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9. HYDROLOGY, HYDROGEOLOGY AND WATER QUALITY

9.1 INTRODUCTION

This chapter reports the findings of a retrospective assessment of the likely significant effects on Hydrology, Hydrogeology and Water Quality as a result of Bord na Móna's peat extraction and ancillary activities at Derryhinch, Drumman, Derryarkin, Ballybeg, and Toar (the ''Application Site''), which form part of the Derrygreenagh Bog Group.

A description of the control measures which were used to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, any mitigation and monitoring arrangements are then discussed. Due to the retrospective nature of the assessment, this chapter will focus on existing or pre-existing measures used in order to mitigate the likely significant effects of historic peat extraction. Any residual effects and remedial (future) effects are also assessed.

In order to align with the temporal scope (Section 2.5, Chapter 2 remedial Methodology), the Project Description distinguishes between the activities that took place prior to the transposition of the Environmental Impact Assessment (EIA) Directive in 1988 and those activities that took place post 1988.

Chapter 4 (Project Description) provides a full description of the Application Site and describes the Peat Extraction Phase (that took place from 1988- June 2020), the Current Phase (the management of the Application Site since June 2020 to present day) and the Remedial Phase (activities intended to be carried out at the Application Site into the future).

9.1.1 Statement of Authority

This EIAR chapter has been completed by John Dillon and Tristan Martin of TOBIN. TOBIN Hydrologists and Hydrogeologists are familiar with the site characteristics of the Toar, Derryhinch, Derryarkin, Ballybeg and Drumman Bogs.

John Dillon (BSc, MSc, MCIWM, PGeo) has over 18 years of experience in hydrogeological/hydrological assessment for EIS/EIA. John is a Senior Environmental Consultant in the Environment and Planning section of TOBIN Consulting Engineers. John has an active involvement in the compilation of remedial environmental impact assessment reports, planning applications and wind farm. John has experience in remedial EIAR including authoring the Hydrology, Hydrogeology and Water Quality chapter for the Derryaroge, Derryadd and Lough Bannow Bogs Peat Extraction Substitute Consent application (ACP Reference: SU14.322204). He has also contributed to the preparation of more than five quarry remedial EIARs.

Tristan Martin (BSc, MSc,) is a hydrogeologist with 3 years of experience in geo-environmental assessments for a wide variety of projects. Tristan undertook the desk study and water sampling for the Application Site and has contributed to Hydrology and Hydrogeology chapters for EIARs on a range of projects including wind farm applications.

Frank O'Connor (MIEI) completed the Flood Risk Assessment which is incorporated into the chapter and included in Appendix 9.1.

Frank has experience in remedial EIAR at Derryaroge, Derryadd bog and Lough Bannow Bogs Peat Extraction Substitute Consent application, as well as the authoring of numerous EIARs.

9.2 ASSESSMENT METHODOLOGY

9.2.1 Background

The main considerations with regard to the assessment of effects on hydrology and hydrogeology from peat extraction activities relate to alterations to drainage patterns and changes in water quality.

Site context is provided in Chapter 1 (Section 1.7) of this remedial EIAR, while further information on sod and milled peat extraction processes is provided in Chapter 4 (Section 4.4).

The Application Site comprises Toar, Derryarkin, Ballybeg, Drumman, and Derryhinch Bogs which form part of a larger bog group, owned and operated by Bord na Móna known as Derrygreenagh Bog Group. The lands encompassed within the Application Site which are the subject of this remedial EIAR are outlined in Figure 1-1 in Chapter 1.

Section 1.6 of Chapter 1 provides a description of the site location. Overall, the Application Site comprises a total of 2,637 hectares including the five bogs, ancillary infrastructure and access roads. Milled peat extraction ceased on the site in June 2020.

The Application Site is located within the Derrygreenagh Bog Group, which is subject to Environmental Protection Agency (EPA) Integrated Pollution Control (IPC) Licence (Reg. No. P0501-01) issued to Bord na Móna Energy Limited. In accordance with this licence, a bog rehabilitation programme has been developed and is being implemented to enhance rehabilitation of parts of the site.

The methodology used to produce this chapter has drawn on information collected during the desktop study and the site walkovers.

9.2.2 Guidance and Legislative Review

The EU Water Framework Directive (2000/60/EC) (WFD) established a framework for the protection of both surface water and groundwater. The updated Directive (EU) 2026/805) expands the list of priority substances to include PFAS, microplastics, and various pharmaceuticals, and introduces mandatory "Effect-Based Monitoring" (EBM) to assess the cumulative impact of chemical mixtures on aquatic life.

Transposing legislation (S.I. No. 792 of 2009, European Communities Environmental Objective (Surface Water) Regulations 2009 as amended) outlines the water protection and water management measures required in Ireland to maintain high or good status of waters where it exists and to prevent any deterioration in existing water status.

Water bodies include both surface and groundwater bodies; achieving good status for these also depends on the good status of dependent ecosystems.

The third cycle of the River Basin Management Plan (2022 – 2027), was published by the Department of Housing, Local Government and Heritage in 2022 and sets out the measures required to protect and restore the quality of Ireland's water environment.

Article 5 of the WFD stated that characterisation is to be carried out for each river basin district, or for the portion of an international river basin district falling within its territory. There are three separate objectives that are of particular relevance to the characterisation of water quality and hydrology (Article 4.1):

- To prevent deterioration of status of all waterbodies;
- To protect, enhance and restore all waterbodies with the aim of achieving Good Status by 2015, with some limited exceptions, or by the dates set out in the river basin management plans; and
- Reverse any significant and sustained upward trend in the concentration of any pollutant resulting from the impact of human activity on groundwater.

The European Communities Environmental Objectives (Surface Waters) Regulations, 2009 as amended gives effect to the criteria and standards to be used for classifying surface waters in accordance with the ecological objectives approach of the WFD. In accordance with the regulations, waters classified as 'High' or 'Good' must not be allowed to deteriorate. Waters classified as less than good must be restored to at least good status within a prescribed timeframe. In addition, the regulations address certain shortcomings identified by the European Court of Justice in relation to Ireland's implementation of the Dangerous Substances Directive (76/464/EEC), as amended. The regulations set standards for biological quality elements and physico-chemical conditions, supporting biological elements (e.g., temperature, oxygen balance, pH, salinity, nutrient concentrations and specific pollutants), which must be complied with. These parameters establish the 'ecological status' of a water body.

This chapter has been prepared having regard to the policy documents:

- S.I No. 349 of 1989: European Communities (Environmental Impact Assessment) Regulations, and subsequent Amendments (S.I. No. 84 of 1994, S.I. No. 101 of 1996, S.I. No. 351 of 1998, S.I. No. 93 of 1999, S.I. No. 450 of 2000 and S.I. No. 538 of 2001, S.I. 134 of 2013 and the Minerals Development Act 2017), the Planning and Development Act, and S.I. 600 of 2001 Planning and Development Regulations and subsequent Amendments. These instruments implement EU Directive 2011/92/EU and subsequent amendments, on the assessment of the effects of certain public and private projects on the environment;
- Directives 2011/92/EU and 2014/52/EU on the assessment of the effects of certain public and private projects on the environment, including Circular Letter PL 1/2017: Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive);
- Planning and Development Act, 2000, as amended;
- S.I. No. 296 of 2018: European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which transposes the provisions of Directive 2014/52/EU into Irish law;
- S.I. No. 293 of 1988: European Communities (Quality of Salmonid Waters) Regulations;

- S.I. No. 272 of 2009 (as amended): European Communities Environmental Objectives (Surface Waters) Regulations 2009 (as amended by S.I. No. 296/2009; S.I. No. 386/2015; S.I. No. 327/2012; and S.I. No. 77/2019 and giving effect to Directive 2008/105/EC on environmental quality standards in the field of water policy and Directive 2000/60/EC establishing a framework for Community action in the field of water policy) and S.I. No. 722 of 2003 European Communities (Water Policy) Regulations which implement EU Water Framework Directive (2000/60/EC) establishing a framework for the Community action in the field of water policy and provide for implementation of 'daughter' Groundwater Directive (2006/118/EC) on the protection of groundwater against pollution and deterioration. Since 2000 water management in the EU has been directed by the Water Framework Directive (2000/60/EC) (as amended by Decision No. 2455/2011/EC; Directive 2008/32/EC; Directive 2008/105/EC; Directive 2009/31/EC; Directive 2013/39/EU; Council Directive 2013/64/EU; and Commission Directive 2014/101/EU (WFD). The WFD was given legal effect in Ireland by the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003);
- S.I. No. 684 of 2007: Waste Water Discharge (Authorisation) Regulations 2017, resulting from EU Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances (the Groundwater Directive); S.I. No. 106 of 2007: European Communities (Drinking Water) Regulations 2007 and S.I. No. 122 of 2014: European Communities (Drinking Water) Regulations 2014, arising from EU Directive 98/83/EC on the quality of water intended for human consumption (the Drinking Water Directive) and EU Directive 2000/60/EC;
- S.I. No. 9 of 2010: European Communities Environmental Objectives (Groundwater) Regulations 2010 (as amended by S.I. No. 389/2011; S.I. No. 149/2012; S.I. No. 366/2016; the Radiological Protection (Miscellaneous Provisions) Act 2014; and S.I. No. 366/2016); and
- S.I. No. 296 of 2009: The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 (as amended by S.I. No. 355 of 2018).

No PFAS or microplastic monitoring was undertaken; given the nature of past activity (peat extraction, not industrial manufacturing), these are not considered significant pathways.

The assessment was carried out in accordance with the guidance documents outlined in Chapter 2 – Methodology, in addition to the following guidelines, and tailored accordingly based on professional judgement and experience:

- Environmental Protection Agency (2022), Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;
- Environmental Protection Agency (2006): Environmental Management in the Extractive Industry (Non-Scheduled Minerals);
- Institute of Geologists Ireland (2013) Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements; and
- National Roads Authority (NRA) (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;

9.2.3 Desk Review

A desk study was undertaken in August 2026, in order to collate and review background information of the project during the assessment. The sources of the information obtained to inform this desk study are:

- Details of hydrological features associated with peat extraction and ancillary activities at the Application Site (e.g. drains, silt ponds, surface water outfalls) provided by the Bord na Móna;
- Integrated Pollution Control Licence (IPC) Derrygreenagh Bog Group (Ref: P0501-01) Environmental Protection Agency, Appendix 4-2;
- Bord na Móna Rehabilitation Plans, Appendix 4-3.;
    - Toar Bog Draft Cutaway Bog Decommissioning and Rehabilitation Plan 2026;
    - Derryarkin Bog Draft Cutaway Bog Decommissioning and Rehabilitation Plan 2026;
      Drumman Bog Draft Cutaway Bog Decommissioning and Rehabilitation Plan 2026; and
    - Ballybeg Bog Draft Cutaway Bog Decommissioning and Rehabilitation Plan 2026.
    - Derryhinch Bog Draft Cutaway Bog Decommissioning and Rehabilitation Plan 2026.

- Annual Environmental Reports 2000 to 2025 as shown in Appendix 4-4 (2008 to 2025 are publicly available on the EPA website[1])
- IPC Licence P0501-01 Application (available at https://leap.epa.ie/licence-profile/P0501/versions/1ec7e87d-7c61-e211-9eb5-0050568a69e2);
- Inspection of extraction records at Derrygreenagh Works;
- Aerial Maps from 1973 to 2020, Appendix 4-5;
- Bord na Móna databases on peat depth and drainage;
- Bord na Móna LiDAR data;
- National Peatland Strategy (NPWS, 2015);
- Geological Survey of Ireland (GSI) online mapping;
- Environmental Protection Agency database (www.epa.ie);
- Teagasc SIS Map Viewer (www.gis.teagasc.ie/soils/map.php);
- Met Éireann Meteorological Databases (www.met.ie);
- National Parks and Wildlife Services Public Map Viewer (www.npws.ie);
- Water Framework Directives Catchments Map Viewer (www.catchments.ie);
- Hydrological features (drains, silt ponds, outfalls) provided by the Bord na Móna ;
- Geological Survey of Ireland (GSI) online mapping – access in August 2026;
- Environmental Protection Agency database (www.epa.ie) – access in August 2026;
- Teagasc SIS Map Viewer (www.gis.teagasc.ie/soils/map.php) – access in August 2026;
- Met Éireann Meteorological Databases (www.met.ie) – access in August 2026;
- National Parks and Wildlife Services Public Map Viewer (www.npws.ie) – access in August 2026;
- Water Framework Directives Catchments Map Viewer (www.catchments.ie) – access in August 2026;
- Bedrock Geology 1:100,000 Scale Map Series, Sheet No. 6; Geological Survey of Ireland;
- Geological Survey of Ireland – Groundwater Body Characterisation Reports;

[1] Annual Environmental Reports 2010-2024 available at: https://leap.epa.ie/licence-profile/P0501/compliance

- OPW Indicative Flood Maps (www.floodmaps.ie) – access in August 2026;
- Environmental protection Agency - HydroTool Map Viewer (www.watermaps.wfdireland.ie/HydroTool) – access in August 2026;
- CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.floodinfo.ie) – access in August 2026;
- Department of Environment, Community and Local Government on-line mapping viewer (www.myplan.ie) – access in August 2026; and
- The Derrygreenagh Power Planning Application. ACP Reference 319023 (Consented April 2026).

9.2.4 Consultation

EIA scoping correspondence was issued to appropriate statutory and non-statutory bodies in June 2023 and June 2026 via post and email, in accordance with Article 28 of the Planning and Development Regulations 2001 (as amended). Consultation letters were issued to the bodies, as set out in Table 2-1 of Chapter 2, to obtain feedback on the content of the remedial EIAR and the Substitute Consent application. Consultation responses relevant to Hydrology and hydrogeology are detailed below in Table 9-1.

Table 9-1: List of Consultees and Record of Consultations

Consultee Name	Summary of Comments Received (2023)	Summary of Comments Received (2026)
Offaly Co. Co.	No response received	No response received
Meath Co. Co.	No response received	No response received
Westmeath Co. Co.	No response received	No response received
Minister for Housing, Local Government and Heritage c/o The Manager, Development Applications Unit Department of Housing, Local Government and Heritage	No response received	No response received
Environmental Protection Agency	No response received	No response received

Consultee Name	Summary of Comments Received (2023)	Summary of Comments Received (2026)
Inland Fisheries Ireland	No response received	In an email dated 13/06/2026, Inland Fisheries Ireland (IFI) asked TOBIN to consider the EU Water Framework Directive (WFD) (2000/60/EC) and Article 5 of the 2009 Surface Water Regulations. The response also includes consideration of article 28(2) of the Surface Water Regulations which states that a surface water body whose status is determined to be less than good shall be restored to at least good status not later than the end of 2015 and any water body of good status should remain at least this status. The response states that the Yellow River at this site has poor status. It contains stocks of fish such as Atlantic Salmon, Brown Trout, Eel and Lamprey. A copy of Guidelines on Protection of Fishing During Construction works in and adjacent to waters (2016) was also provided.
Geological Survey of Ireland	The response acknowledged receipt of recent consultation, and provided sources for relevant datasets to use throughout the assessment	Geological Survey Ireland issued a letter in response to the EIA Scoping request, confirming receipt of the EIA Scoping report. GSI recommended using GSI various data sets when conducting EIAR. The response did not include specific information relating to the Substitute Consent application.

9.2.5 Field Survey

Bord na Móna has been undertaking surveys and site monitoring as part of the requirements of their IPC Licence since 2000.

Table 9-2 below presents a breakdown of the site surveys that were carried out.

In support of this remedial EIAR, several site walkovers and field inspections have been carried out to review the current hydro(geo)logical conditions on site. These visits are outlined in Table 9-2 below. Information obtained during these site surveys are included in the discussions on the baseline environment in Section 9.3 of this chapter.

Table 9-2: Summary of Site Surveys completed

Date	Types of survey/ investigation conducted
September 2022	Site visit
January 2023	Site walkover and Water quality sampling at sections of Mongagh River, Yellow River
April 2023	Water quality sampling at sections of Mongagh River, Yellow River
September 2023	Site walkover
April 2026	Site walkover and Water quality sampling at sections of Mongagh River, Yellow River

9.2.6 Assessment Methodology

The importance/sensitivity of the geological, hydrogeological and hydrological receptors was assessed on completion of the desk study and baseline assessment.

Using the NRA 2008 Guidance presented in Appendix C of the IGI Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements (2013), an estimation of the importance of the hydrological and hydrogeological environments is set out in Table 9-3 and

Table 9-4.

Table 9-3: Estimation of Importance of Hydrology Attributes

Importance	Criteria	Typical Example
Extremely High	Attribute has a high quality or value on an international scale.	• River, wetland or surface water body ecosystem protected by EU legislation, e.g., 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very High	Attribute has a high quality or value on a regional or national scale.	• River, wetland or surface water body ecosystem protected by national legislation – NHA status. • Regionally important potable water source supplying >2500 homes. • Quality Class A (Biotic Index Q4, Q5). • Flood plain protecting more than 50 residential or commercial properties from flooding. • Nationally important amenity site for wide range of leisure activities.
High	Attribute has a high quality or value on a local scale.	• Salmon fishery locally important potable water source supplying >1000 homes. • Quality Class B (Biotic Index Q3-4). • Flood plain protecting between 5 and 50 residential or commercial properties from flooding.
Medium	Attribute has a medium quality or value on a local scale.	• Coarse fishery. • Local potable water source supplying >50 homes Quality Class C (Biotic Index Q3, Q2-3). • Flood plain protecting between 1 and 5 residential or commercial properties from flooding.
Low	Attribute has a low quality or value on a local scale.	• Locally important amenity site for small range of leisure activities. • Local potable water source supplying <50 homes. • Quality Class D (Biotic Index Q2, Q1) Flood plain protecting 1 residential or commercial property from flooding.

		• Amenity site used by small numbers of local people.

Table 9-4: Estimation of Importance of Hydrogeology Attributes

Importance	Criteria	Typical Example
Extremely High	Attribute has a high quality or value on an international scale.	• Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation, e.g., Special Areas of Conservation (SAC) or Special Protection Areas (SPA) status.
Very High	Attribute has a high quality or value on a regional or national scale.	• Regionally Important Aquifer with multiple wellfields. • Groundwater supports river, wetland or surface water body ecosystem protected by national legislation - Natural Heritage Area (NHA) status. • Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source.
High	Attribute has a high quality or value on a local scale.	• Regionally Important Aquifer Groundwater provides large proportion of baseflow to local rivers. • Locally important potable water source supplying >1000 homes. • Outer source protection area for regionally • important water source. • Inner source protection area for locally important water source.
Medium	Attribute has a medium quality or value on a local scale.	• Locally Important Aquifer. • Potable water source supplying >50 homes. • Outer source protection area for locally important water source.
Low	Attribute has a low quality or value on a local scale.	• Poor Bedrock Aquifer Potable water source supplying <50 homes.

This assessment involved desktop research supported by a review of water survey data to evaluate whether a fundamental, material or detectable change in water quality might have occurred from past peat extraction within the Application Site.

Overview of Impact Assessment Process

The conventional source-pathway-receptor model (Figure 9-1) for groundwater/surface water protection was applied to access impacts on groundwater and surface water specifically on downstream sensitive ecological receptors and local groundwater supplies.

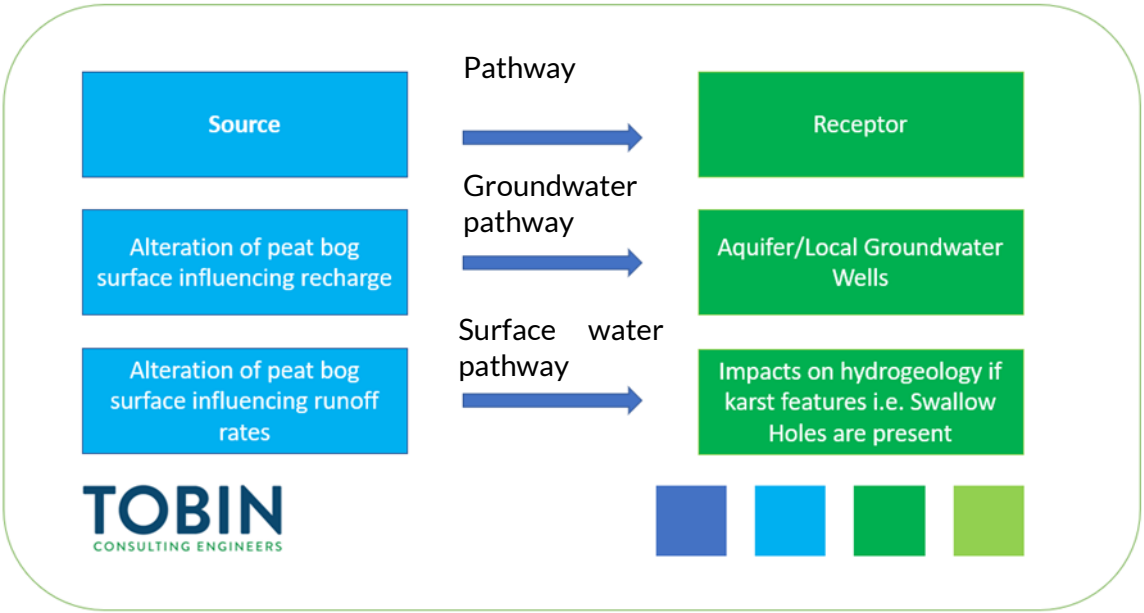


Figure 9-1: Example of a Source Pathway Receptor Model

9.3 BASELINE ENVIRONMENT

The following section builds on the opportunity to show where the baseline has evolved over the years based on the availability of data and records. In many instances, the lack of available baseline information limits the pre-extraction baseline conditions to an estimate of the baseline environment at the time, based on information available from intact bogs in Ireland.

Subject to the availability of data/records, the baseline conditions that existed in 1988 have been included throughout this report in order to align with the coming into force of the EIA Directive.

The current baseline conditions have been provided which highlight the outcome of the implementation of control and monitoring measures, subsequently following the implementation of the draft Cutaway Bog Decommissioning and Rehabilitation Plans – See Appendix 4-3.

With these key stages in mind, the receiving environment is discussed in terms of hydrogeological and hydrological features including water quality.

9.3.1 Historic Land-use Changes

The land-use changes are associated with the initial stages of peat extraction and all ancillary works process. The Application Site began operations in 1950, with the commencement of vegetation clearance and drainage installation. A summary of the operational history dates for the five bogs within the Application Site is provided in Table 9-5.

Table 9-5: Operational History of the Application Site

Bog Unit	Application Site Area – hectares	Commencement of Site Preparation Works (vegetation clearance and drainage)	Extraction Commenced	Extraction Ceased
Derryhinch Bog	334	1950	1958	2017
Drumman Bog	840	1950	1958	2018
Derryarkin Bog	400	1950	1958	Between 1988 and 1991
Toar Bog	400	1950	1958	2018
Ballybeg Bog	672	1950	1958	2020

The earliest aerial imagery available (1973) confirms that at that time, drainage to facilitate peat extraction was already inserted. Figure 4-12 in Chapter 4 presents the extent of peat extraction at the Application Site across the five bogs in 1973. All aerial imagery available for the Application Site is included in Appendix 4-14.

The drainage ditches were installed on the bog which lowered the local peat water table. Around this time and in the years that followed, ancillary features were also constructed including railway lines, workshops, welfare facilities and peat loading facilities.

After the site was drained, vegetation was removed from the bog surface, leaving only bare peat fields between the drains. During the Peat Extraction Phase following the initial drainage, only minimal land-use change occurred which predominantly related to minor annual topographic changes caused by ongoing peat extraction activities and all ancillary works. While the peat extraction activities and all ancillary works was ongoing it was not possible to rehabilitate the underlying peatland.

All peat extraction activities ceased at the Application Site by the Bord na Móna in 2020.

9.3.2 Topography and Site Description

The topography of the Application Site is relatively flat and low lying with the majority of the area within 73 m and 96 m above mean ordnance datum (mOD).

The site topography is summarised as follows;

- Toar Bog is between 86-96 mOD;
- Derryarkin is between 76-86 mOD;
- Drumman is between 74-86 mOD;
- Ballybeg is between 73-82 mOD, and
- Derryhinch is between 74-82 mOD.

On a regional scale, the Application Site and its environs are in the Boyne Hydrometric Area and Catchment. The Application Site is relatively flat in most areas with ground slopes predominantly less than 1 degree. The delineation of the catchments and general area of confluence is shown in Figure 9-2. The river waterbody types located within the Application Site are primarily slow flowing, lowland streams/drainage channels which flow to the River Boyne. The western and northwestern section of Toar bog are within the River Brosna catchment.

The Mongagh River (Castlejordan _07) is located to the north of Derryarkin and flows through Drumman bog and the south of Derryhinch bog. The Yellow [Castlejordan] River flows between the Derryarkin and Ballybeg River (see Figure 9-2). The Yellow River discharges to the Castlejordan river near Clongall Bridge to the north of Edenderry.

Croghan Hill (234 mOD) is the regional high point, located to the east of Ballybeg bog. Croghan hill and Cronin Hill (134 mOD) are the remains of an extinct volcanoes that erupted and rose up from the sea that covered this region during the Carboniferous Period. Croghan Hill is not within in the Application Site.

Localised anthropogenic alterations to topography due to peat extraction activities are likely to have been most apparent prior to the time that the EIA Directive was brought in as this was during peak extraction at the site – See Chapter 4.

Areas of active extraction within the Application Site became smaller as extraction encountered the underlying tills and gravels.

Further details on the site topography are included in Chapter 8 - Lands, Soils and Geology.

9.3.3 Establishing the 1988 Baseline Environment

9.3.3.1 Water Balance

Long term rainfall and evaporation data is available from Met Éireann. The 30-year annual average rainfall recorded at the Derrygreenagh rainfall station (Station no. 3431) at Derrygreenagh works, are presented in Table 9-6: Met Eireann - Rainfall gauge data, along with data from the Mullingar synoptic station located 15 km to the northwest.

