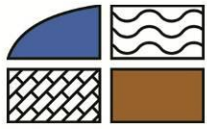




APPENDIX 8-4

**WATER FRAMEWORK
DIRECTIVE ASSESSMENT FOR
EXTRACTION IN LEMANAGHAN
BOG, CO. OFFALY 2025**



**HYDRO
ENVIRONMENTAL
SERVICES**

22 Lower Main St
Dungarvan
Co. Waterford
Ireland

tel: +353 (0)58 44122
fax: +353 (0)58 44244
email: info@hydroenvironmental.ie
web: www.hydroenvironmental.ie

**WATER FRAMEWORK DIRECTIVE ASSESSMENT
EXTRACTION AT LEMANAGHAN BOG, CO. OFFALY**

FINAL REPORT

Prepared for:
BORD NA MONA ENERGY LTD

Prepared by:
HYDRO-ENVIRONMENTAL SERVICES

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Author:	MICHAEL GILL CONOR McGETTIGAN NITESH DALAL
Signed:	 Michael Gill B.A., B.A.I., M.Sc., MIEI Managing Director – Hydro-Environmental Services
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1. INTRODUCTION

1.1 BACKGROUND

Hydro-Environmental Services (HES) were requested by MKO Ireland on behalf of Bord na Móna Energy Ltd to complete a Water Framework Directive (WFD) Assessment for the effects of peat extraction and ancillary activities at Lemanaghan Bog, Co. Offaly.

Lemanaghan Bog ("the Application Site") is a large Bord na Móna bog which forms part of the Boora Bog Group. The Application Site comprises an area of ~1,111 hectares (ha) within which bog drainage works began in 1950 followed by the commencement of peat extraction from 1960. The Application Site is located 3.3km to the northeast of Ferbane, 7.8km southwest of Clara, and 8.7km south of Moate.

The purpose of this WFD assessment is to determine whether any specific components or activities associated with peat extraction and ancillary activities at the Application Site have compromised WFD objectives or have resulted in a deterioration of the status of any waterbodies in the vicinity or downstream of the Application Site. In addition, this assessment will determine whether any components or activities associated with the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan and associated activities will compromise WFD objectives or result in a deterioration of the status of any waterbodies in the vicinity or downstream of the Application Site. This assessment will determine the water bodies with the potential to be impacted, describe the control measures and determine if the peat extraction and ancillary activities have been in compliance with the objectives of the WFD since its required transposition into Irish Law in 2003.

This WFD assessment is intended to supplement the remedial EIAR submitted as part of the substitute consent application. For the purposes of this WFD Compliance Assessment, and consistent with the rEIAR, the various components are described and assessed using the following references: the 'Project', 'Peat Extraction Phase', 'Current Phase' and the 'Remedial Phase'.

1.2 STATEMENT OF AUTHORITY

Hydro-Environmental Services (HES) are a specialist geological, hydrological, hydrogeological and environmental practice that delivers a range of water and environmental management consultancy services to the private and public sectors across Ireland and Northern Ireland. HES was established in 2005, and our office is located in Dungarvan, County Waterford. We routinely complete impact assessments for hydrology and hydrogeology for a large variety of project types including wind farms.

This WFD assessment was prepared by Michael Gill, Conor McGettigan and Nitesh Dalal.

Michael Gill (BA, BAI, Dip Geol., MSc, MIEI) is an Environmental Engineer and Hydrogeologist with over 18 years' environmental consultancy experience in Ireland. Michael has completed numerous hydrological and hydrogeological impact assessments for a variety of development types across Ireland. He has substantial experience in surface water drainage design and SUDs design and surface water/groundwater interactions. Michael has also worked on rEIARs for Cleanrath WF, 41 no. Bord na Móna bogs, the Ballivor Bog Group, and also for a number of quarry sites.

Conor McGettigan (BSc, MSc) is an Environmental Scientist, holding an M.Sc. in Applied Environmental Science (2020) from University College Dublin. Conor has also completed a B.Sc. in Geology (2016) from University College Dublin. In recent times Conor has assisted in the preparation of hydrological and hydrogeological impact assessments for a variety of developments. Conor assisted in the preparation of the land, soils and geology chapter of the

rEIAR completed for the substitute consent application for the peat extraction and ancillary activities at the Ballivor Bog Group.

Nitesh Dalal (B.Tech, PG Dip., MSc) is an Environmental Scientist with over 7 years' experience in environmental consultancy and environmental management in India. Nitesh holds a M.Sc. in Environmental Science from University College Dublin (2024), a PG Diploma in Health, Safety and Environment from Annamalai University, India (2021) and B.Tech. in Environmental Engineering (2016) from Guru Gobind Singh Indraprastha University, India (2016).

1.3 WATER FRAMEWORK DIRECTIVE

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

The WFD requires that all member states protect and improve water quality in all waters, with the aim of achieving good status by 2027 at the latest. Any new development must ensure that this fundamental requirement of the WFD is not compromised.

The WFD is implemented through the River Basin Management Plans (RBMP) which comprises a six-yearly cycle of planning, action and review. RBMPs include identifying river basin districts, water bodies, protected areas and any pressures or risks, monitoring and setting environmental objectives. In Ireland the first RBMP covered the period from 2010 to 2015 with the second cycle plan covering the period from 2018 to 2021, and the third cycle covers the period from 2022 to 2027¹. The RBMPs are forward looking.

The Water Action Plan 2024 is Ireland's 3rd River Basin Management Plan (2022 - 2027). The objectives of the Water Action Plan 2024 have been integrated into the design of the Proposed Development and include:

- Ensure full compliance with relevant EU legislation;
- Prevent deterioration;
- Meet the water standards and objectives for designated protected areas;
- Protect high-status waters; and,
- Implement targeted action and pilot schemes in focus sub-catchments aimed at (i) targeting water bodies close to meeting their objective and (ii) addressing more complex issues that will build knowledge for future cycles.

Our understanding of these objectives is that water bodies, regardless of whether they have 'Poor' or 'High' status, should be treated the same in terms of the level of protection and mitigation measures employed.

¹ The WFD RBMP cycles are forward looking plans, so 2009-2015 (1st Cycle), 2016-2021 (2nd Cycle), and 2022-2027 (3rd Cycle) are the plans and they use status from the previous 6 years.

The EPA updates status every three years, but they also complete an additional assessment mid-RBMP cycle. The mid-cycle status does not get reported to the Commission.

The linkage between the two is that the 2nd Cycle plan uses the 2009-2015 status, the 3rd Cycle plan uses the 2016-2021 status. The 2013-2018 status was not used in the RBMP and the 2019-2024 status will not be used in the next RBMP.

2. WATERBODY IDENTIFICATION AND CLASSIFICATION

2.1 INTRODUCTION

This section identifies those surface waterbodies (SWBs), groundwater bodies (GWBs) and protected areas with potential to be affected by the historic peat extraction and ancillary activities and proposed remedial measures and reviews any available WFD information.

2.2 SURFACE WATERBODY IDENTIFICATION

Regionally, the Application Site is located in a total of 3 no. surface water catchments. The vast majority of the Application Site is located in the Lower Shannon surface water catchment within Hydrometric Area 25A of the Shannon Irish River Basin District (Shannon IRBD). Meanwhile, a small area in the northwest of the Application Site is located within the Lower Shannon surface water catchment within Hydrometric Area 25B of the Shannon IRBD. Furthermore, a small section towards the north of the Application Site is located in the Upper Shannon surface water catchment within Hydrometric Area 26G of the Shannon IRBD (www.epa.ie). Therefore, all surface waters draining the Application Site will eventually discharge to the River Shannon. The River Shannon flows to the southwest approximately 10km northwest of the Application Site before veering to the southeast at Shannonbridge, approximately 15km west of the Application Site. The River Shannon then flows to the southwest, north of Banagher, approximately 17km southwest of the Application Site before eventually discharging into Lough Derg.

Within the Upper Shannon regional surface water catchment (26G), the Application Site is located in the Shannon Lower sub-catchment (Shannon[Lower]_SC_010) and the Boor_010 WFD river sub-basin. This area of the Application Site is drained by the Boor River. Within this WFD river sub-basin the EPA named Ballynahown Stream flows to the northwest from the vicinity of the Application Site. For reference, this stream is referred to locally on the 25" basemaps and on the Discovery Series Maps as 'The Brook'. This watercourse forms part of the WFD Boor_020 SWB. The Ballynahown Stream discharges into the Boor River approximately 6.5km northwest of the Application Site. The Boor River (Boor_020 SWB) then continues to the west for 4.5km before it discharges into the River Shannon (Shannon(Upper)_120 SWB).

Within the Lower Shannon (25B) regional surface water catchment, the Application Site is located in the Shannon Lower sub-catchment (Shannon[Lower]_SC_030) and the Blackwater(Shannonbridge)_010 WFD river sub-basin. The closest EPA mapped watercourse is the EPA named Holy Well of Clongawny Stream which flows to the northwest approximately 950m west of the Application Site and discharges into the Blackwater River (EPA Code: 25B27) approximately 3.3km northwest of the Application Site. These watercourses form part of the Blackwater(Shannonbridge)_010 SWB. The Blackwater River then continues to the southwest before the Blackwater(Shannonbridge)_020 SWB discharges into the Lower River Shannon (Shannon(Lower)_010 SWB) approximately 13.5km southwest of the Application Site and southeast of the village of Shannonbridge.

As stated above, the majority of the Application Site is located within the Lower Shannon (25A) regional surface water catchment. On a more local scale within this catchment, the Application Site is situated in the River Brosna sub-catchment (Brosna_SC_060) and 3 no. WFD river sub-basins. The easternmost section of this area of the Application Site is located in the Brosna_100 WFD river sub-basin. In this area the EPA named Fortified House Castlearnstrong Stream flows southwards immediately to the east of the Application Site. This stream forms part of the Brosna_100 SWB and discharges into the Brosna River approximately 1.3km to the east. Meanwhile, the majority of the Application Site is located in the Lemanaghan Stream_010 WFD river sub-basin with the Lemanaghan Stream flowing southwards through the centre of the Application Site. This stream discharges into the Brosna River approximately 1.2km south of the Application Site. Within this WFD river sub-basin the EPA map another stream to flow to the southwest along the northern boundary of Derrynagun Bog. This

stream, referred to by the EPA as the Lemanaghan discharges into the Lemanaghan Stream to the south of the Application Site. In addition, the west of the Application Site is located in the Brosna_110 WFD river sub-basin. Here the EPA named Kilcolgan Beg Stream, forms part of the Brosna_110 SWB and flows to the south from the Application Site, passing to the west of Curraghalassa Bog discharging into the Brosna River.

