KYLETALESHA, PORTLAOISE, CO. LAOIS

Hydrological and Hydrogeological Risk Assessment Report

BM Lynch Construction & Civils Ltd.

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1 INTRODUCTION

DNV was appointed by BM Lynch Construction & Civils Ltd (hereafter referred to as 'the Applicant') to prepare a hydrological and hydrogeological risk assessment for the proposed infilling and recontouring of lands at Kyletalesha, Portlaoise, Co. Laois (referred to hereafter as the 'Proposed Development' and 'site').

1.1 Project Objective

The project objective was to establish the baseline hydrological and hydrogeological conditions at the site and to identify the potential for any effects on receptors associated with the site and the Proposed Development:

- Establish the hydrological and hydrogeological regime and Conceptual Site Model (CSM) at the Proposed Development site.
- Determine if there are any potential effects on the receiving water environmental receptors, including those at the site and adjoining downgradient of the site.
- Determine if the Proposed Development could have an effect on any designated and protected Natura 2000 sites hydraulically connected with the site.
- Determine if the Proposed Development could have an effect on the water quality status assigned by the EPA of the receiving water bodies hydraulically connected with the site for the purposes of the Water Framework Directive.

1.2 Project Scope

The scope of the hydrological and hydrogeological assessment included the following tasks:

- A desk-based review of published information and information pertaining to the site and Proposed Development provided by the Applicant.
- Two (2 No.) walkover surveys on 9th December 2025 and on 26th January 2026.
- Develop a hydrogeological CSM and identify any potential source-pathway-receptor (SPR) linkages.
- Identify and assess any potential effects associated with the Proposed Development on sensitive receptors associated with the receiving water environment.

This assessment is reliant on the design information for the Proposed Development provided by the Applicant.

1.3 Professional Competency

The report was prepared by Nuria Manzanas, a Principal Consultant of DNV with over 12 years' experience in preparing hydrogeological assessments.

The report was reviewed by Gareth Carroll BA BEng MIEnvSc CEnv, a Principal Consultant of EGC. Gareth is a Chartered Environmentalist (CEnv) with the Institute of Environmental Sciences (IES) with over 13 years' experience in preparing environmental and hydrogeological assessments for a range of project types and geological and hydrogeological site settings and is accredited to undertake water framework directive assessments.

The report was approved by Patrick Higgins BSc, MSc, MIEnvSc, CEnv. Patrick is a Chartered Environmentalist (CEnv) with IES with over 20 years' experience of preparing environmental and hydrogeological assessments for a range of project types and geological and hydrogeological site settings, and is a Technical Director with DNV, who is professionally competent and accredited to undertake hydrogeological assessments.

2 METHODOLOGY

2.1 Standards and Regulations

The methodology adopted for this assessment takes cognisance of the relevant standards and regulations pertinent to undertaking a hydrological and hydrogeological assessment 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.
- Commission Directive 2014/80/EU of 20 June 2014 amending Annex II to Directive 2006/118/EC of the European Parliament and of the Council on the protection of groundwater against pollution and deterioration.
- Meath County Council (MCC) Development Plan 2021-2027 (MCC, 2021).
- EU Water Framework 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.
- European Communities (Water Policy) Regulations 2003 (S.I. No. 722/2003).
- Environmental Protection Agency, December 2011. Guidance on the Authorisation of Discharges to Groundwater.
- Department of the Environment, Heritage and Local Government, Environmental Protection Agency and Geological Survey of Ireland, 1999. Groundwater Protection Schemes (Groundwater Protection Schemes, 1999).
- Local Government, July 1990. No. 21 of 1990. Local Government (Water Pollution) (Amendment) Act, 1990.
- S.I. No. 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010 and as amended.
- S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 and as amended.

2.2 Desk-based Study

A desk-based study was undertaken including a review of relevant information from the following publicly available sources and information provided by the Applicant:

- Ordnance Survey Ireland Online mapping (OSI, 2026).
- Geological Survey of Ireland Online mapping (GSI, 2026).
- Environmental Protection Agency Online mapping (EPA, 2026).
- National Parks & Wildlife Services, Protected Sites Webmapping (NPWS, 2026).
- Relevant drawings and design reports for the Proposed Development provided by the Applicant;

- Lenztech Surveying & Engineering Ltd. (Lenztech, 2023). Outline Construction Environmental Management Plan (OCEMP). Infilling of Soil and Recontouring of Lands at Kyletalesha, Portlaoise. Report Reference: 22024-LT-P-OCMP. Version No: 2, December 2023.

Other documents and reports reviewed as part of this assessment included the following:

- DNV, 2026b. Resource and Waste Management Plan (submitted with the planning application under separate cover).

2.3 Risk Based Effect Assessment

A risk-based and receptor-focussed approach was adopted to include an assessment of any effect on the receiving hydrological and hydrogeological (water) environment associated with the Proposed Development.

The basis for a risk assessment is the CSM or SPR model which underpins the Directive 2000/60/EC (Water Framework Directive) amended by Directives 2008/105/EC, 2013/39/EU and 2014/101/EU that has been transposed to Irish legislation as European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003) as amended, as well as EPA guidelines on the protection of groundwater and surface water resources including associated aquatic ecosystems and human health receptors (e.g., groundwater supply users), the EPA Guidance on the Authorisation of Discharges to Groundwater (EPA, 2011) and the EPA Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites (EPA, 2013) on the protection of groundwater and surface water resources including associated aquatic ecosystems and human health receptors (e.g., groundwater supply users).

A risk assessment is undertaken to provide an understanding of the risk associated with the presence of any potentially contaminating materials and/or activities on a Site. This is informed by the assessment of potential for viable pollutant linkage(s) to be present. A pollutant linkage is established when there is a viable or potentially viable **S**ource, a **P**athway and a **R**eceptor (refer to Section 2.4 below). If one or more of the three elements are missing, the exposure pathway is considered incomplete and there is no risk associated with the activity or contaminant source (i.e., a viable means of exposure is not considered to be present or is unlikely to be present).

The objective of the Water Framework Directive (WFD) is no deterioration of the water quality status, and the “prevent or limit” objective is a key element of achieving that WFD status for all water bodies, regardless of the water quality status of the water body. The ‘prevent or limit’ objective is a key element to achieving the WFD status and water quality objectives and in principle, prevent or limit measures (i.e., avoidance and mitigation) are the first line of defence in restricting inputs of pollutants from a development (i.e., ‘source’ removal) and any potential effect or deterioration of water quality status or WFD status of the receiving water body.

In this assessment, all three elements of the Source-Pathway-Receptor model will be identified to develop a CSM, and any potential linkages will be evaluated and assessed to determine if the development could potentially have an effect upon any identified receptors, including Natura 2000 sites, as well as the WFD Status of the water bodies associated with the site.

2.4 Conceptual Site Model

A CSM represents the characteristics of the Site and identifies the possible relationship and potential risk between contaminant sources (i.e., characteristics of the Proposed Development), pathways and receptors (receiving environment). These three essential elements of the CSM are described as:

- A **source –** a substance that is in, on or under the land and has the potential to cause harm or pollution;
- A **pathway** – a transport route or means by which a receptor can be exposed to, or affected by, a contaminant source; and
- A **receptor** – in general terms, something that could be adversely affected by a contaminant, such as people, an ecological system, property, or a water body.

The term pollutant linkage is used to describe a particular combination of source-pathway-receptor. Each of these elements can exist independently, but they create a risk only where they are linked together so that a particular contaminant affects a particular receptor through a particular pathway (i.e., a pollutant linkage).

The preliminary CSM for the site of the Proposed Development is initially defined and this is then revised throughout the risk-based assessment process.

3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The Applicant intends to apply for permission for the importation of inert soil and stone (by-product) and recontouring development on a 2.92 hectares (ha) site, of which 2.52ha is developable for infilling, located on the eastern boundary of the former Clonreher peatland, partially wooded bogland in a rural location at Kyletalesha, roughly midway between Portlaoise due southeast and Mountmellick due northwest (LCC, 2023).

As documented in the Outline Construction Environmental Management Plan (OCEMP) (Lenztech, 2023), carried out by Lenztech Surveying & Engineering Ltd. on behalf of BM Lynch Construction & Civils, the development is designed to facilitate the recovery of excavated inert soil and stone (by-product) from local greenfield residential development sites and proposes the infilling with an estimated maximum volume of 50,250m³ (85,000 tonnes).

The lands will be recontoured to a maximum height of 2.6m with an average depth of 1.9m, with final recontoured lands remaining below the adjoining local primary road (L2117) level. The infilling of soil and regrading of land will support future agricultural activity, potential forestry, amenity use, or other appropriate land uses within these low-lying lands, which represents the intended end use of the Proposed Development.

The development works will allow for the use of materials as resources, thereby minimising the requirement for the extraction of additional natural resources. The surplus excavated material planned for infilling at the site is a By-product (Regulation 27 of the European Communities (Waste Directive) Regulations 2011) arising from greenfield soil & stone.

3.1 Construction Phase

The construction phase of the Proposed Development will comprise the following enabling works:

- Site clearance of the entire area.
- Widening of the road.
- Establishment of the construction compound.

The construction phase of the Proposed Development will require the clearance of the majority of self-seeded trees and vegetation across the site, together with a series of enabling works to prepare the area for the subsequent infilling and regrading operations. The roadside boundary hedge on the northern and eastern sides of the site will require partial removal as necessary to facilitate sightlines and access. These preparatory works will include the installation of temporary site fencing, the establishment of buffer strips to adjoining lands, the protection of existing site drainage infrastructure, the construction of a Temporary Construction Compound (TCC), and the formation of the site access, including road widening works.

The TCC will be formed by stripping and regrading the topsoil, followed by the installation of a geotextile membrane and a layer of imported stone. The stripped topsoil will be stored adjacent to the compound within a linear bund typically no greater than 2 m in height. Superficial soil will be stripped and stored separately from the topsoil and will be stored in a similar manner.

The location of all drainage features will be identified and surveyed prior to commencement, for record and maintenance purposes. As part of the preparatory works for the site, there will be temporary silt containment barriers put in place in all the identified bog drains graded of material. In addition, the existing drainage features (i.e., charted bog/field drains) will be cleared of vegetation and filled with clean washed CL6A material to TII specification with no fines or dust particles, which shall allow water to flow through it in all directions. They will be maintained and upgraded to filter drains to maintain existing drainage flows. A 10-meter buffer and silt fence will be maintained along the western boundary of the site, where no soil importation shall take place to protect this surface water (i.e., drainage ditch) and retain its cover of birch and willows.

It is expected that the use of cementitious material will be required for foundations to palisade fence posts, benching of manhole bases, etc. It is envisaged that approximately 16m^3 will be utilised and mixed at the batching plant.

Welfare facilities, including toilets with sealed waste storage for offsite removal, will be provided for the full duration of the construction phase and operational phase (i.e., infilling and recontouring). These facilities will include provisions for waste management, refuelling, power supply, potable water, and the safe storage of chemicals and materials.

Wheel wash facilities/weighbridge will also be required during the construction and operational phase of the Proposed Development. The selection of any wheel wash system will be confirmed prior to construction and as part of any Article 27 application. The option of a dry wheel wash system is currently proposed and is suited for heavy machinery and delivery or muck away vehicles to ensure that local roads are kept clean. The dry wheel wash is suited for remote locations as it does not require a water supply to function.

The TCC will be in use for the duration of the operational infilling stages.

3.1.1 Surface Water Drainage

As documented in the OCEMP (Lenztech, 2023), good practice construction techniques would be adopted for the management of sediment and surface water runoff generated during the construction phase of the Proposed Development.

The new surface water drainage collection network will be provided at commencement (i.e., during the construction phase of the Proposed Development) with the installation of the Sustainable Drainage Systems (SuDS) measures. Any surface water discharge will be via the bypass separator (i.e., catchpit manholes) with an integrated silt collection chamber for disposal to ground onsite via a soakway (i.e., an infiltration trench sized in accordance with BRE Digest 365 Soakaway Design). In addition, sumps of approximately 600mm depth, within manhole chambers will serve as silt traps to manage siltation with optional use of strainers within the pipe network and manholes during seasonal weather conditions in order to reduce the silting effects of these particles in the network. Runoff from areas of exposed soil will be intercepted by a silt containment barrier installed as good practice in advance of the drainage feature.

Uncontaminated surface runoff from the compound (TCC) will be directed to a swale or infiltration area constructed during the construction phase, to prevent discharge to the existing drainage ditch. The swale will be located at the perimeter of the compound area and will be a wet swale, with runoff infiltrating to ground (i.e., to the existing subsoil). All other runoff from

the wider site will continue to follow existing natural drainage patterns and newly installed drainage routes as established above.

3.1.2 Foul Drainage

As documented in the Planning Application form, there will be no more than 1-2 people (i.e., delivery driver and plant operator) at the site at any one time. Therefore, temporary welfare facilities, when provided, will have a waste collection company.

As documented in the OCEMP (Lenztech, 2023), a combination of a temporary portaloo and an onsite welfare facility cabin with self-contained toilet and washing facilities will be provided for site personnel. No onsite wastewater treatment system or connection to the public mains is required. Effluent and waste from temporary onsite welfare facilities would be maintained, collected and tankered offsite by a contracted licenced waste contractor.

3.1.3 Water Supply

As documented in the Planning Application form, there is no proposed source of drinking water supply for the duration of the Proposed Development. There will be no more than 1-2 people (i.e., delivery driver and plant operator) at the site at any one time. This falls below the Health and Safety Authority (HSA) threshold of 5 persons for full welfare provision. As such, a permanent drinking water supply is not required, and proportionate welfare arrangements are acceptable for this scale of activity.