Table 9-6: Met Eireann - Rainfall gauge data from Derrygreenagh rainfall station (Station no. 3431)

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mullingar	91.7	72	78.3	62.1	68.7	70.5	61.8	80.8	73.8	102	82.4	97.1	941
Derrygreenagh Works	86.1	78.3	66.5	59.4	62.5	68.8	79.4	81.4	77.5	107.5	98.9	96.5	962.8
Mean number of days with ≥ 0.2 mm Mullingar	19	17	20	15	16	16	16	17	17	19	18	19	209

The long-term average Potential Evaporation (PE) is 491 mm/yr at Mullingar. Long term PE data is not available at Derrygreenagh. This value is used as the best estimate of the site PE. Actual Evaporation (AE) at the Application Site is estimated as 466 mm/yr (which is 0.95 × PE).

The effective rainfall (ER) represents the water available for runoff and groundwater recharge. The ER for the site is calculated as follows: Effective rainfall (ER) = 963 mm/yr – 466 mm/yr = 497 mm/yr. Based on groundwater recharge coefficient estimates from the GSI (www.gsi.ie) an estimate of 19.65 mm/year average annual recharge is given for basin peat in this area (recharge coefficient of 4%). This means that the hydrology of the Application Site is characterised by very high surface water runoff rates and very low groundwater recharge rates. Therefore, annual recharge and runoff rates for the Application Site are estimated to be 19.65 mm/yr and 497 mm/yr respectively.

As the Application Site was drained pre-1988, on-site drainage systems provided storage and attenuation, and release runoff water. Some additional storage capacity was created between 1988 and 2020 in the low-lying areas. Ponding frequently occurs in a number of areas in the Application Site. Since 2020, these areas have accumulated and expanded as drainage is decommissioned.

9.3.4 Surface Water Hydrology

The purpose of this section is to describe the surface water environment at the Application Site as of 1988 including the following:

- Surface Water Catchments;
- Site surface water features and drainage;
- Flood Risk Assessment;
- Assessment of hydrometric data;
- Surface water abstractions within the catchment of the site; and
- Surface water quality.

9.3.4.1 Surface Water Catchments

A catchment also referred to as a drainage basin and watershed, is a topographic area that collects and discharges surface streamflow through one outlet or mouth. The catchment boundary is the line dividing land where surface drainage flows toward a given stream from land where it drains into a separate stream.

The majority of the Application Site is located in the Boyne Catchment (Catchment ID: 07), with a portion of Toar Bog located in the Lower Shannon Catchment (Catchment ID: 25A) and a portion of Ballybeg Bog located in the Barrow Catchment (Catchment ID: 14).

The Mongagh River (EPA code: 07/C/04) is a tributary of the Yellow River, which ultimately flows into the River Boyne (HA 7). The Mongagh River rises to the west of Tyrellspass, Co. Westmeath, to the north of Toar Bog, flowing in an easterly direction before joining with the Yellow River and entering the River Boyne (See Figure 9-2). The Grand Canal, located to the south of the Application Site, is not hydrologically linked to the Application site.

The historical OSI and EPA steam names typically are similar to the current EPAs WFD naming nomenclature however a number of streams in the area are renamed in this area. The old and new names are outlined below in Table 9-7 and a catchment summary in 9-8.

Table 9-7: OSI/EPA river names

OSI Stream/River Names	EPA Stream Names (WFD)	EPA Code	Notes
Mongagh River	Kiltotan and Collinstown	07K04	Section to the north of Derryarkin
Mongagh River	Castlejordan 07	07C04	Flows through Drumman Bog
Derry River	Castlejordan 07	07C04	Section between Rochfordbridge and Drumman
Rochfortbridge Stream	Rochfordbridge Steam	07R04	Section to the north of Rochfortbridge and discharges to the Mongagh
Yellow river	Yellow [Castlejordan]	07Y02	Section which flows to the north of Ballybeg
Milltownpass River	Milltown	07M04	Stream from Milltown which flows between Drumman and Derryhinch bog
TEMP_07D93	Unnamed channel	07D93	Parallel channel to the Milltown however appears to discharge to the Milltown river.

The Mongagh River flows through the centre of Drumman Bog. The Rochfortbridge Stream converges with the Mongagh River approximately 1 km east of the R400 in Drumman Bog. The Mongagh River converges with the Milltown River between Drumman and Derryhinch Bog. Downstream of Derryhinch Bog, the Mongagh Rover is known as Castlejordan_07 River. The Castlejordan River joins with the Yellow River approx. 1 km south of Castlejordan Village.

The Yellow River (EPA code: 07Y02) is a tributary of the River Boyne (HA 7) rises to the north of Croghan Village, Co. Offaly; flowing in an easterly direction for approximately 22 km before entering the River Boyne (See Figure 9-2). The Coolcor Stream rises on the lower slopes of Croghan and flows through the site before discharging to the Yellow River to the east of the R400.

Table 9-8: Catchment Summary

Catchment	Hydrometric Area	Subcatchment	Relevant Rivers/streams	% of site within each catchment
Boyne	**07**	Yellow [Castlejordan]_SC_010	Coolcor, Yellow, Mongagh, Rochfordbridge, Rathgarrett, Milltown, Kiltotan	96.4% (2281/2367 ha site)

Boyne	**07**	Boyne_SC_030	Kinnegad	0.7% (19 ha)
Barrow	**14**	Figile_SC_020	Esker, Figile	0.3% (6 ha)
Lower Shannon	**25A**	Silver [Tullamore]_SC_010 River Brosna	Silver	2.8% (74 ha)

The bog consists of four sub-catchments, which are the Yellow [Castlejordan]_SC_010, Boyne_SC_030, Figile_SC_020 and Silver [Tullamore]_SC_010. The regional natural surface water drainage pattern, in the environs of the Application Site is shown in Figure 9-2.

The Mongagh and Yellow River drains the central part of the site. The Mongagh and Yellow rivers flow eastwards, externally to the site and effectively dividing the site. The Yellow [Castlejordan]_SC_010 drains a Subcatchment of approximately 184 km^2 before entering the River Boyne downgradient of Clongall Bridge.

9.3.4.2 Drainage (1988)

The Application Site has been comprehensively drained in the past by a series of parallel open ditches to facilitate peat production. Large areas of the site have been stripped to the subsoil layer as a result of peat extraction operations. The drainage ditches installed in the worked bog discharge to the natural drainage of the area. These drains were constructed in the early-1950s in order to prepare for peat extraction. Similar to arterial drainage schemes, the streams surrounding the bog and within the boundary were straightened in the 1950s to 1970s.

As part of the Third Development Programme in the 1970s (refer to Chapter 4 - Section 4.5 of this remedial EIAR), the Bord na Móna decided in 1974 to install specially designed and constructed silt ponds across its landbank. The purpose of this was to control surface water emissions, thereby trapping more than 90% of the suspended solids present in the drainage waters[2]. In 1975, experiments were carried out to establish the optimum size, number and location of silt ponds required for a given area. As well as installing silt ponds in all new bogs from this date, Bord na Móna decided to fit ponds in all previously developed bogs which at that time was a *"major time-consuming undertaking"* which *"often proved difficult and slow"*. In the provision of silt ponds across the bogs, the perimeter drains were now diverted through the ponds prior to discharge into a nearby surface water body. Silts ponds were installed in the early 1970s were reviewed with addition ponds installed in 1978. As detailed in Chapter 4, further Bord na Móna 's records show that silt pond measures were introduced across all the Bord na Móna 's bogs in the early to mid-1980s in response to the 1977 *Water Pollution Act*. All silt ponds were in place pre-1988. It is assumed that the Ballybeg pumping station was in place in 1987 as detailed Chapter 4.

EPA rivers were identified flowing through the Application Site (see Figure 9-2). The Application Site and adjacent lands also include many man-made drains which flow to the watercourses identified in Figure 9-3 to Figure 9-7 and assist in the drainage of peatland and reclaimed peatland areas, under agricultural land use and forestry. A list of the bogs and relevant drainage is included in Table 9-9.

[2] Clarke, Donal, *Brown Gold: A History of Bord na Móna and the Irish Peat Industry* (2010)

Table 9-9: Bog Drainage Summary pre-1988

Bog	Notes (25 inch map) 1920s	Drainage 1970s	Silt ponds (1988)	Pumps (1988)
Toar	Historical drainage (25inch map) along the Application Site and drainage surrounding mineral island. More intensive drainage towards west of site.	All Field and main drains in place in 1973. Boundary drain/streams evident on 1973 maps.	6	0
Derryarkin	Historical drainage (25 inch map) along the Application Site and drainage surrounding mineral island. (Grand) canal feeder marks across Derryarkin and Ballybeg bog	All Field and main drains in place in 1973. Boundary drain/streams evident on 1973 maps.	0	0
Ballybeg	Historical drainage (25 inch map) along the Application Site and drainage surrounding mineral island. (Grand) canal feeder marks across Derryarkin and Ballybeg bog	All Field and main drains in place in 1973. Boundary drain/streams evident on 1973 maps.	6	2
Drumman	Historical drainage (25 inch map) along the Application Site and drainage surrounding mineral islands. River Mongagh evident through centre of bog. Drainage channels extent to surface water ponds. A number of streams mark the townland boundaries.	All Field and main drains in place in 1973. Boundary drain/streams evident on 1973 maps.	6	0
Derryhinch	Historical drainage (25 inch map) along the Application Site and drainage surrounding mineral islands. Drainage evident surrounding Lough Bawn. Drainage channels extent to surface water ponds. A number of streams mark the boundaries.	All Field and main drains in place in 1973. Boundary drain/streams evident on 1973 maps.	4	0

9.3.4.3 Peat Extraction Phase Drainage July 1988 – June 2020

The Application Site was subject to peat extraction pre-1988. Drainage ditches and associated silt ponds were in place prior to 1988. Internal drains were cleaned on a regular basis in suitable weather, mainly prior to and post the extraction season (i.e. between October and March). This was necessary to remove sediment from the bottom of milled peat field ditches and dispose of it by spreading it on the adjacent peat field.

During the Peat Extraction Phase, the deepening and maintenance of drainage channels continued beyond 1988 and remained ongoing at each bog until peat extraction ceased. As the areas subject to peat extraction gradually decreased in extent over time, and as the available

peat depth correspondingly reduced, the number and extent of drains requiring deepening and maintenance also reduced over time.

The main drains store water and direct it to main drains and to the settlement ponds. The storage capacity of run-off water in the drainage network lessens the impact of sediment mobilisation to receiving water, due to the low velocity of the water and the retention time in the drains. Final settlement occurs in the settlement ponds before discharging to the adjacent drains and streams. See the conceptual sketch below in Diagram 9-1.

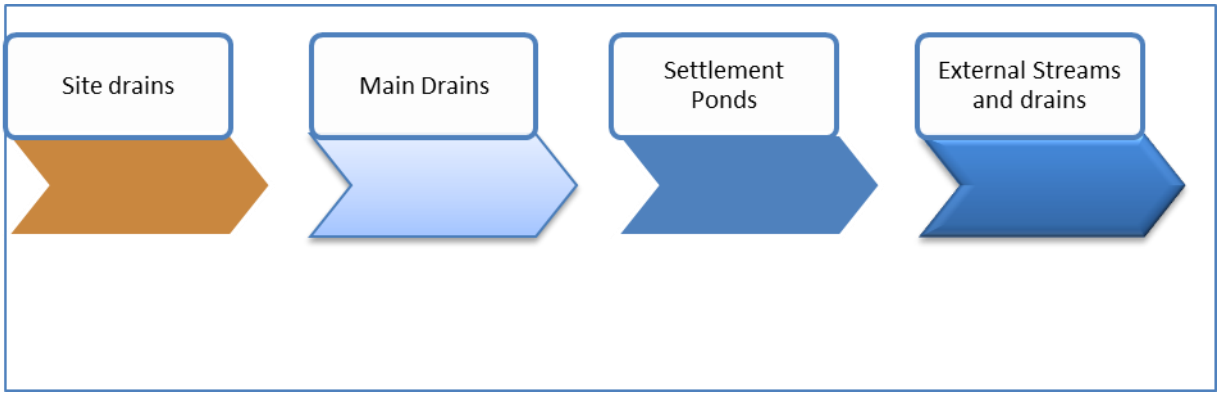


Diagram 9-1 Drainage Hierarchy on Peatlands

Drainage channels were maintained and are present throughout the Application Site which is currently operated under IPC licence P0501-01 since 2000. All drainage water from bog units in the licensed area discharged via an appropriately designed silt pond treatment arrangement. The silt ponds serving operation bogs have been sized and maintained in accordance with a condition in the existing Integrated Pollution Control Licence (P0501-01) which states:

"*Within three years of date of grant of this licence all existing silt ponds serving operational bogs shall achieve the following minimum performance criteria (flood periods excepted):*

- *Maximum flow velocity < 10 cm/s; and*
- *silt design capacity of lagoons, minimum 50 m^3 per nett ha of bog serviced."*

9.3.4.4 Current Phase Drainage (2020-Present Day)

A review of the current drainage was undertaken for the Application Site. The current drainage infrastructure is as shown in Figure 9-4 to Figure 9-8. This drainage was in operation during the Peat Extraction Phase described in Section 9.3.4.3 above. Surface water ponding has increased on the five bogs as drainage maintenance is reduced.

Extensive areas of gravel extraction occurred at Derryarkin and Drumman Bog in 2002 following planning permission from Westmeath County Council and Offaly County Council (planning application reference 01444 and 01365 respectively). An extension to Drumman sand and gravel extraction pit was consented by Offaly County Council in 2019 (application reference 19/25).

Extraction is by means of drag line/dredging and occurs below the water table. Where extraction has occurred below the water table, large ponds have formed. These ponds are not connected to the streams but can accommodate flood flows of the Mongagh river. Water levels

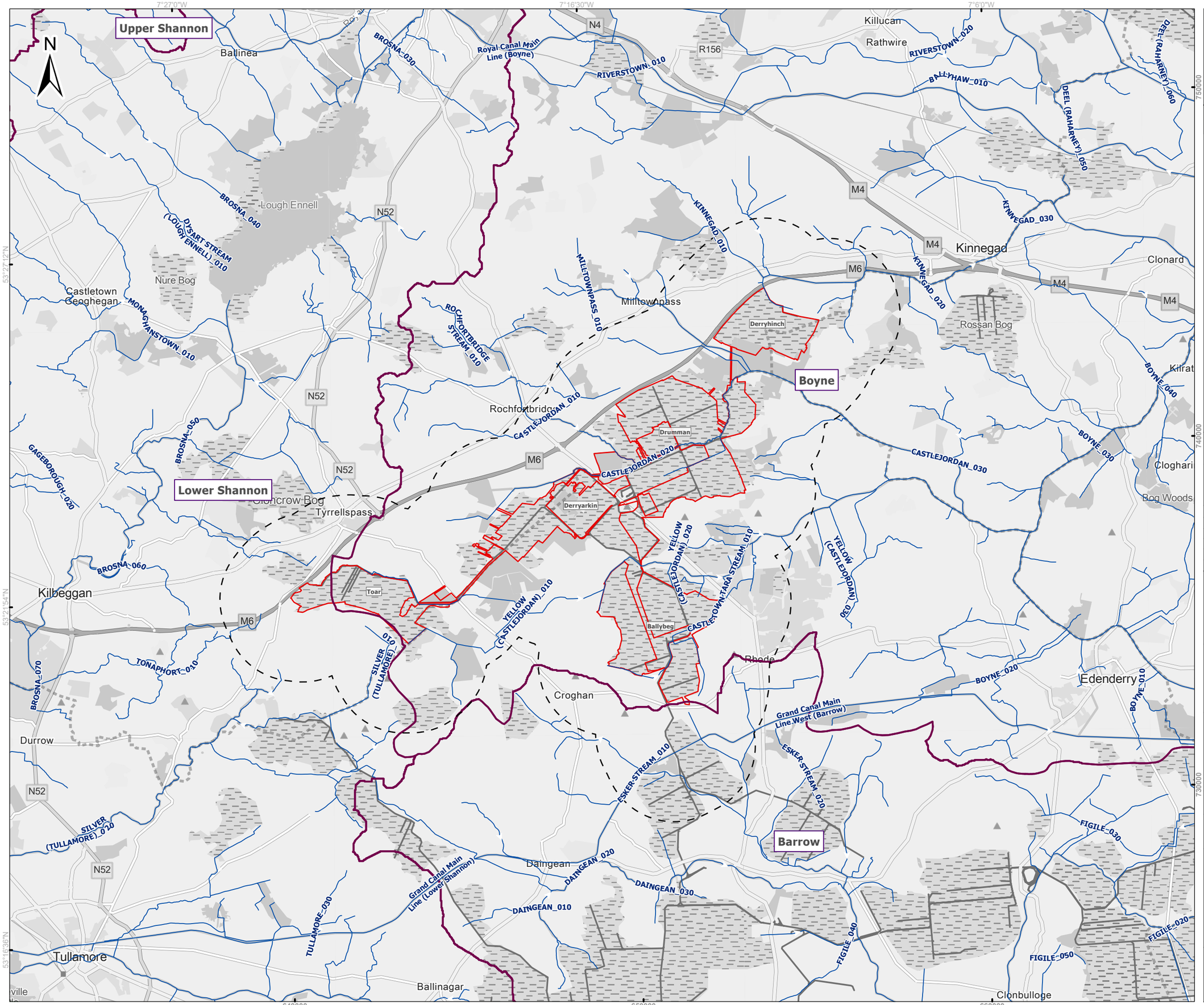
in the ponds vary seasonable by 1 to 1.5 m. Groundwater/water levels in the Derryarkin ponds are c76 mOD and 74 mOD in Drumman representing the regional water levels in the area. Water in the ponds seeps back towards the Mongagh providing baseflow in the summer months.

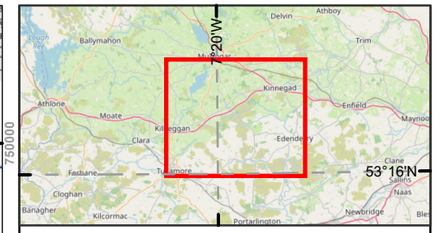
Lands within Toar Bog discharge to the Kiltotan stream, Tyrellspass and Silver [Tullamore] River. A number of topographical highs occur in the centre of Toar bog. As a consequence the eastern section of Toar bog discharges through a series of silt ponds SW15 and SW16 to Kiltotan River – See Figure 9-7. The western and northern sections of Toar bog discharge through a series of silt ponds to the Tyrellspass (SW14) and Silver [Tullamore] River (SW17). Sampling points are included in the Cutaway Bog Decommissioning and Rehabilitation Plan for Toar Bog, see Appendix 4-3.

Lands within Derryarkin Bog discharge to the Kiltotan stream and Yellow River. A number of topographical highs occurs to the centre of Derryarkin bog. There are no active silt ponds on Derryarkin as all water percolates through the permeably gravels. The area is currently modified by gravel extraction.

The majority of Ballybeg Bog discharges via SW14 and SW11 outfalls, located in the west of the bog. The Tara/Coolcor stream discharges to the Yellow River. An area of unextracted bog to the south of Ballybeg bog discharges to the Esker river. The unextracted area of bog is to the north of the Grand Canal however there is no hydrological connection to the canal.

Lands within Drumman Bog discharge to the Mongagh stream via SW4A to SW7 which is runs through the centre of the bog. The majority of Derryhinch Bog discharges to Mongagh stream via SW2 to SW4, located in the south of Derryhinch Bog. Approximately 19 hectares to the north discharge to the Kinnegad stream to the north of Derryhinch Bog.





Legend

- Application Site Boundaries
- 2km Buffer
- WFD - Rivers
- WFD - Catchments

0 1.5 3
Kilometers

Spatial Reference
Datum: IRENET95
EPSG: 2157

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A	21/08/2026	First issue	K.K	B.K

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Title:
Figure 9-2:
Regional EPA Catchment Delineation

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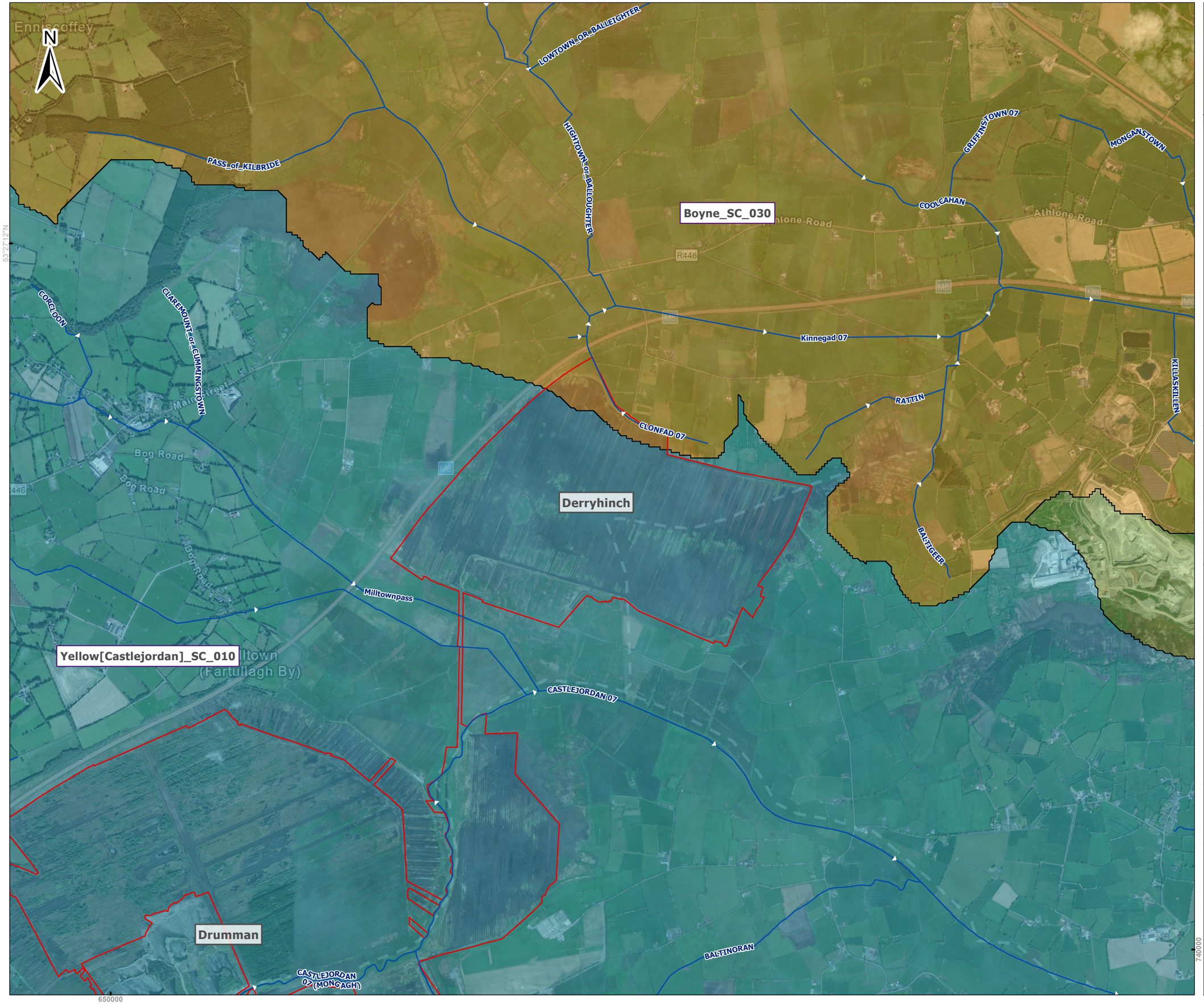
Prepared by:	Checked by:	Date:
K.Kale	B.Kasonde	August 2026

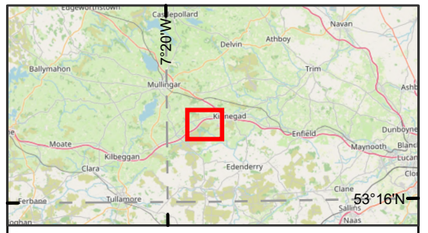
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Legend

- Application Site Boundaries
- EPA - Rivers

WFD - Subcatchments

- Boyne_SC_010
- Boyne_SC_030
- Yellow[Castlejordan]_SC_010

0 500 1,000
Meters

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A	20/08/2026	First issue	K.K	B.K

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Figure 9-3: Surface Water Features/ Local Catchment Delineation - Derryhinch Bog

Scale @ A3: 1:25,000

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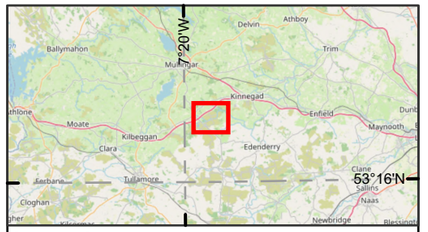
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Legend

- Application Site Boundaries
- EPA - Rivers

WFD - Subcatchments

- Boyne_SC_030
- Yellow[Castlejordan]_SC_010

0 500 1,000
Meters

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Figure 9-4: Surface Water Features/ Local Catchment Delineation - Drumman Bog

Scale @ A3: 1:25,000

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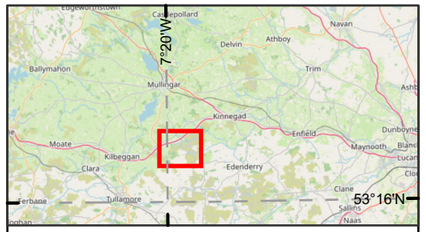
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Legend

- Application Site Boundaries
- WFD - Subcatchments
  - BROSNA_SC_020
  - Figile_SC_020
  - Silver[Tullamore]_SC_010
  - Yellow[Castlejordan]_SC_010
- EPA - Rivers

0 500 1,000
Meters

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Figure 9-5: Surface Water Features/ Local Catchment Delineation - Derryarkin Bog