Downstream of the Application Site the Brosna River then continues to flow to the west before the Brosna_140 SWB discharges into the Lower River Shannon (Shannon(Lower)_010 SWB) approximately 14.5km to the southwest. The River Shannon itself then continues to flow to the southwest before discharging into Lough Derg near Portumna.

As detailed in Section 8.4.4 of the rEIAR, the Application Site is drained by a network of field drains, main drains which direct water to silt ponds prior to discharge to streams and drains around the perimeter of the Application Site. There are a total of 4 no. surface water outfalls (SW22, SW22A, SW22B and SW22C) in the Brosna_100 WFD river sub-basin, 2 no. surface water outfalls (SW19 and SW19A) in the Lemanaghan Stream_010 WFD river sub-basin, 1 no. surface water outfall (SW19B) in the Brosna_110 WFD river sub-basin and 1 no. surface water outfall (SW22D) in the Boor_020 WFD river sub-basin. There are no outfalls within the Blackwater (Shannonbridge)_010 WFD river sub-basin.

Figure A below is a local hydrology map of the area. The surface water outfall locations are shown on **Figure B**.

Table A presents the catchment area of each waterbody downstream of the Application Site as far as Lough Derg. The Boor_020 and Lemanaghan Stream_010 SWBs in the vicinity of the Application Site have the smallest catchment areas (11.04 and 13.68km² respectively). The catchment area increases progressively downstream with the River Shannon having a catchment area in excess of 4,500km² downstream of its confluence with the Boor River. The Brosna River to the south of the Application Site also has a significant upstream catchment area in excess of 850km². In addition, **Table A** presents the area of the Application Site mapped within, and upstream of each SWB, as a percentage of the total catchment area for that SWB. Based on this, the greatest potential for effects would have occurred on the Lemanaghan Stream_010 SWB as the Application Site represents 52% of the catchment area to this SWB. Meanwhile, the Application Site only represents 2.3% of the catchment area of the Boor_020 SWB, and 0.09% and 1.05% of the catchment areas of the Brosna_100 and Brosna_110 SWBs respectively. The Application Site represents 1.51% of the catchment area of the Blackwater (Shannonbridge)_010 SWB (however, there was no surface water discharge from the Application Site within this river sub-basin). Therefore, those SWBs which are located in close proximity to the Application Site are more susceptible to water quality impacts as a result of activities within the Application Site.

Table A: Downstream Catchment Size

WFD River Sub-Basin	Total Catchment Area (km ²)	Area of Application Site draining to Waterbody (km ²)	Application Site as % Area of Catchment
Boor_020	11.04	0.262	2.37
Shannon(Upper)_120	4,700	0.262	0.01
Shannon(Upper)_130	4,968.67	0.262	0.01
Blackwater(Shannon bridge)_010	26.91	0.406	1.51
Blackwater(Shannon bridge)_020	93.43	0.406	0.43
Brosna_100	884.86	0.828	0.09
Lemanaghan Stream_010	13.68	7.184	52.51
Brosna_110	990.35	10.453	1.05
Brosna_120	1,180.31	10.453	0.88
Brosna_130	1,195.63	10.453	0.87
Brosna_140	1,244.39	10.434	0.84
Shannon(Lower)_010	7,971.29	11.122	0.14
Shannon(Lower)_020	8,111.29	11.122	0.14
Shannon(Lower)_030	9,093.29	11.122	0.12
Lough Derg	10,913.29	11.122	0.10

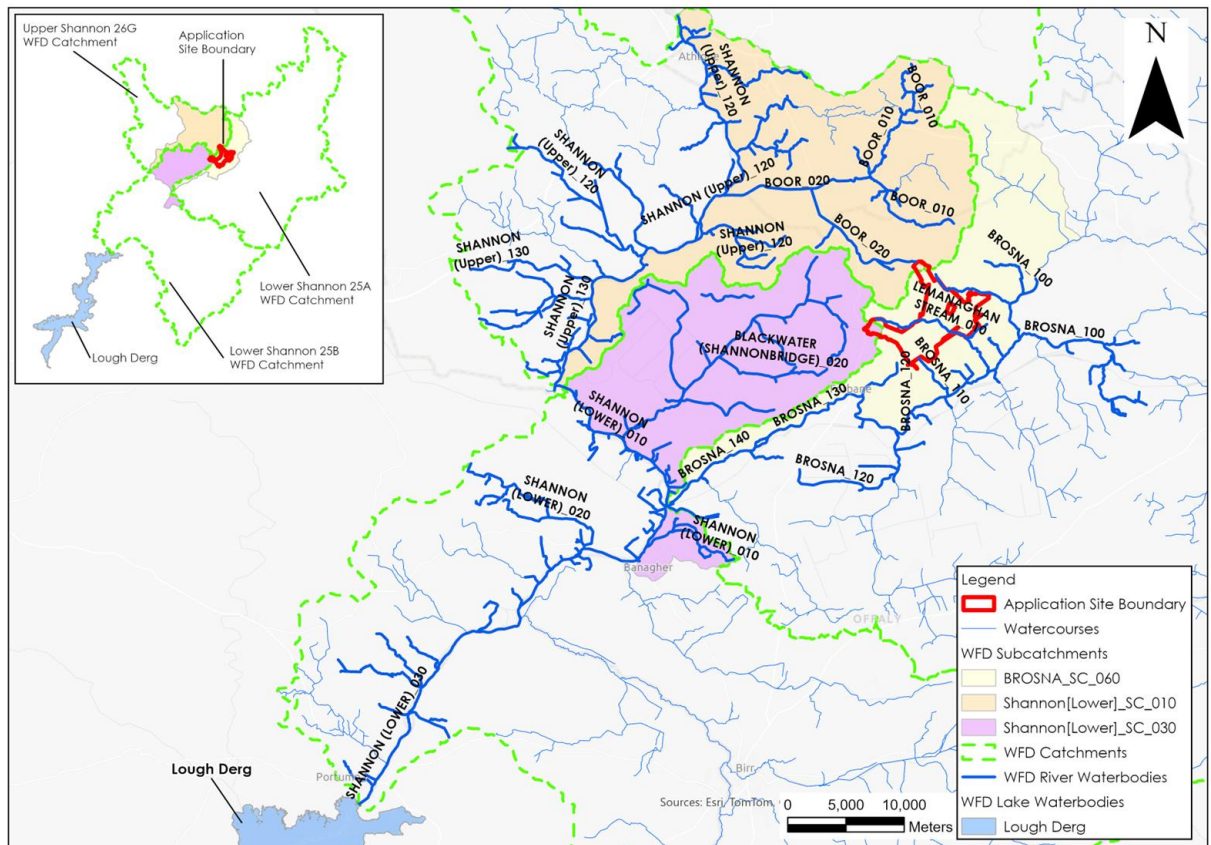


Figure A: Hydrological Setting and Downstream Surface Water Bodies



Figure B: Surface Water Outfall Locations

2.3 SURFACE WATER BODY CLASSIFICATION

A summary of the WFD status and risk result for Surface Water Bodies (SWBs) downstream of the Application Site are shown in **Table B**. The overall status is based on the ecological, chemical and quantitative status of each SWB.

Local Groundwater Body (GWB) and Surface water Body (SWB) status information is available from (www.catchments.ie).

Within the Shannon Lower_SC_010 sub-catchment, SW22D discharges to the EPA named Ballynahwon Stream. This stream forms part of the Boor_020 SWB which achieved 'Good' status in the latest WFD cycle (2016-2021). This was an improvement on the 'Moderate' status which this SWB achieved previously. Further downstream, the Boor_020 SWB discharges into the Shannon (Upper)_120 SWB. The Shannon (Upper)_120 and _130 SWBs achieved "Poor" and "Moderate" status respectively in the latest WFD cycle. Meanwhile, upstream of the Application Site, the Boor_010 SWB experienced a deterioration in WFD status from 'Good' status in the 1st cycle to 'Moderate' status in the subsequent cycles. Within this sub-catchment, the Boor_020 SWB is considered to be 'not at risk' of failing to meet its WFD objectives. No significant pressures have been identified to be impacting on this SWB. Further downstream, the Shannon (Upper)_120 SWB is deemed to be 'at risk' with hydromorphology listed as the significant pressure.

Within the Shannon Lower_SC_030 sub-catchment, the Blackwater(Shannonbridge)_010 and _020 SWBs downstream of the Application Site achieved "Poor" and "Moderate" status respectively in the latest WFD cycle. Both of these SWBs experienced a deterioration in WFD status from the 'Good' status which they were assigned in the 2nd WFD cycle (2013-2018). These SWBs are deemed to be 'at risk' of failing to meet their WFD objectives. Extractive

industry (peat) has been listed as being the significant pressure on these SWBs. Note that there is no surface water discharge from the Application Site within this sub-catchment.

Meanwhile, within the Brosna_SC_060 sub-catchment, SW22, SW22A, SW22B and SW22C discharge to the EPA named Fortified House Castlearmstrong Stream which forms part of the Brosna_100 SWB. SW19 and SW19A discharge to the Lemanaghan Stream_010 SWB whilst SW19B discharges to the EPA named Kilcolgan Beg Stream which forms part of the Brosna_110 SWB. These receiving SWBs all achieved 'Moderate' status in the latest WFD cycle. The Brosna_100 SWB achieved 'Moderate' status in all 3 no. WFD cycles, whilst the Lemanaghan Stream_010 SWB and the Brosna_110 SWBs experienced a deterioration in WFD status from the 'Good' status which they achieved in the 2nd WFD cycle (2013-2018). Further downstream the Brosna River (Brosna_120, 130 and 140 SWBs), the River Shannon (Shannon(Lower)_010, _020 and _030 SWBs) and Lough Derg all achieved 'Moderate' status in the latest WFD cycle. Meanwhile, upstream of the Application Site, the Brosna_090 SWB achieved 'Good' status in all 3 no. WFD cycles.