Potable water will be provided in the form of bottled water for drinking and messing purposes, while welfare units are likely to incorporate built-in water bowsers for sanitation. Electricity will be supplied by onsite generators.

3.2 Operational Phase

The operational phase of the Proposed Development will involve the importation of approximately 50,250m^3 (85,000tonnes) of inert soil and stone to the site to restore 2.92ha of the total site (with approximately 2.52ha available for development), which will be sourced from local development sites and their subsequent spreading and infilling. The material to be imported meets the criteria for classification as a by-product under Regulation 27 of the European Communities (Waste Directive) Regulations 2011. In addition, a total of 87m^3 (150 tonnes) of material from the construction phase will also be reused onsite.

The lands will be recontoured to a maximum height of 2.6metres (m) with an average depth of 1.9m. All finished ground levels will remain below the adjoining Local Primary Road level. The engineering infilling works and recontouring of the site will be completed within the lifetime of any grant of permission and returned for agricultural, forestry planting or amenity use within the 5-year period.

During the operational phase, provisions for surface water drainage, foul drainage and water supply will continue as established during the construction phase of the Proposed Development. Surface water will infiltrate onsite via the SuDS soakaway system, and foul effluent will continue to be contained in sealed tanks and tankered offsite for licensed disposal. As such, there is no direct discharge to any surface waterbody, including the onsite drainage ditches or the nearby stream/river.

The operations will progress on a phased basis. The phasing plan is shown in Figure 3-1 and will comprise four (4 No.) different phases, as follows:

- Phase 1 (Phase 1a and Phase 1b): It will comprise the regrading works of the third part of the site, the most eastern part of the site.
    - Approximately 25,550m^3 (or 33,215 tonnes using a conversion factor of 1.3 tonnes per m^3) will be infilled at the site during this phase of works.
    - Soil and stone material will be regraded in 200mm-250mm thickness layers.
    - The material will be temporarily stockpiled for re-grading beside the temporary permeable granular unloading area (i.e., temporary haul route).
    - The material placed into the drainage features during the infilling of the site to achieve the new formation levels will be deposited without compaction.
    - The water will be allowed to flow through the existing drainage features at right angles in either direction.
    - Runoff from the areas of exposed soil will be intercepted by a silt containment barrier installed in advance of the drainage ditch during the preparatory works (i.e., construction phase).
- Phase 2: It will comprise the regrading works of the third part of the site, the middle part of the site. Approximately 22,250m^3 (or 28,925 tonnes using a conversion factor of 1.3 tonnes per m^3).
    - The most eastern part of the site that was infilled in Phase 1, will be regraded and recontoured during Phase 2.
    - Infilling of the middle part of the site will take place subsequently to the regrading works within the most eastern part of the site.
- Phase 3: It will comprise the regrading works of the third part of the site, the most western part of the site. Approximately 18,200m^3 (or 23,660 tonnes using a conversion factor of 1.3 tonnes per m^3).
    - The area infilled during Phase 2 (i.e., the middle part of the site) will be regraded and recontoured during Phase 3.
    - Infilling of the most western part of the site will take place subsequently to the regrading works within the middle part of the site.
    - The temporary haul route is being extended along each phase for the regrading works.
- Phase 4: It will comprise the completion stage.
    - The area infilled during Phase 3 (i.e., western part of the site) will be regraded and recontoured during Phase 4.
    - The temporary haul route and TCC and associated works, utilised during the regrading works, including any granular material (i.e., imported material), will be removed on completion (i.e., during Phase 4).
        - Concrete manholes, manhole lids, access covers, etc., will be recovered for storing and recycled use.
        - Sub-surface pipework for SuDS drains will remain in place.
        - Swales will be infilled as the compound is decommissioned and the demobilisation of TCC and associated works occurs.
        - Granular material utilised in the construction of the compound (TCC) will be removed to be stored and recycled for haul routes on any other projects.
        - There will be some minor waste from manhole bases, etc., which will be placed in skips for removal offsite and disposal to a licenced facility.
    - The surface will then be reseeded as required. Where ground conditions allow, inert materials such as the imported stone may be retained in place, with

reinstatement achieved through the replacement of stored soils. In these circumstances, the area would be kept on record and could be reused as the TCC during any future decommissioning phase.

The recontoured lands will remain below the adjoining local primary road (L2117) and the reuse of the soil and stone will benefit any future agricultural activity, potential forestry, amenity or other use of the site within the identified low-lying agricultural lands in the future.

The infilling phases for the Proposed Development are presented in Drawing No. 22024-010 (Lenztech Surveying and Engineering Limited).

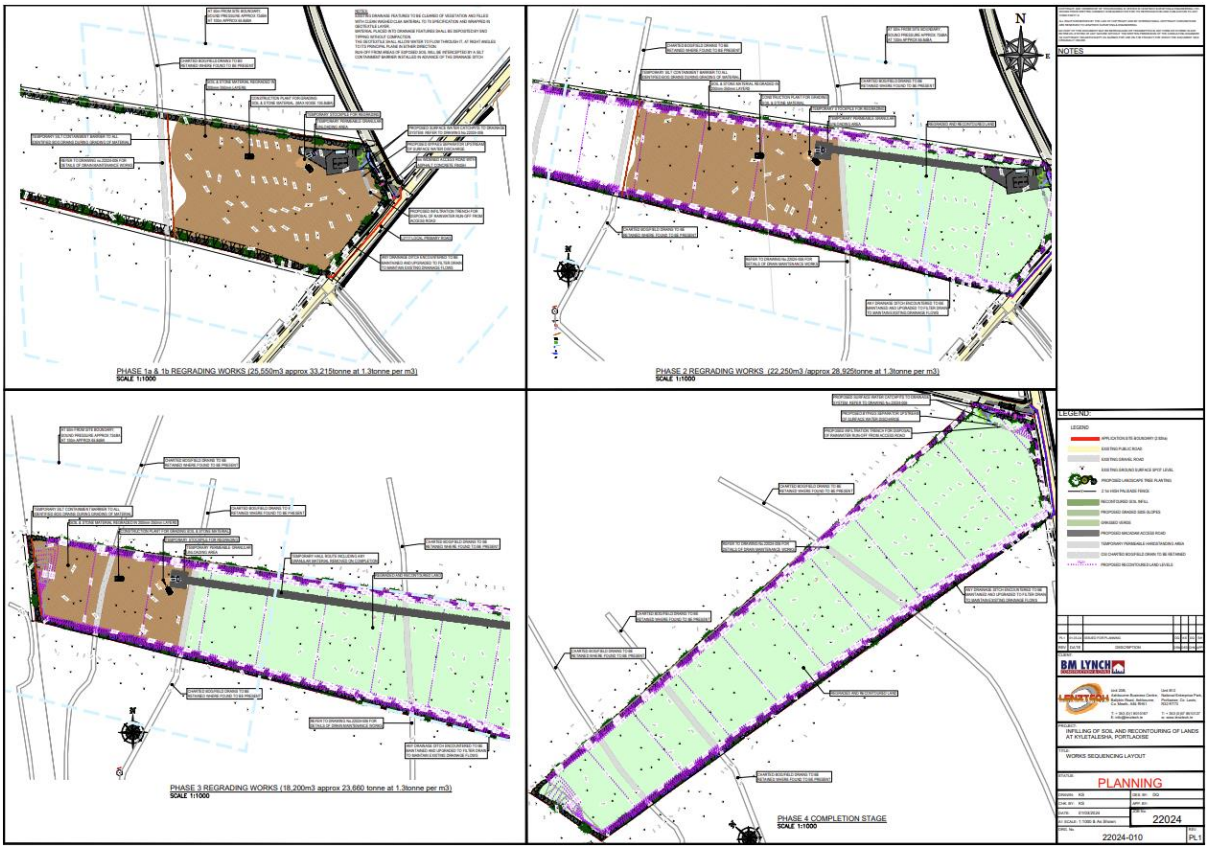

Figure 3-1. Proposed Works Sequencing (Infilling Phases)

4 SITE SETTING

4.1 Site Location and Description

The site is located approximately 2.57km north of Portlaoise town centre and is located between Portlaoise to the southeast and Mountmellick to the northwest. Access to the site is provided via the L2117 Local Primary Road located to the southeast of the site, through an established private access that also serves adjoining third-party lands to the north. The L2117 joins with the National Secondary Route, the N80, at a controlled junction located approximately 900m southwest of the site.

The lands immediately adjoining the site to the north and west consist of a combination of uncultivated land and areas of existing industrial activity. Lands directly to the west of the site comprise agricultural lands associated with established dairy and beef farming enterprises.

The former Portlaoise Landfill facility is located approximately 750 metres southwest of the site, which now functions as a recycling centre (Portlaoise Waste and Recycling facility). A number of industrial and waste-related facilities are located approximately 400 metres west of the Proposed Development, each operating under existing waste licences.

The site location is presented in Figure 4-1 and the current layout of the site is presented in Figure 4-2.

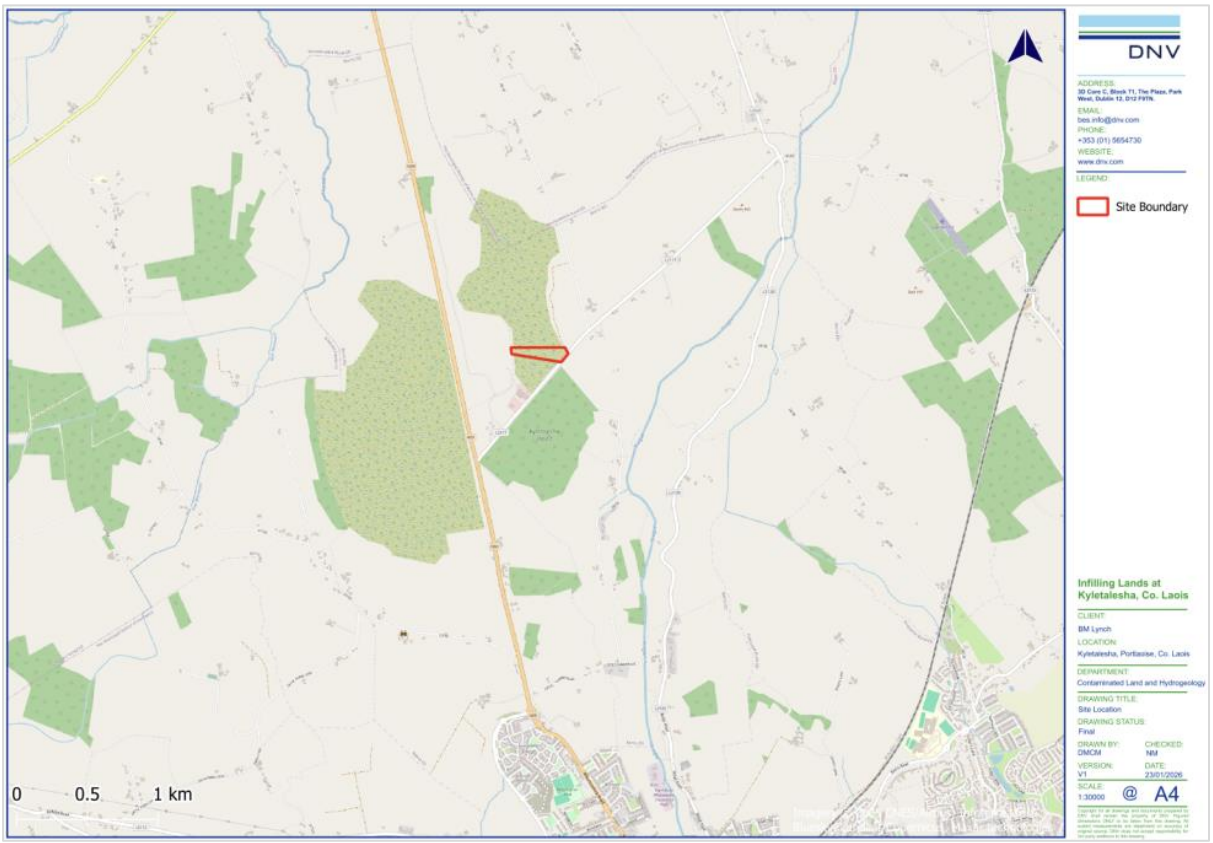

Figure 4-1. Site Location

4.1.1 Current and Historical Land Use

The site of the Proposed Development is located within the eastern edge of the Clonreher Bog. Although the precise historical land-use is not documented, it is considered likely that limited, non-commercial peat extraction took place on the lands at site in the past. Following the cessation of the limited peat-related activity, the lands regenerated naturally and have remained unused for productive agricultural purposes due to wet ground conditions. As a result, the site has become overgrown with ground-cover vegetation and self-seeding trees (refer to Figure 6-4).

The site is designated as an “Area under Strong Urban Influence” in the rural housing policy of the Laois County Development Plan 2021–2027 and lies approximately 2.5km from existing and proposed residential zoned lands within the Plan.

The ground at the site is wet underfoot and is characterised by an overgrowth of self-seeded trees and ground vegetation that has established over-time following the cessation of peat-related activity. The existing ground conditions render the lands unsuitable for agricultural use and pose risks to both farm machinery and livestock.

Ground levels are below the local primary road level and decline gradually in a westerly direction.

The lands immediately adjoining the site to the north and west consist of a combination of uncultivated land and areas of existing industrial activity. Lands directly to the west of the site comprise agricultural lands associated with established dairy and beef farming enterprises.

Surrounding lands comprise a mix of agricultural holdings, uncultivated areas, and established industrial and waste-related operations, reflecting a long-standing pattern of mixed rural and industrial land use in this locality.