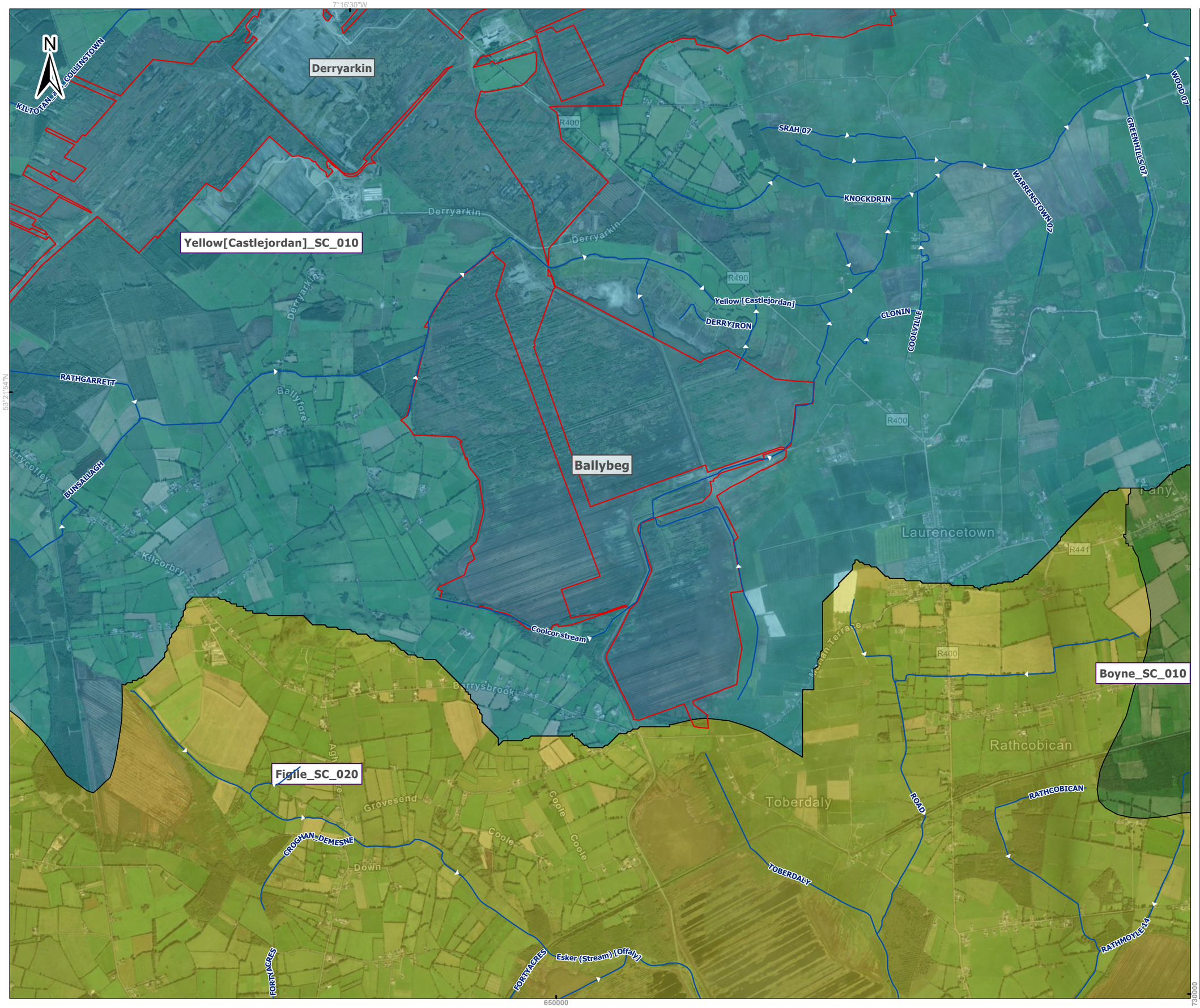
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Legend

- Application Site Boundaries
- EPA - Rivers

WFD - Subcatchments

- Boyne_SC_010
- Figile_SC_020
- Yellow[Castlejordan]_SC_010

0 500 1,000
Meters

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Figure 9-6: Surface Water Features/ Local Catchment Delineation - Ballybeg Bog

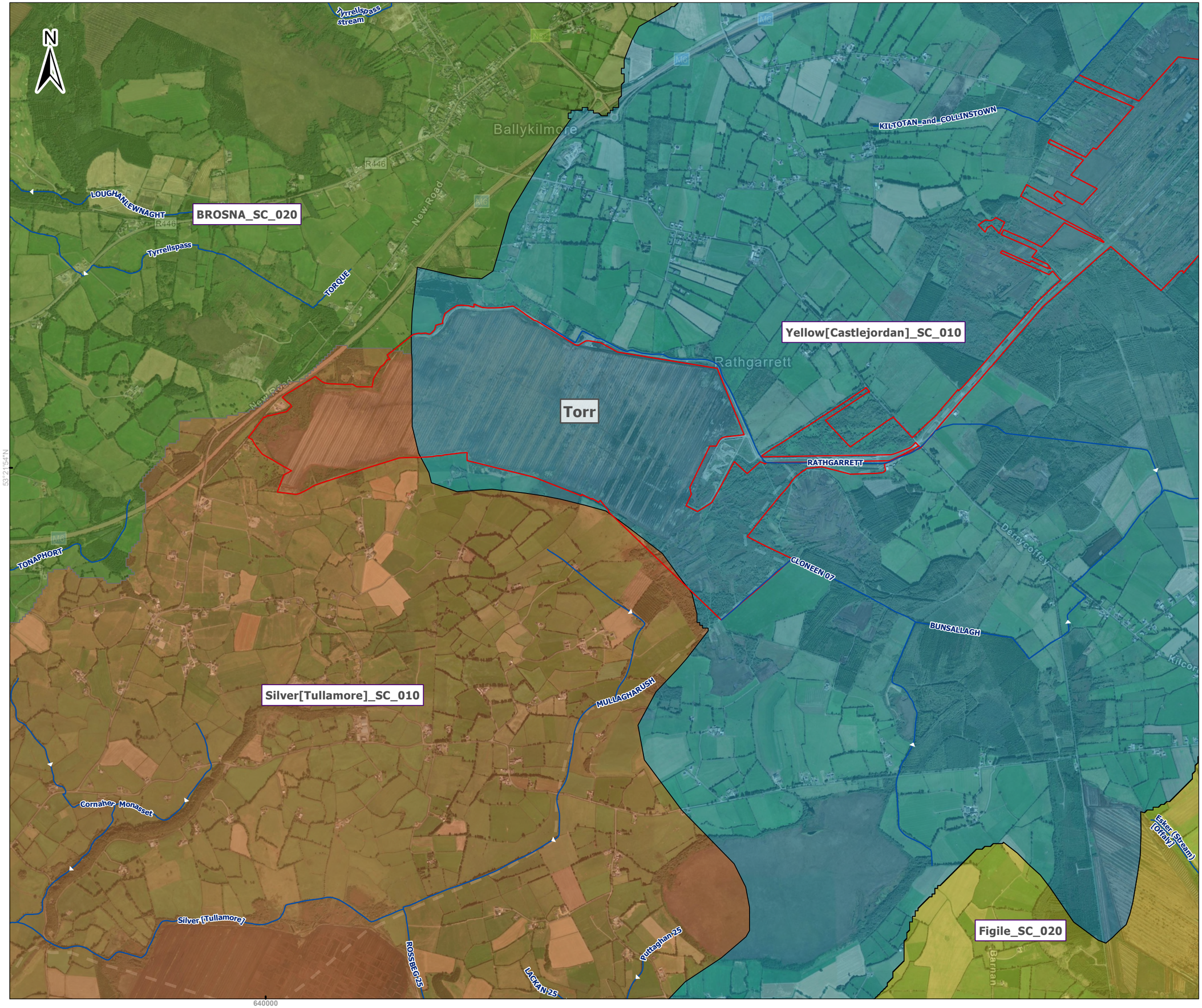
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Legend

- Application Site Boundaries
- EPA - Rivers

WFD - Subcatchments

- BROSNA_SC_020
- Figile_SC_020
- Silver[Tullamore]_SC_010
- Yellow[Castlejordan]_SC_010

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Meters

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Client: BnM

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Figure 9-7: Surface Water Features/ Local Catchment Delineation - Toar Bog

Scale @ A3: 1:25,000

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9.3.4.5 Flood Risk Assessment

The OPW 'Flood Hazard Database' was used to obtain information on historical flooding events within the Application Site. No reported historical flood events were identified on or within 1km of the Application Site. There are no records of flooding in 1988. The OPW Past Flood Events Maps have no records of recurring or historic flood instances. Based on the flood maps shown in Figure 3-1, Appendix 7-1, there are no reported past flood events recorded by the OPW National Flood Information Portal in the immediate vicinity of the Application site. The closest past flood event to the subject site is a recurring flood event 1.3km north of the subject site at its closest point and is a result of low-lying lands.

The national programme of Catchment Flood Risk Assessment and Management (CFRAM) Studies comprises the execution of three parts:

- Preliminary Flood Risk Assessments;
- Flood Hazard Mapping; and
- The development of Flood Risk Management Plans.

The OPW initially produced a series of maps to assist in the development of the Preliminary Flood Risk Assessment (PFRA) throughout the country. These maps were produced as part of a desktop study of several sources. In July 2011, the Office of Public Works (OPW) published a series of maps showing the estimated 100-year flood plain from the Preliminary Flood Risk Assessment (PFRA) study. This information was used to establish the current baseline conditions. Areas of pluvial flooding were noted on the OPW PFRA mapping. The PFRA study maps (i.e., the MyPlan.ie viewer) were reviewed and the Application Site is not located within a groundwater flood risk zone. There is no evidence of historic groundwater flooding at the site.

Part of the Application Site boundary is located in a flood prone area (Flood Zone A or B) based on the Preliminary Flood Risk Assessment (PFRA) and National Indicative Flood Map (NIFM) maps. This dataset suggests that fluvial flooding potentially occurs at in a number of areas on site.

Substantial areas of the Application Site and surrounding area have been artificially drained to enable industrial peat extraction. The carefully maintained network of drainage ditches effectively drain the Application Site and surrounding area.

Drainage management works carried out as part of site activities reduce the potential for surface water ponding. Data on historical flooding is limited but records do not indicate that flooding occurs on the downgradient streams. Large areas of pluvial flooding occur within the site where the infiltration capacity is lower than the rainfall rates. Water management has limited the potential for flooding in the Ballybeg bog. The drainage within the site is controlled in existing drains and in part by mechanical pumping in accordance with the IPC licence.

Pump capacities at Ballybeg were designed based on a runoff rate of 1 l/s/Ha, which is less than the pre-1988 runoff rates. Greenfield runoff rates for the Application Site are greater than 5 l/s/Hectare therefore surface water accumulates/ponds on site during the winter, providing additional flood storage on site and reducing the potential for flooding off site.

9.3.4.6 Assessment of Hydrometric Data

Long term rainfall and evaporation data was sourced from Met Éireann. The long-term (30 year) annual average rainfall (AAR) for the Mongagh and Yellow/Yellow [Castlejordan]_SC_010 Catchment of 184 km^2, to immediately downstream of the bog is 941mm. During the months April to October, there is very little runoff or recharge. Most of the effective rainfall at field scale occurs in the winter months.

There are no long-term recording surface water flow gauging station in or near the site. In the 1950s and 1960s however, three water level gauging stations associated with the original power station recorded levels in the rivers for a short period and flows were measured at one of these, in the Yellow [Castlejordan]_SC_010 River downstream of the site. These provide an indication of the surface water response at the time.

Flows estimated using the EPA Hydrometric System (Hydrotool), also suggest a relatively fast runoff.

9.3.5 Surface Water Quality

9.3.5.1 EPA Biological Q-Rating Monitoring

The Environmental Protection Agency (EPA) regularly monitors water bodies in Ireland as part of their remit under the Water Framework Directive (WFD) (2000/60/EC), which requires that rivers are maintained or restored to good/ favourable status. Quality of watercourses are assessed in terms of 4 No. quality classes; 'Unpolluted' (Class A), 'Slightly Polluted' (Class B), 'Moderately Polluted' (Class C) and 'Seriously Polluted' (Class D). These water quality classes, and the water quality monitoring programme are described in the EPA publication 'Water Quality in Ireland, 2022'. The water quality assessments are based on biological surveys. Biological Quality Ratings or Biotic Indices (Q values) ranging from Q1 to Q5 are defined as part of the biological river quality classification system. The relationship of these indices to the water quality classes defined above, are set out in Table 9-10.

Table 9-10: Relationship between Biotic Indices and Water Quality Classes

Biotic Index	Quality Status	Quality Class
Q5, 4-5, 4	Unpolluted	Class A
Q3-4	Slightly Polluted	Class B
Q3, 2-3	Moderately Polluted	Class C
Q2, 1-2, 1	Seriously Polluted	Class D

In order to determine the biological quality of the river, the Q-scheme index is used whereby the analyst assigns a Biotic Index value (Q-Value) based on macro invertebrate results. The Biotic Index is a quality measurement for freshwater bodies that range from Q1 - Q5 with Q1 being of poorest quality and Q5 being pristine/unpolluted. The criteria used in the assessment of ecological water quality is shown in Table 9-11. Subsequently, the Q-values for the rivers relevant to the application site based on the criteria listed above are listed in Table 9-12 to Table 9-21.

Table 9-11: Biotic Index of Water Quality

Biotic Index	EPA Water Quality	Water Framework Directive (WFD) Ecological Status	Quality Status
Q5	Good	High	Unpolluted
Q4-5	Fair-Good	High	Unpolluted
Q4	Fair	Good	Unpolluted
Q3-4	Doubtful-Fair	Moderate	Slightly Polluted
Q3	Doubtful	Poor	Moderately Polluted
Q2-3	Poor-Doubtful	Poor	Moderately Polluted
Q2	Poor	Bad	Seriously Polluted
Q1-2	Bad-Poor	Bad	Seriously Polluted
Q1	Bad	Bad	Seriously polluted

Based on the results recorded at the EPA water monitoring stations, the overall water quality in the watercourses around the application site have been generally moderate to good over the past 30 years, since regular monitoring commenced (See Table 9-12 to Table 9-21). Results upgradient are in general lower due to a combination of pressures including WWTPs, agriculture and hydromorphological pressures.

Recorded Q-values have been consistently between 3-4 and 4 in the majority of monitoring stations. Stations that were in operation around the time the EIA Directive was brought in were also recording Q values of between 3 to 4 (between 1980 to 1990).

9.3.5.2 Pre-1988 EPA Q-Values

The first national biological and physico-chemical survey of the quality of Irish rivers and streams was carried out by An Foras Forbartha in 1971. No Q-values were available on the Castlejordan River or its tributaries. There are EPA or WFD monitoring locations on the streams adjacent to or within the Application Site as shown in Figure 9-2. Historic Q-value data are available for the year 1981 and 1985 for the Yellow and Castlejordan Rivers. Garr bridge is located approximately 2 km to the east of Derryarkin bog. The result is presented in Table 9-12, with a value of Q3-4, indicating the river was 'moderately polluted' during this year. Clongall bridge is located approximately 8 km to the east of Derryarkin bog boundary. The result is presented in Table 9-12, with a value of Q4-5, indicating the river was 'unpolluted' during 1981/1985.

Biological sampling of the Yellow River has been conducted by the EPA, as well as the Environmental Research Unit (ERU) and An Foras Forbartha prior to the establishment of the

EPA. The Mongagh River was partially straightened and deepened as part of the Boyne Arterial Drainage Scheme.

Table 9-12: EPA Q-Values – Yellow River

Station Name /Location	Yellow River			
	Upgradient		Downgradient	
Distance to bog	Site boundary	Site Boundary	2km	8km
Station Code	RS07Y020060	RS07Y020070	RS07Y020100	RS07Y020300
Location	Yellow - Nr Derryarkin	Br d/s Big R confl	Garr Br	Clongall Br
1981	ND[3]	ND	3-4	4-5
1985	ND	ND	4	4-5

Table 9-13: EPA Q-Values - Mongagh River, Kinnegad and Brosna Tributaries

Station Name/Location	Mongagh River	Kinnegad		Silver [Tullamore]	Silver [Tullamore]	Brosna
	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
Distance to bog - km	1.5 km	2.5 km	8 km	7km	9km	6.5km
Station Code	RS07C040100	RS07K010060	RS07K0100100	RS25S030055	RS25S030100	RS25B090400
Location	Baltinoran Br	Br SE of Cloonfad Ho	Ballivor Rd Br Kinnegad	SILVER (TULLAMORE) - Derrygolan Br (RH Chan)	Gormagh Br	D/Ss Kilbeggan Br
1981	4-5	3-4	3	ND	ND	ND
1982	ND	ND	ND	ND	ND	4
1984	ND	ND	ND	ND	ND	4-5
1985	3-4	4	3	ND	ND	4
1987	ND	ND	ND	4	3-4	ND

[3] ND= No Data

The Mongagh River that bisects the Drumman bog has one monitoring station downgradient pre-1988. Conditions downgradient of the site at Baltinoran Bridge (0100) are variable between Q3-4 and Q4-5. The Kinnegad River was straightened and deepened as part of the Boyne Arterial Drainage Scheme. The river predominantly drains agricultural lands along with a small section of Derryhinch Bog. Two monitoring stations downgradient of the bog. In the 1980s, the dominance of pollution tolerant macroinvertebrate fauna and paucity of sensitive species indicated unsatisfactory ecological conditions at the four stations surveyed on the Kinnegad River.

Water quality monitoring on the Brosna and Silver [Tullamore] indicated unpolluted conditions. No monitoring was undertaken on the Esker stream pre-1988.

9.3.5.3 EPA Q-Values during the Peat Extraction Phase (1988 – 2020)

EPA Q-Value monitoring has been completed at locations on the downgradient steams between 1988 and 2020. Historic Q-values are shown in Table 9-14 to 9-15. Q-Values within the Yellow River have fluctuated between Q3-Q4 'Slightly Polluted' status during the Peat Extraction Phase, with 'Unpolluted' status Q4, recorded downgradient at Garr Bridge and Clongall Bridge during the Peat Extraction Phase. The majority of EPA monitoring points in the Brosna catchment indicate that the overall water quality in this area was Q3–Q4 'Moderately Polluted' and that the water quality upstream of the Application Site was Q3-Q4 'Slightly Polluted', during the Peat Extraction Phase.

Table 9-14: EPA Q-Values– Yellow River

Station Name /Location	Yellow River			
	Upgradient		Downgradient	
Distance to bog	Site boundary	Site Boundary	2km	8km
Station Code	RS07Y020060	RS07Y020070	RS07Y020100	RS07Y020300
Location	Yellow - Nr Derryarkin	Br d/s Big R confl	Garr Br	Clongall Br
1990		ND	3-4	4
1994	4	ND	4	4
1997	4	ND	3-4	4
2000	4	ND	3	4
2003	3	3	3-4	4
2006	ND	4	3-4	4
2009	ND	4	3-4	4
2012	ND	4	3-4	4
2014	ND	ND	3-4	ND
2015	ND	3-4	4	ND

Station Name /Location	Yellow River			
	Upgradient		Downgradient	
Distance to bog	Site boundary	Site Boundary	2km	8km
Station Code	RS07Y020060	RS07Y020070	RS07Y020100	RS07Y020300
Location	Yellow - Nr Derryarkin	Br d/s Big R confl	Garr Br	Clongall Br
2018	ND	3-4	4	4
2020	ND	3	4	4
2024	ND	3	3-4	4

Results upgradient of the Application Site are generally moderately polluted with deterioration at Bridge d/s Big River confluence since 2015. This is attributed to river widening works and intensification of agriculture activity at this location. This monitoring has indicated that the water quality at the closest monitoring location downgradient (Garr Bridge: Site Code 07Y020100), has a majority of monitoring events recording "slight pollution to unpolluted" at the monitoring location.

Further downstream at Clongall Bridge (Site Code 07Y020300) water quality has been consistently good, with a water quality status of "unpolluted" recorded for all monitoring events. Upstream of Garr Bridge, (Site code 07Y020060), near Derryarkin the water quality has been classified as "unpolluted" since monitoring began in 1994.

Table 9-15: EPA Q-Values Mongagh River and tributaries

Station Name/Location	Rochfordbridge Stream		Mongagh River		
Distance to bog - km	Upgradient 2 km	Upgradient 1.8 km	Upgradient 1.6 km	Downgradient 1.5 km	Downgradient 5.5 km
Station Code	RS07C040040	RS07C040050	RS07C040060	RS07C040100	RS07C040200
Location	Mongagh Br	SE of Rahinine d/s Rochfortbridge Stream	SE of Rahinine	Baltinoran Br	0.5km d/s Castlejordan Br
1990	ND	ND	3-4	4	4
1994	ND	ND	2-3	3-4	3-4
1997	ND	ND	2-3	3-4	3-4
2000	ND	ND	3	4	4

Station Name/Location	Rochfordbridge Stream		Mongagh River		
	Upgradient	Upgradient	Upgradient	Downgradient	Downgradient
Distance to bog - km	2 km	1.8 km	1.6 km	1.5 km	5.5 km
Station Code	RS07C040040	RS07C040050	RS07C040060	RS07C040100	RS07C040200
Location	Mongagh Br	SE of Rahinine d/s Rochfortbridge Stream	SE of Rahinine	Baltinoran Br	0.5km d/s Castlejordan Br
2003	ND	ND	ND	3	3
2006	ND	2-3	ND	3-4	4
2009	ND	3	ND	3-4	4
2012	3	ND	ND	3-4	4
2015	3	ND	ND	3-4	4
2018	3	ND	ND	4	4

The Mongagh River that bisects the Drumman bog has two monitoring stations adjacent to the Application Site. Upgradient of the site, a lack of sensitive macroinvertebrate fauna, dominance of pollution tolerant species, abundant instream macrophyte growth and excessive siltation indicated unsatisfactory poor ecological conditions in the upper reaches (0040) of the Mongagh River.

Conditions downgradient of the site at Baltinoran Bridge (0100) improved to good in 2018. However, calcification and compaction of the substratum are still evident. Between 1988 and 2018, results at Baltinoran Br varied between Q3-4 and Q4.

The monitoring location at Baltinoran Bridge (07/Y/02/0100), where a Q value of 3 was assigned in 2003. There was an improvement water quality at this monitoring station since 2003.

The Kinnegad River was straightened and deepened as part of the Boyne Arterial Drainage Scheme. The river predominantly drains agricultural lands along with a small section of Derryhinch Bog. Two monitoring stations downgradient of the bog – See Table 9-16. The water quality furthest downgradient of Kinnegad was poor with improvement see since 2000 as a result of WWTP capacity upgrades and the inclusion of secondary treatment.

Table 9-16: EPA Q-Values- Kinnegad River

Station Name/Location	Kinnegad		
	Upgradient	Downgradient	Downgradient
Distance to bog -km	2 km	2.5 km	8 km
Station Code	RS07K010040	RS07K010060	RS07K0100100
Location	Kinnegad - Br NE of Eskertown	Br SE of Cloonfad Ho	Ballivor Rd Br Kinnegad
1990	4	3-4	1
1994	ND	2-3	3-4
1997	ND	3	3-4
2000	ND	3-4	3
2003	ND	3-4	3
2006	ND	3-4	3-4
2009	ND	3-4	ND
2012	ND	3-4	3-4
2014	ND	3-4	ND
2015	ND	3-4	ND
2018	ND	3-4	ND

The Esker Stream rises to the west of Croghan Hill and flows underneath the Grand Canal, discharging to the Figile River near Esker Bridge. Overall, the EPA water quality monitoring in the Esker Stream between 1989 and 2017 varied between poor and high status water quality at their stations – See table 9-17. No peat extraction was undertaken by Bord na Móna on Ballybeg south catchment which flows to the Esker stream. The rail line which is located to the west of Ballybeg south was constructed in the 1960s however the infrastructure remains in place.

Table 9-17: Esker River

Station Name/Location	ESKER	
	Downgradient	
	5 km	8 km
Station Code	RS14E010100	RS14E010200
Location	Newtown Br	Esker Br
1989	3	3
1993	3-4	4
1997	4	4-5
2000	4-5	4
2003	3-4	3-4
2006	ND	3
2009	ND	3-4
2011	ND	3-4
2015	ND	3-4
2017	ND	4

9.3.5.4 EPA Q-Values during the Current Phase (June 2020 – Present Day)

EPA Biological Q-Value monitoring data postdates 2020, with Q-Values for 2020 to 2024 provided in Table 9-18.

Table 9-18: Castletown Stream - Yellow River

Station Name/Location	Castletown Tara Stream/ Coolcor	
	Downgradient	Downgradient
Distance to bog	0	0.2
Station Code	RS07C080020	RS07C080190
Location	Rhode WWTW upstream	Rhode WWTW downstream
2020	3-4	3-4
2024	3	3

Monitoring of the Coolcor Stream was undertaken for the first time in 2020. The monitoring stations are located downgradient of Ballybeg bog and Rhode WWTP. Results in 2020 and 2024 indicate the stream is slightly to moderately polluted both upgradient and downgradient of the Rhode WWTP. The stream is straightened and deepened as part of the Boyne Arterial Drainage Scheme and initial Bog Development. Arterial drainage maintenance works may have temporarily affected results in 2024.

In 2020, the dominance of pollution tolerant macroinvertebrate fauna and paucity of sensitive species indicated unsatisfactory ecological conditions at the four stations surveyed on the Kinnegad River in 2020. The loss of sensitive taxa from the site at the Bridge SE of Cloonfad House (0060) indicated a decline to poor ecological status. These conditions persisted downstream. In 2024 the results from Br SE of Cloonfad House recovered to Q 3-4 (slightly polluted).

Table 9-19: Mongagh River – Yellow River Tributary

Station Name/Location	Rochfordbridge Stream		Mongagh River		
	Upgradient	Upgradient	Upgradient	Downgradient	Downgradient
Distance to bog - km	2 km	1.8 km	1.6 km	1.5 km	5.5 km
Station Code	RS07C040040	RS07C040050	RS07C040060	RS07C040100	RS07C040200
Location	Mongagh Br	SE of Rahinine d/s Rochfortbridge Stream	SE of Rahinine	Baltinoran Br	0.5km d/s Castlejordan Br
2020	3	ND	ND	4	4
2024	3	ND	ND	3-4	4

The Mongagh River that bisects the Drumman bog has two monitoring stations adjacent to the Application Site. Upgradient of the site, a lack of sensitive macroinvertebrate fauna, dominance of pollution tolerant species, abundant instream macrophyte growth and excessive siltation indicated unsatisfactory poor ecological conditions in the upper reaches (0040) of the Mongagh River. Conditions downgradient of the site at Baltinoran Bridge (0100) improved to good in 2018. However, calcification and compaction of the substratum are still evident. Between 1988 and 2024, results at Baltinoran Br varied between Q3-4 and Q4. Water quality downgradient of the bogs is generally similar to or higher than water quality upgradient on the Rochfordbridge Stream.