With respect to risk status, the Brosna River in the vicinity and downstream of the Application Site is 'deemed to be risk'. The risk status of the Lemanaghan Stream_010 SWB is currently 'under review'. Agriculture is listed as a significant pressure on the Brosna_100 and _110 SWBs in the vicinity of the Application Site. Hydromorphology is also listed as a significant pressure on the Brosna_110 SWB.

The SWB status for the 2016-2021 WFD cycle are shown on **Figure C**.

Table B: Summary WFD Information for Downstream Surface Water Bodies

River Waterbody	Status 2010-2015	Status 2013-2018	Status 2016-2021	WFD 3 rd Cycle Risk Status	WFD Pressures
Boor_010	Good	Moderate	Moderate	At risk	Anthropogenic
Boor_020	Moderate	Moderate	Good	Not at risk	None
Shannon(Upper)_120	Poor	Poor	Poor	At risk	Hydromorphology
Shannon(Upper)_130	Unassigned	Poor	Moderate	Under Review	None
Blackwater(Shannonbridge)_010	Moderate	Good	Poor	At Risk	Extractive Industry
Blackwater(Shannonbridge)_020	Good	Good	Moderate	At Risk	Extractive Industry
Brosna_090	Good	Good	Good	Not at risk	None
Brosna_100	Moderate	Moderate	Moderate	At risk	Agriculture
Lemanaghan Stream_010	Unassigned	Good	Moderate	Under Review	None
Brosna_110	Good	Good	Moderate	At Risk	Agriculture & Hydromorphology
Brosna_120	High	Good	Moderate	At risk	Agriculture
Brosna_130	Good	Moderate	Moderate	At risk	Anthropogenic
Brosna_140	Moderate	Moderate	Moderate	At risk	Hydromorphology
Shannon(Lower)_010	Unassigned	Unassigned	Moderate	Under Review	None
Shannon(Lower)_020	Good	Moderate	Moderate	At risk	Anthropogenic
Shannon(Lower)_030	Unassigned	Moderate	Moderate	Under Review	None
Lough Derg	Poor	Moderate	Moderate	At risk	Agriculture, Hydromorphology & Invasive Species

2.4 GROUNDWATER BODY IDENTIFICATION

The bedrock geological formations which underlie the Application Site are predominantly classified by the GSI as being Locally Important Aquifers - Bedrock which is Moderately Productive only in Local Zones (LI) (www.gsi.ie). These bedrock geological formations include the massive, unbedded lime-mudstones of the Waulsortian Limestone Formation which underlie the northwest of the Application Site, the dark muddy limestones and shales of Ballysteen Formation and the limestone, mudstone and sandstones of Navan Beds. Meanwhile, the Old Red Sandstones, found in the core of the Ferbane Inlier, are classified by the GSI as a Locally Important Aquifer - Bedrock which is Generally Moderately Productive (Lm).

In terms of Groundwater Bodies (GWBs), the Application Site is underlain by a total of 3 no. GWBs. The vast majority of the Application Site is underlain by the Clara GWB (IE_SH_G_240). A small area in the north of the Application Site is underlain by the Inny GWB (IE_SH_G_110) whilst some of the south of the Application Site is underlain by the Ferbane GWB (IE_SH_G_089). The Boor Gravels GWB (IE_SH_G_258) is also located in close proximity to the Application Site.

The GWB status for the 2016-2021 WFD cycle are shown on **Figure C**.

2.5 GROUNDWATER BODY CLASSIFICATION

All GWBs in the vicinity and in the lands surrounding the Application Site achieved "Good" status in all 3 no. WFD cycles (**Table C**). This status is defined based on the quantitative status and chemical status of each GWB.

Furthermore, all GWBs underlying the Application Site have been deemed to be "not at risk" of failing to meet their respective WFD objectives. No significant pressures have been identified to be impacting these GWBs.

Table C: Summary WFD Information for Groundwater Bodies

Groundwater body	Status 2010-2015	Status 2013-2018	Status 2016-2021	WFD 3 rd Cycle Risk Status	WFD Pressures
Clara	Good	Good	Good	Not at risk	None
Ferbane	Good	Good	Good	Not at risk	None
Inny	Good	Good	Good	Not at risk	None
Boor Gravels	Good	Good	Good	Not at risk	None

2.6 ZONE OF INFLUENCE

The zone of influence of the Application Site extend to the following SWBs and GWBs:

- River SWBs –Boor_020, Shannon(Upper)_120 and 130, Blackwater(Shannonbridge)_010 and 020, Lemanaghan Stream_010, Brosna_100 to 140 and Shannon(Lower)_010 to 030 SWBs;
- GWBs – Clara, Ferbane, Inny and Boor Gravels GWBs; and,
- Lake Waterbody – Lough Derg.

2.7 PROTECTED AREA IDENTIFICATION

The WFD requires that activities are also in compliance with other relevant legislation, as considered below.

The potential effect of the historic peat extraction and ancillary activities and the proposed remedial measures on nature conservation designated sites, bathing waters, nutrient sensitive areas (NSAs), shellfish areas and drinking water protected area's (DWPAs) are also included as part of the WFD Compliance Assessment.

2.7.1 Nature Conservation Designations

The Application Site is not located within any designated site. However, there are downstream hydrological connections to the designated sites as described below.

Within the Shannon Lower_SC_010 sub-catchment, the River Shannon Callows SAC/pNHA (Site Code: 000216) and the Middle Shannon Callows SPA (Site Code: 004096), are located approx. 9km to the northwest of the Application Site. The Application Site is hydrologically connected to this SAC/pNHA/SPA via the Ballynahown Stream (receives discharge from SW22D) and the Boor River. The length of the hydrological flowpath between the Application Site and this SAC/pNHA/SPA is approx. 10.5km.

Within the Brosna_SC_060 sub-catchment, the River Shannon Callows SAC/pNHA (Site Code: 000216) and the Middle Shannon Callows SPA (Site Code: 004096), are located approx. 13.6km to the southwest of the Application Site. The Application Site is hydrologically connected to this SAC/pNHA/SPA via the tributaries of the Brosna River which receive discharge from the Application Site (SW22, SW22A, SW22B, SW22C, SW19, SW19A and SW19B). The length of the hydrological flowpath between the Application Site and the SAC/pNHA/SPA in this sub-catchment is approx. 22.1km.

Meanwhile, there is no direct hydrological connection to any designated site within the Shannon Lower_SC_030 sub-catchment due to the lack of any surface water discharge.

Other designated sites within 10km of the Application Site are as follows:

- Clara Bog SAC and pNHA (Site Code: 000572), approx. 3.6km to the east. This SAC/pNHA is located upstream and upgradient of the Application Site;
- Ferbane Bog SAC and pNHA (Site Code: 000575), approx. 1.9km to the west. This SAC is located upstream and upgradient of the Application Site;
- Grand Canal pNHA (Site Code: 002104), approx. 2.1km to the south. This pNHA lies to the south of the Brosna River which acts as a hydrological barrier between the Application Site and this pNHA;
- Ballyduff Esker pNHA (Site Code: 000885), approx. 8.5km to the east. This pNHA is located upstream and upgradient of the Application Site;
- Woodfield Bog pNHA (Site Code: 000586), approx. 9km to the northeast. This pNHA is located upstream and upgradient of the Application Site;
- Clonydonnin Bog NHA (Site Code: 000565), approx. 2.5km to the north. There is no hydrological connection between the Application Site and this NHA;
- Kilkormac Esker pNHA (Site Code: 00906), approx. 9km to the southeast. The Brosna River acts as a hydrological barrier between the Application Site and this pNHA;
- Lough Boora pNHA (Site Code: 001365), approx. 7km to the south. The Brosna River acts as a hydrological barrier between the Application Site and this pNHA;
- Moyclare Bog SAC and pNHA (Site Code: 000581), approx. 5.5km to the west. This SAC is located upstream of the Application Site;
- Pilgrim's Road Esker SAC (site Code: 001776), approx. 7.8km to the northwest. There is no hydrological connection with this SAC;
- Mongan Bog SAC/pNHA (Site Code: 000580) and SPA (Site Code: 004017), approx. 9km to the northwest. There is no hydrological connection with this SAC;
- Doon Esker Wood pNHA (Site Code: 001830), approx. 4km to the northwest. There is no hydrological connection between the Application Site and this pNHA;

- Clonlough Glebe Bog pNHA (Site Code: 000893), approx. 4km to the west. This pNHA is located downstream of the Application Site on the southern banks of the Blackwater River. However, there is no discharge from the Application Site within this sub-catchment; and.
- Fin Lough SAC and pNHA (Site Code: 000576), approx. 8.5km to the northwest. The Blackwater River acts as a hydrological barrier between the Application Site and this SAC/pNHA.

2.7.2 Bathing Waters

Bathing waters are those designated under the Bathing Water Directive (76/160/EEC) or the later revised Bathing Water Directive (2006/7/EC).

There are no bathing water sites located in the vicinity of the Application Site or within the Zone of Influence.

2.7.3 Nutrient Sensitive Areas

Nutrient Sensitive Areas (NSA) comprise Nitrate Vulnerable Zones and polluted waters designated under the Nitrates Directive (91/676/EEC) and areas designated as sensitive areas under the Urban Wastewater Treatment Directive (UWWTD)(91/271/EEC). Sensitive areas under the UWWTD are water bodies affected by eutrophication associated with elevated nitrate concentrations and act as an indication that action is required to prevent further pollution caused by nutrients.

The Brosna River is located ~2km directly south of the Application Site is identified as an NSA. The Application Site is hydrologically connected with this NSA via several surface water outfalls (SW22, SW22A, SW22B, SW22C, SW19, SW19A and SW19B).

2.7.4 Shellfish Waters

The Shellfish Waters Directive (2006/113/EC) aims to protect or improve shellfish waters in order to support shellfish life and growth.

There are no shellfish protected areas within the vicinity of the Application Site or within the Zone of Influence.