The wider area has an extensive history of waste-related activity, including the former Portlaoise Landfill and a number of licensed waste and industrial facilities located within proximity to the site. However, there is no record of previous extraction, development, or landfilling activity on the Proposed Development site itself, which forms part of the historical cutover bog footprint of Clonreher Bog.

The planning history relevant to the site is summarised in Chapter 3 of this EIAR.

Figure 4-2. Current Site Layout

4.2 Soil and Geology

The soils and geology at the subject site are described and assessed in Chapter 6 (Land and Soil) of this EIAR and are summarised as follows:

- The soils beneath the majority of the site are mapped by Teagasc (Teagasc, 2026) as poorly drained cutover peat (IFS Soil Code: Cut). A small area of the eastern portion of the site is mapped as poorly drained mineral (mainly basic) soil (IFS Soil Code: BminPD).
- The quaternary sediments or subsoils beneath the majority of the site are mapped by the GSI (GSI, 2026) as cutover raised peat. A small area of the eastern portion of the site is mapped as till derived from Lower Carboniferous limestone (TLs) (GSI, 2026).
- The bedrock beneath the site is mapped by the GSI (GSI, 2026) as the Ballysteen Formation (Code: CDBALL), described as dark muddy limestone and shale.
- The GSI (GSI, 2026) records for karst features indicate that there are no karst features within a 2km radius of the Proposed Development site. The closest karst feature is a borehole (KARST40KID: IE_GSI_KARST_40K_2459) located 2.7km east of the site boundary.

4.3 Hydrogeology

4.3.1 Groundwater Body and Flow Regimes

The bedrock aquifer beneath the site is within the Portlaoise Groundwater Body (GWB) (EU Code: IE_SE_G_107).

The Portlaoise GWB Report (GSI, 2026) identifies that the main diffuse recharge mechanism for the aquifer occurs across the area where there is thin or permeable subsoil. However, point recharge may occur along the boundary between the sandstones of the Slieve Bloom Mts. and the limestones of this GWB. The main discharge mechanism of this aquifer is to the surface waterbodies overlying it as baseflow along riverbeds, also via springs and to the Bagenalstown GWB located beside the Portlaoise GWB.

The topography of this groundwater body (Portlaoise GWB) can be considered in separate areas. The highest elevations are to the south in the foothills of Slieve Bloom, west of Portlaoise where the drainage direction is to the north to Mountmellick, where it turns eastward and then south at Monasterevin. To the east there is a drainage divide at Clonygowan, south of this surface drainage is to the south to meet the Barrow between Mountmellick and Portarlington. North of this, the flow in the River Cushina is to the east towards the Derrylea Bog. In the northern section of the groundwater body the elevation decreases from the north with the Figile River flowing south to meet the Cushina east of the Derrylea Bog (GSI, 2026).

Groundwater flow paths are considered to be short, there may be dissolution of the limestone along fractures but it is not likely to continue to great depths. Groundwater flow is considered to occur at shallow depths and the age of the groundwater is young. This groundwater body is not expected to have regionally developed karstic flow systems, however, locally may have a developed karst system in local areas, which concentrates recharge and discharges it at a spring.

4.3.2 Aquifer Classification

The GSI provides a methodology for aquifer classification based on resource value (regionally important, locally important and poor) and vulnerability (extreme, high, moderate or low). Resource value refers to the scale and production potential of the aquifer whilst vulnerability refers to the ease with which groundwater may be contaminated by human activities (vulnerability classification primarily based on the permeability and thickness of subsoils).

The bedrock aquifer within the Ballysteen Formation (Code: CDBALL) beneath the site is classified by the GSI (GSI, 2026) as a Locally Important Aquifer - bedrock which is moderately productive only in local zones (Ll).

Locally important aquifers are capable of supplying locally important abstractions (e.g. smaller public water supplies, group schemes), or ‘good’ yields (100-400m^3/d). Groundwater flow occurs predominantly through fractures, fissures and joints. However, the poorly connected network of fractures, fissures and joints gives a low fissure permeability which tends to decrease further with depth.

A shallow zone (i.e., fractured/weathered rock) with higher permeability may occur within the top few metres, and also along fault zones. These zones may be able to provide larger ‘locally important’ supplies of water. However, the lack of connection between the limited fissures results in relatively poor aquifer storage and flow paths that may only extend a few hundred

metres. Due to the low permeability and poor storage capacity, the aquifer has a low 'recharge acceptance'. Some recharge in the upper, more fractured/weathered zone is likely to flow along the relatively short flow paths and rapidly discharge to streams, small springs and seeps. Groundwater discharge to streams ('baseflow') can significantly decrease in the drier summer months.

While there are no mapped sand and gravel aquifers at the site of the Proposed Development, the closest sand and gravel aquifer recorded on the GSI mapping (GSI, 2026) is the Portlaoise aquifer, which is a locally important gravel aquifer (Lg) located approximately 0.7km east of the site at its closest point (GSI, 2026).

The bedrock, and sand and gravel aquifers are presented in Figure 4-3.

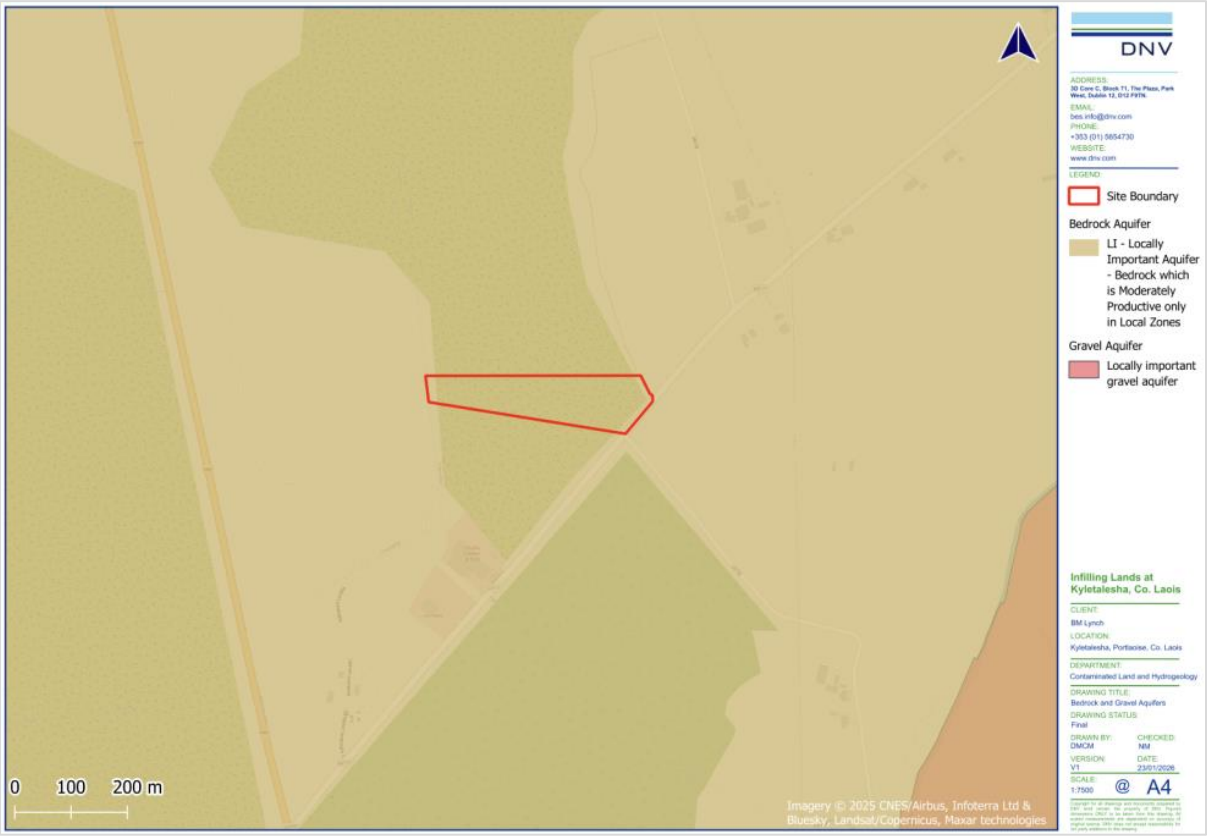

Figure 4-3. Aquifer Classification

4.3.2.1 Groundwater Vulnerability

The vulnerability categories, and methods for determination, are presented in the Groundwater Protection Schemes publication (DEHLG/EPA/GSI, 1999) and summarised in Table 4-1. 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 4-1. Vulnerability Mapping Criteria (DEHLG/EPA/GSO, 1999)

Subsoil Thickness	Hydrogeological Requirements				
	Diffuse Recharge			Point Recharge	Unsaturated Zone
	Subsoil Permeability and Type			(Swallow Holes, Losing Streams)	(Sand and Gravel Aquifers Only)
	High Permeability (Sand and 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 has assigned a groundwater vulnerability rating of 'Moderate' (M) for the bedrock aquifer beneath the site. Based on the moderate vulnerability and low permeability subsoils beneath the site, the anticipated depth to bedrock is between 5 metres below ground level (mbgl) and 10mbgl.

The groundwater vulnerability map is presented in Figure 4-5.

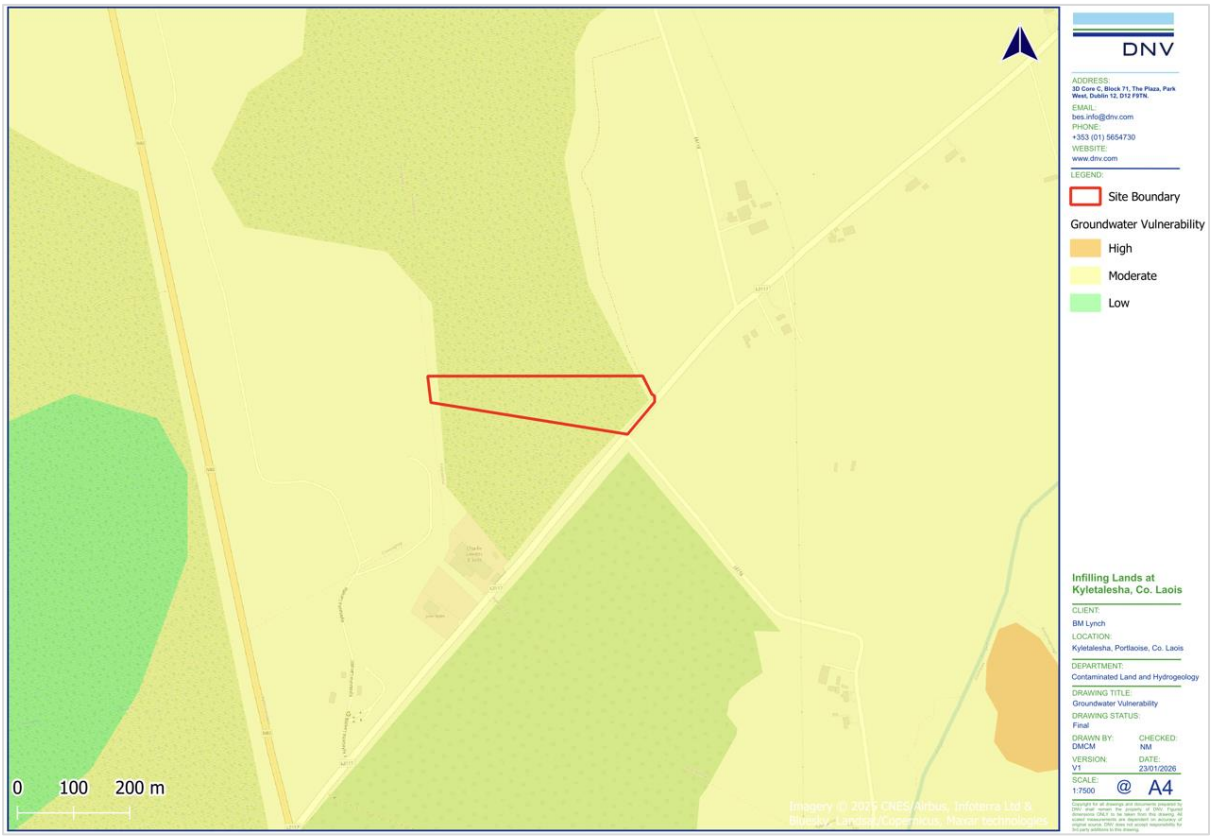

Figure 4-4. Groundwater Vulnerability

4.4 Hydrology

4.4.1 Catchment and Surface Water Features

The site of the Proposed Development is within the Barrow Catchment (Catchment Code: 14) and the Barrow_SC_020 Sub-catchment (Sub-catchment Code: 14_11).

There are no surface water features recorded on the EPA database (EPA, 2026) within the site boundary. However, during the site walkover undertaken by DNV, a number of field drains (i.e., drainage ditches) were identified throughout the site. The existing drainage ditches were observed to flow in a southerly direction (i.e., north to south). A drainage ditch present along the western boundary of the site, which will be retained as part of the proposed development, turns southeast where it appears to be culverted under the road. This ditch was observed to contain water permanently, whereas the other ditches contained water only during rainfall events.

The closest EPA mapped waterbody to the site is the Kyleclonhobert Stream (WFD Name: Triogue_030, EU Code: IE_SE_14T010300), which is located approximately 0.2km south of the site, and it is a tributary of the Triogue River (WFD Name: Triogue_030, EU Code: IE_SE_14T010300). The stream flows in a southeasterly direction for approximately 980m before discharging into the Triogue River. The Triogue River (Triogue_030) flows a further 2.6km (river length) in a northeasterly direction before discharging into the Triogue River (WFD Name: Triogue_040, EU Code: IE_SE_14T010400), which flows a further 3.9km (river length) also in a northeasterly direction before joining the River Barrow (EPA Code: Barrow_050, EU Code: IE_SE_14B010550).