The monitoring location along the Mongagh River is at Baltinoran Bridge (07/Y/02/0100), where a Q value of 4 was assigned in 2018, 2020 and 2024. There was an improvement water quality at this monitoring station since 2003.

Table 9-20: Kinnegad River

Station Name/Location	Kinnegad		
	Upgradient	Downgradient	Downgradient
Distance to bog -km	2 km	2.5 km	8 km
Station Code	RS07K010040	RS07K010060	RS07K0100100
Location	Kinnegad - Br NE of Eskertown	Br SE of Cloonfad Ho	Ballivor Rd Br Kinnegad
2020	ND	3	3-4
2024	ND	3-4	3

The Kinnegad River was straightened and deepened as part of the Boyne Arterial Drainage Scheme. The river predominantly drains agricultural lands along with a small section of Derryhinch Bog. Two monitoring stations downgradient of the bog. In 2020, the dominance of pollution tolerant macroinvertebrate fauna and paucity of sensitive species indicated unsatisfactory ecological conditions at the four stations surveyed on the Kinnegad River in 2020. The loss of sensitive taxa from the site at the Bridge SE of Cloonfad House (0060) indicated a decline to poor ecological status. These conditions persisted downstream. In 2024 the results from Br SE of Cloonfad House recovered to Q 3-4 (slightly polluted).

Table 9-21: Esker River

Station Name/Location	Esker	
	Downgradient	
	5km	8km
Station Code	RS14E010100	RS14E010200
Location	Newtown Br	Esker Br
2020	ND	3-4
2023	ND	3-4

The Esker Stream rises to the west of Croghan Hill and flows underneath the Grand Canal, discharging to the Figile River near Esker Bridge. Overall, the EPA water quality monitoring in the Esker Stream in 2020 and 2023 indicated moderate status water quality at their stations. No peat extraction was undertaken by Bord na Móna on Ballybeg south catchment which flows to the Esker stream.

9.3.5.5 Field Based Studies

Site Specific Surface Water Quality

Site Specific Surface Water Quality (2026):

Field monitoring results taken in January 2023, April 2023 and April 2026 are included in Table 9-22 to Table 9-24. The sampling locations are shown in

Figure 9-11: Surface Water Monitoring Locations

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Table 9-22: Surface Water Quality Monitoring - January 2023[4]

ID	EPA Waterbody	Temp °C	Conductivity (µS/cm)	pH (units)	Ammonium as N(mg/l)
S1	0.4 km downgradient of Toar bog and SW17	8.8	625	7.8	0.4
S2	Mongagh River	8.9	660	7.6	0.09
S3	Quarry Pond in Drumman Bog	9.1	680	7.5	0.01
S4	Mongagh River D/S Drumman bog	8.8	710	8.1	0.03
S5	Mongagh River - Baltinoran Bridge – DS of Drumman/Derryhinch bogs	8.9	650	7.4	0.05
S6	SW15 – Ballybeg bog	9.5	710	7.6	0.7
S7	Yellow River - Garr Bridge	8.9	655	7.4	0.03

Table 9-23: Surface Water Quality Monitoring - April 2023[5]

ID	EPA Waterbody	Temp °C	Conductivity (µS/cm)	pH (units)	Ammonium as N(mg/l)
S1	0.4 km downgradient of Toar bog and SW17	9.2	685	7.8	0.3
S2	Mongagh River	9.8	710	7.6	0.02
S3	Quarry Pond in Drumman Bog	10.4	680	7.5	0.04
S4	Mongagh River D/S Drumman bog	11.9	690	7.5	0.1

[4] Handheld meter (YSI ProDSS, Hach)

[5] Handheld meter (YSI ProDSS)

S5	Mongagh River - Baltinoran Bridge – DS of Drumman/Derryhinch bogs	10.5	720	7.6	0.05
S6	SW15 – Ballybeg bog	11	NA	7.8	0.3
S7	Yellow River - Garr Bridge	10.2	710	7.7	0.03
S8	Yellow River US Derryarkin and Ballybeg bogs	10.1	725	7.4	0.04

Table 9-24: Surface Water Quality Monitoring -April 2026

ID	EPA Waterbody	Temp °C	Conductivity (µS/cm)	pH (units)	Ammonium as N (mg/l)	TSS (mg/l)	Chloride (mg/l)
S1	Toar bog and SW17	8.8	740	8.0	0.46	8.0	15
S2	Mongagh River	8.6	780	7.9	0.096	< 5.0	22
S3	Quarry Pond in Drumman Bog	8.7	580	8.2	0.02	6.0	15
S4	Mongagh River D/S Drumman bog	8.5	700	8.3	0.50	10	19
S5	Mongagh River - Baltinoran Bridge – DS of Drumman/Derryhinch bogs	8.9	930	8.5	0.20	< 5.0	19
S6	SW15 – Ballybeg bog	8.1	690	8.0	0.5	< 5.0	17
S7	Yellow River - Garr Bridge	8.1	720	8.3	0.11	5.0	16
S8	Yellow River US Derryarkin and Ballybeg bogs	7.9	750	8.2	0.075	< 5.0	18

Additional handheld monitoring was undertaken downgradient of Toar bog in April 2026. Monitoring was undertaken in SW17, 0.4 km downgradient, 1.4 km downgradient and 2.4 km downgradient of SW17. Results showed a decrease as outlined below:

- S1 - located at SW17 – 0.48 mg/l NH4

- 0.4 km downgradient – 0.26 mg/l NH4
- 1.4 km downgradient – 0.26 mg/l NH4
- 2.4 km downgradient – 0.01 mg/l NH4

While the channel is highly modified, has a low gradient and is straightened, the channel showed a rapid reduction in ammonium concentrations in the Kiltonan Stream.

Suspended Solids

As detailed in Table 9-24, suspended solids were below 35 mg/l in accordance with the IPC Licence. The Environmental Protection Agency (EPA) in Ireland introduced trigger values for water quality monitoring as part of its efforts to manage and protect water resources. These values were established to help identify potential pollution issues and guide actions to address water quality concerns. The specific introduction of trigger values in Ireland is closely tied to the implementation of the EU Water Framework Directive (WFD), which was adopted in 2000 and transposed into Irish law through the Water Pollution Acts and subsequent regulations. The trigger values as part of its water quality assessment framework for IPC Licence.

Trigger values are used to indicate when certain parameters (e.g., phosphorus, nitrogen, or other pollutants) exceed acceptable levels, prompting further investigation or remedial action. These values are part of Ireland's broader water quality management system, which aims to achieve "good status" for all water bodies as required by the WFD.

EPA Monitoring Data

The EU Water Framework Directive was adopted, leading to more systematic and detailed monitoring programs. Since the late 2000s the EPA began to systematically monitor surface water locations including at Garr Bridge – Yellow River and Baltinoran Bridge on the Mongagh River. The data presented below summarises the EPA monitoring data where records are available.

Nutrients and Temperature:

Annual average concentrations are below the annual average environmental quality standards (AA-EQS). Based on the EPA monitoring data, there is no significant trend in ammonium concentrations from 2010-2024, as shown graphically in Figure 9-8.

The EPA chemical test for nutrient conditions is “Pass” or “High” on account of good nitrate, ammonium and orthophosphate conditions at Garr Bridge and Clongall Bridge (Station RS07Y020100 and RS07Y020300).

As stated in the EPA sub-catchment assessment, there are a number of issues within Castlejordan River including heavy siltation and channelisation. Pressures identified include historical channel modification. The river system is affected by historical hydromorphological alterations in areas at and downstream of the Application Site.

Ammonium (NH4):

Ammonia is produced when organic compounds are decomposed through microbial action induced by drainage/lowering of the water table. The reported concentrations as outlined in Table 9-25 to 9-26 of total ammonia represent both unionized ammonia (NH_3, or ‘free ammonia’) and ionized ammonia (NH_4^+, or ammonium). NH_3 is significantly more toxic to fish.

However, at the Application Site, NH_4^+ will be the dominant form of ammonia at lower temperatures and near neutral pH (pH 7 – 8.2), therefore the percentage of NH_3 is low. In all cases, the total ammonia concentrations and pH values (based on EPA monitoring and site-specific monitoring data above) result in ammonia (NH_3) concentrations that are significantly lower than the 0.02 mg/l NH_3 threshold for "non-ionized ammonia" that is stipulated in the Quality of Salmonid Water Regulations (S.I. No. 293/1988). Annual average Environmental Quality Standards (AA-EQS) are set out in the Surface Water Regulations (2019) (S.I. No. 77/2019). Since transposition of EU law is the responsibility of Member States, annual average threshold values vary across EU states (EU, 2006)[6].

No statistically significant trend was noted. EPA data is not available pre-2010. EPA data from 2010 to 2024 is included in Table 9-27 to 9-30.

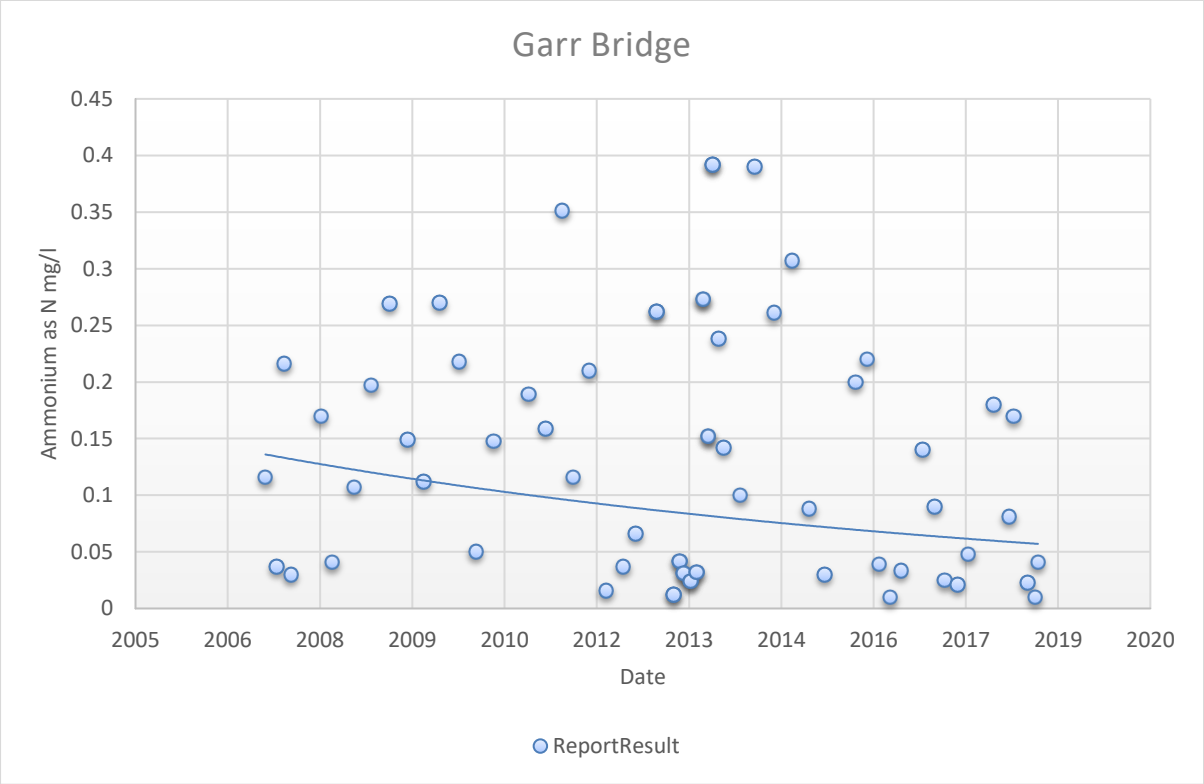


Figure 9-8: Ammonium Concentrations - Garr Bridge

EPA chemistry data is available since 2007, with a summary of collated from 2007 to 2025 summarised in Table 9-25, indicating no significant overall trend following cessation of activities. One annual exceedance for ammonium occurred in 2018 as detailed in Table 9-25. Laboratory Limits of Detection for ammonium have decreased since 2010.

[6] Directive 2006/118/EC on the protection of groundwater against pollution and deterioration and Directive 2013/39 EU as regards priority substances in the field of water policy.

Concentration are elevated both upgradient and downgradient of the site however the overall significant trend is downwards at all locations between 2007 and 2020.

Table 9-25: Annual Average Ammonium Concentrations (mg/l)

Year	SE of Rahinine d/s Rochfortbridge Stream	Baltinoran	Castlejordan Br	Clongall Br
2007	0.621	0.131	0.101	0.083
2008	0.088	0.187	0.12	0.092
2009	0.144	0.133	0.108	0.105
2010	0.093	0.103	0.088	0.084
2011	0.088	0.061	0.042	0.044
2012	0.092	0.06	0.034	0.037
2013	0.293	0.092	0.06	0.04
2014	ND	0.108	0.122	ND
2015	0.04	0.168	0.15	0.104
2016	0.076	0.163	0.146	0.041
2017	0.043	0.049	0.02	0.023
2018	0.215	0.09	0.063	0.032
2019	0.054	0.102	0.066	0.031
2020	0.049	0.086	0.078	0.048
2021	0.041	0.068	0.036	0.042
2022	0.03	0.06	0.046	0.053
2023	0.126	0.059	0.033	0.046
2024	0.144	0.048	0.031	0.056
Mann – Kendall trend 2007- 2020[7]	Decreasing trend- statistically significant	Decreasing trend- statistically significant	Decreasing trend- statistically significant	Decreasing trend- statistically significant
Trend – 2020 to 2025[8]	No statistically significant trend	No statistically significant trend	No statistically significant trend	No statistically significant trend

EPA monitoring of the Coolcor stream commenced in 2012 both upstream and downstream of the Rhode WWTP – See table 9-26. The upstream WWTP monitoring point is located at Ballybeg bog and reflects the discharge from the Ballybeg bog and surrounding agricultural area. Concentration of ammonium are elevated in both the upstream and downstream locations. A downward trend was identified however it is not statistically significant. Concentrations varied temporarily however concentrations were generally lower downgradient of the site,

[7] Mann Kendall - P values <0.05

[8] Mann Kendall - P values >0.1

Table 9-26: Annual Average Ammonium Concentrations – Coolcor Stream (mg/l)

Year	US WWTP	DS WWTP
2012	0.92	0.88
2013	1.09	1.76
2014	1.36	0.84
2015	1.42	0.90
2016	0.75	0.55
2017	1.10	0.78
2018	1.69	0.92
2019	1.32	0.94
2020	0.75	1.10
2021	0.77	0.64
2022	0.92	0.55
2023	0.49	0.37
2024	0.72	0.31
2025	0.7	0.42

The Water Framework Directive (WFD) classified all the surface waters as at risk of not achieving good status by 2027 (www.epa.ie). Where waterbodies have been classed as At Risk, significant pressures have been identified. The significant pressure affecting the greatest number of waterbodies is agriculture, followed by hydromorphology, other[9], peat, domestic wastewater, urban wastewater, urban run-off, industry and forestry.

Orthophosphate:

The reported EPA orthophosphate concentrations at Baltinoran Bridge are below AA EQS standards and are included in Appendix 9.2. Typically, orthophosphate concentrations are low in peatland areas that are not developed for agricultural purposes.

Nitrate:

There is no reported exceedance above the EU Drinking Water Directive (2020/2184) maximum admissible concentration of 50 mg/l, or the groundwater threshold value of 37.5 mg/l (Protection of Groundwater Regulations, 1999 (S.I. No. 41/1999)).

Pre-IPC Licence (i.e. pre-2000)

Prior to the implementation of the IPC Licence requirements and associated monitoring, limited monitoring of surface water quality and emissions was completed at the Application Site by Bord na Móna.

However, several control measures were designed to protect surface water quality were in place prior the IPC Licence.

[9] *Other – abstractions, aquaculture, atmospheric, anthropogenic pressures, historically polluted sites, waste, water treatment and invasive species have all been grouped into the "Other" pressure category for the purpose of this report

These measures were related to refuelling of production machines, storage and of tanks and drums and maintenance of machinery, with further information detailed in Section 4.4 Chapter 4 Project Description.

IPC Licence Monitoring (2000 – Present Day)

Surface water monitoring is conducted at the Application Site on a regular basis since 2000 as part of IPC Licence requirements. Data from four bogs between 2010 to 2024 are presented from Table 9-27 to 9-30 respectively. As there is no surface water discharges from Derryarkin bog, no monitoring is undertaken on this bog. Additional IPC Licence data are available for 2001 to 2010 (during the Peat Extraction Phase) and included in Appendix 4-3, however locations are not directly comparable to the locations shown in Figure 9-11.

Emission limit values associated with the IPC Licence are presented in Table 9-27 below. All samples were taken from surface water channels during periods of low flow (i.e. low dilution factor), these results are as expected for the environment in this area (in particular, occasional elevated levels of ammonia and suspended solids would be expected in a peat soil/subsoil environment).

While most samples complied with IPC Licence emission limit values, exceedances of the 2.78 mg/l NH4 ELV were recorded at Derryhinch and Ballybeg bogs between 2010–2019. These exceedances were generally isolated (single quarters), highly variable and did not show a persistent trend.

A statistically significant trend (Mann-Kendell trend test) was noted between 2010-2024 at Ballybeg[10]. While concentration fluctuate, an overall decrease is noted in SW13A. No statistically significant trend was identified in the downgradient EPA monitoring locations at Rhode WWTP, Garr Bridge (yellow river) or Baltinoran Bridge (Mongagh River).

Table 9-27: IPC Licence Surface Water Monitoring Results (Drumman Bog)

SW Monitoring Point No.	Monitoring Period	pH	Suspended Solids (SS)	Total (dissolved) Solids	Ammonia	TP	COD	Colour
		Ph 6-9	35 mg/l	-mg/l	2.78 mg/l	mg/l-	100 mg/l	-Hazen
SW-8	Q3 13	7.8	5	290	0.02	0.05	40	51
SW-9	Q3 13	7.6	5	354	0.02	0.05	82	244
SW-8	Q2 16	7.6	5	344	0.36	0.09	68	152
SW-9	Q2 16	7.3	16	256	0.37	0.13	101	166
SW-8	Q3 17	7.9	7	366	0.19	0.05	38	93
SW-9	Q3 17	7.6	6	274	0.02	0.05	42	122
SW-8	Q3 18	8	5	366	0.35	0.05	50	166
SW-9	Q3 18	7.5	5	240	0.04	0.07	62	146

[10] P values are <0.05 and therefore indicate a statistically significant decrease.

SW Monitoring Point No.	Monitoring Period	pH	Suspended Solids (SS)	Total (dissolved) Solids	Ammonia	TP	COD	Colour
		Ph 6-9	35 mg/l	-mg/l	2.78 mg/l	mg/l-	100 mg/l	-Hazen
SW-8	Q1 19	7.7	5	240	1.2	0.05	10	127
SW-9	Q1 19	7.7	5	228	0.15	0.05	54	118
SW-8	Q1 21	7.7	2	266	0.11	0.05	47	161
SW-9	Q1 21	7.6	2	243	0.138	0.05	42	144
SW-8	Q2 22	7.5	2	270	0.015	0.05	68	224
SW-9	Q2 22	6.3	8	131	0.014	0.08	79	327
SW-8	Q4 22	7	5	123	0.178	0.06	76	352
SW-9	Q4 22	No flow						
SW-8	Q1 23	7.8	12	339	0.076	0.05	52	310
SW-9	Q1 23	No flow						

Table 9-28: IPC Licence Surface Water Monitoring Results (Derryhinch Bog)

Bog	SW Monitoring Point No.	Monitoring Period	pH	Suspended Solids (SS)	Total (dissolved) Solids	Ammonia	TP	COD	Colour
IPC Licence Emission Limit values[11]			Ph 6-9	35 mg/l	-mg/l	2.78 mg/l	mg/l-	100 mg/l	-Hazen
Derryhinch	SW4	Q1 10	7.5	5	398	2.4	0.5	56	160
Derryhinch	SW4	Q2 10	7.8	5	274	1.87	0.5	56	113
Derryhinch	SW4	Q3 10	7.6	5	374	1.11	0.5	59	140
Derryhinch	SW4	Q4 10	7.5	5	350	1.91	0.5	55	143
Derryhinch	SW4	Q1 11	7.4	5	–	0.24	0.05	46	–
Derryhinch	SW4	Q2 11	7.8	5	–	1.35	0.05	49	–
Derryhinch	SW4	Q3 11	7.6	5	–	0.06	0.05	61	–
Derryhinch	SW4	Q4 11	7.4	5	–	1.76	0.05	52	–
Derryhinch	SW-2	Q2 13	7.8	8	218	2.3	0.05	65	100
Derryhinch	SW-3	Q2 13	7.8	7	332	2.7	0.06	41	83

[11] Bord na Mona Energy Ltd (Derrygreenagh Group of Bogs) IPC Licence P0501-01

Bog	SW Monitoring Point No.	Monitoring Period	pH	Suspended Solids (SS)	Total (dissolved) Solids	Ammonia	TP	COD	Colour
IPC Licence Emission Limit values11			Ph 6-9	35 mg/l	-mg/l	2.78 mg/l	mg/l-	100 mg/l	-Hazen
Derryhinch	SW-4	Q3 13	7.6	5	344	0.05	0.05	83	161
Derryhinch	SW-1	Q3 13	7.5	12	237	1.9	0.13	108	125
Derryhinch	SW-2	Q4 15	7.2	5	166	1.5	0.05	83	225
Derryhinch	SW-3	Q4 15	7.4	5	204	2.4	0.05	22	129
Derryhinch	SW-2	Q1 16	7.9	16	372	1.4	0.05	53	136
Derryhinch	SW-3	Q1 16	7.8	5	400	1.5	0.05	48	133
Derryhinch	SW-4	Q2 16	7.9	10	446	1.5	0.05	37	52
Derryhinch	SW-1	Q2 16	7.9	7	462	0.91	0.05	36	33
Derryhinch	SW-1	Q3 17	7.6	5	226	0.71	0.08	39	86
Derryhinch	SW-3	Q3 17	7.5	5	284	3	0.05	28	61
Derryhinch	SW-4	Q3 17	7.7	5	314	0.14	0.05	33	108
Derryhinch	SW-1	Q3 18	7.7	7	344	0.51	0.09	78	95
Derryhinch	SW-2	Q3 18	7.6	5	228	1.1	0.06	61	119
Derryhinch	SW-3	Q3 18	7.7	5	214	2.3	0.05	49	201
Derryhinch	SW-4	Q3 18	7.8	5	432	0.08	0.05	52	105
Derryhinch	SW-1	Q1 19	7.4	5	222	1.3	0.05	73	139
Derryhinch	SW-2	Q1 19	7.4	5	200	1.8	0.05	63	186
Derryhinch	SW-3	Q1 19	7.4	5	276	1.9	0.05	50	125
Derryhinch	SW-4	Q1 19	7.6	5	272	1	0.05	10	16
Derryhinch	SW-1	Q1 21	6.9	2	133	0.183	0.05	70	387
Derryhinch	SW-2	Q1 21	7.6	2	283	0.05	0.05	61	246
Derryhinch	SW-3	Q1 21	6.5	2	100	0.04	0.05	68	311
Derryhinch	SW-4	Q1 21	6.5	2	102	0.224	0.05	61	296
Derryhinch	SW-1	Q1 22	6.8	2	170	0.311	0.05	81	347
Derryhinch	SW-2	Q1 22	7	3	115	0.149	0.05	43	178
Derryhinch	SW-3	Q1 22	6.9	2	187	0.396	0.05	89	345
Derryhinch	SW-4	Q2 22	7.2	2	192	0.221	0.13	63	318
Derryhinch	SW-1	Q4 22	7.5	2	231	0.106	0.05	71	269
Derryhinch	SW-2	Q4 22	7.4	2	308	0.181	0.05	75	287
Derryhinch	SW-3	Q4 22	7.7	2	236	0.098	0.05	74	231



Bog	SW Monitoring Point No.	Monitoring Period	pH	Suspended Solids (SS)	Total (dissolved) Solids	Ammonia	TP	COD	Colour
IPC Licence Emission Limit values11			Ph 6-9	35 mg/l	-mg/l	2.78 mg/l	mg/l-	100 mg/l	-Hazen
Derryhinch	SW-4	Q4 22	7.5	2	313	0.057	0.05	79	247
Derryhinch	SW-1	Q1 23	6.7	2	156	0.093	0.05	60	313
Derryhinch	SW-2	Q1 23	7.3	2	220	0.019	0.05	51	186
Derryhinch	SW-3	Q1 23	7.2	2	215	0.056	0.05	63	260
Derryhinch	SW-4	Q1 23	6.9	2	184	0.258	0.05	67	317

Table 9-29: IPC Licence Surface Water Monitoring Results (Ballybeg Bog)

Bog	SW Monitoring Point No.	Monitoring Period	pH	Suspended Solids (SS)	Total (dissolved) Solids	Ammonia	TP	COD	Colour
IPC Licence Emission Limit values[12]			Ph 6-9	35 mg/l	-mg/l	2.78 mg/l	mg/l-	100 mg/l	-Hazen
Ballybeg	SW15	Q1 10	7.8	5	436	1.31	0.5	58	85
Ballybeg	SW15	Q2 10	7.7	5	514	1.27	0.11	42	72
Ballybeg	SW15	Q3 10	7.7	22	492	1.32	0.12	68	89
Ballybeg	SW15	Q4 10	7.7	**115**	500	1.44	0.16	135	71
Ballybeg	SW13	Q1 11	7.7	5	–	1.22	0.05	52	–
Ballybeg	SW13	Q2 11	7.8	5	–	2.16	0.05	30	–
Ballybeg	SW13	Q3 11	7.8	5	–	0.88	0.05	31	–
Ballybeg	SW13	Q4 11	7.7	5	–	1.6	0.05	34	–
Ballybeg	SW-13	Q1 13	7.9	11	222	1.4	0.06	38	80
Ballybeg	SW-12	Q4 13	7.1	5	306	0.11	0.05	79	263
Ballybeg	SW-13	Q4 13	7.6	13	318	1.5	0.05	54	124
Ballybeg	SW-13A	Q4 13	7.6	17	342	0.88	0.08	46	103