2.7.5 Drinking Water

According to the EPA (www.epa.ie) the Shannon (Lower)_010, which is located 20.7km downstream and southwest of the Application Site, has been deemed a drinking water protected area (DWPA). This abstraction is associated with the Banagher PWS with a daily abstraction volume of 2,688m³/day.

The Shannon(Upper)_120 SWB has also been identified as a Drinking Water Protected Area (DWPA). This DWPA is associated with the Uisce Eireann's abstraction for the Athlone Water Supply. The maximum daily abstraction volume is 19,350m³/day.

Meanwhile, all GWBs within the catchment are listed as DWPAs. However, the GSI do not map the presence of any National Federation registered Group Water Schemes (GWS) or Public Water Schemes (PWS) or an associated Source Protection Area (SPA) within the Application Site. There is Group Water Scheme (GWS), the Boher Lamonaghan GWS, located ~270m northeast of the Application Site.

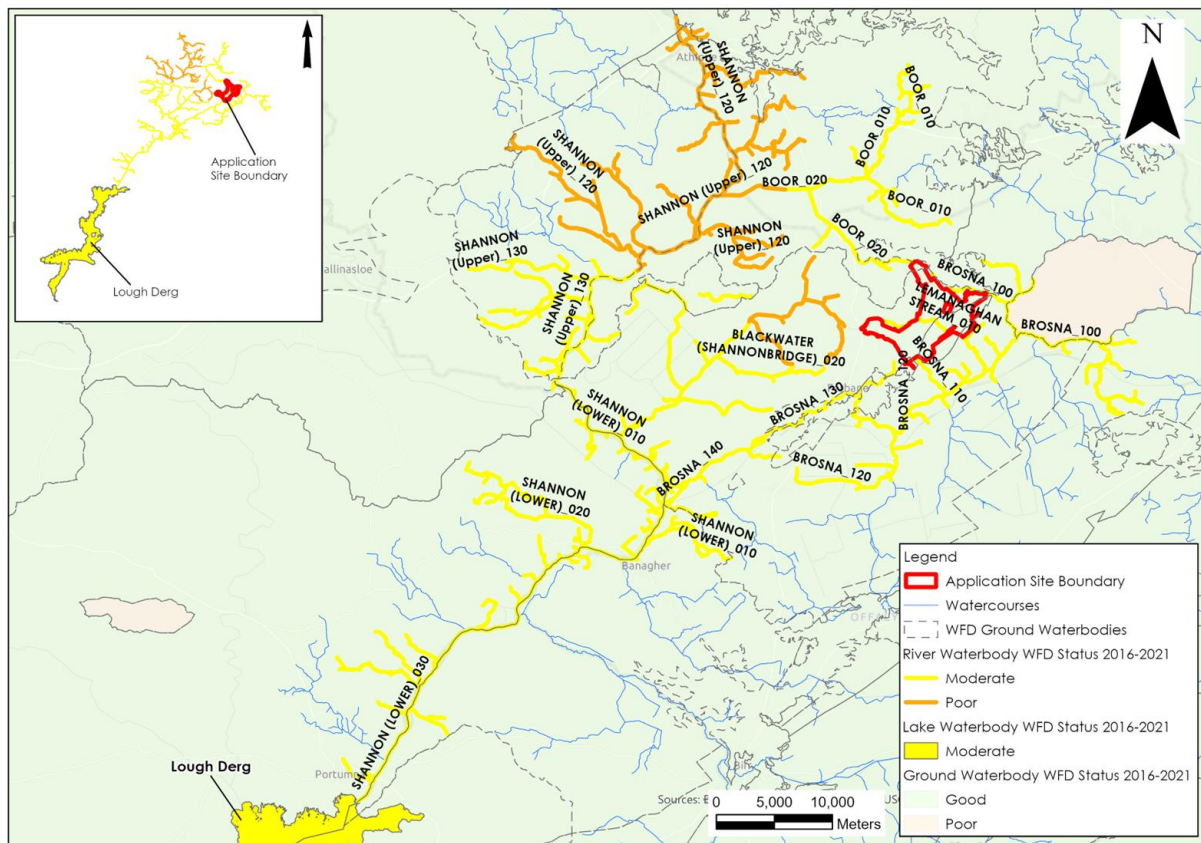


Figure C: WFD Groundwater and Surface Waterbody Status (2016-2021)

3. WFD SCREENING

As discussed in **Section 2**, there are a total of 16 no. SWBs that are located in the vicinity or downstream of the Application Site as far as Lough Derg. In addition, 4 no. GWBs are located in the vicinity of the Application Site. Furthermore, there are several protected areas within the vicinity and downstream of the Application Site including a number of nature conservation sites, NSAs and DWPA's.

3.1 SURFACE WATER BODIES

With consideration for the historic peat extraction and ancillary activities and all ancillary work, and the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan for the Application Site, it is considered that the Boor_020, Brosna_100, Lemanaghan Stream_010 and Brosna_110 SWBs are included in the WFD Compliance Assessment. The Application Site discharges to these SWBs via existing surface water outfalls. Further downstream the Boor_020 and Brosna_120 to _140 SWBs are included in the Compliance Assessment due to their location downstream of the Application Site.

The Blackwater(Shannonbridge)_010 SWB has been included for the purposes of a conservative WFD Compliance Assessment. Some of the Application Site is located in this WFD river sub-basin, but due to the artificial bog drainage, drainage in this area of the Application Site is directed into the Brosna_110 WFD river sub-basin from where it discharges to this SWB. The bog drainage comprising of field drains, main drains, silt ponds and surface water outfalls was well in place by the transposition of the WFD into Irish Law in 2003. Nevertheless, this SWB will be included in the assessment. However, the Blackwater(Shannonbridge)_020 SWB has been screened out of the WFD Compliance Assessment.

Downstream of the Boor and Brosna rivers, the River Shannon has been screened out of the WFD Compliance Assessment due to its distant location from the Application Site and the significant volumes of water within these SWBs. The significant flows are associated with the large upstream catchment area of the River Shannon (refer to **Table A**). The historic peat extraction and ancillary activities, and the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan have no potential to cause a deterioration in the status of these screened out SWBs and/or jeopardise their attainment of good surface water status.

Similarly, Lough Derg lake waterbody has been screened out due to its distant location from the Application Site and the large volume of water within this SWB. The historic peat extraction and ancillary activities, and the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan have no potential to cause a deterioration in the status of these screened out SWBs and/or jeopardise their attainment of good surface water status.

Regarding the SWBs which have been screened in the potential for the historic peat extraction activities, and all ancillary works, and the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan to impact these waterbodies will vary. This will be dependent on the total area of the Application Site which drains to each SWB, the number of bog outfalls and the flow volumes within the receiving SWBs. As shown in **Table A**, the SWBs with the greatest potential to be impacted were the Lemanaghan Stream_010 and Boor_020 SWBs.

3.2 GROUNDWATER BODIES

With respect to GWBs, the Clara, Inny and Ferbane GWBs will be carried through to the WFD Compliance Assessment due to their proximal location directly underlying the Application Site.

Meanwhile, the Boor Gravels GWB has been screened out as the Application Site does not overlap with the mapped extent of this GWB.

3.3 PROTECTED AREAS

The River Shannon Callows SAC/pNHA and the Middle Shannon Callows SPA are located downstream of the Application Site, and its surface water outfalls, via the Boor and Brosna rivers. With consideration for the historic peat extraction and ancillary activities and the Draft Bord na Móna Cutaway Decommissioning and Rehabilitation Plan for the Application Site, it is considered that the River Shannon Callows SAC/pNHA and the Middle Shannon Callows SPA are carried through into the WFD Compliance Assessment.

All other designated sites have been screened out of the WFD Compliance Assessment due to the lack of hydrological and/or hydrogeological connectivity with the Application Site.

The Brosna River is a nutrient sensitive area (NSA) and is located ~800m to the south of the Application Site. This NSA will be carried through to the WFD Compliance Assessment.

The Shannon(Lower)_010 and Shannon(Upper)_120 DWPAs are located on the River Shannon downstream of the Application Site. However, due to their distant location from the Application Site and the large volumes of water within the River Shannon these DWPAs have been screened out.

The GWB DWPAs are included in the WFD Compliance Assessment and are assessed in the overall assessment with regards to the Clara, Ferbane and Inny GWBs.

3.4 WFD SCREENING SUMMARY

A summary of WFD Screening discussed above is shown in **Table D**.

Table D: Screening of WFD water bodies

Type	WFD Classification	Waterbody Name/ID	Inclusion in Assessment	Justification
Surface Water Body	River	Boor_010	No	The Boor_010 SWB has been screened out due to its location upstream of the Application Site.
	River	Boor_020	Yes	A small area in the north of the Application Site is located in the Boor_020 WFD river sub-basin. There is an existing surface water outfall (SW22D) from the Application Site in this river sub-basin. An assessment is required to consider the potential impacts that peat extraction and ancillary activities have had on this SWB. Similarly, an assessment is required to consider the potential impacts of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan on this SWB.
	River	Shannon(Upper)_120	No	The Shannon (Upper)_120 SWB is located directly downstream of the Boor_020 SWB. This SWB has been screened out due to its distant location from the Application Site and the large volumes of water within the River Shannon.
	River	Shannon(Upper)_130	No	The Shannon (Upper)_130 SWB is located directly downstream of the Shannon (Upper)_130 SWB. This SWB has been screened out due to its distant location from the Application Site and the large volumes of water within the River Shannon.
	River	Blackwater(Shannonbridge)_010	Yes	The Blackwater(Shannonbridge)_010 SWB has been screened in due to the occurrence of an area in the northwest of the Application Site within this river sub-basin. However, the potential for effects is limited as the artificial bog drainage regime does not include any surface water outfalls within this river sub-basin. Nevertheless, this SWB is included for the purposes of a conservative assessment. An assessment is required to consider the potential impacts that peat extraction and ancillary activities have had on this SWB. Similarly, an assessment is required to consider the potential impacts of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan on this SWB.
	River	Blackwater(Shannonbridge)_020	No	The Blackwater(Shannonbridge)_020 SWB is located directly downstream of the Blackwater(Shannonbridge)_010 SWB. This SWB has been screened out due to its distant location from the Application Site and the lack of any surface water outfalls from the Application Site to the Blackwater River or any of its tributaries.
	River	Brosna_100	Yes	The east of the Application Site is located in the Brosna_100 river sub-basin. There are 4 no. surface water outfalls (SW22, SW22A, SW22B and SW22C) from the Application Site within this river sub-basin. An assessment is required to consider the potential impacts that peat extraction and ancillary activities have had on this SWB. Similarly, an assessment is required to consider the potential impacts of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan on this SWB.
	River	Lemanaghan Stream_010	Yes	The centre of the Application Site is located in the Lemanaghan Stream_010 river sub-basin. There are 2 no. surface water outfalls (SW19 and SW19A) from the Application Site within this river sub-basin. An assessment is required to consider the potential impacts that peat extraction and ancillary activities have had on this SWB. Similarly, an assessment is