The Clonreher Stream (WFD Name: Kylegrove Stream_010, EU Code: IE_SE_14K060600), which is located approximately 1km south of the site at its closest point, is a tributary of the Kylegrove Stream (WFD Name: Kylegrove Stream_010, EU Code: IE_SE_14K060600), which flows in a easterly direction before converging into the Kylegrove Stream (WFD Name: Kylegrove Stream_010, EU Code: IE_SE_14K060600) approximately 1.1km south of the site at its closest point. The Kylegrove Stream (WFD Name: Kylegrove Stream_010, EU Code: IE_SE_14K060600), which flows in a northerly direction, is located approximately 1.1km south of the site at its closest point and discharges into the Triogue River (WFD Name: Triogue_030, EU Code: IE_SE_14T010300) approximately 1km southeast of the site at its closest point.

The Clonsoghey Stream (WFD Name: Blackwater (Laois)_010, EU Code: IE_SE_14B031000), tributary to the Blackwater (Laois) Stream, is located approximately 1.2km to the northwest and flows in a northwesterly direction before discharging into the Blackwater (Laois) River approximately 1.8km northwest of the site. The Blackwater (Laois) River (WFD Name: Blackwater (Laois)_010, EU Code: IE_SE_14B031000) is located approximately 1.3km northwest of the site at its closest point and flows in a northerly direction before discharging into the Owenass River (WFD Name: Owenass_020, EU Code: IE_SE_14O010300) approximately 3.6km northwest of the site, which in turn discharges into the River Barrow (EPA Code: Barrow_040, EU Code: IE_SE_14B010550) approximately 6.4km north of the site at its closes point.

The closest coastal waterbody potentially indirectly connected to the site is the Southwestern Irish Sea - Killiney Bay (HA10), which is located approximately 85km east of the site at its

closest point. The significance of this connection is considered negligible due to the separation distance from the site.

The surface water features mapped by the EPA (EPA, 2026) within a 2km radius of the site are presented in Figure 4-5.

Figure 4-5. Surface Water Features within a 2km Radius of the Site

4.4.1.1 Existing Drainage Infrastructure

There is no surface water or foul water drainage within the site of the Proposed Development.

4.5 Flood Risk

As indicated in the Planners Report (Application Reference: 23/200) (LCC, 2023), the site is outside the confines of the critical Flood Zones A and B as indicated in the Strategic Flood Risk Assessment of the Plan.

An initial review of flood risk information was conducted for the site and Proposed Development based on information available from floodinfo.ie (OPW, 2026). This assessment involved an initial flood risk assessment to determine if there were any potential flooding or surface water management issues that might affect the site or the Proposed Development. The results of the initial flood risk assessment indicated that there is no significant flood risk to the site. Consequently, the Proposed Development is deemed appropriate for the site, which is classified as Flood Zone C, indicating a low probability of flooding. Additionally, the initial flood risk assessment stated that there were no past flood events recorded within a 2.5km radius of the site.

4.6 Water Use and Source Protection

The GSI groundwater wells and springs database (GSI, 2026) was utilised to identify registered wells and groundwater sources in the surrounding area. There are fourteen (14 No.) groundwater sources recorded within a 2km radius of the site.

- Eleven (11 No.) recorded wells of unknown use.
- One (1 No.) recorded well of public supply use.
- One (1 No.) recorded well of agricultural and domestic use.
- One (1 No.) recorded well of domestic use only.

There is one (1 No.) Groundwater Source Protection Areas (SPAs) mapped by the GSI (GSI, 2025) within a 2km radius of the site.

- Mountmellick Derrygile PWS (Public Water Supply) – the Inner Protection Area (SI) is located approximately 1.93km north of the site.

There are other Public Supply Source Protection Areas in the close vicinity of the site, namely the Portlaoise (SI - Inner Protection Area), located approximately 2.4km east of the site, the Meelick (SO – Outer Protection Area), approximately 5.9km southeast of the site and the Knocks PWS (SO - Outer Protection Area) approximately 8.7km southwest of the site.

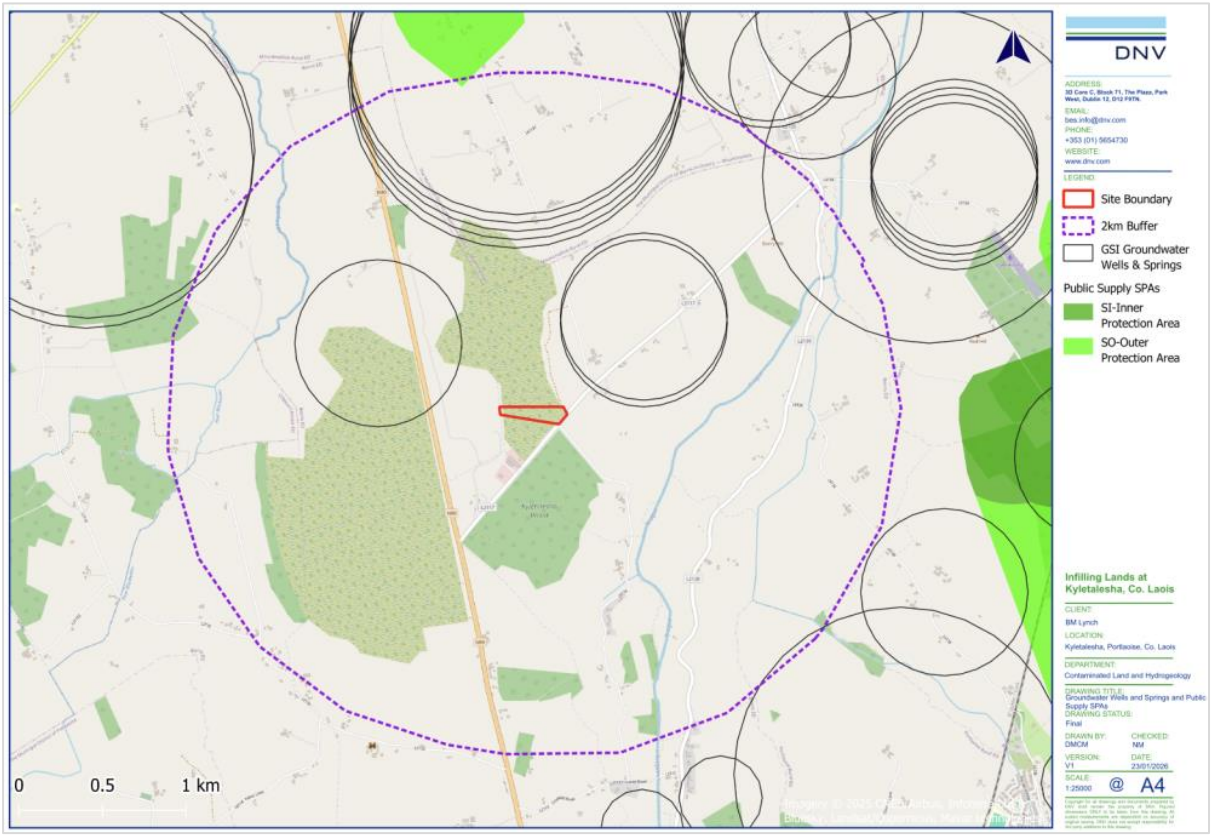

Figure 4-6. Groundwater Wells, Springs and Public Supply SPA's

4.7 Water Quality

4.7.1 EPA Water Quality

4.7.1.1 Published Regional Surface Water Quality

The EPA surface water quality monitoring database (EPA, 2026) was consulted. A summary of the most recent published EPA water quality monitoring data (EPA, 2026) for waterbodies which have a potential hydraulic connection to the site is presented in Table 4-2.

Table 4-2. Surface Water Quality

Waterbody I.D. (Location)	EPA WFD Parameter Quality & Trend Analysis				
	Parameter	Period	Indicative Quality	Trend	Baseline Conc. (2023) (mg/l)
Triogue_030	Ammonia-Total (as N)	Annual	Moderate	Upwards	0.077
	Total Oxidised Nitrogen (as N)	Annual	Moderate	Upwards	4.130
	Ortho-Phosphate (as P) - unspecified	Annual	Moderate	Upwards	0.047
Triogue_040	Ammonia-Total (as N)	Annual	Good	Upwards	0.058
	Total Oxidised Nitrogen (as N)	Annual	Moderate	Downwards	3.952
	Ortho-Phosphate (as P) - unspecified	Annual	Moderate	Upwards	0.048
Kylegrove_010	No data available.				
Blackwater (Laoise)_010	Ammonia-Total (as N)	Annual	Good	Downwards	0.049
	Total Oxidised Nitrogen (as N)	Annual	Moderate	Upwards	1.928
	Ortho-Phosphate (as P) - unspecified	Annual	Moderate	Upwards	0.053
Owenass_020	Ammonia-Total (as N)	Annual	Good	Upwards	0.053

Waterbody I.D. (Location)	EPA WFD Parameter Quality & Trend Analysis				
	Parameter	Period	Indicative Quality	Trend	Baseline Conc. (2023) (mg/l)
(1.7km d/s Mountmellick)	Total Oxidised Nitrogen (as N)	Annual	Moderate	Downwards	1.905
	Ortho-Phosphate (as P) – unspecified	Annual	Bad	Downwards	0.104
Owenass_020 (Br N of Irishtown Ho on N80)	Ammonia-Total (as N)	Annual	Good	Upwards	0.042
	Total Oxidised Nitrogen (as N)	Annual	Good	Downwards	1.432
	Ortho-Phosphate (as P) – unspecified	Annual	Moderate	Upwards	0.035
River Barrow_050	Ammonia-Total (as N)	Annual	Good	Downwards	0.045
	Total Oxidised Nitrogen (as N)	Annual	Moderate	Downwards	2.140
	Ortho-Phosphate (as P) - unspecified	Annual	Moderate	Downwards	0.042

4.7.1.2 Published Regional Groundwater Quality

The EPA groundwater monitoring data (EPA, 2026) was reviewed to locate the closest groundwater quality monitoring stations within the close vicinity of the site. The closest groundwater stations are the Mountmellick WS (Derrygile) station (Station ID: GWIE_SE_G_10716000009) located approximately 2.8km north of the site and the Portlaoise WS (Derrygannon BH) station (Station ID: GWIE_SE_G_15316000011) located approximately 4.7km southeast of the site. The recorded groundwater quality data for the groundwater body beneath the site (Portlaoise GWB) is presented in Table 4-3.

Table 4-3. Groundwater Quality

Groundwater Body	EPA WFD Parameter Quality & Trend Analysis				
	Parameter	Period	Indicative Quality	Trend	Baseline Conc. (2021) (mg/l)
Portlaoise GWB	No data available.				

4.8 Water Framework Directive

The WFD status for river, lake, groundwater, transitional and/or coastal water bodies that have a potential hydraulic connection to the subject site as recorded by the EPA (EPA, 2026) in accordance with European Communities (Water Policy) Regulations 2003 (S.I. No. 722/2003) are provided in Table 4-4 and the locations presented in Figure 4-8.

Table 4-4. Water Framework Directive Status

Waterbody Name	Waterbody EU Code	Location from Site	Distance from Site (km)	WFD Status (2019-2024)	WFD Risk	Hydraulic Connection to the Site
Surface Water Bodies						
Triogue_030	IE_SE_14T010300	South	0.2	Poor	At Risk	Potential hydrological or hydrogeological connection via surface water (i.e. drainage ditches at the site) and groundwater flow.
Triogue_040	IE_SE_14T010400	Northeast	2.2	Poor	At Risk	Potential hydrological or hydrogeological connection via the Triogue_030 river.
Kylegrove Stream_010	IE_SE_14K060600	South	1.0	Poor	Review	No hydraulic connection. This river is located south of the Triogue_030 river, which is the closest to the site. Therefore, it is hydrologically isolated from the site as any potential runoff from the site would be intercepted by the Triogue_030 river.
Blackwater (Laoise)_010	IE_SE_14B031000	Northwest	1.2	Moderate	Not at Risk	No hydro connection - surface water is upgradient of the site and located within a different catchment.
Owenass_020	IE_SE_14O010300	Northwest	3.6	Moderate	At Risk	
. River Barrow_050	IE_SE_14B010550	North/Northeast	6.4 / 7.1	Moderate	At Risk	Potential hydro connection via the Triogue_030

Waterbody Name	Waterbody EU Code	Location from Site	Distance from Site (km)	WFD Status (2019-2024)	WFD Risk	Hydraulic Connection to the Site
						river and Triogue_040 river.
Groundwater Bodies						
Portlaoise GWB	IE_SE_G_107	Underlying	0.0	Good	Not at Risk	Underlying groundwater-body.
Note: * - 'denotes distance and direction at its closest point'						