[12] Bord na Mona Energy Ltd (Derrygreenagh Group of Bogs) IPC Licence P0501-01

Bog	SW Monitoring Point No.	Monitoring Period	pH	Suspended Solids (SS)	Total (dissolved) Solids	Ammonia	TP	COD	Colour
IPC Licence Emission Limit values[12]			Ph 6-9	35 mg/l	-mg/l	2.78 mg/l	mg/l-	100 mg/l	-Hazen
Ballybeg	SW-11	Q1 15	7.2	5	312	0.68	0.05	59	208
Ballybeg	SW-12	Q3 16	7.4	5	347	0.73	0.05	48	77
Ballybeg	SW-13	Q3 16	7.6	7	394	0.08	0.05	90	101
Ballybeg	SW-13A	Q3 16	6.9	**37**	468	2.3	0.51	93	130
Ballybeg	SW-11	Q4 17	7.2	5	500	0.1	0.05	48	90
Ballybeg	SW-12	Q4 17	7.2	5	324	0.05	0.05	100	278
Ballybeg	SW-13	Q4 17	7.3	5	516	1.1	0.06	45	60
Ballybeg	SW-13A	Q4 17	7.3	6	514	0.9	0.05	45	69
Ballybeg	SW-11	Q4 18	7.2	5	418	0.12	0.05	61	119
Ballybeg	SW-12	Q4 18	7.1	5	358	3	0.05	83	213
Ballybeg	SW-13	Q4 18	7.3	5	368	3.7	0.05	74	184
Ballybeg	SW-13A	Q4 18	7.2	5	402	3	0.05	71	148
Ballybeg	SW-11	Q2 19	7.4	5	554	0.11	0.05	52	112
Ballybeg	SW-12	Q2 19	7.8	5	574	0.6	0.05	69	133
Ballybeg	SW-13	Q2 19	7.9	5	584	1.5	0.05	19	49
Ballybeg	SW-13A	Q2 19	7.8	5	556	1.1	0.05	40	51
Ballybeg	SW-11	Q2 21	7.5	2	509	1.88	0.05	30	114
Ballybeg	SW-12	Q2 21	8	2	482	0.226	0.05	33	75.6
Ballybeg	SW-13	Q2 21	7.4	6	512	1.88	0.05	32	118
Ballybeg	SW-13A	Q2 21	8.3	2	496	0.015	0.05	39	107
Ballybeg	SW-11	Q2 22	6.6	4	155	0.395	0.05	74	300
Ballybeg	SW-12	Q2 22	7.7	2	223	0.015	0.05	56	235
Ballybeg	SW-13	Q2 22	No flow						
Ballybeg	SW-13A	Q3 22	7.3	17	257	0.123	0.1	81	432
Ballybeg	SW-13A	Q3 22	7.4	3	292	0.143	0.11	93	402
Ballybeg	SW-11	Q 2 23	7.8	5	423	0.139	0.07	46	145
Ballybeg	SW-12	Q 2 23	8.2	10	325	0.045	0.09	40	175
Ballybeg	SW-13	Q 2 23	7.1	4	430	0.451	0.16	90	325
Ballybeg	SW-13A	Q 2 23	7.1	3	158	0.154	0.14	67	303
Ballybeg	SW-11	Q2 24	7.5	8	398	0.025	0.15	52	141



Bog	SW Monitoring Point No.	Monitoring Period	pH	Suspended Solids (SS)	Total (dissolved) Solids	Ammonia	TP	COD	Colour
IPC Licence Emission Limit values[12]			Ph 6-9	35 mg/l	-mg/l	2.78 mg/l	mg/l-	100 mg/l	-Hazen
Ballybeg	SW-12	Q2 24	7.3	5	369	0.314	0.05	40	214

Table 9-30: IPC Licence Surface Water Monitoring Results (Toar Bog)

Bog	SW Monitoring Point No.	Monitoring Period	pH	Suspended Solids (SS)	Total (dissolved) Solids	Ammonia	TP	COD	Colour
IPC Licence Emission Limit values[13]			pH 6-9	35 mg/l	-mg/l	2.78 mg/l	mg/l-	100 mg/l	-Hazen
Toar	SW-14	Q 2 21	7.4	7	430	2.95	0.05	38	231
Toar	SW-15	Q 2 21	7.6	2	501	0.309	0.05	37	200
Toar	SW-16	Q 2 21	7.5	2	476	0.362	0.05	30	227
Toar	SW-17	Q 2 21	7.4	3	400	2.94	0.05	35	231
Toar	SW-14	Q3 22	7.2	19	271	0.023	0.47	98	315
Toar	SW-15	Q3 22	7.3	2	239	0.175	0.09	62	277
Toar	SW-16	Q3 22	7.3	2	284	0.259	0.23	57	250
Toar	SW-17	Q3 22	5.9	2	160	0.549	0.05	102	365
Toar	SW-14	Q 2 23	NF	NF	NF	NF	NF	NF	NF
Toar	SW-15	Q 2 23	7.8	3	529	0.432	0.06	45	447
Toar	SW-16	Q 2 23	7.3	2	309	0.117	0.1	94	366
Toar	SW-17	Q 2 23	NF	NF	NF	NF	NF	NF	NF
Toar	SW-14	Q3 24	7.5	4	276	0.174	0.06	64	197
Toar	SW-15	Q3 24	7.1	2	373	0.19	0.09	133	237
Toar	SW-16	Q3 24	7	2	337	0.178	0.1	88	241
Toar	SW-17	Q3 24	NF	NF	NF	NF	NF	NF	NF

[13] Bord na Mona Energy Ltd (Derrygreenagh Group of Bogs) IPC Licence P0501-01

Suspended Solids

The Environmental Protection Agency (EPA) in Ireland introduced trigger values for water quality monitoring as part of its efforts to manage and protect water resources. These values were established to help identify potential pollution issues and guide actions to address water quality concerns. The specific introduction of trigger values in Ireland is closely tied to the implementation of the EU Water Framework Directive (WFD), which was adopted in 2000 and transposed into Irish law through the Water Pollution Acts and subsequent regulations. The trigger values as part of its water quality assessment framework for IPC Licence.

Trigger values are used to indicate when certain parameters (e.g., phosphorus, nitrogen, or other pollutants) exceed acceptable levels, prompting further investigation or remedial action. These values are part of Ireland's broader water quality management system, which aims to achieve "good status" for all water bodies as required by the WFD.

As shown from Table 9-27 to 9-30, there were no exceedances of suspended solids, with all concentrations measured below 35 mg/l in accordance with the IPC Licence. As shown from Table 9-27 to 9-30, pH ranged from pH6 to pH8 across the period of record (2010-2024).

EPA Monitoring Data

The EU Water Framework Directive was adopted, leading to more systematic and detailed monitoring programs. Since the late 2000s the EPA began to systematically monitor surface water locations including at Garr Bridge in Rhode. The data presented below summarises the EPA monitoring data where records are available.

Nutrients and Temperature:

Annual average concentrations on the River Yellow in Rhode are below the annual average environmental quality standards (AA-EQS). Based on the EPA monitoring data, there is no significant trend in ammonium concentrations from 2010-2024, as shown graphically in Figure 9-8.

The EPA chemical test for nutrient conditions is “Pass” or “High” on account of good nitrate, ammonium and orthophosphate conditions at Garr Bridge (Station RS07Y020100). As stated in the EPA sub-catchment assessment, there are a number of issues within Yellow (Upper)_100 including heavy siltation noted at the biological monitoring station and the presence of Asian clams and zebra mussels. Pressures identified include impoundment (major weir and lock gates upstream of Tarmonbarry), historical channel modification and elevated water temperature. The river system is affected by historical hydromorphological alterations in areas at and downstream of the Application Site.

Ammonium (NH4):

Ammonia is produced when organic compounds are decomposed through microbial action induced by drainage/lowering of the water table.

The reported concentrations as outlined in Table 9-25 to 9-26 of total ammonia represent both unionized ammonia (NH_3, or ‘free ammonia’) and ionized ammonia (NH_4^+, or ammonium). NH_3 is significantly more toxic to fish. However, at the Application Site, NH_4^+ will be the dominant form of ammonia at lower temperatures and near neutral pH (pH 6.5 – 8), therefore the percentage

of NH_3 is low. In all cases, the total ammonia concentrations and pH values (based on EPA monitoring and site-specific monitoring data above) result in ammonia (NH_3) concentrations that are significantly lower than the 0.02 mg/l NH_3 threshold for "non-ionized ammonia" that is stipulated in the Quality of Salmonid Water Regulations (S.I. No. 293/1988).

Annual average Environmental Quality Standards (AA-EQS) are set out in the Surface Water Regulations (2019) (S.I. No. 77/2019). Since transposition of EU law is the responsibility of Member States, annual average threshold values vary across EU states (EU, 2006)[14].

No statistically significant trend was noted. EPA data is not available pre-2010. EPA data from 2010 to 2024 are included in Table 9-27 to 9-30. Additional data is available for 2001 to 2010 however locations are not directly comparable to the locations shown on Figure 9-11.

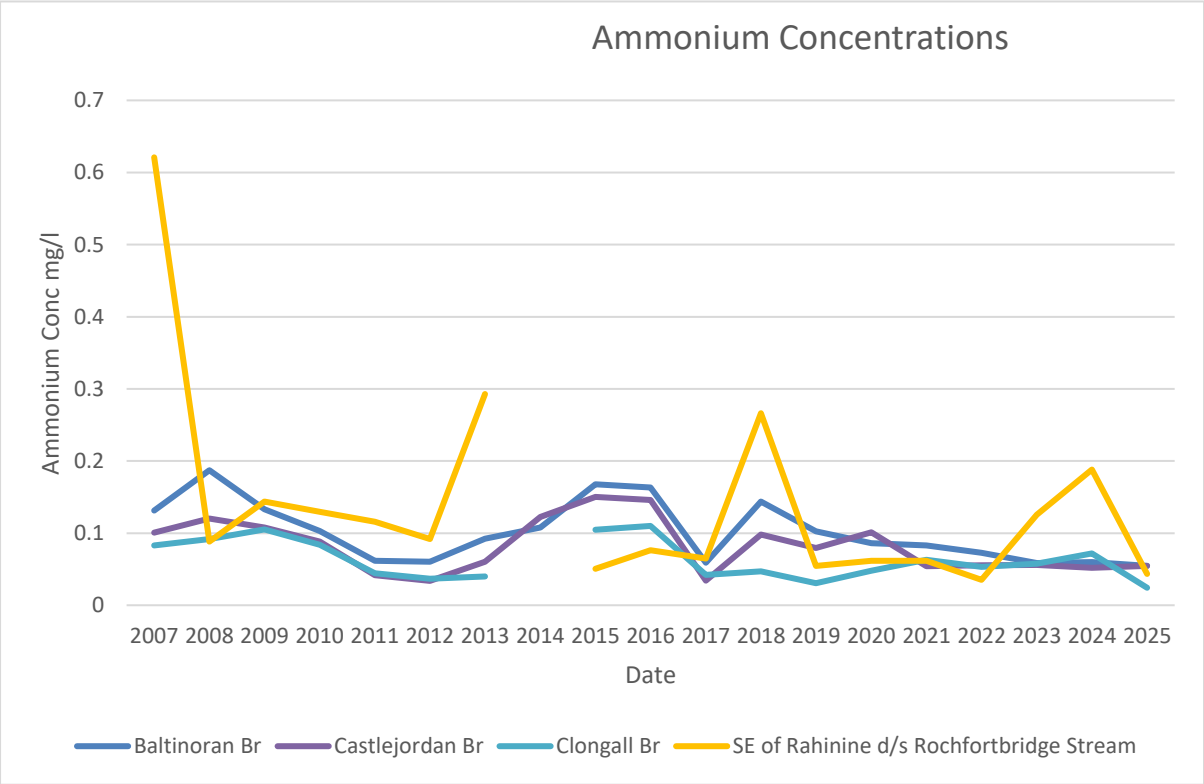


Figure 9-9: Annual average Ammonium Concentrations - Mongagh River

*Note - SE of Rahinine is located upgradient – Baltinoran, Castlejordan and Clongall are downgradient

EPA data is available since 2007, with a summary of collated from 2007 to 2025 provided in Table 9-31, indicating no significant overall trend. Annual exceedance for ammonium occurred in a number of years both pre and post closure and both upgradient and downgradient as detailed in Table 9-31. Laboratory Limits of Detection for Ammonium have decreased since 2010.

[14] Directive 2006/118/EC on the protection of groundwater against pollution and deterioration and Directive 2013/39 EU as regards priority substances in the field of water policy.

Table 9-31: Annual Average Ammonium Concentrations (mg/l)

EPA Monitoring Location					
Annual Average Concentration mg/l as NH4					
Year	Baltinoran Br	Br d/s Big R confl	Br in Milltownpass	Castlejordan Br	Clongall Br
	Downgradient	Upgradient	Upgradient	Downgradient	Upgradient
2007	**0.131**	ND	**0.089**	**0.101**	**0.083**
2008	**0.187**	ND	**0.075**	**0.120**	**0.092**
2009	**0.133**	ND	0.057	**0.108**	**0.105**
2010	**0.103**	ND	0.063	**0.089**	**0.084**
2011	0.062	ND	**0.104**	0.042	0.044
2012	0.061	ND	0.046	0.034	0.037
2013	**0.092**	ND	**0.097**	0.060	0.040
2014	**0.108**	ND	**0.084**	**0.122**	ND
2015	**0.168**	ND	0.054	**0.150**	**0.105**
2016	**0.163**	ND	0.051	**0.146**	**0.110**
2017	0.059	ND	**0.072**	0.034	0.042
2018	**0.144**	ND	0.053	**0.098**	0.047
2019	**0.102**	**0.096**	0.057	**0.080**	0.031
2020	**0.086**	**0.107**	0.038	**0.101**	0.048
2021	**0.083**	**0.145**	0.045	0.054	0.063
2022	**0.073**	0.064	0.041	0.055	0.053
2023	0.059	0.063	0.058	0.056	0.058
2024	0.060	0.057	0.057	0.052	**0.072**
2025	0.055	0.033	0.053	0.055	0.024

The Water Framework Directive (WFD) classified all the surface waters as At Risk of not achieving good status by 2027 (www.epa.ie). Where waterbodies have been classed as At Risk, significant pressures have been identified. The significant pressure affecting the greatest number of waterbodies is agriculture, followed by hydromorphology, other[15], peat, domestic wastewater, urban wastewater, urban run-off, industry and forestry.

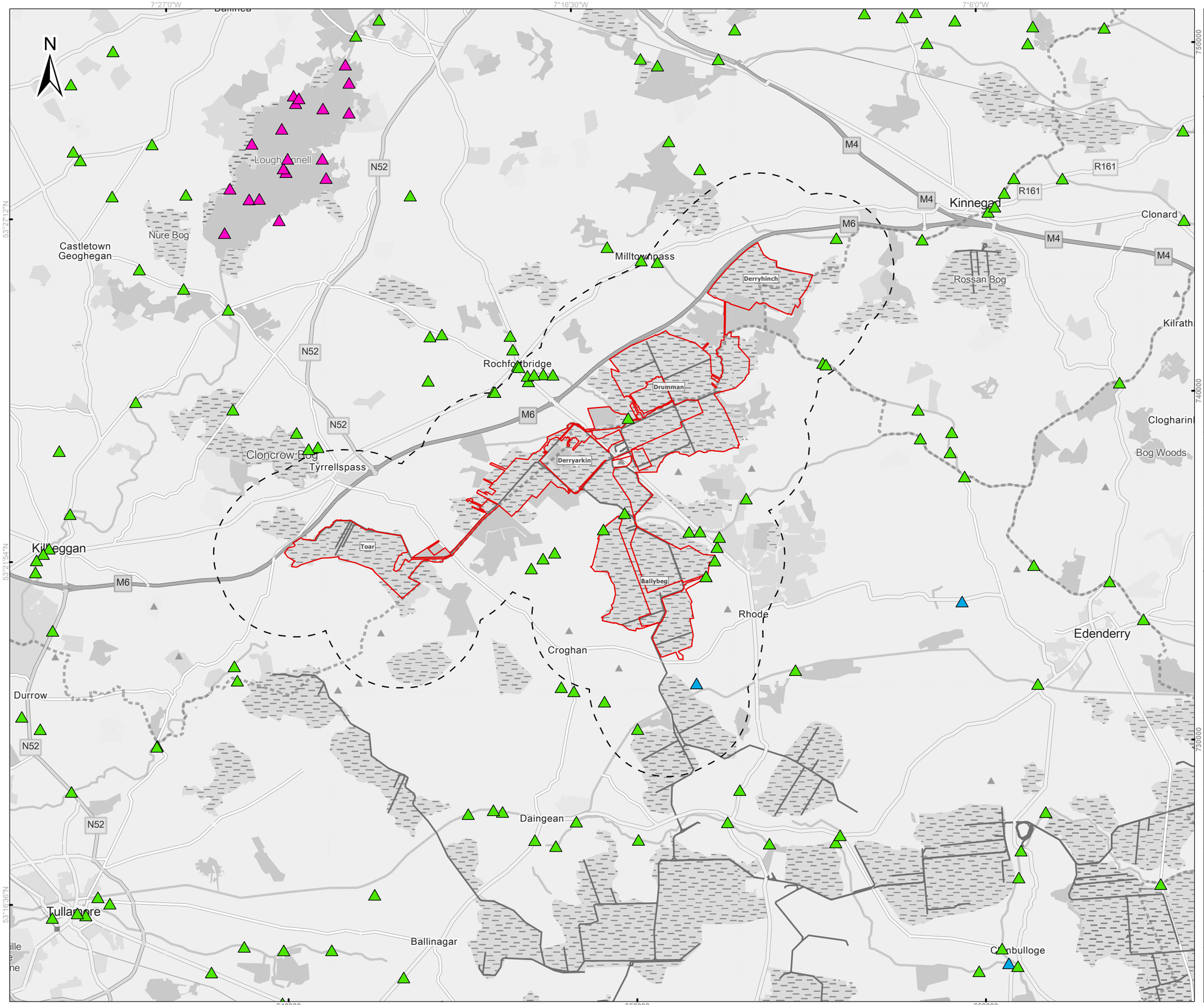
[15] *Other – abstractions, aquaculture, atmospheric, anthropogenic pressures, historically polluted sites, waste, water treatment and invasive species have all been grouped into the "Other" pressure category for the purpose of this report

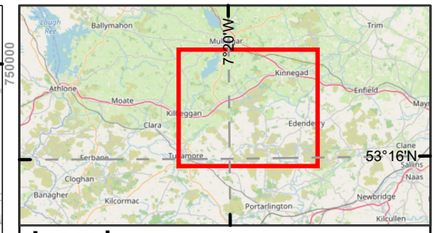
Orthophosphate:

The reported EPA orthophosphate concentrations at Garr Bridge and Clongall Bridge are below AA EQS standards. Typically, orthophosphate concentrations are low in peatland areas that are not developed for agricultural purposes.

Nitrate:

There is no reported exceedance above the EU Drinking Water Directive (2020/2184) maximum admissible concentration of 50 mg/l, or the groundwater threshold value of 37.5 mg/l (Protection of Groundwater Regulations, 1999 (S.I. No. 41/1999)).





Legend

- Application Site
- 2km Buffer

National Surface Water Monitoring Locations

- Groundwater Station
- Lake Station
- River Station

0 2 4
Kilometers

Spatial Reference
Datum: IRENET95
EPSG: 2157

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A	10/09/2026	First issue	K.K	B.K

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Title:
Figure 9-10:
EPA National Surface Water Monitoring Locations

Scale @ A3: 1:100,000

Prepared by:	Checked by:	Date:
K.Kale	B.Kasonde	September 2026

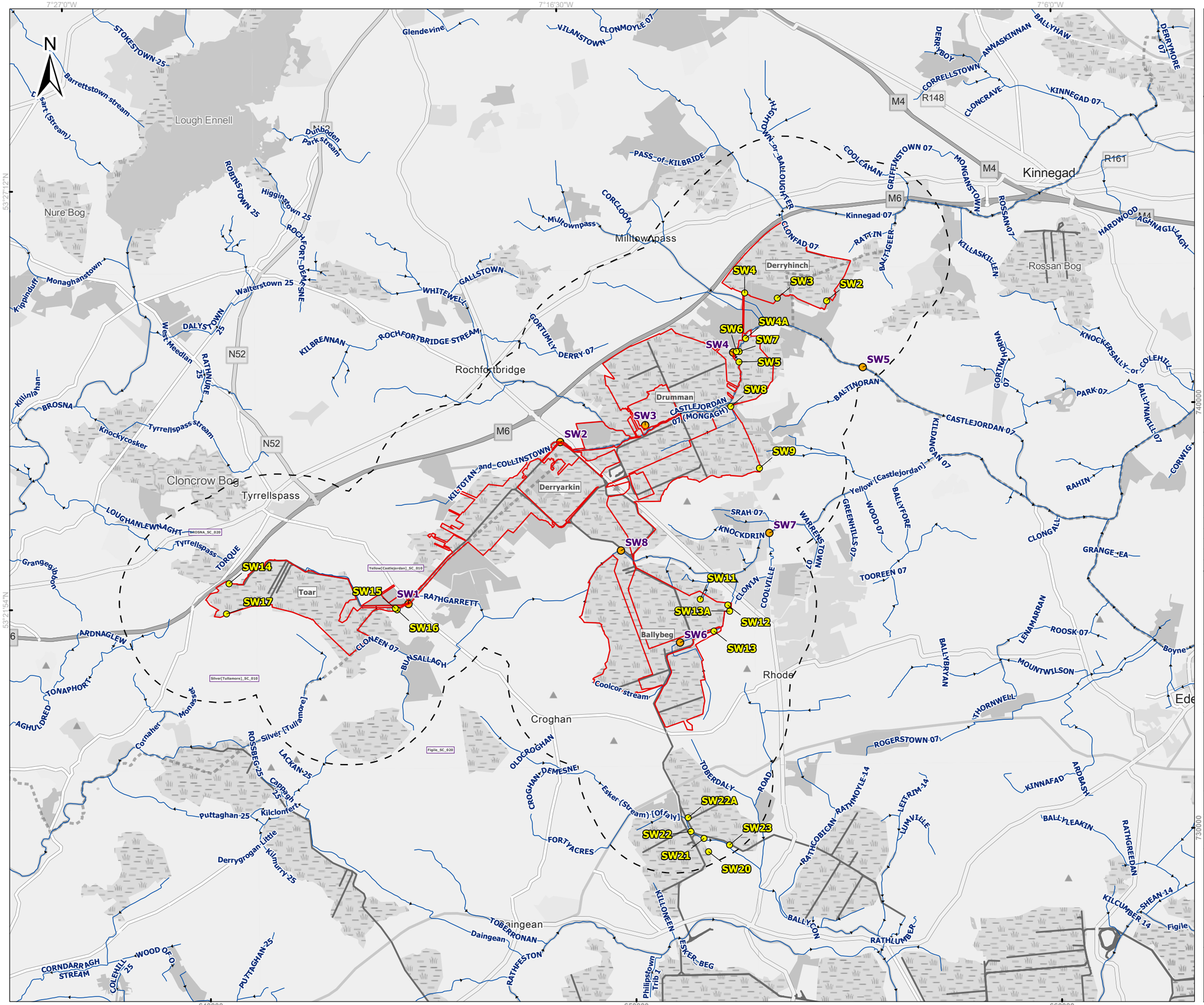
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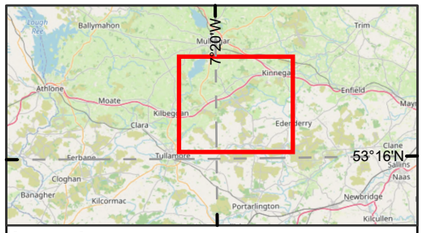
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Legend

- Application Site
- 2km Buffer
- EPA - Rivers
- TOBIN Surface Water Monitoring Locations
- BnM monitoring locations

0 2 4
Kilometers

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A	10/09/2026	First issue	K.K	B.K

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Title:
Figure 9-11:
Surface Water Monitoring Locations

Scale @ A3:		
1:81,920		
Prepared by:	Checked by:	Date:
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9.3.6 Hydrogeology / Groundwater

The information provided herein relates to the hydrogeology (groundwater) environment. It is provided to give context to the groundwater characteristics and flow patterns within and adjacent to the Application Site. Groundwater is water that has infiltrated into the ground to fill the spaces between sediments and cracks in rock.

9.3.6.1 Existing Groundwater Quality

There has been little alteration of the hydrogeological (groundwater) environment at the Application Site since 1988. As the underlying baseline, e.g., underlying bedrock and aquifer type, does not change over time, the primary method of change is the alteration of the hydrological (surface water) regime. Drainage of the bogs can alter the hydrogeological regime, by increasing the ratio of runoff to recharge. Drain blockage can reduce the ratio of runoff to recharge. Therefore, limited changes occurred from a hydrogeological perspective since 1988 as it was drained prior to peat extraction.

In general, peat bogs are typically characterised by low recharge, with the GSI generally mapping the bogs with recharge rate of approximately 4% of effective rainfall, so the scale of any change has to be understood in this context. Bogs have a high natural surface water runoff rate. The Application Site is underlain by a variety of rock types with varying permeabilities. A significant portion of the Application Site is underlain by permeable sand and gravels. The less permeable limestone tills underlying part of the Application Site limit the infiltration of water downwards into the underlying aquifer. Rainfall is therefore stored within the peat and slowly infiltrates to ground or discharges to streams surrounding the bog. Following the drainage of the bog, the hydrology changes and storage is reduced within the peat by creating drainage channels to channel rainwater off the bogs and directly to streams/waterbodies.

