2012) and 2016 (S.I. No. 366 of 2016).

Thus, the Proposed Development will not cause a deterioration in the status of water bodies hydraulically connected with the Proposed Development, taking account of design avoidance and mitigation measures that will be implemented. Hydrocarbon interceptors on site will lead to a positive impact on water quality to downstream receptors including the Brosna River. Therefore, the impacts of the Proposed Development on the WFD will be 'neutral', 'imperceptible' and 'permanent'.

6.11 Residual Impact Assessment

Residual Impacts are defined as 'effects that are predicted to remain after all assessments and mitigation measures. They are the remaining 'environmental costs' of a project and are the final or intended effects of a development after mitigation measures have been applied to avoid or reduce adverse impacts.

The predicted impacts of the construction phase and operational phase of the Proposed Development are described in Table 6.10 in terms of quality, significance, extent, likelihood, and duration. The relevant mitigation measures are detailed, and the residual impacts are determined which take account of the avoidance, remedial and mitigation measures.

Overall, there are no significant residual impacts on hydrology and hydrogeology anticipated regarding this Proposed Development.

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Table 6.10 Residual Impacts

Activity	Attribute	Predicted Impact	Quality	Significant	Duration	Type	Mitigation	Residual Impact
Construction Phase								
Construction of Proposed Development	Hydrological Flow Regime	During construction, the recharge potential will increase temporarily in localised areas of the site.	Neutral	Imperceptible	Temporary	Direct	None required. The exposure of the underlying aquifer will be temporary, and that the extent of any impact will be localised to immediate area of excavation. This will be reduced over the course of the construction of the Proposed Development with an overall increase in impermeable areas and reduced infiltration potential.	Imperceptible
Accidental Release of Deleterious Materials (e.g., Fuels or Other Hazardous Materials Being Used Onsite) and cementitious materials	Groundwater and Surface Water Quality / WFD status	Potential for uncontrolled release of deleterious materials to the underlying groundwater and surface water environment with potential impact on the receiving water quality / WFD Status of the land drains to the north of the site, Brosna River, Ennell Lake and the Inny and Clara GWBs.	Negative	Moderate to Significant	Long term	Direct/ Worst Case	The storage of fuels and other hazardous materials, refuelling and lubrication of plant during the Construction Phase will only be carried out in accordance with the requirements and procedures outlined in the CEMP. The cementitious materials will avoid contamination through the use of appropriate design and methods implemented by the appointed Contractor and in accordance with the CEMP and relevant industry standards.	Imperceptible

Activity	Attribute	Predicted Impact	Quality	Significant	Duration	Type	Mitigation	Residual Impact
Release of Suspended Solids / Sediments During Groundworks	Water quality	There is a risk of contamination entrained in surface water run-off entering the land drains to the north of the site, discharging to the Brosna River, and tracking downstream.	Negative	Slight	Short term	Direct	Appropriate measures outlined in the CEMP including silt fences and buffer zones to be used to prevent fugitive runoff.	Imperceptible
Discharge of Water to Sewer, Water courses or Ground	Water Quality	Where localised water must be pumped from excavations (i.e., following heavy rainfall), water will be discharged following appropriate treatment (e.g., settlement or hydrocarbon interceptor) to sewer, watercourses or groundwater.	Neutral	Imperceptible	Temporary	Direct	There will be no unauthorised discharge of water (groundwater / surface water runoff) to sewer, watercourses or groundwater during the construction phase of the Proposed Development. All water will be discharged in accordance with the necessary discharge licences issued by UE or WCC.	Imperceptible
Operational Phase								
Proposed Development	Hydrological Flow Regime	The Proposed Development will convert a percentage of the surface to impermeable surfaces due to the construction of buildings, roads and other infrastructure.	Neutral	Imperceptible	Temporary	Direct	Infiltration tests carried out across the site indicate 'low' infiltration potential. The proposed SuDS measures adopted across the site will allow discharge of surface water run-off from the site to ground. Thus, the overall change in recharge to the underlying aquifer will be negligible.	Imperceptible

Activity	Attribute	Predicted Impact	Quality	Significant	Duration	Type	Mitigation	Residual Impact
Surface Water Drainage & Management of SuDS	Water Quality	In the worst-case scenario of accidental spillage from a car engine and failure of SuDS there is a potential risk to water quality in the receiving environment.	Negative	Moderate	Medium-Term	Direct/ Worst Case	Surface water drainage at the Proposed Development has been designed in accordance with SuDS and therefore it is anticipated that there will be an overall positive impact on water quality of groundwater and surface water.	Imperceptible
Proposed Development Drainage	Flood risk and surface water flow regime	The FRA concludes the Proposed Development i appropriately located I Flood Zone C and the Proposed Development will not result in displacement of any potential flood waters, will not obstruct important flow paths and will not adversely impact on the hydrological regime of the area or increase flood risk elsewhere	Neutral	Imperceptible	Long Term	Direct	None Required. Ongoing maintenance of the SUDS and drainage network will be undertaken.	Imperceptible
Surface Water / Foul Drainage	Water Quality	The Proposed Development will not result in any impact on the receiving water quality.	Neutral	Imperceptible	Long Term	Direct (also cumulative)	None required.	Imperceptible
Surface Water / Foul Drainage	WFD Status	There is no identified risk to the WFD status for the Operational Phase.	Neutral	Imperceptible	Long Term	Direct	None required.	Imperceptible.

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6.12 Risk of Major Accidents or Disasters

There is no identified risk of flooding at the site.

The site is not located within an area associated with karst geology and therefore risk associated with karst features.

6.13 Significant Interactions

6.13.1 Population and Human Health

An assessment of the potential impacts of the Proposed Development on human health is included in Chapter 4 of this EIAR.

No public health issues associated with the water (hydrology and hydrogeology) conditions at the site have been identified for the construction phase or operational phase of the Proposed Development.

Appropriate industry standard and health and safety legislative requirements will be implemented during the construction phase that will be protective of site workers.

6.13.2 Biodiversity

An assessment of the potential impacts of the Proposed Development on the biodiversity of the subject site, with emphasis on habitats, flora and fauna which may be impacted as is included in Chapter 14 of this EIAR such as potential pollution of waterbodies impacting on flora and fauna in the absence of mitigation measures.

Chapter 14 addresses impacts of the Proposed Development on habitats and species, particularly those protected by national and international legislation or considered to be of particular conservation importance and proposes measures for the mitigation of these impacts.

6.13.3 Land, Soils and Geology

An assessment of the potential impact of the Proposed Development on the existing land, soils and geological environment during the construction phase and operational of the Proposed Development is set out in Chapter 5. In the absence of avoidance and mitigation measures, there is a potential for sediments from excavated soils entering the drainage network and tracking downstream during the construction phase.

6.13.4 Material Assets- Site Services

An assessment of the potential impact on the Proposed Development on the material assets including built services and infrastructure has been set out in Chapter X of this EIAR.

During the Construction Phase of the Proposed Development discharge of water will be accordance with necessary licensing and consent of Westmeath County Council.

During the Operational Phase of the Proposed Development, any discharge to the public foul sewer and water supply will be under consent from UE.

6.14 References & Sources

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