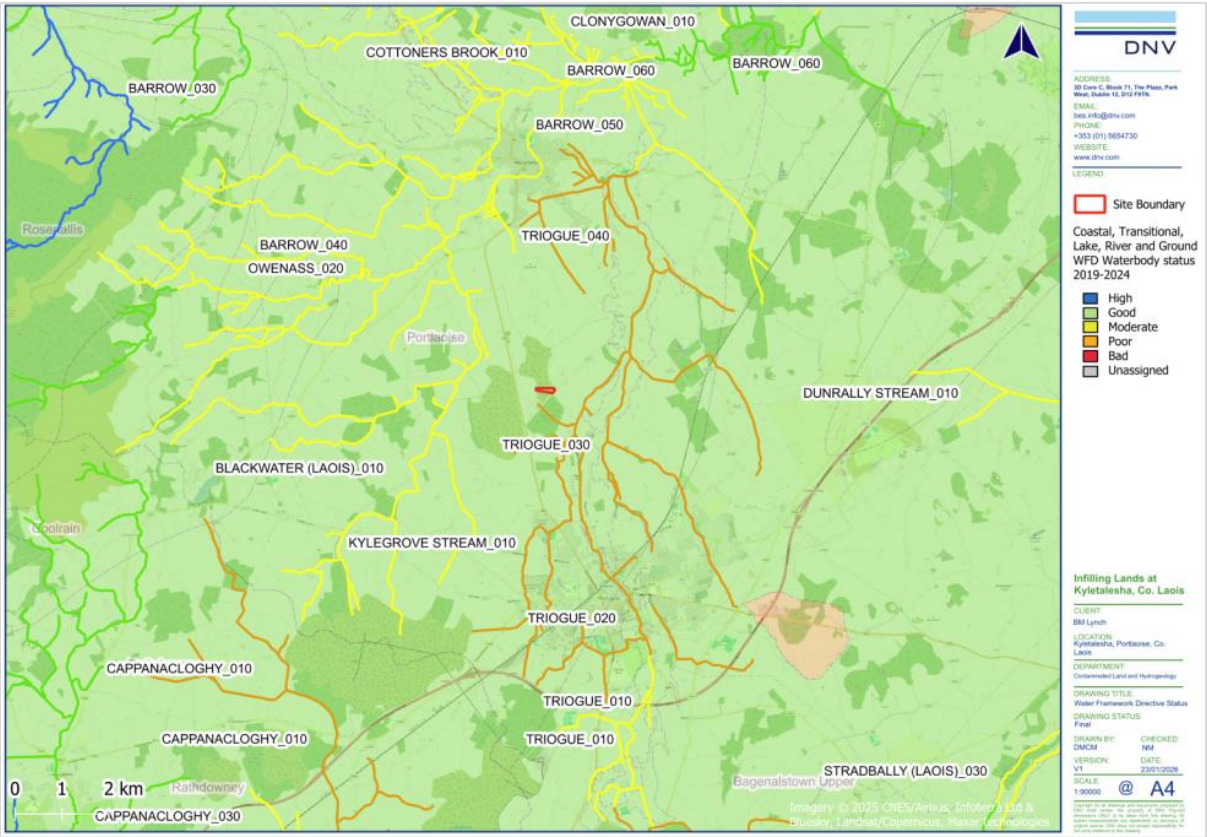

Figure 4-7. Water Framework Directive Status (2019-2024)

4.8.1 Designated and Protected Areas

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).

National Heritage Areas (NHAs) are designations under the Wildlife Acts to protect habitats, species, or geology of national importance. The boundaries of many of the NHAs in Ireland overlap with SAC and/or SPA Sites. Although many NHA designations are not yet fully in force under this legislation (referred to as 'proposed NHAs' or pNHAs), they are offered protection

in the meantime under planning policy which normally requires that planning authorities give recognition to their ecological value.

There is one (1 No.) Natura 2000 site and five (5 No.) Proposed Natural Heritage Area (pNHA) identified with a potential hydraulic connection to the site and Proposed Development. The Natura 2000 sites and other protected and designated sites or areas within a 15km radius of the site are summarised in Table 4-5.

As documented in the Biodiversity Chapter (Chapter 5), all European sites potentially linked to the Proposed Amendments have been identified and fully assessed in the AA Screening Report (Stage 1 AA) accompanying this submission under separate cover. A summary of the AA conclusion is given below:

> *'The potential likely significant effects of this development (to use the terminology of the Habitats Directive) are minimal and it cannot be said that this development will have a significant impact on the European site downstream or on the integrity of the Natura 2000 network. It will also not compromise the attainment of the conservation objectives for any site, in particular the River Barrow & River Nore SAC. This finding is based on the best scientific information available. This holds for the project by itself or in combination with other projects in the vicinity and there is no necessity for a Stage 2 assessment (NIS).'*

Further details and assessment of the potential impacts of the Proposed Development on habitats, flora and fauna are included in the Biodiversity Chapter (Chapter 5) of the EIAR prepared by DNV and submitted with the planning application.

Table 4-5. Designated and Protected Sites

Designated Site	Site Code	Distance from Site (km)	Direction	Potential Risk
Special Area of Conservation (SAC)				
Slieve Bloom Mountains SAC	000412	5.9	West	Not hydrological connection to the site – upgradient of the site.
Mountmellick SAC	002141	6.5	Northeast	Not hydrological connection to the site due to distance.
River Barrow and River Nore SAC	002162	3.6	North	Possible hydraulic connection via the Triogue River and subsequently Barrow River.
Special Protection Area (SPA)				
Slieve Bloom Mountains SPA	004160	5.9	West	Not hydraulically connected to the site – upgradient of the site.
Natural Heritage Area (NHA)				
Clonreher Bog NHA	002357	0.4	East	Not hydraulically connected to the site – upgradient of the site.
Proposed Natural Heritage Area (pNHA)				
Dunamase Wood	001494	7.5	Southeast	Potential hydraulic connection – downgradient of the site.

Designated Site	Site Code	Distance from Site (km)	Direction	Potential Risk
Rock Of Dunamase	000878	8.48	Southeast	
Kilteale Hill	000867	9.9	Southeast	
Ridge of Portlaoise	000876	0.9	Southeast	
The Great Heath of Portlaoise	000881	6.6	East	
Derries Wood	000416	10.07	Northeast	Not connected to the site – upgradient of the site.
Emo Court	000865	9.1	Northeast	
Shanahoe Marsh	001923	14.6	South	
Slieve Bloom Mountains	000412	5.9	West	
Stradbally Hill	001800	14.5	Southeast	
Timahoe Esker	000421	12.9	Southeast	
Note: '*' = Distance is measured as closest point to the site				

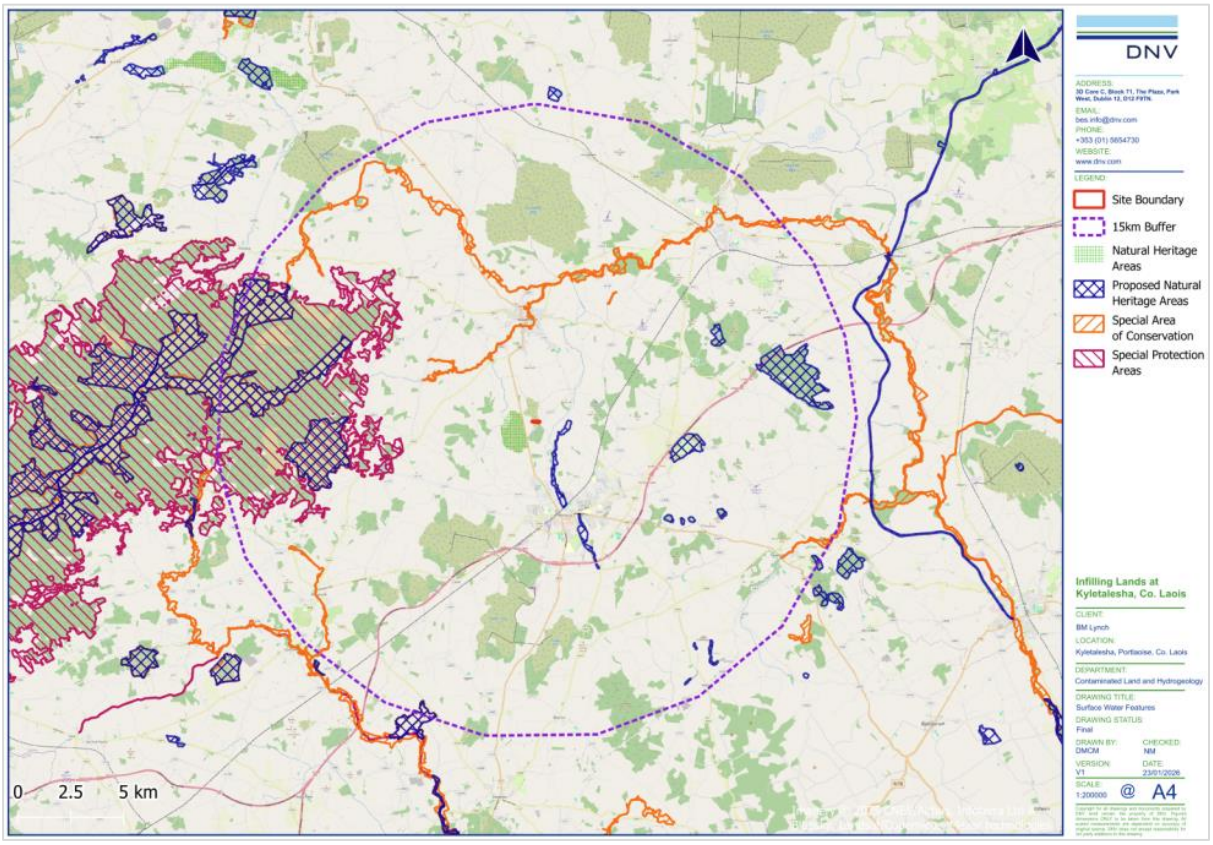

Figure 4-8. Designated and Protected Sites

4.8.2 Drinking Water

The river drinking water protected areas (DWPA) are represented by the full extent of the Water Framework Directive (WFD) river waterbodies from which there is a known qualifying abstraction of water for human consumption as defined under Article 7 of the WFD.

There are no surface water drinking water sources, under Article 7 of the Water Framework Directive, identified by the EPA (EPA, 2026) within a 2km radius of the site. However, the groundwater body beneath the site, the Portlaoise GWB (IE_SE_G_107), is classified under Article 7 Abstraction for Drinking Water.

4.8.3 Shellfish Areas

Although the Shellfish Waters Directive (SWD) has been repealed, areas used for the production of shellfish that were designated under the SWD, are protected under the WFD as ‘areas designated for the protection of economically significant aquatic species’.

The requirement from a WFD perspective is to ensure that water quality does not impact on the quality of shellfish produced for human consumption. In Ireland, 64 areas have been designated as shellfish waters (S.I. No. 268 of 2006, S.I. No. 55 of 2009, S.I. 464 of 2009).

The closest designated Shellfish Area location is Malahide (IE_EA_020_0000) located approximately 89.6km northeast of the site.

4.8.4 Nutrient Sensitive Areas

EU member states are required under the Urban Wastewater Treatment Directive (91/271/EEC) to identify nutrient-sensitive areas. These have been defined as “natural freshwater lakes, other freshwater bodies, estuaries and coastal waters which are found to be eutrophic or which in the near future may become eutrophic if protective action is not taken”.

The closest designated nutrient-sensitive area (estuaries and lakes) is the Triogue (River) (IERI_SE_2001_0016- Urban Wastewater Treatment Directive Sensitive Area), located approximately 0.7km east of the site at its closest point.

4.8.5 Bathing Waters

Bathing waters are designated under Regulation 5 of Directive 2006/7/EC. Designated Bathing Waters exist under S.I. No. 79/2008 and S.I. No. 351/2011 Bathing Water Quality (Amendment) Regulations 2011. EC Bathing Water Profiles - Best Practice and Guidance 2009.

The closest designated Bathing Water location is the Greystones South (IEEABWC100_0000_0200), located approximately 84.8km northeast of the site.

5 ASSESSMENT OF POTENTIAL EFFECTS

5.1 Conceptual Site Model

As outlined in Section 2.4, the conceptual site model (CSM) represents the characteristics of the site and identified the possible relationship and potential risk between the contaminant sources, pathways and receptors.

The preliminary CSM and identified sources, pathways and receptors associated with the site and Proposed Development are outlined in Section 5.1.1, Section 5.1.2 and Section 5.1.3.

5.1.1 Potential Sources

The potential sources associated with the Proposed Development during construction and operational phases are discussed below.

5.1.1.1 Construction Phase

During the construction phase of the Proposed Development, there will be no direct discharges to surface water or groundwater, with the exception of rainfall, which will continue to infiltrate to ground. There will be no unauthorised discharge of water (groundwater or surface water runoff) to drains or water courses during the construction phase of the Proposed Development. Foul water discharge from the temporary welfare units at the site will be tankered offsite in accordance with waste management legislation.

Potential sources of contamination that could affect water quality, based on the design of the site, include:

- Storage and use of fuel, oils and chemicals used during construction, which in the event of an accidental release through the failure of secondary containment or a materials handling accident, could infiltrate to the underlying aquifer.
- Leakage from machinery or refuelling of plant and machinery operating onsite that has the potential to be accidentally discharged from the site during the construction phase.
- Use of cementitious materials during the construction phase, in particular for the foundations to palisade fence posts, benching of manhole bases, mortar for setting brick risers and access covers to manholes, which have the potential to infiltrate through the soils and migrate down into the groundwater.
- Suspended sediment and other contaminants entrained in runoff arising from the limited groundworks, stockpiling of materials and other construction works at the site that have the potential to be transported into the existing drainage ditches.
- Release of suspended solids and other contaminants during the infilling of the drainage ditches and vegetation clearance.
- Sediment or other material on construction vehicles could potentially be tracked offsite to external public roads.
- Accidental release of foul water from mobile toilets and/or sealed self-contained welfare cabins.