Groundwater Bodies

The application site is on the boundary of five groundwater waterbodies (GWB):

- Athboy (IE_EA_G_001);
- Trim (IE_EA_G_002);
- Clara (IE_SH_G_240);
- Geashill (IE_SH_G_103); and
- Daingean (IE_SE_G_049).

Over 90% of the Application Site is underlain by the Athboy GWB. All of the five GWBs underlying the Application Site are at Good WFD Status (2019-2024). These GWB are overlain by glacial till, sand and gravel deposits, cutover peat and alluvium deposits along the rivers and streams. These deposits consist of a highly heterogeneous mixture of glacial moraines, drumlins and gravels. The cleaner gravels have a higher sand and gravel content and therefore a higher permeability. Most groundwater flux in the bedrock will be in the uppermost part of the aquifer; comprising a broken and weathered zone typically less than 30 m thick; a zone of interconnected fissuring 10-15 m thick; and a zone of isolated poorly connected fissuring typically less than 150 m. Shallow groundwater is likely to discharge to streams and lakes. The permeable gravels means that the baseflow component of the total streamflow will be moderate to high to the Mongagh River. Some gravels also occur within the Castletown River Catchment.

9.3.6.2 Aquifer Potential and Characteristics

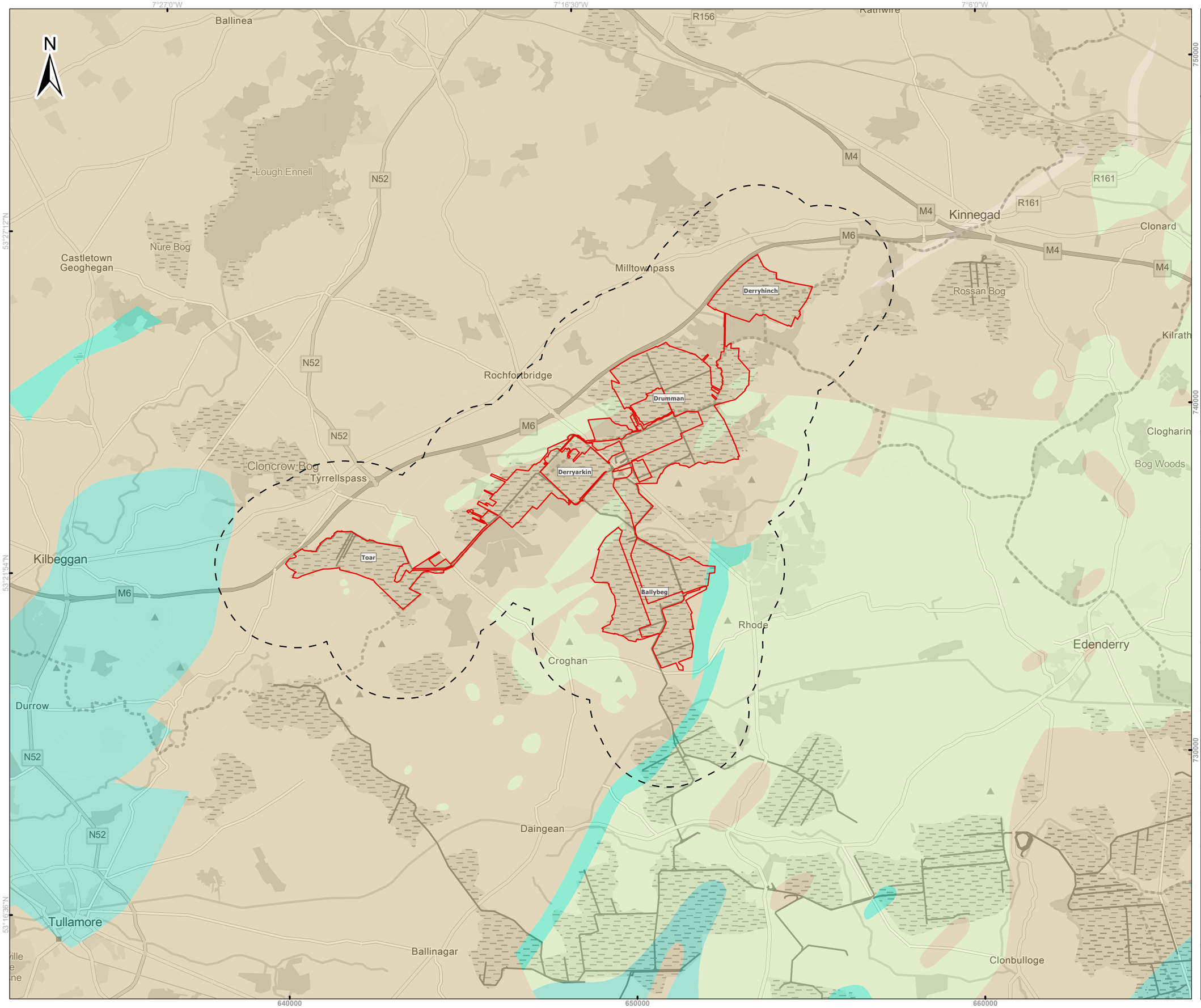
The aquifer potential of a bedrock unit is determined by the groundwater productivity. The productivity is determined based on hydraulic characteristics compiled from borehole data throughout the country.

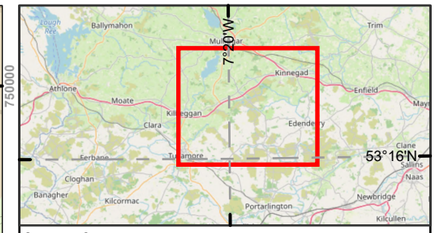
Using the GSI National Aquifer Map (www.gsi.ie), the underlying bedrock aquifer is classified as a poor aquifer. This essentially means that the aquifer is characterised by moderate to poor well yields, generally less than 400 m^3/day. The underlying bedrock is predominantly the Lucan Formation with interbedded felsic and mafic volcanics which comprises Basalts & other Volcanic rocks. This aquifer is Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones.

The high permeability subsoils across the area that consist of sands and gravels are not mapped in sufficient detail to constitute an aquifer at present, with the exception of the Kilbeggan Lg aquifer. The Kilbeggan Lg aquifer intercepts the Toar bog.

Groundwater flow paths within the aquifer are expected to generally follow the local surface water catchments. In terms of water level, areas immediately adjacent to the rivers will most likely have the highest groundwater levels.

The underlying bedrock aquifer map for the Project is shown in Figure 9-12 below.





Legend

- Application Site
- 2km Buffer

Aquifer Bedrock

- Rkd - Regionally Important Aquifer - Karstified (diffuse)
- Lm - Locally Important Aquifer - Bedrock which is Generally Moderately Productive
- Lk - Locally Important Aquifer - Karstified
- Ll - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones
- Pl - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones

0 2 4
Kilometers

Spatial Reference
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Rev	Date	Description	By	Chkd.
A	10/09/2026	First issue	K.K	B.K

Client: BnM

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Figure 9-12:
Aquifer Classification underlying the Application Site

Scale @ A3: 1:100,000

Prepared by:	Checked by:	Date:
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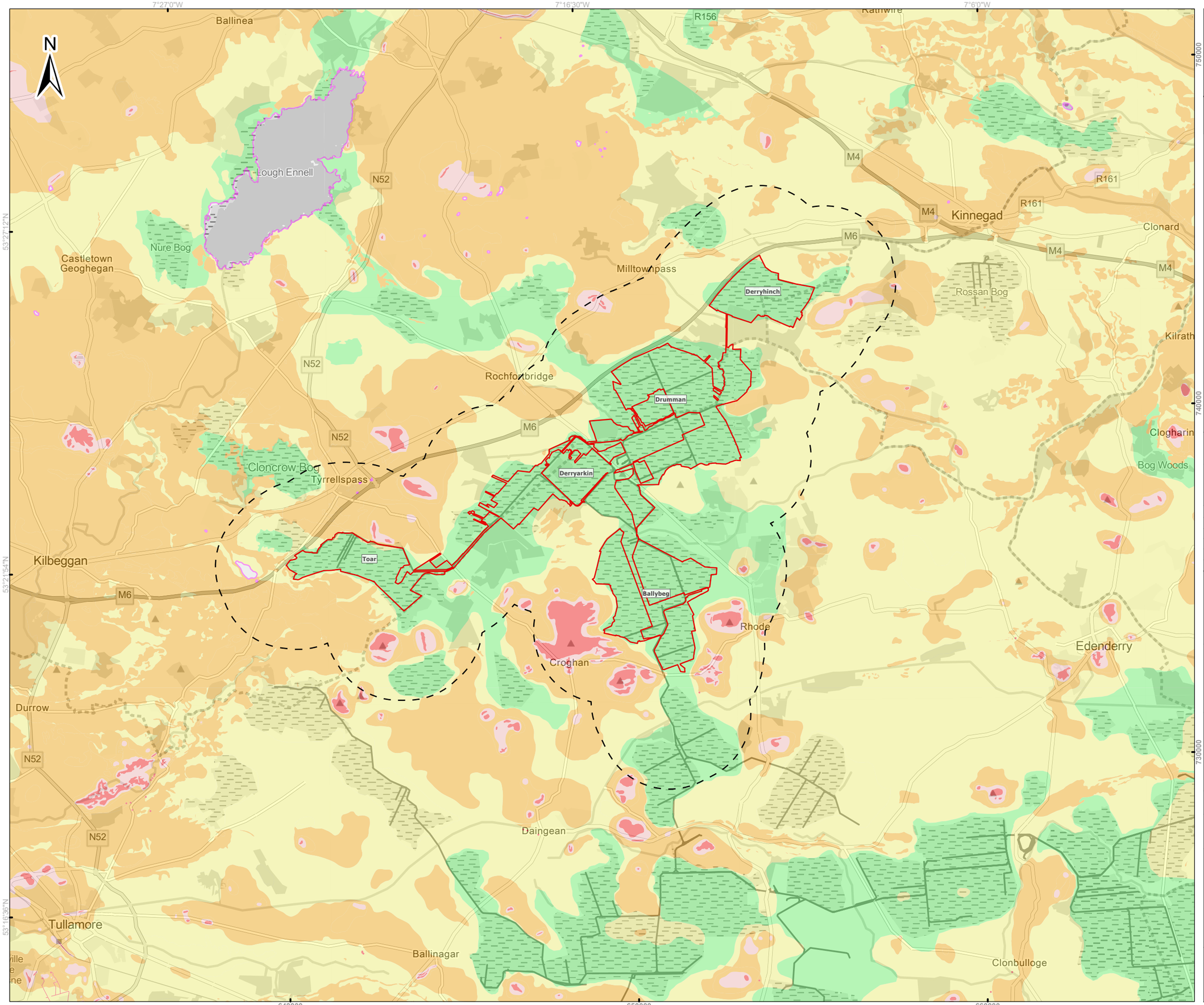
9.3.6.3 Groundwater Vulnerability

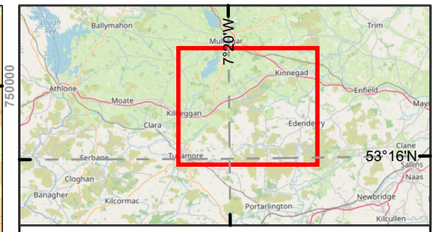
Groundwater vulnerability is dictated by the nature and thickness of the material overlying the uppermost groundwater 'target'. This means that vulnerability relates to the thickness of the unsaturated zone in the sand/gravel aquifer, and the permeability and thickness of the subsoil in areas where the sand gravel aquifer is absent. A detailed description of the vulnerability categories can be found in the Groundwater Protection Schemes document (DELG/EPA/GSI, 1997) and in the draft GSI Guidelines for Assessment and Mapping of Groundwater Vulnerability to Contamination.

Groundwater vulnerability represents the intrinsic geological and hydrogeological characteristics that determine how easily groundwater may be contaminated by activities at the surface. Vulnerability depends on the quantity of contaminants that can reach the groundwater, the time taken by water to infiltrate to the water table and the attenuating capacity of the geological deposits through which the water travels. These factors are controlled by the type of subsoils that overlie the groundwater, the way in which the contaminants recharge the geological deposits (whether point or diffuse) and the unsaturated thickness of geological deposits from the point of contaminant discharge.

The mapped groundwater vulnerability across the application site ranges from 'Extreme' to 'Low'. Generally, groundwater vulnerability corresponds to subsoil permeability. Where there is highly permeable subsoil there is normally highly vulnerable groundwater. The majority of the site is characterised by moderate groundwater vulnerability which correlates with cutover peat cover. Hence, the cutover peat cover must contribute to the 'Moderate' groundwater vulnerability classification. Some areas within the site are characterised by highly permeable glaciofluvial sands and gravels as the subsoils, which are in turn overlain by poorly drained soil/peat. These areas where peat overlies highly permeable subsoil are found to have higher groundwater vulnerability classifications. Areas where alluvial deposits are found along the Mongagh and Yellow River also have 'High' groundwater vulnerability. Subsoil exposure along the Mongagh and Yellow River comprise interbedded and cross bedded sands and gravels.

The variation in groundwater vulnerability throughout the bog site can be seen in 3. The majority of the site has 'Low' groundwater vulnerability however certain areas fall under the 'Moderate' and 'High') vulnerability category.





Legend

- Application Site
- 2km Buffer

Groundwater Vulnerability

- Rock at or near Surface or Karst
- Extreme
- High
- Moderate
- Low
- Water

0 2 4
Kilometers

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Rev	Date	Description	By	Chkd.
A	10/09/2026	First issue	K.K	B.K

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Figure 9-13:
Groundwater Vulnerability

Scale @ A3: 1:100,000

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9.3.6.4 Groundwater Usage

As reported by the EPA and the GSI, groundwater sources, particularly public, group scheme and industrial supplies, are of critical importance in many regions. Consequently, the objective of Source Protection Zones is to provide protection by placing tighter controls on activities within all or part of the zone of contribution (ZOC) of the source. According to the GSI/EPA Source Protection Zone Map (www.gsi.ie), there are no Source Protection Zones within the Application Site.

The Toberdaly Public Supply groundwater source protection zone is mapped to the east of Ballybeg Bog (www.gsi.ie). Springs at Toberdaly were developed as part of the ESB peat powered Rhode power station. The abstraction to supply Rhode power station ceased in 2003 following the closure of the power station. Toberdaly continues to be used as a public water supply.

There are no Group Water Scheme (GWS) Zones of Contribution (ZOCs) within the Application Site. The Mount Lucus GWS ZOC is c. 5 km south of Ballybeg Bog and the Ballybroder Ballycallan GWS ZOC is 6 km southwest of Toar Bog.

There is one groundwater abstraction well within Derrygreenagh works, which is located outside the Application Site boundary.

9.3.6.5 Groundwater Flow

On a regional scale, the groundwater flow direction is generally a subdued reflection of surface water drainage i.e. from west to east across the Application Site with localised flow to the surface water features. At a local scale, groundwater is expected to be closely linked to the topographic lay of the land. Therefore, on a regional scale, it is assumed that the groundwater flow in the Mongagh and Yellow Rivers would be towards the west, reflecting the general flow direction of the Yellow and Mongagh Rivers. Local groundwater flow discharges to the local streams and drainage ditches in the area. Groundwater levels are approximately 78 m OD in Derryhinch and decrease to 74 m towards the east of Drumman bog and Ballybeg Bog.

9.4 CHARACTERISTICS OF THE PROJECT

A full description of the Project and all works completed at the Application Site is provided in Chapter 4.

By 1988, peat extraction activities and all ancillary works were well established at the Application Site. All bogs were fully drained and milled peat extraction was the only form of peat extraction taking place across the Application Site in 1988. In the late 1960s, a trial of Fóidín peat extraction was undertaken at the Application Site. Fóidín peat was a form small sod peat product produced from milled peat bogs. This trial was not sufficiently productive, and the practice ceased shortly after its commencement.

The following ancillary infrastructure was established at the site by July 1988:

- Railway infrastructure (all bogs within the Application Site);
- Silt ponds and drains (all bogs within the Application Site); and
- Pumping station (Ballybeg Bog).

Derrygreenagh Works, (also referred to as 'the Works'), provided a central location for support services to the Application Site and other adjacent bogs within the Derrygreenagh Bog Group, and includes workshops, offices and welfare facilities such as toilets and a canteen. The Works are located on the eastern side of the R400, approximately 4 km southeast of Rochfortbridge, Co. Westmeath and are located outside the Application Site boundary. There remains existing rail infrastructure at Derrygreenagh Works which was used to access Drumman Bog, however, this falls outside the application boundary.

There is also an existing workshop located approximately 580 m southwest of the access to the Derryarkin sand and gravel extraction pit, west of the R400. The workshop has fuel and chemical storage facilities including oil store and tanks, oil traps and silt pond. This workshop is located outside the application boundary.

Derrygreenagh Works is still used as a satellite works location for machinery repair and material storage for the bogs within the Derrygreenagh Bog Group. Other smaller local holding areas were situated in various locations across the Application Site, which were used as temporary storage and repair facilities, convenient for the workers.

From 1958 to 2020 milled peat was extracted at the Application Site. For the extraction of milled peat, parallel open drains were cut at 50 ft. (approx. 15.2 m) centres which divided the peat extraction area into fields 45 ft. (13.7 m) wide. Typically, the field drains were from 800 to 2,000 yards (approx. 700 to 1,800 m) long, discharging at either end into piped outfalls which ran at 90° to the open drains and which themselves discharged into the nearest natural outfall. Beyond the piped outfall was left a headland or turning ground 70 to 100 ft. (21 to 30 m) wide which ran parallel to the piped outfall to enable extraction machines to turn from one field into another. When fully developed, the open field drains had a depth of approx. 4′ 6" (approx. 1.4 m) and a top width of approx. 5′ 0" (approx. 1.52 m).

9.4.1 Peat Extraction Phase (July 1988- June 2020)

Drainage was installed in all bogs, and railway infrastructure was laid and maintained on all bogs as required. During the Peat Extraction Phase, the deepening and maintenance of drainage channels continued beyond 1988, up until the cessation of peat extraction in 2020. Machinery used for drainage works would have been largely the same as that described in Chapter 4 Project Description, with ever-improving engine efficiency in tractors and excavators.

9.4.2 Current Phase (June 2020 – Present Day)

The Current Phase includes all activities carried out at the Application Site from the cessation of peat extraction activities and all ancillary works from June 2020 to Present day.

During this period, activities at the Application Site have been limited to the removal of stockpiled peat with no peat extraction activities or ancillary works occurring.

Ongoing decommissioning at the Application Site have included the removal of peat stockpiles which was completed in 2021 along with the planned decommissioning or further infrastructure. Decommissioning activities for each of the five bogs within the Application Site are detailed in Appendix 4-3 of Chapter 4.

In accordance with the IPC Licence, waste items are - and will continue to be - removed from the Application Site for recycling or disposal, using professional licenced contractors as required under Condition 7.2. Waste management records are, and will continue to be, maintained in full compliance with Condition 7.3.

9.4.3 Remedial Phase

A Draft Cutaway Bog Decommissioning and Rehabilitation Plans for each of the five bogs within the Application Site (i.e., Derryhinch, Drumman, Derryarkin Ballybeg and Toar Bogs), have been produced by Bord na Móna, refer to Appendix 4-3 of Chapter 4 for details. These rehabilitation plans are required in order to fulfil the requirements of Condition 10.2 of the IPC Licence. Each Decommissioning and Rehabilitation Plan, as per Condition 10 of the IPC Licence will be subject to agreement with the EPA. It is the intention of Bord na Móna to rehabilitate the bogs in a phased approach under the requirements of the IPC Licence.

Each plan contains within a detailed ecological report and GIS mapping pack. The key objective of Bord na Móna 's peatland rehabilitation is environmental stabilisation. The plans use bespoke interventions designed to firstly stabilise the environment and secondly to rehabilitate the site as much as possible by placing the existing peatland environments on a path towards naturally functioning peatlands. The rehabilitation of the bogs will support biodiversity e.g., plants, insects, bird and mammals, and the formation of wetland habitats. In addition, peatland rehabilitation will bring a range of benefits to the local community via improvements in the local landscape, and it is also complying with national policies and strategies regarding the reduction of carbon emissions, supporting biodiversity and enhancing water quality. It is anticipated it will take up to 30 years for naturally functioning wetland and peatland ecosystems to fully re-establish.

Each individual bog comprising the Application Site has its own unique history of peat extraction activities and all ancillary works operations, therefore the most appropriate rehabilitation approach is bog-specific reflecting local ecological and hydrological factors. Consequently, each bog has its own exclusive Cutaway Bog Decommissioning and Rehabilitation Plan.

The intervention measures include drain blocking. This will encourage natural colonisation of cutaway areas and will establish a more suitable hydrological/hydrogeological regime for the development of bog habitats. The details necessary to achieve the aims set out in the Cutaway Bog Decommissioning and Rehabilitation Plans will include the exact locations of the drains to be blocked and any bunds to be constructed. These details are based on the existing habitats present and the topography of the Application Site. This level of detail will only be available once the rehabilitation plan is finalised.

Rehabilitation works have commenced on the Application Site already in the form of natural revegetation and re-colonisation, as described in Appendix 4-3 and in Table 4-7 of Chapter 4. Further rehabilitation work will commence immediately following the full decommissioning of the Application Site.

To inform the final rehabilitation plan for each bog, both national and local stakeholders, including neighbours whose land adjoins the relevant bog units and local representatives of national bodies (such as Regional National Parks and Wildlife Service staff) and relevant offices in County Councils (such as the Heritage or Environmental Offices) will be contacted. Any identified local interest groups will be sought and informed of the opportunity to engage with this rehabilitation plan, and when identified invited to submit their comments or observations in relation to the proposed rehabilitation. All correspondence received will be acknowledged and evaluated against the rehabilitation work proposed and the final draft of plans will contain a review of the consultation.

Prior to the submission of the rehabilitation plans to the EPA for agreement, a baseline ecology survey will be carried out to determine the status of natural colonisation, the potential for targeted revegetation and/or rewetting and the future development at the Application Site to ensure stabilisation of the future cutaway.

9.5 Assessment of Significant Effects

This section presents an assessment of significant effects on the hydrological and hydrogeological environment.

As detailed in Section 1.5. of this remedial EIAR, there is no legal requirement for EIA or screening for EIA in respect of any project prior to the latest dates for transposition of the EIA Directive (Directive 85/337/EEC). Accordingly, this application for substitute consent is confined to the development which took place after those dates. The baseline against which the environmental effects of the development required to be assessed has therefore, been identified as being the position as of July 1988.

However, as development commenced many years prior to those dates, in order to facilitate as complete an assessment as is possible of the development since July 1988, a description of the project and of its environmental effects since commencement (1940s – 1988) is included in Chapter 4 Section 4.5.

9.5.1 Do-Nothing

A description on the approach to the 'Do-Nothing Scenario' in this remedial EIAR is presented in Section 2.11 of Chapter 2 (remedial EIA Methodology). Overall, considering the 'Do-Nothing Scenario' as it relates to hydrology and hydrogeology, had peat extraction activities not taken place at the Application Site after 1988, pre-existing drainage features would still be in place. Depending on the risk of flooding to the adjoining lands, some pump control or additional drainage channel may have remained.

Pump capacities at pumping stations are designed based on a runoff rate of 1 L/s/Hectare (L/s/ha), which is less than the calculated predevelopment runoff rates. Runoff rates for the bare peatlands are greater than 5 L/s/ha therefore surface water tends to accumulate on site during the winter providing additional flood storage on site and reducing the potential for flooding off site.

In terms of water, the cessation of peat extraction and ancillary activities in 1988 in the Do-Nothing Scenario is unlikely to have resulted in a significant effect in water emissions from the Application Site. In the Do-Nothing scenario, natural revegetation of the bare peat would likely occur, which in turn reduces emissions of suspended solids and contaminants into surface water.

Under the Do-Nothing scenario, as there was no IPC Licence in place, the Cutaway Bog Decommissioning and Rehabilitation Plans associated with Condition 10 of same would not likely have been written. The EPA was established post 1988, following the enactment of the S.I. 7 of 1992 *Environmental Protection Agency Act 1992*. Other land uses may have occurred under the do-nothing scenario as a result of the cessation of peat extraction, including increased areas of commercial forestry and agricultural lands.

All types of pollution cause physico-chemical and biological changes in receiving waters and so the assessment of water quality and of water pollution may be approached from the physico-chemical or the biological aspect. Several studies including the followings have shown consistency between variations of biotic indices and fluctuations in physicochemical characteristics of water including McGarrigle et al. 1992. Q-Values show a particularly good relationship with annual median phosphate values in Irish rivers. Without a reduction in the use of phosphate from WWTPs, agriculture or improvement to hydromorphology, all streams in the Shannon and Boyne catchments were not likely to achieve good status in the short term. Phosphate concentration from cutover peatlands are generally low except where agriculture is developed on peatlands. There is no proposal for the conversion of peat extraction areas to agriculture.

9.5.1.1 Peat Extraction Phase (1988 – June 2020)

The Application Site was the site of major peat extraction and ancillary activities. The overall area of the Application Site is approximately 2637 hectares. Peat extraction was active on the site pre 1988 with all areas extracted in production. The area of peat production decrease from the 1980s/1990s as peat depths decreased and were gradually removed for the overall extraction areas.

Drainage for the milled peat production was in place pre 1988, and limited changes occurred until the closure of peat extraction operations. Annual maintenance occurred on the peat drainage channels and silt ponds.

Across the peat bog, the upper acrotelm layer was removed pre 1988 with the underlying catotelm continued to be extracted between 1988 and 2020. Typically, peat for milled peat production was extracted from deep peat layers which comprise dead plant material.

Bord na Móna 's historic peat extraction and related activities involved the following processes:

- Drainage;
- Bog Preparation;
- Extraction; and
- Transportation of Product.