				required to consider the potential impacts of the Draft Bord na M6na Cutaway Bog Decommissioning and Rehabilitation Plan on this SWB.
	River	Brosna_110	Yes	The west of the Application Site is located in the Brosna_110 river sub-basin. There is 1 no. surface water outfall (SW19B) from the Application Site within this river sub-basin. An assessment is required to consider the potential impacts that peat extraction and ancillary activities have had on this SWB. Similarly, an assessment is required to consider the potential impacts of the Draft Bord na M6na Cutaway Bog Decommissioning and Rehabilitation Plan on this SWB.
	River	Brosna_120	Yes	The Brosna_120 SWB is located directly downstream of the Brosna_110 SWB and in close proximity to the Application Site. An assessment is required to consider the potential impacts that peat extraction and ancillary activities have had on this SWB. Similarly, an assessment is required to consider the potential impacts of the Draft Bord na M6na Cutaway Bog Decommissioning and Rehabilitation Plan on this SWB.
	River	Brosna_130	Yes	The Brosna_130 SWB is located directly downstream of the Brosna_120 SWB. An assessment is required to consider the potential impacts that peat extraction and ancillary activities have had on this SWB. Similarly, an assessment is required to consider the potential impacts of the Draft Bord na M6na Cutaway Bog Decommissioning and Rehabilitation Plan on this SWB.
	River	Brosna_140	Yes	The Brosna_140 SWB is located directly downstream of the Brosna_130 SWB. An assessment is required to consider the potential impacts that peat extraction and ancillary activities have had on this SWB. Similarly, an assessment is required to consider the potential impacts of the Draft Bord na M6na Cutaway Bog Decommissioning and Rehabilitation Plan on this SWB.
	River	Shannon(Lower)_010	No	The Shannon(Lower)_010 SWB has been screened out due to its distant location from the Application Site (~15km) and the large volumes of water within the River Shannon associated with its large upstream catchment.
	River	Shannon(Lower)_020	No	The Shannon(Lower)_020 SWB has been screened out due to its distant location from the Application Site (~17km) and the large volumes of water within the River Shannon associated with its large upstream catchment.
	River	Shannon(Lower)_030	No	The Shannon(Lower)_030 SWB has been screened out due to its distant location from the Application Site (~22km) and the large volumes of water within the River Shannon associated with its large upstream catchment.
	Lake	Lough Derg TN	No	The Lough Derg SWB has been screened out due to its distant location from the Application Site (~35km) and the large volumes of water within Lough Derg associated with its large upstream catchment.
Groundwater Body	Groundwater	Clara	Yes	The Application Site overlies the Clara GWB. An assessment is required to consider the impacts of peat extraction and ancillary activities on this GWB. Similarly, an assessment is required to consider the potential impacts of the Draft Bord na M6na Cutaway Bog Decommissioning and Rehabilitation Plan on this GWB.
	Groundwater	Inny	Yes	The Application Site overlies the Inny GWB. An assessment is required to consider the

				impacts of peat extraction and ancillary activities on this GWB. Similarly, an assessment is required to consider the potential impacts of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan on this GWB.
	Groundwater	Ferbane	Yes	The Application Site overlies the Ferbane GWB. An assessment is required to consider the impacts of peat extraction and ancillary activities on this GWB. Similarly, an assessment is required to consider the potential impacts of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan on this GWB.
	Groundwater	Boor Gravels	No	The Application Site does not overlap with the mapped extent of the Boor Gravels GWB. Therefore, this GWB has been screened out of the assessment.
Protected Areas	Nature Conservation Designations	River Shannon Callows SAC/pNHA	Yes	The Application Site is hydrologically connected to the River Shannon Callows SAC/pNHA via several drains and streams which flow from the bog area into the Boor and Brosna rivers which in turn discharge into the River Shannon. An assessment is required to consider the potential impacts that historic peat extraction and ancillary activities have had on this designated site. Similarly, an assessment is required to consider the potential impacts of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan on this designated site.
		Middle Shannon Callows SPA	Yes	The Application Site is hydrologically connected to the Middle Shannon Callows SPA via several drains and streams which flow from the bog area into the Boor and Brosna rivers which in turn discharge into the River Shannon. An assessment is required to consider the potential impacts that historic peat extraction and ancillary activities have had on this designated site. Similarly, an assessment is required to consider the potential impacts of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan on this designated site.
		Ferbane Bog	No	Ferbane Bog SAC/pNHA is located upstream and upgradient of the Application Site. Therefore, the historic or proposed activities have no potential to impact the SAC/pNHA.
		Clara Bog SAC/pNHA	No	Clara Bog SAC/pNHA is located upstream and upgradient of the Application Site. Therefore, the historic or proposed activities have no potential to impact the SAC/pNHA.
		Grand Canal pNHA	No	The Grand Canal pNHA is not hydrologically connected to the Application Site. This pNHA lies to the south of the Brosna River which acts as a hydrological barrier. Therefore, the historic or proposed activities have no potential to impact the SAC/pNHA.
		Ballyduff Esker pNHA	No	Ballyduff Esker pNHA is located upstream and upgradient of the Application Site. Therefore, the historic or proposed activities have no potential to impact the pNHA.
		Woodfield Bog pNHA	No	Woodfield Bog pNHA is located upstream and upgradient of the Application Site. Therefore, the historic or proposed activities have no potential to impact the pNHA.
		Clonydonnin Bog NHA	No	Clonydonnin Bog NHA is not hydrologically connected to the Application Site. Therefore, the historic or proposed activities have no potential to impact the pNHA.
		Kilkormac Esker pNHA	No	Kilkormac Esker pNHA is not hydrologically connected to the Application Site. The Brosna River acts as a hydrological barrier. Therefore, the historic or proposed activities have no potential to impact the pNHA.
		Lough Boora pNHA	No	Lough Boora pNHA is not hydrologically connected to the Application Site. The Brosna

				River acts as a hydrological barrier. Therefore, the historic or proposed activities have no potential to impact the pNHA.
		Pilgrim's Road Esker SAC	No	Pilgrim's Road Esker SAC is not hydrologically connected to the Application Site. Therefore, the historic or proposed activities have no potential to impact the SAC.
		Mongan Bog SAC/pNHA/SAC	No	Mongan Bog SAC, SPA and pNHA is not hydrologically connected to the Application Site. Therefore, the historic or proposed activities have no potential to impact the SAC/SPA or pNHA.
		Clonlyon Glebe Bog pNHA	No	Clonlyon Glebe Bog pNHA is located downstream of the Application Site on the southern banks of the Blackwater River. However, there are no surface water outfalls from the Application Site to the Blackwater River. Therefore, the historic or proposed activities have no potential to impact the pNHA.
		Fin Lough SAC/pNHA	No	Fin Lough SAC/pNHA is not hydrologically connected to the Application Site with the Blackwater River acting as a hydrological barrier. Therefore, the historic or proposed activities have no potential to impact the SAC/pNHA.
		Doon Esker Wood pNHA	No	Doon Esker Wood pNHA is not hydrologically connected to the Application Site. Therefore, the historic or proposed activities have no potential to impact the pNHA.
		Moyclare Bog SAC/pNHA	No	Moyclare Bog SAC/pNHA is located upstream and not hydrologically connected to the Application Site. Therefore, the historic or proposed activities have no potential to impact the pNHA.
	Nutrient Sensitive Area	Brosna River	Yes	The Brosna River NSA is located ~2km to the south of the Application Site and is hydrologically connected to the site. An assessment is required to consider the potential impacts that historic peat extraction and ancillary activities have had on this designated site. Similarly, an assessment is required to consider the potential impacts of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan on this designated site.
	Drinking Water Protected Area	Shannon (Lower)_010	No	The Shannon (Lower)_010 DWPA will not be carried through to the WFD Compliance Assessment due to its distant location from the Application Site and the large volumes of water within the River Shannon. Therefore, the historic or proposed activities have no potential to impact the DWPA.
		Shannon(Upper)_120	No	The Shannon (Upper)_120 DWPA will not be carried through to the WFD Compliance Assessment due to its distant location from the Application Site and the large volumes of water within the River Shannon. Therefore, the historic or proposed activities have no potential to impact the DWPA.

4. WFD COMPLIANCE ASSESSMENT (ASSESSING THE EFFECT OF PREVIOUS ACTIVITIES)

4.1 PEAT EXTRACTION ACTIVITIES (PRE-2003)

The Application Site has been subject to peat extraction and ancillary activities since 1950, i.e. for more than 50 years before the WFD existed.

The primary hydrological and hydrogeological changes associated with the peat extraction process occurs during the initial drainage of the bog in advance of peat extraction. Constructed drainage ditches drained the upper surface of the bog by lowering the local peat water table. At this time, ancillary features were also constructed including railway lines. After the Application Site was drained, vegetation was removed from the bog surface, leaving only bare peat fields between the drains. During the Peat Extraction Phase, only minimal landuse change occurs which predominantly relate to minor annual topographic changes (i.e., lower ground levels) caused by ongoing peat extraction.

The timing of drainage and initiation of peat extraction varies across the Application Site. The first drainage occurred in 1950, with peat extraction commencing in 1960. Sod peat extraction ceased in 1984 and was replaced by milled peat extraction. The vast majority (approximately 968.7ha) of the Application Site had been drained by 1988 and was subject to peat extraction. Meanwhile, an area of approximately 65.1ha in the north of the Application Site, to the north of the local road, had been drained but had not yet been subject to peat extraction. An aerial image from 1988 shows that vegetation had not yet been cleared from this area of the Application Site (an aerial images show that the vegetation had been removed by 1995). Several smaller areas around the perimeter of the Application Site had not been drained at this time.