5.1.1.2 Operational Phase

The operational phase will involve the importation of approximately 50,250m^3 of inert soil and stone classified as Article 27 by-products, together with 87m^3 of reused onsite material, for

infilling and recontouring of approximately 2.52ha of the site. The TCC, SuDS, wheel wash and welfare facilities will remain in use during the operational phase of the Proposed Development.

The most plausible, albeit worst case, source scenario is outlined as follows, some of which remain the same during both phases (i.e., construction and operational phase) of the Proposed Development:

- Storage and use of fuel, oils and chemicals used during the operational phase, which, in the event of an accidental release through the failure of secondary containment or a materials handling accident, could infiltrate to the underlying aquifer.
- Leakage from machinery or refuelling of plant and machinery operating onsite that has the potential to be accidentally discharged from the site during the operational phase.
- Suspended sediment from localised areas of the site and other contaminants entrained in runoff arising from the infilling of the site with Article 27 clean soil and stone before compaction and stabilisation.
- Sediment or other material on vehicles during the operational phase, which could potentially be tracked offsite to external public roads.
- Accidental release of foul effluent from welfare facilities, which will continue to be stored in sealed tanks and removed offsite.

5.1.2 Pathways

The following potential pathways are identified and evaluated below:

Vertical Migration to the Underlying Bedrock and Lateral Migration within the Aquifer to Downgradient Receiving Surface Waterbodies

The site is underlain by a Locally Important bedrock aquifer, which is moderately productive only in local zones (Ll) and is characterised by limited storage and generally short groundwater flow paths. Recharge to this aquifer is expected to occur predominantly via diffuse infiltration of rainfall through overlying soils. Based on available geological mapping (GSI, 2026), the site is overlain by peat and subsoils, which provide a degree of protection to the underlying bedrock aquifer. Although portions of this cutover bog have been historically extracted, these areas will be reinstated through the infilling of Article 27 soil and stone during the operational phase of the Proposed Development, providing a reinstated soil cover over the underlying bedrock.

During both the construction and operational phases, accidental spills of fuels, oils, or other contaminants could infiltrate vertically through the reinstated soil cover and subsoils to the aquifer beneath the site and migrate laterally along local flow paths to surface water receptors. In the absence of mitigation, this could create a potential pathway for contaminants to migrate to sensitive receptors.

However, taking account of the Locally Important bedrock aquifer, the limited transmissivity and short flow paths, and the presence of underlying subsoils and a reinstated soil cover, any potential impact on groundwater or downgradient surface waterbodies would be expected to be localised and limited, arising only under a worst-case accidental spill scenario during the construction or operational phase of the Proposed Development.

Surface Water Runoff and Migration Offsite to Downstream Surface Waterbodies

There are a number of drainage ditches and bog drains identified within the site that will be retained and infilled with clean washed Clause 6A material with no fines or dust particles, which shall allow water to flow through them to maintain natural flow patterns. While the retention and infilling works may result in temporary localised disturbance and an increased risk of sediment mobilisation during construction, the use of washed stone and the implementation of appropriate buffer zones and sediment control measures will ensure that hydraulic connectivity is maintained and that any potential effects are short-term and localised. The drainage ditch along the western site boundary will be protected by a 10-metre buffer during the construction phase, within which no soil importation will occur during the operational phase.

There will be no direct discharge from the site to any surface waterbody or drainage ditch during the duration of the Proposed Development (approximately five years). Surface water runoff generated during the construction and operational phases will be collected and managed via a SuDS network, including swales, infiltration features, soakaways and silt control measures, with runoff discharged to ground via infiltration to the underlying subsoils. As such, there will be no discharge of surface water runoff to any surface water mains network or directly to any surface waterbody.

However, during rainfall events, surface water runoff from construction areas or from the early stages of infilling and recontouring during the operational phase could, in the absence of mitigation, flow overland toward onsite drainage features. During the construction phase, groundworks, site clearance and road widening may generate suspended sediments that can become entrained in surface water runoff. Similarly, during the operational phase, Article 27 clean soil and stone may be temporarily susceptible to erosion prior to full compaction and stabilisation. In a worst-case unmitigated scenario, sediment-laden runoff could enter the onsite drainage ditches and migrate to downgradient surface waterbodies.

In addition, in a worst-case scenario such as the failure or overtopping of SuDS features during extreme rainfall events, there is a potential for limited overland flow to bypass the SuDS network and enter onsite drainage ditches, with potential subsequent migration to downstream surface water receptors. However, the design and operation of the SuDS measures, together with the 10-metre buffer zone and silt fencing along the western boundary ditch and any other drainage ditches identified at the site, are intended to intercept, attenuate and infiltrate runoff onsite. These measures will significantly reduce the potential for offsite migration of suspended solids, thereby limiting the risk of adverse effects on downstream surface waterbodies.

Groundwater Discharge to Mains Sewer and Downstream Receiving Surface Waterbodies

The design of the Proposed Development does not require deep excavations, dewatering or any direct interaction with groundwater. There will be no abstraction or discharge of groundwater to the mains sewer network during either the construction or operational phases. As such, the groundwater discharge to the mains sewer and downstream receiving surface waterbodies pathway is not considered to be present for the Proposed Development.

Foul Water Discharge to Main Sewer and Receiving Surface Waterbodies – Indirect Pathway

During both the construction and operational phases, foul effluent from the welfare facilities onsite will be collected in sealed storage tanks and tankered offsite by a licensed waste contractor to an authorised facility in accordance with waste management legislation. There will be no discharge of foul effluent to ground, sewer or surface water. Therefore, there is no direct foul effluent pathway from the site to any receiving surface waterbody.

Any potential connection between foul effluent generated onsite and downstream surface waterbodies would therefore occur only indirectly, via licensed offsite treatment facilities operating in compliance with their respective discharge licences. As such, any discharge to receiving surface waterbodies would be regulated and controlled in accordance with all relevant statutory consents and licence conditions. Given the small foul load associated with the Proposed Development (approximately 1–2 personnel onsite at any one time), together with the use of sealed storage, licensed offsite removal and treatment, and the regulatory control of the receiving facility, this indirect pathway is not considered to give rise to any significant effect on downstream surface waterbodies.

5.1.3 Receptors

The receptors considered in this assessment include the following:

- Groundwater Bodies
  - Underlying locally important aquifer - bedrock, which is moderately productive only in local zones (LI) part of the Portlaoise GWB.
- Surface Waterbodies:
  - Triogue_030 River and closest associated rivers/streams potentially hydraulically connected to this river (i.e., Triogue_040and Barrow_050). Any other downstream associated waterbodies (i.e., Southwestern Irish Sea - Killiney Bay (HA10)) have been ruled out based on the separation distances to the site.
- Natura 2000 sites:
  - River Barrow and River Nore SAC.
- Other Protected sites:
  - Dunamase Wood pNHA.
  - Rock Of Dunamase pNHA.
  - Kilteale Hill pNHA.
  - Ridge of Portlaoise pNHA.
  - The Great Heath of Portlaoise pNHA.

It is noted that there are other protected sites with a potential hydraulic connection to the site (refer to Table 4-5), however, those hydraulically closest to the site are considered as the most sensitive Natura 2000 sites for this assessment.

5.2 Risk Evaluation of Source-Pathway-Receptor Linkages

A risk-based assessment of the Source-Pathway-Receptor (SPR) Model and the potential risk linkages associated with the construction phase and operational phase of the Proposed Development was undertaken. The results were evaluated to determine if the Proposed Development could potentially effect any potential receptors associated with the site.

Table 5-1. Conceptual Site Model (Source- Pathway Receptor) and Risk Evaluation

Source	Pathway	Receptor	Risk Evaluation and Avoidance
Construction Phase			
Discharge of Contaminants to Ground / Groundwater	Vertical and Lateral Groundwater Migration in Bedrock Aquifer	Underlying Bedrock Aquifer Receiving surface waterbodies (i.e., the Boyne Estuary and downstream waterbodies) Natura 2000 Sites	**Low to Moderate Risk (worst-case unmitigated scenario)** The site has undergone historical peat extraction, reducing the thickness of the protective peat cover locally. During limited site clearance works and excavations associated with construction of the TCC and related infrastructure, including SuDS features, groundwater vulnerability will be temporarily increased, creating a more direct potential pathway for surface contaminants to enter the underlying bedrock aquifer and migrate toward downgradient surface waterbodies. In a worst-case unmitigated construction scenario, such as an accidental release of fuels, chemicals or oils, there is potential for a localised impact on groundwater in the immediate vicinity of the site within the Portlaoise GWB. However, with the implementation of embedded design avoidance and mitigation measures, including silt fencing and berms, strict fuel and chemical management, and adherence to the CEMP, the potential for offsite migration via groundwater will be significantly reduced. The residual risk to nearby watercourses, downstream surface waterbodies and Natura 2000 sites is therefore considered low to negligible, with no likely significant effect on receiving water quality.
Discharge of Surface Water Runoff (i.e., Rainwater)	Discharge to Surface Waterbodies via Drainage Ditches	Receiving surface waterbodies (i.e., the Boyne Estuary and downstream waterbodies) Natura 2000 Sites	**Moderate Risk (worst-case unmitigated scenario)** There is a potential indirect hydraulic connection between the Triogue_030 River and the western drainage ditch; however, the ditch is culverted beneath a road, limiting direct connectivity. During rainfall events, suspended sediments in surface water runoff generated during site clearance, earthworks or indirectly tracked on vehicles could, in the absence of mitigation, migrate via overland flow and onsite drainage ditches toward downstream surface water receptors. Surface water runoff will be managed via a SuDS network, with infiltration to underlying subsoils and no direct discharge to surface waterbodies. In a worst-case unmitigated scenario, sediment-laden runoff could enter drainage ditches or bypass SuDS during extreme rainfall. However, the SuDS design, together with silt fencing, berms and a 10-metre buffer along the western drainage ditch, implemented in accordance with the CEMP, will significantly reduce offsite migration of suspended solids. The residual risk to downstream surface waterbodies and

Source	Pathway	Receptor	Risk Evaluation and Avoidance
			associated Natura 2000 sites is therefore considered low, with no likely significant effect.
Foul Water Discharge	Foul Water Discharge to Main Sewer and Receiving Surface Waterbodies – Indirect Pathway	Receiving surface waterbodies at the licensed offsite treatment facilities Receiving Natura 2000 Sites at the licensed offsite treatment facilities	**No Identified Risk** Foul effluent generated during the construction phase will be collected in sealed storage tanks and removed offsite by a licensed waste contractor to an authorised facility in accordance with waste management legislation. There will be no discharge of foul effluent to ground, sewer or surface water at the site and, therefore, no direct foul water pathway to receiving surface waterbodies. Any potential connection to downstream surface waterbodies would occur only indirectly, via licensed offsite treatment facilities operating in compliance with their statutory discharge licences and consent conditions. Given the small foul load associated with the Proposed Development (approximately 1–2 personnel onsite at any one time), together with sealed storage, licensed offsite treatment and regulatory control of the receiving facility, this indirect pathway is not considered to give rise to any significant effect on downstream surface waterbodies or associated Natura 2000 sites.
Operational Phase			
Discharge of Contaminants to Ground / Groundwater	Vertical and Lateral Groundwater Migration in Bedrock Aquifer	Underlying Bedrock Aquifer Receiving surface waterbodies (i.e., Triogue_030 River and downstream waterbodies) Natura 2000 Sites	**Low Risk (worst-case unmitigated scenario)** During the infilling and recontouring of the site, the thickness of clean soil and subsoil (Article 27) will increase, thereby reducing the potential for contaminants to infiltrate into the underlying bedrock aquifer. In addition, protective measures along drainage ditches, including buffer zones and silt fencing, together with the management of surface water runoff in accordance with the principles and objectives of SuDS, will provide further protection during the operational phase. In a worst-case unmitigated scenario during the operational phase (e.g. accidental release of fuels, chemicals or oils due to failure of secondary containment or a materials-handling incident), there is potential for a localised discharge of contaminants to groundwater. However, taking account of the embedded design avoidance and mitigation measures, including SuDS controls and ongoing monitoring and maintenance of drainage infrastructure, the potential for offsite migration via groundwater pathways would be very limited. With mitigation in place, the residual risk to groundwater, nearby watercourses, downstream surface waterbodies and

Source	Pathway	Receptor	Risk Evaluation and Avoidance
			associated Natura 2000 sites is considered low, with no likely significant effect on water quality during the operational phase of the Proposed Development.
Discharge of Surface Water Runoff (i.e., Rainwater)	Discharge to Surface Waterbodies via Drainage Ditches	Receiving surface waterbodies (i.e., the Boyne Estuary and downstream waterbodies) Natura 2000 Sites	**Low to Moderate Risk (worst-case unmitigated scenario)** During the early infilling stages of the operational phase, Article 27 clean soil and stone may be temporarily susceptible to erosion prior to full compaction and stabilisation. In a worst-case unmitigated scenario, suspended sediments entrained in surface water runoff, or indirectly tracked on vehicles and machinery, could migrate via overland flow and drainage ditches toward downstream surface water receptors. However, silt fencing, buffer zones and other protective measures along drainage ditches, including ditches infilled with clean washed Clause 6A material and the retained western drainage ditch, together with surface water runoff collected, treated and attenuated via SuDS measures (including infiltration features and silt controls), will significantly reduce the potential for sediment-laden runoff to enter the drainage network. With these measures in place and adherence to the CEMP during the operational phase, the residual risk to downstream surface waterbodies and associated Natura 2000 sites is considered low, with no likely significant effect on receiving water quality.
Foul Water Discharge	Foul Water Discharge to Main Sewer and Receiving Surface Waterbodies – Indirect Pathway	Receiving surface waterbodies at the licensed offsite treatment facilities Receiving Natura 2000 Sites at the licensed offsite treatment facilities	**No Identified Risk** During the operational phase, foul effluent generated by onsite welfare facilities will continue to be stored in sealed tanks and removed offsite by a licensed waste contractor to an authorised facility in accordance with waste management legislation. There will be no discharge of foul effluent to ground, sewer or surface water at the site and, therefore, no direct foul water pathway from the Proposed Development. Any potential connection to downstream surface waterbodies would occur only indirectly, via licensed offsite treatment facilities operating in compliance with their statutory discharge licences and consent conditions. Given the small foul load associated with the operational phase (approximately 1–2 personnel onsite at any one time), together with sealed storage, licensed offsite removal and regulatory control of the receiving facility, this indirect pathway is not considered to give rise to any likely significant effect on downstream surface waterbodies or associated Natura 2000 sites.