The peat extraction carried out by Bord na Móna required the construction and use of ancillary structures and features which would have had possible Potential effects on the Hydrology and hydrogeology of the Application Site. Potential associated effects are assessed in the following subsections.

Effects of Drainage on Bog Hydrogeology and Downstream Surface Water Hydrology

As mentioned, the Application Site was drained prior to peat extraction which would have had potential effects to the hydrology and hydrogeology of the area. The volumes of peat extracted, and the depths of peat removed has been estimated using bulk quantities (tonnes) of extracted peat by Bord na Móna. The depth of peat before extensive extraction was in the region of 2 to 4 m. Today however, only a small number of areas have deep peat cover. The majority of the bog has between 0.1 and 2 m of peat cover. Areas of the site have been stripped to the subsoil layer resulting from extraction operations.

The effects on drainage (hydrology) and bog hydrogeology between 1988 and 2020 are characterised by small annual changes in topography (ground levels reducing) as peat was extracted during summer months, with minimal additional changes in hydrology or hydrogeology.

Drainage from the Application Site was regulated by limiting discharges via drainage design, and specifically by routing all drainage via field drains, main drains, headland drains, then to silt ponds to outfalls, with final discharge to natural watercourses. In some areas, pumps assist with the discharge of surface water in this hierarchy.

The effect on the various receptors (i.e., receiving environment) are listed in Table 9-32 below. Overall, the maintenance of bog drainage between 1988 and 2020 would have had a **slight negative effect** on the hydrological and slight effect on the hydrogeological environment. The streams adjacent to the Application Site have a low to moderate sensitivity and low magnitude of impact. On the basis of low/moderate sensitivity and low magnitude of impact, there is a slight direct/indirect long term effect on the local streams and groundwater environment. As detailed in section 9.3.2, there is no significant effect on the River Shannon or groundwater supplies in terms of groundwater/surface water quality.

The Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plans include the targeted blocking of drains to allow re-wetting of areas, where suitable (see section 9.5.4 below).

A number of areas were rehabilitated during the extraction period or utilised for alternative land uses. Parts of the Application Site are already re-vegetating, with establishing cover of pioneer vegetation developing a mosaic of typical cutaway peatland and wetland habitats.

A significant portion of the Derryarkin and Drumman sites (c. 10%) has already been developed as a conifer plantation by Coillte. Wetlands (143 ha) were created in 2001-2002 when main outfalls were blocked and cutaway was re-wetted at Derryarkin. An area of cutaway (13 ha) with significant bare peat cover adjacent to the road in Derryarkin was treated with fertiliser to encourage natural colonisation in 2016. Part of the Derryarkin and Drumman site (273 hectares) is used for gravel extraction and there has also been some rehabilitation of this area.

Rehabilitation trials have been carried out on 19 ha of bare peat cutaway in the north of the Drumman Bog, re-vegetating and stabilising these areas (2010 and 2012). Approximately 60 ha of Ballybeg was developed as an Alder Biomass trial. Rehabilitation was limited at Toar and Derryhinch which were in production during the 1988 – 2020 period with some central and marginal areas of peat coming out of production. The M6 was constructed to the north of Toar, Drumman and Derryhinch Bog during this period.

Table 9-32: Effects of Drainage on Receptors at the application site 1988-2020

Receptor	Effect on Receptor
Hydrogeology	Negative, slight and indirect effect on local hydrogeology
Hydrology	Negative, slight to moderate and direct/indirect effect on surface water flows, particularly in terms of quantity of flow and quality

Effects on Designated Sites

The groundwater within the Application Site primarily drains to surface water bodies situated around the bogs. A description of the designated sites in close proximity to the Application Site is given in Chapter 7 - Biodiversity. Because of the catchments in which the sites are located in, they are considered to be connected to the environment of the bogs both hydrologically (surface water) and hydrogeologically (groundwater).

As previously identified in Section 9.3.4, there is a conceptual link between the Boyne and Blackwater SAC and groundwater and surface water at the Application Site. Changes to the water levels as a result of bog drainage and other peat extraction works would have had a potential effect on the Boyne and Blackwater SAC. While extraction occurred until 2020, the areas of peat extraction gradually reduced over this period. Due to the good water quality downgradient, the effect on the Boyne and Blackwater SAC during the Peat Extraction Phase was not significant and medium term.

Raheenmore SAC is separated from the Application Site by intervening topography. There is no hydrological or hydrogeological effect on Raheenmore SAC.

The Application Site is north of the Grand Canal proposed Natural Heritage Area (pNHA). It must be noted, however, that these sites were not designated at the start of drainage and peat extraction works and no extraction was undertaken as part of the IPC licence. There is no hydrological or hydrogeological connection with the Application Site or Grand canal therefore there is no effect on Grand Canal.

A small section of the Application Site is located in the Shannon and Barrow catchment area. As a result, changes to the hydrological/hydrogeological environment at the Application Site would most likely have had an indirect effect on the hydrological/hydrogeological environment of the SAC. It must be noted, however, that no Natura sites, were designated at the commencement of Peat Extraction Phase (further information is provided in the remedial Natura Impact Statement (remedial NIS)).

The comprehensive assessment of the available data, including an assessment of scientific literature, conservation objectives it is clear that no significant negative adverse effects have occurred or will occur on the integrity of any European site as a result of the Peat Extraction Phase (June 1994 – June 2020) at the Application Site.

Before the implementation of IPC Licence conditions in 2000, Bord na Móna implemented standard operating procedures and best practices which have been set in place for the entire Peat Extraction Phase, to manage environmental risks from peat extraction, particularly regarding suspended solids

and contamination, ensuring the protection of water quality, and minimise the risk of noise disturbance. These pre-IPC Licence measures were successful in managing the risk of impact on water quality and noise disturbance, and no significant adverse effects are anticipated to have occurred to the River Barrow and River Nore SAC, or to the Lough Ennell SPA in the years after the designation of the sites in 1998, and 1995 respectively.

In 2000, following the introduction of the IPC Licence in 2000, stricter environmental controls, including monitoring, sediment control, and pollution prevention measures, were enforced at the Application Sites to further safeguard water quality during the Extraction Phase. Given the effective regulation of peat extraction activities under the IPC License and the consistent compliance with these conditions over a 26-year period, it is reasonable to conclude that there has been no significant impact on water quality.

Effects on Groundwater / Surface Water Abstractions

One groundwater abstraction was active during the operational period, i.e., the Toberdaly abstraction. Springs at Toberdaly were developed as part of the Rhode Power Station. There were no known effects on the groundwater abstraction. The abstraction ceased in 2003 following the closure of the power station. Toberdaly continues to be used as a public water supply.

No nearby groundwater or surface water abstractions would have been affected by peat extraction from the Application Site. There is one groundwater abstraction well within the Derrygreenagh works, adjacent to the Application Site. Effects under this heading would have been typically analysed/reviewed in terms of water quality and quantity. As mentioned previously, the EPA has recorded that groundwater quality at Toberdaly to the south of Application Site is good. This shows that the peat production and related activities at the Application Site would not have had a significant effect on the groundwater quality or groundwater bodies within the Application Site.

As reported by the EPA and the GSI, groundwater sources, particularly public, group scheme and industrial supplies, are of critical importance in many regions. Consequently, the objective of Source Protection Zones is to provide protection by placing tighter controls on activities within all or part of the zone of contribution (ZOC) of the source. According to the GSI/EPA Source Protection Zone Map (www.gsi.ie), part of the Toberdaly Source Protection Zones are within the Application Site. There is no known source pathway receptor and therefore the peat extraction would not have a likely significant effect.

Effects on Local Groundwater Wells/Supplies

Potential effects on local groundwater wells include effects on groundwater quantity, where the volume of water recharging into a particular aquifer has been altered by historic changes in bog recharge and drainage.

As outlined in Sections 9.3.6.3, effects on groundwater from the perspective of quantity would have also been characterised by the groundwater vulnerability and recharge coefficients of the bog.

Areas of ‘Low’ to ‘Moderate’ groundwater vulnerability would be less susceptible to major effects compared to areas of ‘High’ and ‘Extreme’ groundwater vulnerability. Areas where there is a low recharge coefficient (approximately 4%) also limit the effect. The Application Site is

mostly characterised by these limiting environments, in the sense that, groundwater vulnerability is mostly 'Moderate' and the recharge coefficient is often low. Some areas around the bog have much higher recharge coefficients due to the presence of underlying sand and gravel (between 12% and 42.5%).

Historically (and currently), the majority of recharge to the bedrock aquifers was from surrounding grassland and forestry areas. In terms of groundwater quality, the effects included contamination of groundwater via sources and pathways like pore space in peat, subsoil and bedrock. Any spillage of petrol/hydrocarbons on the bog or at the production centres/workshop areas which infiltrated to groundwater, was likely to discharge to surrounding surface watercourses rather than reaching the underlying bedrock aquifer. This again was/is linked to low recharge and moderate groundwater vulnerability across much of the Application Site.

No karst features, such as swallow holes were mapped within the boundary of the Application Site or within 2 km. The effect on local groundwater supplies was not significant and medium term.

Effect on Water Quality

There appears to have been a slow decline in Q values both upstream and downstream sites between 1971 and the 1980s, which may indicate that it is due to existing background pressures in the catchment. However, the results between 1988 and 2020 are generally stable with some decrease in water quality upgradient of the Application Site since the 2000s (Tables 9-12 to 9-21).

The Application Site has been relatively good in terms of water quality since regular monitoring commenced in 2000. The waters of the Mongagh and Yellow catchment area are of moderate to good quality with Q-values between 3-4 and 4 throughout the last 20 years. As discussed previously, the upgradient waters are generally lower in terms of quality.

Peat extraction operations can impact on the aquatic ecology of the receiving waters in the catchments draining the area by increasing ammonium, suspended solids and dissolved organic carbon. Water quality i.e., Q values were generally good over an extended period between 1988s and the present day. Given that there have not been any significant deterioration or changes in water quality since the 1988 and that the overall water quality of the region is good, it is concluded that peat extraction activities did not have a long-term effect on the overall water quality in the area. Part of the Ballybeg bog is drained by pumping. Water quality at the discharge are within the EPA discharge limits. No long term data is available from the Coolcor Stream however Q-values were 3-4 downgradient of the bog in 2020.

Of importance here is the specific evidence-based priorities in the River Basin Management Plan 2022–2027 and principal actions related to peatlands for the 3rd cycle. The effluent discharges from the bogs have been regulated in accordance with the conditions of Industrial Pollution and Control (IPC) Licence P0501 since 2000.

Discharge authorisations from the bog groups were examined by the EPA in 2012/2013 in line with the objectives of the Water Framework Directive and in accordance with the;

- European Communities Environmental Objectives (Surface Water) Regulations 2009, S.I. No. 272 of 2009, (as amended); and
- European Communities Environmental Objectives (Groundwater) Regulations 2010 , S.I. No. 9 of 2010, (as amended).

Emissions to water are controlled under Condition 6 of the licenses. Condition 6.1 states that no specified emission to water shall exceed the emission limit values set out in Schedule 1(i): suspended solids emission limit value = 35 mg/l. Condition 6 relates to the following:

- The submission and approval of a surface water discharge monitoring programme (Condition 6.2);
- The submission of a proposal for the installation of a flow proportionate composite sampler to one representative process effluent surface water discharge point within the licensed area (Condition 6.3);
- Monitoring and analyses of each agreed emission monitoring location as specified in Schedule 1(ii) Monitoring of Emissions to Water of this licence (Condition 6.4). Schedule 1 (ii) specifies quarterly monitoring of the following parameters: pH, Flow, Suspended Solids, Total Solids, Ammonia, Total Phosphorous, Colour and COD.
- Development and implementation of a surface water drainage programme to ensure that all surface water discharge from the boglands is via an appropriately designed silt pond treatment arrangement (Condition 6.6).
- Operational procedure for desilting and cleaning of the silt ponds including inspection of the ponds (Conditions 6.7 and 6.8);
- Programme to upgrade all the sedimentation pond treatment system addressing provision of additional ponds, weir or pipe installation (inlet and outlet), pond configuration, use of baffles, performance efficiency and frequency of de-silting (Condition 6.9).
- Within three years of date of grant of the licences all existing silt ponds serving operational bogs shall achieve the following minimum performance criteria (flood periods excepted): – Maximum flow < 10 cms-1, Silt design capacity of lagoons, minimum 50 m3 per nett ha of bog serviced.
- All new ponds installed shall be designed to achieve these stated minimum design criteria (Condition 6.10).
- Desilting of all silt ponds prone to flooding by 1st November each year (Condition 6.11), and the implementation of procedures to ensure adequate silt control as specified in Condition 6.12.

The peat extraction is considered a pressure on the local streams however there has not been significant changes in water quality over the course of the EPA monitoring timeframe and that the overall water quality on the Yellow and Mongagh downgradient is good, it is concluded that peat extraction activities did not have a significant effect on the overall water quality on the Castlejordan Yellow_010 Subcatchment.

9.5.1.2 Current Phase (June 2020 – Present Day)

The Current Phase includes the period of time between the cessation of peat extraction activities and all ancillary works at the Application Site in June 2020 to the present day.

9.5.1.2.1 Effects of Drainage on Bog Hydrogeology and Downstream Surface Water Hydrology

In compliance with Condition 10.2 of the IPC Licence, it is a requirement of the licensee to decommission the Application Site by removing/disposing/recovering buildings, equipment,

waste from the Application Site. The main criteria pertaining to successfully complying with this condition is ensuring that the Application Site is not causing or likely to cause environmental pollution and the site of the activity is in a satisfactory state such that licenced lands can be deemed suitable for surrender of the IPC License under Section 95 of the EPA Acts. This is achieved by Bord na Móna identifying and quantifying any mechanical and infrastructural resources that were installed in the bog to enable the development and extraction operation at the Application Site. This list is then refined to identify any items that would be deemed as possibly resulting in environmental pollution, should they not be removed.

Ongoing decommissioning at the Application Site included removal of peat stockpiles which was completed in 2021, as well as decommissioning of other infrastructure, which is ongoing, outlined in Table 9-33. As outlined in Chapter 4, approximately 18.56 km of permanent rail track was located within the Application Site boundary. To date approximately 3.71 km of permanent rail has been decommissioned and removed in the east of Ballybeg Bog. The remaining rail track will be decommissioned as part of the overall decommissioning programme for the IPC Licence. Decommissioning activities are detailed for each of the five bogs within the Application Site in Appendix 4.3. A number of measures were undertaken on the peatlands including drain blocking, rehabilitation trials and vegetation of bare peat areas.

Table 9-33: Future decommissioning items for Application Site

Item	Description	Application Site Decommissioning Plan
1	Clean-up of remaining or unconsolidated waste or materials located in Bogs, Yards, Buildings and Offices	Relevant to All Bogs
2	Clean silt ponds	Relevant to All Bogs
3	Decommission peat stockpiles	Completed 2021
4	Decommission or remove buildings and compounds	Relevant to All Bogs
5	Decommission fuel tanks and associated facilities	Not relevant
6	Decommission and removal of septic tanks	Not relevant
7	Decommissioning and reduced pumping of existing bog pumps	Relevant to Ballybeg Bog

The IPC Licence requirements therefore does not form part of this substitute consent application and is being applied at specific locations across Bord na Móna 's landbank that are identified as suitable.

During this Current Phase, the Application Site has operated in accordance with IPC licensing requirements. Silt ponds are maintained and silt is removed from the silt ponds.

Discharge volumes from the Application Site to nearby surface watercourses are comparable to surface water discharges during the Peat Extraction Phase. No additional mitigation measures are deemed necessary as the conditions, emission limit values set out in the IPC licence are designed in accordance with the relevant legislation to ensure ongoing protection of groundwaters and surface waters.

There are no significant effects of drainage on bog hydrogeology and downstream surface water hydrology as a result of the Current Phase of the Application Site.

No additional control measures are deemed necessary as the conditions, emission limits etc. set out in the IPC licence are designed in accordance with the relevant legislation to ensure ongoing protection of groundwaters and surface waters.

9.5.1.2.2 Effects on Designated Sites

As previously identified, there is a hydrological link between the Boyne and Blackwater SAC and groundwater and surface water. The effects on receiving waters (in terms of water quantity and water quality) are similar to, but less than, those outlined in Section 9.5.2.1.2 due to the reduced site activity (i.e. Not Significant).

9.5.1.2.3 Effects on Groundwater / Surface Water Abstractions

No significant effect on local groundwater abstractions will have occurred from the cessation of peat extraction activities and all ancillary works in June 2020 to the present day. Drainage and hydrogeology of the Application Site are not significantly changed during this period.

9.5.1.2.4 Effects on Water Quality

In January 2021, Bord na Móna formally announced that peat extraction across all bogs within its landholding had ceased, although peat extraction at the Application Site had ceased prior to this in June 2020. The Current Phase of the Project includes all activities carried out at the Application Site from the cessation of peat extraction and ancillary works in June 2020 to the present day.

Decommissioning of the peat extraction activities associated with the IPC Licence is currently underway across the Application Site in accordance with Condition No. 10 of the IPC Licence which states the following:

> "*Condition 10.1: Following termination of use or involvement of all or part of the site in the licensed activity, the licensee shall:*
>
> *Condition 10.1.1: Decommission, render safe or remove for disposal/recovery, any soil, subsoils, buildings, plant or equipment, or any waste, materials or substances or other matter contained therein or thereon, that may result in environmental pollution.*"

The main criteria pertaining to successfully complying with this condition is ensuring that no environmental liability remains from this infrastructure and material and that the bog can be deemed suitable for surrender of the IE License under Section 95 of the EPA Acts. This is achieved by Bord na Móna identifying and quantifying any mechanical and infrastructural resources that were installed in the bog to enable the development and extraction operation at the site. This list is then refined to identify any items that would be deemed as possibly resulting in environmental pollution, should they not be removed. Decommissioning activities are detailed for each of the five bogs in Appendix 4-3.

As part of the decommissioning phase an exit audit will be carried out by Bord na Móna. The audit will address residual plant and equipment retained on site.

As required by the Licence, waste items are and will continue to be removed for recycling or disposal, using external contractors with the required waste collection permits, approved under Condition 7.2, and waste records are and will continue to be maintained as required under Condition 7.3. The validation of the success of compliance with Condition 10.2 of the IPC Licence is carried out through an Independent Closure Audit (ICA) which is followed by an EPA Exit Audit (EA) and the eventual partial or full surrender of the licence.

9.5.1.3 Remedial Phase

Effects of Drainage on Bog Hydrogeology and Downstream Surface Water Hydrology

During the Remedial Phase the Application Site will operate in accordance with IPC licensing requirements. Silt ponds will be maintained, and silt is removed on a regular basis. The Cutaway Bog Decommissioning and Rehabilitation Plans aims to rehabilitate the bogs. Bord na Móna 's bogs cannot be restored back to raised bog, as the majority of peat has been removed and the environmental conditions have been modified. However other natural habitats have started to develop, such as poor fen, heath, wetlands/reedbeds and birch woodland on shallower peat. In time areas of Sphagnum rich embryonic bog communities (on deeper peat) and areas or naturalised peatland can be developed.

The River Basin Management Plan (RBMP) is the key national plan for Ireland to achieve the objectives of the Water Framework Directive (WFD). In broad terms, the objectives of the WFD are to prevent the deterioration of water bodies and to protect, enhance and restore them with the aim of achieving at least good status and to achieve compliance with the requirement for designated protected areas. Peatland rehabilitation of Bord na Móna 's cutaway was part of the WFD (2018-2021) programme of measures.

The RBMP 2018-2021 took account of the fact that Bord na Móna was in the process of phasing out the extraction of peat for energy production, that it set a target to rehabilitate 9,000 ha of cutaway bogs (covering 25 peatlands) by 2021 and will look to implement best-available measures to further reduce water quality effects caused by peat extraction while the phasing-out process is taking place. This RBMP 2018-2021 rehabilitation target was superseded by the acceleration of the Bord na Móna 's de-carbonisation programme. The third cycle of the River Basin Management Plan: 2022 – 2027.

The site rehabilitation plans and the delivery of peatland rehabilitation by Bord na Móna is expected to have a positive effect on water quality and will help the RBMP 2022-2027 deliver its objectives in relation to the Water Framework Directive and is one of the five key actions. Restoration works will result in improvements in water quality, although depending on site-specific factors. While research is limited on the long-term restoration of peatlands, ammonium and DOC concentrations are likely to be reduce over time. Ammonium concentrations at rehabilitated peatlands are typically higher than intact raised bogs.

Discharge volumes from the Application Site to nearby surface watercourses will be comparable to surface water discharges during the operational phase. No additional control measures are deemed necessary as the conditions, emission limits etc. set out in the IPC licence are designed in accordance with the relevant legislation to ensure ongoing protection of groundwaters and surface waters.

Effects on Designated Sites

As previously identified, there is a link between the Boyne and Blackwater SAC and groundwater and surface water at this location. The potential effects on receiving waters (in terms of water quantity and water quality) are similar to but less as those outlined in Section 9.5.2 and 9.5.3 due to the reduced site activity. As the site contributes less than 1% of the flow to River Boyne and Blackwater SAC, there are no likely significant effects. Water quality in the Yellow River is good (Good Status at Clongall Bridge) prior to reaching the confluence with the River Boyne.

Effects on Nearby Groundwater / Surface Water Abstractions

No effect on local groundwater abstractions is likely to occur from the rehabilitation of the site. There is limited infiltration of rainwater to ground on the Application Site. The Remedial Phase covers the period from the cessation of peat extraction activities and all ancillary works in June 2020 to the present day. Drainage and hydrogeology of the Application Site are unchanged during this period.

Effect on Water Quality

Decommissioning of the peat extraction activities associated with the IPC Licence is currently underway across the Application Site. Monitoring data show that downstream water quality is not significantly altered since the cessation of peat extraction. This is potential due to other activities in the catchment (agriculture on peat/poorly drained soils, forestry and wastewater) affecting water quality and remained largely unchanged during the Peat Extraction Phase. The impact on downstream surface water quantity is unlikely to be significant, as drainage systems were designed to limit runoff to greenfield rates.

Following the implementation of the Decommissioning and Rehabilitation Plans, the bogs will become wetter, retain more water, and gradually recolonize with vegetation. Over time, they will develop into a wetland mosaic with a reduced silt and nutrient outputs. As a result, the residual effects of these plans are expected to have a moderate, positive, indirect, and long-term impact on downstream surface water hydrology and water quality.

The validation of the success of compliance with Condition 10.2 of the IPC Licence is carried out through an Independent Closure Audit (ICA) which is followed by an EPA Exit Audit (EA) and the eventual partial or full surrender of the licence. Bord na Móna will continue to comply with the existing EPA licence conditions.

9.5.1.4 Site Services

The water supply across the Application Site is supplied from the Toberdaly Public Water Scheme (PWS).

Wastewater from the welfare facilities at the Derrygreenagh Works which is located outside of the Application Site. Wastewater is discharged to an on-site septic tank with the effluent discharged to a percolation system through peat before penetrating to ground. The septic tank will be inspected and desludged annually by a licenced waste permit holder to ensure the treatment system is working optimally.

Given that there have not been any broad changes in water quality over the course of the EPA monitoring timeframe and that the overall water quality of the region is moderate, it is concluded that decommissioning activities will not have a significant effect on the overall water quality in the area.

9.6 CONTROL AND MONITORING MEASURES

The impact assessment of this remedial EIAR identifies where an aspect of the project was likely to give rise to significant environmental effects and identifies any control and/or monitoring measures that were put in place in order to avoid effects or reduce them to acceptable levels where possible. The assessment also identifies the requirement for any additional mitigation and/or monitoring measures.

With the exception of silt control (which from 1974 was subject to a formal management program as discussed in Chapter 4), formal documentation outlining dedicated measures referred to as control measures practised on site from 1948 - July 1988 are not available.

Emissions to Water

The IPC Licence, granted in 2000, sets out specific conditions in relation to emissions to water.

An emission limit value (ELV) for suspended solids of 35mg/l is set out in Schedule 1(i) of the IPC Licence. A schedule for surface water monitoring of emissions is set out in Schedule 1(ii) of the Licence. This condition required the preparation of a surface water monitoring programme at discharge locations, which was established and implemented across the licensed area, including the Application Site. This monitoring programme had regard to the status of each bogland, sensitivity of the receiving watercourse and status of silt pond measures. The Licence also required the preparation of an operational procedure for de-silting of the silt ponds and a roster for visual inspections. The Licence required an upgrade of the sedimentation pond treatment system. Existing silt ponds serving operational bogs during this time were required to achieve the following criteria:

- Maximum flow velocity < 10cm/s; and
- Silt design capacity of lagoons, minimum 50 m^3 per nett hectare of bog serviced.

All licence requirements were implemented and continue to be implemented across the licensed areas.

In respect of silt control, the control measures and procedures implemented across the bogs were required to ensure that:

- Drainage manholes were protected from excessive peat, and new manholes and outfalls were set well back from turning grounds;
- Headlands were kept clean and free from loose peat;
- Silt run-off, while piping or ditching, was minimised;
- Drains were ditched in dry weather;
- Field drains were cleaned regularly, particularly after stockpile loading;
- All fields that were milled were ridged at the end of production season; and
- All fields liable to winter flooding were cleared of milled pilled or re-compacted at the end of the extraction season.

Further to emission control, surface water and groundwater protection measures were required at the workshop[16] and depots. This included the following typical control measures:

- Bunded storage areas were used for tanks and drums and the integrity of bunded area were maintained on a continuous basis to ensure water tightness;
- Loading and unloading of fuel tanks were carried out in designated areas to protect against spillage;
- There were no discharges to off-site surface waters, off site storm drains or groundwaters;
- Monitoring and analyses of surface water discharges was carried out in accordance with *Schedule 3 Monitoring of Workshop/Depot Surface Water Run-off* of the licence;
- Measures were implemented in the event of contamination of surface waters, including;
    - Immediate investigations to identify and isolate the source of the contamination;
    - Put measures in place to prevent further contamination and to minimise the effects of any contamination on the environment; and
    - Notify the Agency as soon as practicable.
- Oil interceptors were fitted in areas of run-off and maintenance and cleaning logs were maintained on a continuous basis of same;
- Bi-annual inspections were made of septic tank;
- Washing down and servicing areas of plant and machinery were carried out in designated areas with suitable systems for collection, containment and if necessary, treatment; and
- Records of inspections and any damage or leaks in rolling stock that could result in accidental spillage were maintained on a continuous basis.