Aerial images from 2004 show that the vast majority of the Application Site was subject to peat extraction during this time. Inspection of aerial imagery also shows several NE-SW orientated areas in the southwest of the bog were not subject to peat extraction. Based on site walkover surveys these areas correspond with areas of cutover bog which has begun to revegetate. Sufficient time has elapsed between the cessation of peat extraction in these areas to allow for revegetation. However, much of the Application Site still comprised of bare cutover peat fields.

Prior to 2000, peat extraction and ancillary activities were not subject to IPC Licence controls. However, management of silt in discharges was always implemented, and this became formalised in the 1970s with the setting up of the silt committees within Bord na Móna. Also, since 1988, environmental monitoring and control measures in the form of silt ponds have been utilised at the Application Site with the aim of minimising the concentrations of suspended solids entering local watercourses.

Due to the nature of peat extraction and ancillary activities being near surface activities, impacts on groundwater are generally negligible. Any groundwater impacts will be contained within the bog basin which is typically isolated from the underlying bedrock groundwater body due to a substantial thickness impermeable lacustrine deposits which underlies the basin peat. Therefore, surface water is the main sensitive receptor. The primary risks to groundwater at the Application Site was from cementitious materials, hydrocarbon spillage and leakages, and wastewater systems installed at welfare facilities across the bogs. The primary risk to surface waters will be entrained suspended sediments (peat and soil particles) in site runoff during peat extraction and ancillary activities along with potential hydrocarbons spillage and leakages.

There is no requirement to assess the peat extraction and ancillary activities at the Application Site with respect to the WFD which pre-date 2003 (i.e. the required transposition of the WFD Directive into Irish Law).

However, for completeness and in order to describe the baseline environment we provide a brief discussion on the potential impacts of peat extraction and ancillary activities on water quality and water quantity and present the available water quality data for this period.

4.1.1 Effects

4.1.1.1 Surface Water Quantity/Quality

Peat in its natural state can act as a sponge providing storage of water after rainfall. However, with the implementation of bog drainage, the water levels in the peat bog were lowered and the capacity of the bog to store water was reduced. The available water storage within the bog would have provided a small buffer for downstream flooding. However, following drainage, surface runoff rates from the Application Site would have increased slightly causing downstream rivers and streams to become flashier (faster and higher flood peaks). However, drainage from the bog is regulated by the shallow (low gradient) nature of the drainage, and by routing all bog drainage via field drains, main drains, headland drains, pumps (where required) then from silt ponds to outfalls, with final discharge to natural watercourses. The bog drainage network likely alters flow volumes entering downstream surface waterbodies due to the increased connectivity of drains to the river network.

In terms of surface water quality, the primary potential negative impact on surface water quality would be the increase in suspended solid entrainment in surface waterbodies. The greatest risk of suspended sediment entrainment occurs during times of major earthworks, such as during the removal of vegetation and the construction of the bog drainage network. During the Peat Extraction Phase, there was an ongoing risk of elevated concentrations of suspended solids making their way into downstream surface watercourses from the erosion and transport of peat sediment via the bog drainage network. This potential pathway would have posed a significant risk to local surface water quality, particularly as the River Boyne and its tributaries are capable of supporting populations of Salmonids which are particularly sensitive to elevated concentrations of sediments. The largest potential negative water quality effect would have occurred in those surface waterbodies directly downstream of the Application Site.

4.1.1.2 Effects from Hydrocarbon Leakages and Spills

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a major pollution risk to groundwater and surface water quality. The accumulation of small spills of fuels and lubricants during routine plant use can also be a pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. It is also a nutrient supply for adapted micro-organisms, which can rapidly deplete dissolved oxygen in waters, resulting in the death of aquatic organisms.

Potential accidental wastewater discharges from on-site welfare facilities (tea stations and workshop/office facilities) have the potential to impact on groundwater and surface water quality. Runoff from concrete works can also impact on surface water and groundwater quality.

Furthermore, discharges from wastewater systems (septic tanks) at office buildings, and at welfare facilities and workshops could potentially have caused surface water contamination.

4.1.2 Baseline Water Quality

As the 1st WFD cycle was completed in 2010-2015, no WFD status reports exist for this period (pre-2003). However, the EPA have been completing ecological monitoring on these watercourses since the 1970s. The Biological Q-Value is a water quality rating system based on both the habitat and the invertebrate community assessment and is divided into status categories² (Q-values) ranging from 0-1 (Poor) to 4-5 (Good/High) (refer to **Table E**). These historic Q-values guide our estimates of the health of the waterbodies during this period.

Historic Q-values for SWBs directly downstream of the Application Site are summarized in **Table F** for the pre-2003 period and presented graphically in **Figure D** and **Figure E**. The pre-2003 (pre-WFD) data shows an overall decreasing trend from the mid-1980s to the late 1990s. In the late 1970s and early 1980s many of the SWBs achieved Q4-Q4-5 ratings (Good to High Q-status) and were deemed to be unpolluted. Meanwhile, in the late 1990s, many of the SWBs achieved Q3, Q3-4 or Q4 ratings (Poor, Moderate or Good Q-ratings) and ranged from being moderately polluted to unpolluted.

Of the consulted SWBs downstream of the Application Site, 4 no. SWBs (Brosna_11-, Brosna_120, Bosna_140 and the Blackwater(Shannonbridge)_010 SWBs) achieved a Q-value of Q4-5/Q5 (High Q-status) and were deemed to be of satisfactory condition during this period (1971-2000). Only 2 no. SWBs achieved a Q-value of Q3 during this period. The Brosna_140 SWB was assigned a Q-value of Q3 in 2002 whilst the Blackwater(Shannonbridge)_020 SWB achieved a Q3 rating in 1984, 1988 and 1999. Note that the Brosna_140 SWB is distant from the Application Site whilst there is no surface water discharge from the Application Site to the Blackwater River or any of its tributaries.

Similar trends in Q-ratings were recorded upstream of the Application Site on the Boor_010 and Brosna_090 SWBs. These SWBs are shown as a bold green dashed line in **Figure D** and **Figure E** for ease of reference. Given that similar trends were experienced both upstream and downstream of the Application Site, the trends are likely to reflect land-use changes in the wider Boor and Brosna sub-catchments rather than any specific peat extraction activities within the Application Site.

Table E: EPA Q-Rating System

EPA Q-Rating	EPA Q-Status	Pollution Status	Waterbody Condition
Q5/Q4-5	High Q-Status	Unpolluted	Satisfactory
Q4	Good Q-Status	Unpolluted	Satisfactory
Q3-4	Moderate Q-Status	Slightly Polluted	Unsatisfactory
Q3/Q2-3	Poor Q-Status	Moderately Polluted	Unsatisfactory
Q2/Q1-2/Q1	Bad Q-Status	Seriously Polluted	Unsatisfactory

² Referred to hereinafter as 'Q-status' in order to differentiate between the EPA Q-Rating status, which is based solely on ecological parameters, and the WFD status which is a combination of ecological and chemical parameters.

Table F: Summary Historic Q-values (Pre-2003)

WFD SWB	EPA Station ID	Available Data	EPA Q-Rating Range
Brosna_SC_060 sub-catchment			
Brosna_090	RS25B090700	1971 – 2002	3 – 4.5
Brosna_110	RS25B090760	1987 – 2002	3.5 – 4
Brosna_110	RS25B090800	1971 – 2002	3 – 5
Brosna_120	RS25B090950	1984 – 2002	4 – 4.5
Brosna_140	RS25B091000	1971 - 2002	3 – 5
Shannon Lower_SC_010 sub-catchment			
Boor_010	RS26B071100	1988 – 1996	4
Boor_020	RS26B071200	2002	4
Shannon(Upper)_120	RS26S021800	1976 - 2002	3.5 – 5
Shannon Lower_SC_030 sub-catchment			
Blackwater(Shannon bridge)_010	RS25B270110	1988 – 2002	3.5 – 4.5
Blackwater(Shannon bridge)_020	RS25B270200	184 - 2002	3 – 3.5

4.2 PEAT EXTRACTION PHASE (2003 – JUNE 2020)

This phase includes all peat extraction and ancillary activities from the required transposition of the WFD into Irish Law in 2003 to the formal cessation of peat extraction in the June 2020. During this time period the peat extraction and ancillary activities at the Application Site were completed under the conditions set out in IPC Licence No. P0500-01. This IPC Licence came into effect in May 2000 and upgraded and enhanced several pre-existing environmental monitoring and control measures which had been implemented at the Application Site since and pre-1988 (refer to Section 4.3.5 of rEIAR Chapter 4 for a complete description of the measures). These pre-IPC measures largely included the incorporation of silt ponds into the bog drainage system to minimise the concentrations of suspended solids entering local watercourses. Further amendments were made to the IPC Licence conditions in 2003 following the required transposition of the WFD into Irish Law. The Application Site also has a Surface Water Management Plan³ which define how compliance with the Licences is achieved. Therefore, throughout this phase peat extraction and ancillary activities have been operating under strict conditions designed to protect downstream water quality and quantity.

As the 1st WFD cycle was completed in 2010-2015, no WFD status exists for the first half of this period. However, EPA Q-values are available from 2002 to 2023/2024 for all watercourses downstream of the Application Site and are summarized in **Table G** and presented graphically in **Figure D** and **Figure E** Error! Reference source not found.. The data shows fluctuating Q-ratings during this period with the majority of watercourses fluctuating between Q3.5 ("Moderate" Q-rating) and Q4 ("Good" Q-rating), being either slightly polluted or unpolluted. However, several SWBs in the Brosna sub-catchment also achieved "High" Q-rating (Q4.5) during this period (Brosna_110, Brosna_120 and Brosna_140 SWBs). Within the Brosna sub-catchment there appears to have been a general improvement in Q-ratings post-2000 with no SWB achieving a Q3 rating or lower since the Brosna_140 SWB in 2005, which subsequently achieved a Q4-5 rating in 2009. The Brosna_090 and Boor_010 SWBs upstream of the Application Site show a similar trend to those SWBs which are downstream of the Application Site. Therefore, trends are likely to reflect land-use changes in the wider Boor and Brosna sub-catchments rather than any specific peat extraction activities within the Application Site. Consequently, changes in water quality during this period cannot be attributed solely to peat extraction and ancillary activities which were being scaled back at this time.