5.2.1 Design Avoidance and Mitigation

The assessment of the potential effects on the receiving environment takes account of the embedded design avoidance measures and standard good practice construction methods to reduce the potential for effects to the water environment. These are outlined below together with additional specific measures based on the findings of this assessment.

5.2.1.1 Construction Phase

During the construction phase, all works will be undertaken in accordance with the Construction Environmental Management Plan (CEMP) to provide detailed construction phasing and methods to manage and prevent any potential emissions to ground with regard to the relevant industry standards (e.g., Guidance for Consultants and Contractors, CIRIA-C532', CIRIA, 2001). The CEMP will be implemented for the duration of the construction phase, covering construction and waste management activities that will take place during the construction phase of the Proposed Development. Mitigation works will be adopted as part of the construction works for the Proposed Development. These measures will address the main activities of potential effect, which include:

- Control and Management of surface water runoff.
- Control and Management of Filling Drainage Ditches.
- Control and Management of Works Adjoining Drainage Ditches.
- Appropriate fuel and chemical handling, transport and storage.
- Management of accidental release of contaminants at the site.
- Control and handling of cementitious materials.
- Management and Control Procedures for the Importation of Aggregates and Materials.
- Control and Management of Soils, Subsoils and Stockpiles.
- Management and Control for the Reuse of Soil.
- Management and Control of Surplus Material.

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

5.2.1.1.1 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. The following mitigation measures will be adhered to during the construction phase of the Proposed Development:

- Silt fencing will be installed prior to the commencement of construction to ensure the protection of the onsite drainage ditches. Silt fencing will also be installed around the perimeter of the site and silt traps within the drainage ditches to avoid sediment laden to migrate offsite to downgradient waterbodies.
- During the construction phase of the Proposed Development, measures would be adopted in order to prevent silt, chemicals and/or other contaminants from being washed into existing waterbodies (i.e., drainage ditches). Areas exposed due to the removal of vegetation are more susceptible to erosion during heavy rainfall, therefore, the areas would be reinstated as soon as possible to minimise this effect.
- Regular monitoring and prompt maintenance of the SuDS measures will ensure that the drainage system continues to function as designed:
    - Use of silt traps, silt fences and SuDS measures.
    - Exclusion zones between earthworks, stockpiles and temporary surfaces.
    - Temporary construction surface water drainage and sediment control measures installed prior to earthworks commencing.
    - Scheduling construction activities taking forecast weather conditions into consideration.
    - Silt ponds will be constructed on site as necessary to contain silt runoff.
    - An earth bund and silt fence will be constructed around the perimeter of the infill area. The earth bund and silt fencing will act as temporary sediment control devices to protect receiving watercourses from sediment and potential surface water runoff from the site. The fencing will be inspected twice daily based onsite and weather conditions for any signs of contamination or excessive silt deposits and records of these checks will be maintained.
- A 10-meter buffer and silt fence will be maintained along the western drainage ditch, where no soil importation shall take place to protect surface waters and to ensure that there are no offsite nuisances created by the site.
- Stockpiles of loose materials pending reuse onsite will be protected for the duration of the works and not located in areas where sediment laden runoff may enter existing surface water drains.
    - To help shed rainwater and prevent ponding and infiltration, the sides and top of the stockpiles will be regraded to form a smooth gradient with compacted sides reducing infiltration and silt runoff.
    - Where required, silt fences will be erected at the toe of stockpiles to prevent runoff.
    - The silt fences will be monitored daily by the appointed contractor and silt will be removed as required.
    - Any materials excavated onsite during the construction works (i.e., construction phase) will be stored onsite close to the excavation location and reused where it is appropriate to do so during the operations phase. As such, offsite disposal of this material is not anticipated.

  - Low mound stockpiles will be formed from excavated material away from open drains.
- A regular review of weather forecasts of heavy rainfall will be conducted, and a contingency plan will be prepared before and after such events to minimise any potential nuisances. As the risk of the break-out of silt-laden runoff is higher during these weather conditions, no work will be carried out during such periods where possible.

5.2.1.1.2 Management Drainage Ditches Infill Works

The infilling of the existing drainage ditches onsite will be undertaken with cognisance to Construction Industry Research and Information Association (CIRIA), 2006. 'Control of Water Pollution from Linear Construction Projects: Technical guidance' (CIRIA C649) and' Control of water pollution from construction sites. Guidance for consultants and contractors (C532)' and the following mitigation measures will be strictly adhered to:

- The infilling of existing drainage features including drainage ditches and bog drains will be completed in accordance with Series 600 pf the TII Specification for Road Works and the recommendations contained within the "NRA Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes".
- The existing drainage features (i.e., charted bog/field drains) will be cleared of vegetation and filled with clean washed CL6A material to TII specification. They will be maintained and upgraded to filter drains to maintain existing drainage flows.
- Before vegetation clearance commences, drainage runoff controls such as silt traps should be installed at the point where the site boundary intercepts any onsite drainage ditch along the northern or southern boundary. This should remain in-place for the duration of the construction phase.
- The installation of a 450mm diameter perforated pipe and permeable surround within the infill area will be applicable to all surface water drains onsite.
- All material placed into drainage features will be deposited by end tipping without compaction.
- The water will be allowed to flow through the existing drainage features at right angles in either direction.
- Runoff from the areas of exposed soil will be intercepted by a silt containment barrier (i.e., silt fence) installed in advance of the drainage ditch.
- Any machines working in the vicinity of the open waterbodies will be protected against leakage or spillage of fuels, oils, greases and hydraulic fuels.
- Any displaced water during the infilling of the open waterbodies will be allowed to infiltrate to ground in the immediate surrounding area. Where required, drainage runoff controls such as silt fences and silt traps will be provided.
- All trucks leaving the site will pass through a dry wheel wash, thereby removing the potential for transport of sediment offsite. The wheel wash will be periodically cleaned out and its contents will be disposed of in the appropriate manner by a suitably licensed waste contractor and never discharged onsite.

5.2.1.1.3 Control and Management of Works Adjoining Drainage Ditches

Silt fencing or bunding along the length of the drainage ditches will be erected following the clearance of the site (i.e., vegetation clearance), which will take cognisance of Inland Fisheries Ireland (IFI) Guidelines on Protection of Fisheries during Construction Works in and Adjacent

to Waters (IFI, 2016). The silt fencing will act in filtering any potential surface water runoff from the site generated during the proposed works and will be retained in place for the duration of the construction phase until the development is complete. The project specific CEMP (which will be finalised by the main contractor in advance of construction works commencing) will identify how this silt curtain is to be installed and maintained throughout the construction phase.

- The silt fences will be monitored to ensure that they remain functional throughout the construction of the Proposed Development (and throughout the operational phase).
- Where necessary, maintenance will be carried out on the fences to ensure that they continue to be effective. This will be particularly important after heavy rainfall events.
- The checks will be undertaken by the Environmental Manager.
- The frequency of monitoring will depend on the stage of works, and local environmental conditions.
- Daily checks may be appropriate during the initial site clearance, during works in the vicinity of the drainage ditches and during and after storm events.
- Weekly or bi-weekly checks may be appropriate at other times (i.e., during the operational phase).

All works carried out in or adjacent to the drainage ditches will adhere to the Inland Fisheries Ireland (IFI) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters (IFI, 2016), the Transport Infrastructure Ireland (TII) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (TII, 2008) and CIRIA C648 Control of Water Pollution from Linear Construction Projects (CIRIA, 2006).

All near stream works will include the following measures:

- Entry to the drainage ditches by vehicles will not be permitted, while vehicle usage along the banks will be restricted as much as practicable. Any machines working in close proximity of the watercourse must be protected against leakage or spillage of fuels, oils, greases and hydraulic fuels.
- Silt fences and other sediment control measures will be utilised as required to prevent sedimentation in the drainage ditches.

5.2.1.1.4 Handling of Fuels, Chemicals and Materials

Fuelling and lubrication of equipment will be carried out in accordance with the procedures outlined in the OCEMP (Lenztech, 2023), in a designated area of the site (i.e., bunded areas), away from any watercourses and drains (where not possible to carry out such activities offsite) with full attendance of plant operatives.

Fuel will be stored onsite for the duration of the Proposed Development within the site compound in secure, fit for purpose containers within bunded containment as appropriate and in accordance CIRIA guidance documents as documented in the OCEMP (Lenztech, 2023). Fuel will only be brought to site via mobile fuel bowser. Any other oils or hydraulic oils stored onsite will be stored in designated areas in suitable tanks and containers. These areas will be bunded and located away from surface water features.

Spillage of fuel, oil and chemicals will be minimised by implementation of an Emergency Pollution Prevention Plan (EPPP), which would be prepared by the contractor as part of the

project-specific CEMP. In the event of any spillage or pollution of any watercourse, the emergency spill procedures as described in the EPPP would be implemented immediately.

- Generally, refuelling of mobile plant and machinery will be carried out at a designated location within the site compound only at a dedicated impermeable refuelling pad or by mobile double-bunded bowsers at their place of work. The refuelling pad would be bunded and equipped with a collection sump. Refuelling will be carried out using an approved mobile fuel bowser with a suitable pump and hose.
- All other fuels, oils and potential contaminants, as well as waste oils, will be stored within the site compound in secure, fit for purpose containers within bunded containment as appropriate and in accordance CIRIA guidance documents (Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors-2001, Environmental Good Practice on Site-C650), EPA "IPC Guidance Note on Storage and transfer of Materials for Scheduled Activities" and with SEPA guidance (GPP 2: Above ground oil storage tanks, January 2018).
- Bunds will have regard to the Environmental Protection Agency guidelines 'Amendment to IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities' (EPA, 2013). 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.
- Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised onsite is in good working condition.
- Any equipment not meeting the required standard will not be permitted for use within the Proposed Development site.
- Only emergency breakdown maintenance will be carried out onsite.
- Drip trays and spill kits will be available onsite to ensure that any spills from vehicles are contained and removed offsite.
- Spill kits will be made available and kept onsite at all times and identified with signage for use in the event of an environmental spill or leak.
- Method statements for dealing with accidental spillages will be provided the Contractor for review by the Employer's Representative.

There may also be the requirement for use of onsite generators or similar fuel containing equipment during the construction phase of the Proposed Development, which will be placed on suitable drip trays. Regular monitoring of drip tray content will be undertaken to ensure sufficient capacity is maintained at all times.

5.2.1.1.5 Emergency Procedures

Emergency procedures will be developed by the appointed contractor in advance of works commencing. Remedial action will be immediately implemented to address any potential impacts in accordance with industry standards and legislative requirements. The following mitigation measures will be adhered to as follows:

- Emergency response procedures and contingency plans will be put in place, in the unlikely event of emergency accidents (i.e., spillages of fuels or lubricants).

- Spill kits, including oil absorbent material, will be provided and available onsite, 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 Proposed Development site and compliantly disposed of offsite. 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, standards and EPA guidelines.
- All construction works staff will be familiar with the emergency procedures in the event of accidental fuel spillages.
- All construction works staff onsite will be fully trained on the use of equipment.

5.2.1.1.6 Concrete Works

The use of cementitious material employed during the construction phase of the Proposed Development will avoid any contamination of the receiving hydrogeological environment through the use of appropriate design and methods implemented by the appointed contractor and in accordance with the OCEMP (Lenztech, 2023), and relevant industry standards to prevent impact on groundwater and surface water quality such as the use of water compatible grout.

The following are mitigation measures that need to be adhered to when using concrete for the Proposed Development:

- Concrete batching will take place offsite.
- Wash down and wash out of concrete trucks will take place into a container located within a controlled bunded area which will then be emptied into a skip for appropriate compliant removal offsite in accordance with all relevant waste management legislation.
- Any excess concrete is not to be disposed of onsite.
- Pouring of cement-based materials for works will only be carried out in dry conditions and pumped concrete will be monitored to ensure there is no accidental discharge.
- A suitable risk assessment for wet concreting shall be completed prior to works being carried out. Pumped concrete will be monitored to ensure there is no accidental discharge.
- Pouring of concrete will not be permitted within 50m of any watercourse during inclement weather.

5.2.1.1.7 Welfare Facilities

Welfare facilities will be provided for the full duration of the Proposed Development. Temporary welfare facilities (i.e., temporary portaloo and an onsite welfare facility cabin with self-contained toilet and washing facilities) have the potential, if not managed appropriately, to release organic and other contaminants to ground or watercourses.

The following mitigation measures will be adhered to during the construction phase of the Proposed Development as follows:

- Effluent and waste from temporary onsite welfare facilities would be maintained, collected and disposed (i.e., tankered offsite) by an approved licenced waste contractor.