Bord na Móna 's *Environmental and Operational Procedures for the Protection of Surface Water* is provided in Appendix 4.13 and details the procedures established following the introduction of the IPC Licences. Ammonia levels fluctuate across all years, with the exception of 2022, where it was below the threshold. Total suspended solids were below the IPC limits across all years.

9.6.1 Peat Extraction Machinery – Maintenance Programmes and Storage

- All peat extraction machinery listed in Chapter 4 were stored either at the Derrygreenagh Works (outside the Application Site boundary), or at machine storage locations in Application Site bogs at the end of the workday;
- All machinery was regularly inspected, serviced and maintained;
- All machinery was regularly cleaned via power steam wash system at a wash bay which drained into a fuel/oil interceptor unit and associated gravel soak pit. The interceptor unit facilitated the removal of any oil/grease components. This was done to minimise dust and particle release; and,
- A self-contained machine parts washer was located in the workshop at the Derrygreenagh Works, outside the Application Site boundary.

[16] Workshop is located at Derrygrennagh works outside of Application Boundary

9.6.2 Refuelling Facilities

Refuelling and maintenance of all vehicles were undertaken at the Derrygreenagh Works (outside the Application Site boundary), and at machine storage locations in Application Site bogs. When machinery required refuelling on the Application Site, it was carried out by a mobile (rail or tractor-transported) fuelling unit which travelled out from the Derrygreenagh Works to the bogs where the machinery was located. Refuelling procedures were upgraded to standard bunding specifications to comply with IPC Licence requirements in 2000 (refer to Section 4.7 for details).

The following emergency action procedure was implemented at the Application Site prior to IPC Licencing (i.e., pre-2000):

1. When a spill occurred, the General Manager was immediately informed of the incident;
2. The spill was required to be assessed by the General Manager for potential risk to the health and safety of employees and the potential environmental consequences;
3. If there was a risk of explosion, all personnel were required to be evacuated from the area;
4. The spill was sourced, isolated and contained with polystyrene booms or dry peat (moisture content of 10%);
5. All efforts were made to prevent the spill from entering a storm drain or nearest outfall;
6. Once the spill had been contained, a suitable absorbent (e.g., dry peat) was to be used to soak the spillage;
7. All possible ignition sources such as electoral equipment, naked lights, machinery were removed from the area. Any combustibles in the spill area were removed;
8. Follow up action measures taken includes the implementation of appropriate remedial work to prevent such a spillage recurring in the future; and,
9. In the event of a significant spillage, the General Manager was required to notify the local authority.

9.6.3 Bog Hydrogeology and Downstream Surface Water Hydrology

The Application Site bogs were regulated by the EPA under IPC Licence (Reg. No. P0501-01) since early 2000. No additional control measures, other than compliance with the control measures, regulated by the EPA, are considered necessary in terms of protecting groundwater quality. The list below outlines the relevant control measures conditioned under the IPC Licence, as regulated by the EPA:

- Effective spill/leak management of mobile fuelling units;
- Replacement (and remediation where necessary) of all underground fuel tanks;
- There shall be no other emissions to water of environmental significance;
- All tank and drum storage areas shall be rendered impervious to the materials stored therein. In addition, tank and drum storage areas shall, as a minimum be bunded;
- Drainage from bunded areas shall be diverted for collection and safe disposal;
- The integrity and water tightness of all the bunding structures and their resistance to penetration by water or other materials stored therein shall be tested and demonstrated by the licensee to the satisfaction of the Agency and shall be reported to the Agency within eighteen months from the date of grant of this licence and every two years thereafter;
- The loading and unloading of fuel oils shall be carried out in designated areas protected against spillage and leachate run-off;

- While awaiting disposal, all materials shall be collected and stored in designated areas protected against spillage and leachate run-off;
- With the exception of roof water, all surface water discharges from workshop areas shall, be fitted with oil interceptors;
- An inspection for leaks on all flanges and valves on over-ground pipes used to transport materials other than water shall be carried out weekly;
- The licensee (Bord na Móna) shall undertake a programme of testing and inspection of underground fuel pipelines to ensure that all underground fuel lines are tested at least every three years; and
- The licensee shall have in storage an adequate supply of containment booms and/or suitable absorbent material to contain and absorb any spillage.

In terms of groundwater quantity and hydrology (surface water runoff), or volumetric flows to surface water impacted by groundwater drainage of the bogs, control measures that were in place included:

- Field drains with low gradients;
- Silt ponds, as well as being a control measure for sediment from the bog, also acted as attenuation measures for higher flows during peak rainfall events. Each metre length of silt pond provides approximately 12m3 of water storage, which aided in slowing down the discharge from the bog;
- Silt ponds were cleaned at least twice a year to maintain adequate storage and treatment (sedimentation/settlement) capacity; and
- Pump capacities at pumping station were designed based on a runoff rate of <1 l/s/Ha, which is less than the greenfield runoff rates (max discharge rate or 0.46 m3/s for an area of 5.3km2). Runoff rates for the peatlands are greater than 5 l/s/HA therefore surface water tends to accumulate on site during the winter providing additional flood storage on site and reducing the potential for flooding off site. Pumping will be reduced or removed under the Draft rehabilitation plan.

9.6.4 Designated Sites

No additional measures are required for designated sites. Measures in place for designated sites are the same as above for Section

9.6.5 Contamination of Soil/Groundwater by Leakages and Spillages and Alteration of Peat/Subsoil/Bedrock Geochemistry

Measures that mitigated against contamination of peat, subsoil and bedrock are presented below:

- Effective spill/leak management of mobile fuelling units;
- Replacement (and remediation where necessary) of all underground fuel tanks;
- There shall be no other emissions to water of environmental significance;
- All tank and drum storage areas shall be rendered impervious to the materials stored therein;
- In addition, tank and drum storage areas shall, as a minimum be bunded;
- Drainage from bunded areas shall be diverted for collection and safe disposal;

- The integrity and water tightness of all the bunding structures and their resistance to penetration by water or other materials stored therein shall be tested and demonstrated by the licensee to the satisfaction of the Agency and shall be reported to the Agency within eighteen months from the date of grant of this licence and every two years thereafter;
- The loading and unloading of fuel oils shall be carried out in designated areas protected against spillage and leachate run-off;
- While awaiting disposal, all materials shall be collected and stored in designated areas protected against spillage and leachate run-off;
- With the exception of roof water, all surface water discharges from workshop areas shall, be fitted with oil interceptors;
- An inspection for leaks on all flanges and valves on over-ground pipes used to transport materials other than water shall be carried out weekly; and
- Inspections and monitoring of wastewater systems and associated discharges.

9.6.6 Nearby Groundwater/Surface Water Abstractions

Potential effects on GWS/PWS have been assessed for the Application Site. Part of Ballybeg Bog is located in the ZOC for Toberdaly however no effects were identified. Ballybeg Bog is underlain by deep subsoils and no spills or contaminated were noted in the area by TOBIN during the site walkovers. The control measures that have protected these water sources are the same as those outlined in Chapter 4 and Section 9.3.5 relating to spills/leakages on the bog units. The implementation of these measures has protected groundwater quality and eliminated any effects on water quality in the underlying aquifer and at downstream water supply source locations.

The control measures that have protected these local groundwater wells/supplies are the same as those outlined in Section 9.6.2, relating to spills/leakages on the bog units. The implementation of those measures has protected groundwater quality and eliminated any effects on water quality in the underlying aquifer and at downstream local groundwater wells/supplies.

9.6.7 Impact on Water Quality

During this period the Application Site will continue to operate under IPC licensing requirements with respect to surface water discharge quality and quantity.

Any works undertaken for the Decommissioning and Rehabilitation Plans will be completed under licence from the EPA with Bord na Móna reporting to the EPA until the IPC Licence is surrendered. PCAS measures will be undertaken as per the submitted PCAS plans.

As required by the Licence, waste items are and will continue to be removed for recycling or disposal, using external contractors with the required waste collection permits, approved under Condition 7.2, and waste records are and will continue to be maintained as required under Condition 7.3. The validation of the success of compliance with Condition 10.2 of the IPC Licence is carried out through an Independent Closure Audit (ICA) which is followed by an EPA Exit Audit (EA) and the eventual partial or full surrender of the licence.

Measures that mitigated against contamination of waters are outlined in Section 9.5 and will be being adhered to at the Application Site.

9.6.8 Remedial Phase

Measures that mitigated and will continue to mitigate against contamination of peat, subsoil and bedrock are outlined in Section 9.6.2 and are currently being adhered to at the site. These mitigation measures reduce the risk of surface water and/or groundwater contamination. These measures/controls have been implemented as part of compliance with IPC licence conditions across the Derrygreenagh Bog Group, including the Application Site. No further mitigation, beyond that implemented to date, are deemed necessary. The existing wastewater services at the Application Site have been in operation for years with no reported issues.

9.7 Residual Effects

9.7.1 Peat Extraction Phase

Between 1988 and 2020, hydrological and hydrogeological changes at the Application Site, are limited. All effects and risks associated with the Peat Extraction Phase were suitably mitigated and controlled in order to prevent and/or minimise the significance of effects.

Overall, the effect for the period of 1988 to 2020 was slight to moderate, direct, medium term, reversible and negative. Based on the available monitoring data and the absence of any discernible deterioration in biological, chemical or supporting quality elements, the Project has not caused and is not expected to cause deterioration in WFD status or no impediment to achieving WFD objectives.

9.7.2 Current Phase

The Current Phase of the bog life cycle is stabilising the peat deposit and setting it on a path to restoration. According to the AERs that have been carried out since the introduction of the rehabilitation plan, this process is continuously improving the conditions of the bog which will continue to reduce the effect of residual effects. The rehabilitation phase will result in a slight to moderate, direct, long term and beneficial.

9.7.3 Remedial Phase

Rehabilitation of the bogs will continue in the Remedial Phase in accordance with the Bord na Móna 's proposed rehabilitation plans for the five bogs comprising the Application Site. The rehabilitation phase will result in a slight to moderate, direct, long term and beneficial.

9.8 Cumulative and Indirect Effects

Cumulative effects of this project with other developments in the region, relate to the effects on Hydrology, Hydrogeology and Water Quality. These developments include other existing or planned developments in the environs of the Application Site and/or developments with the potential to interface with the bog in terms of environmental effects.

A cumulative impact assessment of the subject peat extraction and all ancillary works and other relevant development was undertaken with the purpose of identifying what influence the subject development has had, or potentially could have, on the surrounding environment when considered cumulatively and in combination with relevant permitted, proposed and constructed projects and other land-uses in the vicinity of the site. Cumulative impacts are defined as 'impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project'.

Assessment material for this cumulative impact assessment was compiled on the relevant developments within the vicinity of the Application Site with reference to Guidance contained in Section 3.7 of the *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2022). The material was gathered through a search of relevant online Planning Registers including Offaly, Meath and Westmeath County Council's and ACP's online planning portals). A review of relevant EIAR and remedial EIAR documents, technical assessments, planning application details and planning drawings was undertaken to identify past projects, their activities, environmental effects and potential impact on this Substitute Consent planning application.

As outlined in Section 2.9.2 The projects assessed as part of this cumulative assessment have been grouped according to the Project phases, namely those consented during the Peat Extraction Phase (1988 to June 2020), those consented during the Current Phase (June 2020 to September 2026), and any future developments that may be constructed or continue to operate during the Rehabilitation Phase which are known to the applicant.

The developments identified are listed in Table 2-3 to 2-4 and the main projects with potential cumulative effect on the land use, soils and geological environment are described in the subsequent sections. To account for the potential effects which may occur from the ongoing current of the peat extraction works at the Application Site and the future rehabilitation of the lands in accordance with the IPC Licence requirements, consideration was also given to the planned future uses of the lands within the Application Site. The various projects are detailed in Chapter 2, Table 2-3 to 2-4 of this EIAR. An assessment of the relevant cumulative effects is discussed below.

9.8.1 Peat Extraction Phase

Other commercially harvested bogs operated by Bord na Móna and private operators

Consideration has been given to other commercially extracted bogs located in close proximity to the Application Site. These primarily consist of other bogs owned and operated by Bord na Móna which are also part of the Derrygreenagh Bog Group, however it also includes privately owned and operated commercially harvested bogs. Commercial peat extraction on all Bord na Móna bogs ceased in January 2021, although many of the Bord na Móna bogs ceased extraction much earlier than this, similar to the Application Site which ceased in June 2020.

Third party peat cutting (turbary plots) is generally a much smaller area of bog compared to the Bord na Móna extraction areas. Bogs in the Bog group were in active production between 1988 and the cessation of peat harvesting on all Bord na Móna bogs. As with the Application Site, areas within the peatlands were removed from production on a phased basis.

The Rossan Bog (located to the east of Derryhinch Bog) is within the Boyne catchment while the Esker Bogs discharges to the River Esker. The Cavemount bog is fully out of operation since 2014/2015. The activities carried out on the other bogs would have been similar to those carried out at the Application Site. The principal risks associated with hydrology, hydrogeology and water quality at the site are the generation of silty waters due to runoff to water. These risks were mitigated through the adoption of existing Bord na Mona control measures and IPC licence measures. Potential effects were mitigated through the adoption of operational good practice and IPC licence procedures and hence, it is unlikely that the development give rise to any significant cumulative effects with regards to hydrology, hydrogeology and water quality.

9.8.2 Current Phase

Yellow River Wind Farm – ACP Planning reference PA0032

The site is located within the townlands of Derryarkin, Derryiron, Coolcor, Coolville, Ballyburly, Greenhills, Bunsallagh, Derrygreenagh, Knockdrin, Wood, Killowen, Corbetstown, Carrick, Garr and Dunville, Rhode, Co. Offaly. The windfarm is located to the South of Derryarkin and to the south of Drumman and Derryhinch Bog. The wind farm was granted permission in 2014 and was constructed between 2022 to 2024, commencing operation in 2025.

The area surrounding the Application Site is currently the site of the Yellow River Wind Farm development. Yellow River Wind Farm is currently in the operational phase where there no significant effects.

The surrounding area is relatively flat lying, with cutover peat overlying glacial till and gravels that in turn overly sedimentary bedrock of mixed lithology. The principal risks associated with hydrology and hydrogeology at the yellow river wind farm site are the generation of silty waters due to runoff from construction areas, and the loss of construction and operational materials (concrete, fuel and oil, etc) to water. These risks were mitigated through the implementation of the agreed mitigation measures. The effects from Yellow River Wind Farm are listed below.

- Pollution with suspended solids due to runoff of soil from construction areas;
- Pollution during construction phase with substances such as fuels, lubricants, waste concrete, wastewater from site toilet and wash facilities, etc;
- Pollution with surface drainage water during operation; and
- Permanent loss of habitat due to culverting or bank/stream alteration.

As mentioned, these risks are mitigated through the implementation of construction and operational mitigation measures, the development did not give rise to any significant cumulative effects with regards to hydrology, hydrogeology, and water quality.

BNM Biomass Storage (Planning ref 20331, 20/329)

Biomass (timber) is stored on part of the Drumman Bog. The implementation of the proposed mitigation measures in the planning application ensured there is no cumulative significant adverse effects on the water environment in combination with other relevant developments within the catchment.

Clonin Solar Farm, Rhode, Co. Offaly Planning ref 21488)

This solar farm was granted in 2017 for a 96.6 hectare solar farm with a proposed capacity of 40 MW. It is located to the east of Ballybeg bog. Based on a review of the submitted application, there is no risk of significant cumulative effects on hydrology and hydrogeology as a result of the development.

Derryarkin Sand and Gravel DAC (Planning reference 01/365, 02/172, 051113, 1925, 18209)

A planning application and EIAR accompanied an Application by Derryarkin S&G to Westmeath County Council and Offaly County Council in respect of the development of a new sand and gravel extraction operation, as well as the ancillary facilities required to serve the development. The initial application was consented in 2001 and an extension to Drumman extraction pit was consented in 2019 (application reference 19/25). The gravel extraction area extends to c. 250 hectares and includes a restoration plan for the site. The site was on the former peat extraction area with gravel deposits above and below the water table. Flooded quarry ponds can improve water quality on floodplains through two key mechanisms: capturing sediment and pollutants during flood events and actively removing excess nutrients from the water. These ponds can provide important ecosystem services such as water provisioning and nitrogen cycle regulation[17]. Proposed mitigation measures in place there is no likely significant cumulative effects on the identified groundwater and surface water receptors.

S&G Extraction - Kilmurray Precast Concrete Ltd. (Planning reference 051028, 12207, 178, 15141, 13122, 18324, 1849)

A planning application and EIAR by Derryarkin S&G to Offaly County Council in respect of the development of a new sand and gravel extraction operation, as well as the ancillary facilities required to serve the development. The initial application was in 2012 with additional applications in 2105, 2017 and 2021. The site extends to c. 150 hectares and includes a restoration plan. The site was on the former extraction area with gravel deposits above and below the water table. The implementation of the proposed mitigation measures ensured there is no cumulative significant adverse effects on the water environment in combination with other relevant developments within the catchment.

S&G Extraction - BD Flood (Planning reference 2560511, 501316)

A planning application and EIAR accompanied an application by BD Flood to Offaly County Council in respect of the development of a sand and gravel extraction operation, as well as the ancillary facilities required to serve the development. The initial application was in 2025. The application site extends to c. 19.5 hectares and includes a restoration plan for the site. The application area involves extraction of gravel deposits above and below the water table. The S&G application area is located approximately 0.2 km from the Application Site. Based on a review of the application along with the implementation of the mitigation measures, there is no cumulative significant adverse effects on the hydrology and hydrogeology environment in combination with other relevant developments.

[17] Ghirardi, N., Bresciani, M., Pinardi, M., Nizzoli, P., Viaroli, P., Pit lakes from gravel and sand quarrying in the Po River basin: An opportunity for riverscape rehabilitation and ecosystem services improvement, Ecological Engineering, Volume 196,

Derrygreenagh Power Station (ACP reference 319023)

The consented development will comprise of two generating units located on the site. These are a flexible combined cycle gas turbine unit (CCGT) of c. 430 megawatts (MW) and a reserve/peaking open cycle gas turbine unit (OCGT) of c. 170 MW. The primary fuel source for the CCGT unit will be natural gas with distillate stored onsite as a backup fuel.

The consented development will also consist of all necessary ancillary structures and equipment to allow for the efficient and safe running of the power plant. Further to this, it is proposed that Bord na Móna 's Power Generation business unit headquarters will be located at the site.

Potential effects identified include groundwater abstraction and the potential to effect flow regimes which can have an effect on the ecology of the Yellow River. In relation to groundwater abstraction this has the potential to result in hydrogeological disruption. In addition, wastewater discharges to the Yellow River have the potential to result in direct adverse effects on water quality.

The consented development has potential hydrological and hydrogeological connectivity at downstream sites and therefore there can be potential cumulative effects or interactions with other developments. The implementation of the proposed mitigation measures will ensure there will be no cumulative significant adverse effects on the water environment from the consented Derrygreenagh Power Plant.

9.8.3 Remedial Phase

Bog Rehabilitation

BnM intends to develop a wind and solar energy project across Derryarkin, Drumman, Derryhinch and Ballybeg Bog, currently known as Derrygreenagh Wind and Solar project. The proposed development is currently at the design phase and is likely to consist of wind turbines, solar photovoltaics and a battery energy storage system. The design of the development will align and integrate with the peatland rehabilitation measures as required under the IPC Licence P0501-01.

A third party intends to develop infrastructure at lands within the Application Site, consistent with the Government's Large Energy User Action Plan (LEAP), and which will be subject to separate planning and regulatory consent as appropriate.

Any future development within the Application Site, will be the subject of separate planning applications. Where required, such applications will be accompanied by an Environmental Impact Assessment Report (EIAR), which will assess the likely significant environmental effects associated with the construction, operation and decommissioning of the respective developments, including consideration of the rehabilitation measures being implemented at the Application Site.

Rehabilitation measures will be carried out at the Application Site. The proposals for future land uses have been accounted for, to the extent that information is available, in the preparation of the draft Cutaway Decommissioning and Rehabilitation Plans for the bogs which are included in Appendix 4.3 of this remedial EIAR.

The draft Cutaway Bog Decommissioning and Rehabilitation plans were developed in compliance with Condition 10 of the IPC licence. The scope of the plans was to address issues of concern as identified by Bord na Móna and consultees.

The primary rehabilitation goal is environmental stabilisation of the site and optimising climate action benefits. This will be achieved via wetland creation/management and residual peat re-wetting. This is defined as:

- Stabilisation or improvement in water quality parameters (e.g., suspended solids).
- Environmental stabilisation;
- The main target will be to maintain water-levels close to the peat surface, and to avoid the creation of large-water bodies, where possible;
- Reducing pressures due to former peat extraction activities on receiving water bodies in general. Carrying out rehabilitation with the application rehabilitation measures to re-wet peat and slow water movement across the site;
- Where appropriate, optimising hydrological conditions for the further development of wetland, Reed swamp, wet woodland and fen habitats on shallow cutaway peats, along with management of existing wetlands;
- Rehabilitation will support the National Policies on Climate Action and Green House Gas mitigation by maintaining and enhancing the current residual peat storage capacity of the bog (locking the carbon into the ground).

It is expected that the Application Site will have reduced emissions (reduced source) as it further develops naturally functioning wetland, scrub, woodland and peatland/heath habitats. It will also support Ireland's commitments towards Water Framework Directive and the River Basin Management Plan 2022-2027.

Colonisation of the cutaway generally begins within the first year of the field being taken out of extraction. Vegetation quickly establishes in drains and slows water flow and improves water quality. Rehabilitation will allow for the stabilisation of the site in its entirety. In order to achieve this, the drainage channels in the peat extraction areas were blocked to reduce water level fluctuations in the peatlands. The rehabilitation plan slowed the movement of water through the peat extraction areas through blocking of field drains and developing replacement siltation areas for terminal silt ponds. Each of these aspects are undertaken on a phased basis.

The draft Cutaway Bog Decommissioning and Rehabilitation plan also entailed the aftercare management of a number of siltation ponds. A programme of works will be devised in consultation with the EPA. Soft rush and other pioneer vegetation quickly establish in drains and then spreads across the peat fields. Once the soft rush establishes, other species begin to colonise the peatlands. The vegetation in the drains, helps to retain suspended solids and reduce the velocity of runoff.

Monitoring of the areas taken out of operations showed a steady recovery of the site through natural colonisation and stabilisation of the soils and overall high quality of water draining the site and entering streams. The rehabilitation was successful in slowing the movement of water on site and containing any peat within the bog area. A number of pools and shallow waterbodies have been created and these help to mitigate against peat run-off by extending the area for peat settlement before entering existing silt ponds.

In conclusion, decommissioning and rehabilitation is and will have mostly positive effects on the water environment of the Application Site. Rehabilitation works will include the blocking of drainage channels may have had slight short-term negative effects, as the environment was altered but, in this case, this was done in order to assist and speed up the recovery process of the bog and result in long-term positive effects.

The bog rehabilitation by Bord na Móna will have restored the regime closer to that expected for a wetland on peat soils and is a beneficial impact of the rehabilitation following cessation of peat harvesting activities. Reduction in pumping will expand wetland habitats at Ballybeg, improving overall water quality. It is considered that there will be a long-term slight positive effect on water quality arising from the cumulative effects of the rehabilitation of the bogs and the future development of the subject lands. The future proposals are also expected to slight beneficial and long term on hydrology, hydrogeology and water quality.

9.8.4 Major Accidents and Disasters

Major Accidents and Disasters assessment considers the likely significant effects of a development on the environment as a result of its vulnerability to, or introduction of, risks of major accidents and/or disasters. It is clear from the EIA directive that a major accident and/or natural disaster assessment should be mainly applied to Control of Major Accident Hazards (COMAH) sites, SEVESO sites or nuclear installations. The Project is not a COMAH or nuclear installation, however the assessment is included for completeness. The potential for a significant peat slide is Negligible at the Application Site.

It can be concluded that the risk of accidents associated with this Project is low and did not cause unusual, significant, or adverse effects on the hydrological or hydrogeological environment during the Peat Extraction Phase, Current Phase or Remedial Phase.

9.9 REFERENCES

Department of Housing, Planning and Local Government (2017) *Circular Letter PL 1/2017: Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive)
Environmental Protection Agency (2022): Guidelines on the Information to be contained in Environmental Impact Assessment Reports;
Environmental Protection Agency (2003): Advice Notes on Current Practice (in the preparation of Environmental Impact Statements);
CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006; and,
Environmental Protection Agency (2006): Environmental Management in the Extractive Industry (Non-Scheduled Minerals);
Institute of Geologists Ireland (IGI) Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements;
National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
Mott MacDonald (2020): Remedial Environmental Impact Assessment Report for Peat Extraction Substitute Consent Application
Mongagh and Yellow Power Ltd. (2013): Yellow River Wind Farm Environmental Impact Statement
McGarrigle, M.L., Bowman, J.J., Clabby, K.J., Lucey, J., Cunningham, P., Keegan, M., Cantrell, B., Lehane, M., Clenaghan, C. and Toner, P.F. (1992) *Water Quality in Ireland 1987-1990*. Environmental Protection Agency, Wexford.

Webpages

Source	Website	Date accessed
GSI online mapping	www.gsi.ie – https://storymaps.arcgis.com/stories/ae9feb997c7248578a0276e965bdcf96	August 2026
EPA Maps database	https://gis.epa.ie/EPAMaps/	August 2026
Met Éireann	www.met.ie	August 2026
NPWS	www.npws.ie	August 2026
WFD Catchments	www.catchments.ie	August 2026
OPW Flood Maps	www.floodmaps.ie	August 2026
HydroTool	www.watermaps.wfdireland.ie/HydroTool	August 2026
Flood info	www.floodinfo.ie	August 2026
MyPlan	www.myplan.ie	August 2026



www.tobin.ie