³ Current versions: SWMP 0500 Boora 31.01.2020.pdf

We consider that with the implementation of the control measures in accordance with IPC Licence Requirements the status of the SWBs during this phase were comparable to those recorded in the 1st WFD cycle (2010-2015).

Table G: Summary Historic Q-values (2002/2003 to Present)

WFD SWB	EPA Station ID	Available Data	EPA Q-Rating Range
Brosna_SC_060 sub-catchment			
Brosna_090	RS25B090700	2002 – 2021	3.5 – 4
Brosna_110	RS25B090760	2002 - 2023	3.5 – 4
Brosna_110	RS25B090800	2002-2023	3.5 – 4.5
Brosna_120	RS25B090950	2002 - 2023	4 – 4.5
Brosna_140	RS25B091000	2002 – 2023	3 – 4.5
Shannon Lower_SC_010 sub-catchment			
Boor_010	RS26B071100	2008 - 2024	3.5 - 4
Boor_020	RS26B071200	2002 - 2023	3.5 - 4
Shannon(Upper)_120	RS26S021800	2002 - 2024	3 - 4
Shannon Lower_SC_030 sub-catchment			
Blackwater(Shannon bridge)_010	RS25B270110	2002 – 2023	3 – 4
Blackwater(Shannon bridge)_020	RS25B270200	2002 - 2023	3 – 4

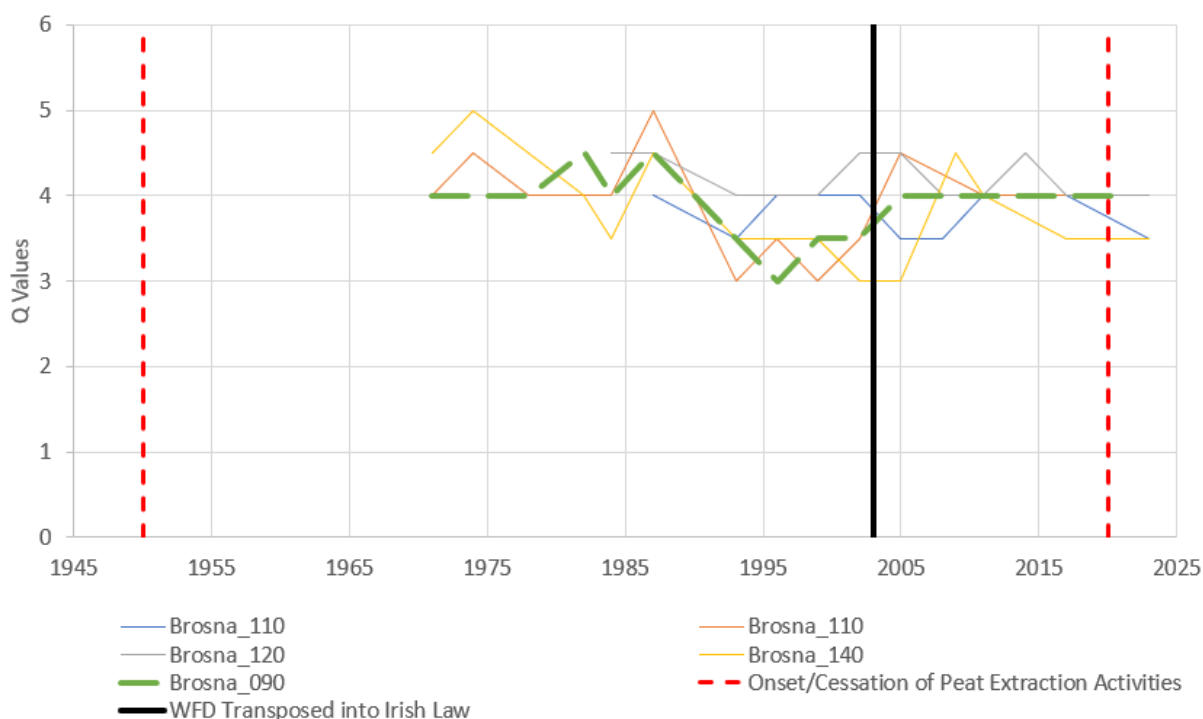


Figure D: Biological Q-Ratings Changes in the Shannon Lower_SC_010 and _030 sub-catchments

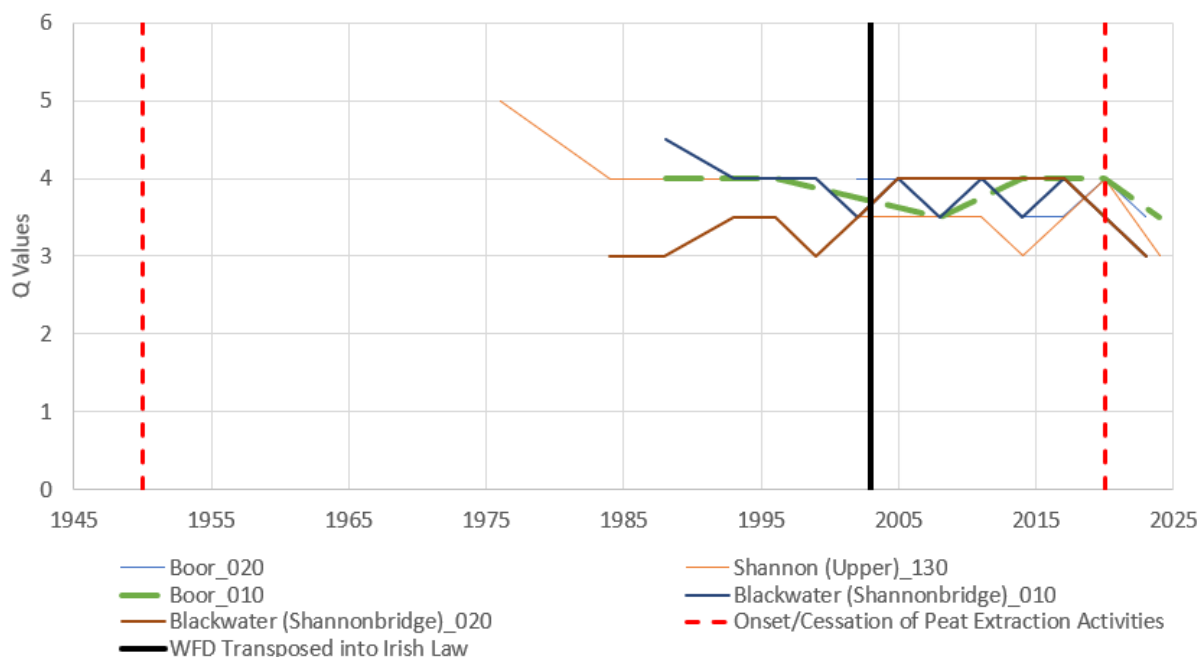


Figure E: Biological Q-Rating Changes in the Brosna_SC_060 sub-catchment

4.2.1 Effects

4.2.1.1 Surface Water Quality Effects from Bog Drainage

During this period the Application Site operated in accordance with IPC Licence conditions which put in place a series of control measures designed for the protection of surface water quality in the vicinity and downstream of the Application Site. These measures included:

- All water from the peat extraction areas is to be treated via an appropriately designed silt pond treatment system which has been inspected and maintained in accordance with Condition 6 of the IPC Licence. Treated water is discharged into nearby surface watercourses, with quarterly grab sampling completed on a select number of discharge outlets;
- Stormwater derived on-site is released into a local waterbody following basic treatment. Where run-off is from a rooftop only, it is directed to a drain. Runoff from other areas such as carparks is passed through hydrocarbon interceptor prior to release.

Bord na Móna have been conducting monitoring of emissions to water from the Application Site with the results summarised in **Table H** below.

We consider that the status of the SWBs at this time was comparable to those recorded during the 1st WFD round. Based on the EPA Q-values, there has been a slight improvement in water quality in comparison with the pre-2000 period. However, this is likely to be a combination of factors within the overall catchment and cannot be attributed solely to activities at the Application Site. The monitoring and requirements of the IPC licence would have ensured that peat extraction and ancillary activities were not adversely impacting water quality in downstream receptors.

A summary of potential status change to SWBs arising from potential surface water quality impacts from peat extraction and ancillary activities during the mitigated Peat Extraction Phase are outlined in **Table I**.

Table H: Bord na Móna Water Quality Monitoring (2000-2024)

Parameter	IPC Licence Limit	Range	No. samples	No. Exceedances	% Compliant
COD (mg/l)	100	<10 – 216	57	2	96.5%
pH	6 – 9	4.8 - 8.1	57	7	88%
Ammonia (mg/l)	3.7	0.01 – 3	57	0	100%
Ortho Phosphorous (mg/l)	-	<0.01 – 0.11	N/A	N/A	N/A
Suspended Solids (mg/l)	35	<2 - 174	57	4	93%

Table I: Surface Water Quality Effects During Mitigated Peat Extraction Phase

SWB	WFD Code	Assessed Pre-IPC Licence Status (Pre-2000)	Assessed Post IPC Licence Status (2000-2010)	WFD Cycle 1 Status (2010-2015)
Boor_020	IE_SH_26B071200	Moderate/Poor	Moderate	Moderate
Blackwater(Shannonbridge)_010	IE_SH_25B270110	Moderate/Poor	Moderate	Moderate
Brosna_100	IE_SH_25B090761	Moderate/Poor	Moderate	Moderate
Lemanaghan Stream_010	IE_SH_25L040890	Unassigned	Unassigned	Unassigned
Brosna_110	IE_SH_25B090800	Good/Moderate	Good	Good
Brosna_120	IE_SH_25B090950	High/Good	High	High
Brosna_130	IE_SH_25B091000	Good/Moderate	Good	Good
Brosna_140	IE_SH_25B091200	Moderate/Poor	Moderate	Moderate

4.2.1.2 Groundwater Quality Effects from Leakages and Spills

The Application Site has been regulated by the EPA under IPC Licence Registration No. P0500-01 since 2000. Compliance with the IPC Licence requires a series of water quality protection controls. The list below outlines control measures conditioned under the IPC licencing regime, as regulated by the EPA:

- Effective spill/leak management of mobile fueling 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;
- Except for 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 (BnM) 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.