- All waste will be managed in accordance with the relevant statutory obligations and with relevant waste management legislation.
- Welfare facilities will comply with the Health and Safety Authority (HSA) Requirements for Construction Site Welfare Facilities (2017).

5.2.1.1.8 Management and Control Procedures for the Importation of Aggregates and Materials

There will be limited quantities of aggregates imported to the site during the construction phase of the Proposed Development. However, contract and procurement procedures will ensure that all imported aggregates and materials required for the construction phase of the Proposed Development will be sourced from reputable suppliers operating in a sustainable manner and in accordance with industry conformity/compliance standards and statutory obligations.

The importation of aggregates and materials will be subject to management and control procedures, which will include testing for contaminants, invasive species and other anthropogenic inclusions and assessment of the suitability for use in accordance with engineering and environmental specifications for the Proposed Development. As a result, any unsuitable material will be identified prior to unloading / placement onsite, thereby ensuring environmental protection and compliance with regulatory requirements.

5.2.1.1.9 Control and Management of Soils, Subsoils and Stockpiles

Segregation and storage of soils for reuse onsite or removal offsite and material for disposal offsite (i.e., vegetation during the site clearance) will be segregated and temporarily stored onsite pending removal or for reuse in accordance with the OCEMP (Lenztech, 2023), which will be updated by the main contractor in advance of construction works commencing.

Stockpiled materials, pending reuse onsite, will be located away from the location of any sensitive receptors (i.e., drains / watercourses). An excavation/stockpile register will be maintained onsite.

The reuse of suitable excavated soil and subsoil for the Proposed Development will be undertaken in accordance with the final recontouring design for the Proposed Development.

Stockpiling of excavated material (i.e., soils and subsoils) r, where required (i.e., awaiting reuse onsite or removal offsite), will be appropriately managed onsite during the construction phase of the Proposed Development in accordance with the measures outlined in the OCEMP (Lenztech, 2023). To minimise the overall effect on soils arising during the construction works, the following mitigation measures will be adhered to.

- A suitable temporary storage area will be identified and designated.
- All stockpiles will be assigned a stockpile number.
- Material identified for reuse onsite, offsite and waste materials will be individually segregated; and all segregation, storage & stockpiling locations will be clearly delineated on the site drawings.
- Soil stockpiles will be covered to prevent runoff from the stockpiled material generation and/or the generation of dust.
- Topsoil should not be stored in piles of greater than two metres in height as the soil matrix (internal structure) can be damaged beyond repair. It should also be kept as dry as possible and used as soon as possible to reduce any deterioration through lengthy storage and excess moving around the site.

- Any waste that will be temporarily stored / stockpiled will be stored on impermeable surface high-grade polythene sheeting, hardstand areas or skips to prevent cross-contamination of the soil below or cross-contamination with soil.
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust.

Stockpiles of materials shall be kept to a minimum and if necessary, they shall be kept away from sensitive receptors.

5.2.1.1.10 Management and Control for the Reuse of Soil

There will be limited excavations at the site during the construction phase. However, it is expected that the excavated material will be reused onsite as part of the infilling works (i.e., operational phase).

- All topsoil stripping associated with the Proposed Development will be monitored by a suitably qualified consultant.
- Excavated soil that is not suitable for reuse will be removed from the site by a suitable contractor licensed under the Waste Management Act 1996 and relevant regulations.

Any soil reused onsite will be monitored for the occurrence of invasive plant species with follow-up treatment.

5.2.1.1.11 Management and Control of Surplus Material

Surplus materials will be removed offsite, if required, in accordance with the requirements outlined in the OCEMP (Lenztech, 2023) and the RWMP (DNV, 2026) and will be managed in accordance with all legal obligations.

The removal of soil offsite, if required, will be undertaken in accordance with all statutory requirements and obligations including, where appropriate, reuse as by-product in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011 (SI No. 126 of 2011) as amended. Any surplus material not suitable for reuse as a by-product and other waste materials arising from the construction phase will be removed offsite by an authorised contractor and sent to the appropriately authorised receiving facility. As only authorised facilities will be used, the potential effects at any authorised receiving facility sites will have been adequately assessed and mitigated as part of the statutory consent procedures.

Any excess material will be documented prior to leaving the site. All information will be entered into a waste management register kept on the site.

Vehicles transporting material with potential for dust emissions to an offsite location shall be enclosed or covered with a tarpaulin at all times to restrict the escape of dust.

Public roads outside the site will be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary. Where required, trucks entering / leaving the site will pass through a dry wheel washing system. The wheels of all lorries will be cleaned as required prior to leaving the site to prevent the generation of dust or cause the build-up of aggregates and fine material in the public domain. The correct use and management of the wheel washing system (where required) will be undertaken by the main contractor to ensure that there is no harm or effect to the receiving water environment.

5.2.1.2 Operational Phase

Only clean soil and stone (Article 27) from development sites will be accepted at the site for the infilling and recontouring phase.

- The mitigation measures outlined for the construction phase will continue to apply, where relevant, during the operational phase of the Proposed Development. These measures will ensure the ongoing protection of surface water, groundwater and peatland hydrology. In addition to the construction phase controls that remain applicable, a small number of operational specific mitigation measures will also be implemented and will address the main activities of potential impact, as outlined below:Management and control of imported soil and aggregates from offsite sources.
- Management and control during the recontouring works

5.2.1.2.1 Importation of Soil and Stone

The following mitigation measures will be adhered to during the operational phase of the Proposed Development as follows:

- All materials imported to the site for recovery will be inspected on delivery and prior to unloading / placement on the site.
- All soil and stone imported to the site for infilling and recontouring purposes shall be monitored in accordance with the requirements of Article 27 of the European Communities (Waste Directive) Regulations 2011 and the EPA Guidance on Soil and Stone By-Products (EPA, 2019). This will ensure that only clean, inert materials, free from contamination, invasive species and other anthropogenic inclusions, are accepted for use at the site, thereby preventing the introduction of potential contaminant sources.
- Any unsuitable materials will be removed from the site in accordance with all legislative requirements.
- Where applicable, the removal of surplus materials arising during the construction phase of the Proposed Development will be managed in accordance with the by-product provisions of Article 27 of the European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011), as amended. A by-product assessment shall be undertaken to demonstrate that any such surplus material satisfies all four conditions set out in Article 27 prior to its removal from the site. Where applicable, this will be addressed either by way of a project-specific Article 27 notification to the Environmental Protection Agency (EPA) or by confirming that the material falls within the scope of a valid Article 27 registration held with the EPA. In accordance with EPA guidance, surplus material shall not be removed from the site until the Article 27 assessment has been completed and the material is confirmed to be covered by the relevant notification or registration.
- All loads of imported soil and stone shall be subject to visual inspection on arrival at the site and prior to placement, to confirm the absence of contamination, invasive species, staining, odours or anthropogenic inclusions.
- Where soil and stone are proposed to be imported from non-greenfield or previously developed sources, additional supporting information may be required to demonstrate geochemical suitability. This may include soil analytical data and/or a source-specific risk assessment, as appropriate, in accordance with EPA (2019) guidance.

- Any material received from an unapproved or unverified source, or which fails to meet the Article 27 acceptance criteria, shall be rejected and shall not be incorporated into the infill.

5.2.1.2.2 Recontouring

The recontouring (i.e., restoration) of the site will take into consideration the surrounding landscape, the local groundwater flow regime and proposed use of the lands for agriculture which will be undertaken in accordance with the requirements of applicable EPA restoration guidelines. Where required, the appropriate drainage layers will be incorporated into the soil cover to minimise potential issues for slope stability associated with pore water.

Accordingly, any potential impact on receiving surface water and groundwater beneath the Proposed Development will be avoided taking account of the design and mitigation proposals. Therefore, it is considered that the water quality protection criteria and objectives of the SuDs and Water Framework Directive will be achieved.

There is no other requirement for mitigation measures for the operational phase of the Proposed Development.

5.3 Water Framework Directive

The EU Water Framework Directive (2000/60/EC), as amended by Directives 2008/105/EC, 2013/39/EU, and 2014/101/EU ("WFD"), was established to ensure the protection and enhancement of the water environment across all EU member states. In Ireland, the WFD has been transposed through the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003).

The WFD requires that all member states protect and improve water quality in all waters, with the objective of achieving at least 'good' status by 2027. It applies to all surface waters (including rivers, lakes, reservoirs, streams, and canals), groundwater, transitional (estuarine), and coastal waters. Any new development must ensure that this objective is not compromised.

A risk-based assessment was undertaken to evaluate the potential impact of the Proposed Development on water quality within the surrounding hydrological environment. This assessment considered both the baseline conditions and the relevant legislative framework, including the WFD and associated national regulations

5.3.1 Potential Effect on Natura 2000 Sites

Based on the findings of this assessment, and applying the precautionary principle under a worst-case scenario, it is considered that there is no likely significant effect arising from the Proposed Development on the closest hydraulically connected Natura 2000 sites or other designated sites, either alone or in combination. Having regard to the distance downstream, together with the significant dilution and attenuation that will occur within the receiving environment, no adverse effects are anticipated at the River Barrow and River Nore SAC or associated downgradient pNHAs.

The Proposed Development incorporates embedded design avoidance and mitigation measures, including management of surface water in accordance with SuDS principles and appropriate construction and operational controls, which will limit the potential for effects on the receiving groundwater and surface water environment. In addition, the design of the

Proposed Development results in limited potential sources of contamination. During both the construction and operational phases, foul water from onsite welfare facilities will be contained within sealed storage tanks and removed offsite by a licensed waste contractor to an authorised facility in accordance with waste management legislation. Surface water runoff will be treated, attenuated and managed via SuDS, with infiltration to ground via the onsite soakaway.

The SuDS features will remain in place for the duration of the works and will be decommissioned once infilling, recontouring and stabilisation are complete, and active surface water management is no longer required. Taking account of these measures, it is concluded that the Proposed Development will not give rise to any likely significant effect on Natura 2000 sites in relation to discharges from the site.

5.3.2 Water Framework Directive Status

The findings of the risk-based assessment identified that, in the absence of any mitigation and avoidance measures, there could be a potential effect on the water quality within receiving water bodies associated with the Proposed Development, specifically within a local zone of the Portlaoise GWB and with the Triogue_030 river and associated waterbodies (i.e., Triogue_040 and Barrow_050). There is no identified potential effect on the coastal waterbody (i.e., Southwestern Irish Sea - Killiney Bay (HA10)) attributed to the separation distances and anticipated assimilation capacity of the receiving water bodies taking account of the existing baseline conditions and WFD Status.

The mitigation measures as outline above, including the implementation of the CEMP during the construction phase of the Proposed Development and the incorporation of SUDS in the design of the construction and operational phase of the Proposed Development, will prevent any effect on the receiving groundwater and surface water environment. With these measures in place, the Proposed Development will not result in deterioration of waterbody status and will not adversely affect compliance with the EU Water Framework Directive, the European Communities (Environmental Objectives) Surface Water Regulations 2009 (as amended), or the European Communities (Environmental Objectives) (Groundwater) Regulations 2010 (as amended).

Taking account of the design avoidance and mitigation measures proposed, the Proposed Development will not jeopardise the achievement of ‘good’ surface water status or good ecological potential, nor will it result in any deterioration in the status of hydraulically connected waterbodies, including the Triogue_030 River and the Portlaoise GWB. Accordingly, the Proposed Development is not expected to result in any likely significant effect on WFD status.

6 CONCLUSIONS

DNV carried out a risk-based hydrological and hydrogeological effect assessment for the Proposed Development to determine if there is any potential for significant effects on the receiving water environment and designated Natura 2000 sites in the absence of avoidance and mitigation measures.

The CSM was developed identifying plausible S-P-R linkages for the Proposed Development and the receiving water environment. The CSM formed the basis of the evaluation of any potential effects to receptors, including water bodies and Natura 2000 sites associated with the Proposed Development. The assessment assumed a worst-case scenario (individually and in-combination) and in the absence of any mitigation measures intended to avoid or reduce potential harmful effects.

Based on the findings of this assessment, the following can be concluded:

- Assuming a worst-case scenario (e.g., accidental release of fuels, chemicals or oils through the failure of secondary containment or a materials handling accident during the construction or operational phase or SuDS failure during the construction and operational phase) at the site and taking account of the local hydrogeological regime, there is a potential risk of effect to local groundwater quality. However, there is no identified potential effect on the receiving surface water bodies via groundwater flow from the site.
- There are no identified direct pollutant linkages between the site via surface water courses to receiving waterbodies.
- The appropriate standard design measures for the construction phase and operational phase of the Proposed Development, including implementation of a site-specific CEMP and SuDS measures, will prevent, limit and mitigate the potential for the worst-case scenario to occur. These embedded measures will ensure there is no risk to water quality of the receiving watercourses.
- The underlying aquifer has been identified as a locally important aquifer - bedrock which is moderately productive only in local zones (Ll). Groundwater flow occurs predominantly through poorly connected network of fractures. Due to the poor connectivity of the fractures, in a worst-case scenario, effects will likely be confined to the immediate vicinity of the site.
- There are no identified risks to water quality via discharge of foul water drainage, as there will be no connection to any public foul sewer or discharging from the site. Effluent and waste from temporary onsite welfare facilities would be maintained, collected and tankered offsite by a contracted licenced waste contractor
- In the unmitigated worst-case scenario, there is no identified negative effect on the closest hydraulically connected Natura 2000 sites, in particular River Barrow and River Nore SAC and associated downgradient pNHAs associated with Proposed Development either individually or in-combination.
- There is no identified effect to the existing WFD status of water bodies associated with the Proposed Development including the Drogheda GWB and the Triogue_030 river and associated waterbodies.

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