Due to the local hydrogeological regime, and the isolated perched water table in the peat bog which is separated from the underlying regional groundwater table, we consider that no change occurred in the status of the underlying GWBs during the Peat Extraction Phase (refer to **Table J**).

Table J: Groundwater Quality Effects during Unmitigated Operational Phase

GWB	WFD Code	Assessed Pre-IPC Licence Status (Pre 2000)	Assessed Post-IPC Licence Status (2000-2010)	WFD Cycle 1 Status (2010-2015)
Clara	IE_SH_G_240	Good	Good	Good
Ferbane	IE_SH_G_089	Good	Good	Good
Inny	IE_SH_G_110	Good	Good	Good

4.2.1.3 Surface Water Quality Effects from Leakages and Spills

The Application Site has been regulated by the EPA under IPC Licence Registration No. P0500-01 since 2000. The Application Site also has a Surface Water Management Plan which defines how compliance with the Licence is achieved via various control measures.

As described above in Section 4.2.1 the historic Q-values during this period were generally of moderate and good status. If hydrocarbon leakages and spills were occurring during the Peat Extraction Phase such Q-values would not have been achieved. Much lower Q-ratings would be anticipated for waters polluted with hydrocarbon compounds. Therefore, we do not consider that the peat extraction and ancillary activities during this period resulted in a significant deterioration in surface water quality due to leakages and spills.

A summary of potential status change to SWBs arising from leakages and spills during the mitigated Peat Extraction Phase are outlined in **Table K**.

Table K: Surface Water Quality Effects from Leakages and Spills during Mitigated Peat Extraction Phase

SWB	WFD Code	Assessed Pre IPC Licence Status (Pre 2000)	Assessed Post IPC Licence Status (2000- 2010)	WFD Cycle 1 Status s (2010- 2015)
Boor_020	IE_SH_26B071200	Moderate/Poor	Moderate	Moderate
Blackwater(Shannonbridge)_010	IE_SH_25B270110	Moderate/Poor	Moderate	Moderate
Brosna_100	IE_SH_25B090761	Moderate/Poor	Moderate	Moderate
Lemanaghan Stream_010	IE_SH_25L040890	Unassigned	Unassigned	Unassigned
Brosna_110	IE_SH_25B090800	Good/Moderate	Good	Good
Brosna_120	IE_SH_25B090950	High/Good	High	High
Brosna_130	IE_SH_25B091000	Good/Moderate	Good	Good
Brosna_140	IE_SH_25B091200	Moderate/Poor	Moderate	Moderate

4.2.1.4 Effects on Protected Areas

The surface water connections from the Application Site to the Boor and Brosna rivers could potentially have transferred poor quality surface water that may have affected the conservation objectives of the downstream designated sites throughout the Peat Extraction Phase. The downstream sensitive receptors included the Brosna River NSA, the River Shannon Callows SAC/pNHA and the Middle Shannon Callows SPA.

The Brosna River NSA would have been most susceptible to potential effects due to its close proximity to the Application Site. There would have been very limited potential for effects on the SAC/pNHA and SPA due to their distant location from the Application Site and the large volumes of water within the River Shannon.

However, during this period the Application Site operated in accordance with IPC licence conditions which put in place a series of control measures designed for the protection of surface water quality in the vicinity and downstream of the Application Site. Therefore, it can be concluded that the potential to affect the qualifying interests of the downstream SAC and SPA, and water quality in the Brosna River, throughout the Peat Extraction Phase was significantly reduced due to the implementation of control measures throughout this phase.

4.3 CURRENT PHASE (JUNE 2020 – PRESENT DAY)

The Current Phase includes all activities carried out at the Application Site from the cessation of peat extraction in June 2020 to the present day.

During this time period the decommissioning activities at the Application Site have been limited to the removal of stockpiled peat (all stockpiles have been removed by 2024) with no peat extraction occurring during this phase. Environmental monitoring and drainage and silt maintenance continued during this phase in accordance with IPC licence conditions.

4.3.1 Surface Water Quality Effects from Bog Drainage

With the cessation of peat extraction, there is less potential for disturbance of peat and elevated concentrations of suspended sediments entering surface watercourses. During this period the site drainage still operated under the same drainage systems as during the Peat Extraction Phase i.e. field drains, main drains, silt ponds and discharge outlets etc. Therefore, discharge volumes from the Application Site to nearby surface watercourses will be comparable to surface water discharges during the Peat Extraction Phase.

During this period the Application Site also continued to operate under IPC licencing requirements with respect to surface water discharge quality and quantity.

The status of SWBs during the Current Phase is likely to be unchanged from those recorded during the most recent WFD round (2016-2021). A summary of the status change to SWBs arising from the bog drainage during the Current Phase are detailed in **Table L**.

Table L: Surface Water Quality Effects from Bog Drainage during the Current Phase

SWB	WFD Code	Status (2016-2021)	Assessed Change
Boor_020	IE_SH_26B071200	Good	Good
Blackwater(Shannonbridge)_010	IE_SH_25B270110	Poor	Poor
Brosna_100	IE_SH_25B090761	Moderate	Moderate
Lemanaghan Stream_010	IE_SH_25L040890	Moderate	Moderate
Brosna_110	IE_SH_25B090800	Moderate	Moderate
Brosna_120	IE_SH_25B090950	Moderate	Moderate
Brosna_130	IE_SH_25B091000	Moderate	Moderate
Brosna_140	IE_SH_25B091200	Moderate	Moderate

4.3.1.1 Contamination of Groundwater by Leakages and Spills

Despite the cessation of peat extraction at the Application Site, there was still some limited ancillary activities at the Application Site involving machinery and plant with which there is always a risk of accidental spillage of hydrocarbons. Similarly, the office buildings at the Bord na Móna depot remained occupied and discharges from wastewater systems (septic tanks) etc. have the potential to cause surface water and groundwater contamination. However, the risks are of a lesser extent due to the lower volumes of plant, machinery and workers operating at the Application Site during the Current Phase.

A summary of potential status change to GWBs arising from potential groundwater quality impacts during the Current Phase are outlined in **Table M**.

Table M: Groundwater Quality Effects during Current Phase

GWb	WFD Code	Status (2013-2018)	Assessed Change
Clara	IE_SH_G_240	Good	Good
Ferbane	IE_SH_G_089	Good	Good
Inny	IE_SH_G_110	Good	Good

4.3.1.2 Contamination of Surface Water by Leakages and Spills

Despite the cessation of peat extraction at the Application Site, there is still some limited activity at the Application Site involving machinery and plant with which there is always a risk of accidental spillage of hydrocarbons. Similarly, the office buildings at the Bord na Móna depot remain occupied and discharges from wastewater systems (septic tanks) etc. have the potential to cause surface water and groundwater contamination. These risks of a lesser extent due to the lower volumes of plant, machinery and workers operating at the Application Site during the Current Phase.

A summary of status change to SWBs arising from bog drainage during the Current Phase are outlined in **Table N**.

Table N: Surface Water Quality Effects from Leakages and Spills during Current Phase

SWB	WFD Code	Status (2016-2021)	Assessed Change
Boor_020	IE_SH_26B071100	Good	Good
Blackwater(Shannonbridge)_010	IE_SH_25B270110	Poor	Poor
Brosna_100	IE_SH_25B090761	Moderate	Moderate
Lemanaghan Stream_010	IE_SH_25L040890	Moderate	Moderate
Brosna_110	IE_SH_25B090800	Moderate	Moderate
Brosna_120	IE_SH_25B090950	Moderate	Moderate
Brosna_130	IE_SH_25B091000	Moderate	Moderate
Brosna_140	IE_SH_25B091200	Moderate	Moderate

4.3.1.3 Effects on Protected Areas

With the cessation of peat extraction, there is less potential for disturbance of peat and elevated concentrations of suspended sediments and contaminants entering surface watercourses and downstream designated sites. During this period the Application Site drainage still operates under the same drainage systems as during the Peat Extraction Phase i.e. field drains, main drains, silt ponds and discharge outlets etc. Therefore, discharge volumes from the Application Site to nearby surface watercourses will be comparable to surface water discharges during the Peat Extraction Phase.

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

Therefore, it can be concluded that the potential to affect the qualifying interests of the downstream Middles Shannon Callows SPA, River Shannon Callows SAC/pNHA throughout the Current Phase is significantly reduced due to the reduced activity at the Application Site and the continued implementation of mitigation measures. Similarly, the potential for effects on the Brosna NSA were significantly reduced.

5. WFD COMPLIANCE ASSESSMENT (REMEDIAL PHASE)

5.1 REMEDIAL PHASE

A Cutaway Bog Decommissioning and Rehabilitation Plan will be implemented at the Application Site. This plan is required in order to fulfil the requirements of Condition 10.2 of the IPC licence No. P0500-01. The Draft Cutaway Bog Decommissioning and Rehabilitation Plan, attached as Appendix 4-2, will be subject to consultation as well as input from the EPA prior to their implementation across the Application Site.

The key objective of the Cutaway Bog Decommissioning and Rehabilitation Plan is to achieve environmental stabilisation. The plan outlines 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 Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan for the Application Site will be undertaken using standard best practices (refer to Appendix III of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan included as Appendix 4-2 of the rEIAR).

Prior to the finalisation of and submission of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan to the EPA, 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. The most appropriate rehabilitation approach is chosen for individual areas of the bog reflecting local ecological and hydrological factors. Further details can be found in the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan in Appendix 4-2 of the rEIAR.

The Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan comprises short-term planning actions, short-term practical actions and long-term actions. The initial short-term planning actions will involve seeking approval of the rehab plan from the EPA. In addition, detailed site plans of how the various rehabilitation measures will be applied will be developed and a review of all issues and constraints which may affect how the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan will be completed. The short-term planning actions will also ensure that all activities associated with the rehab plan will be completed in accordance with the requirements of the IPC Licence. Several short-term actions will be completed in the first 2 years following EPA approval of the plan. These actions will include intensive drain blocking and monitoring of the rehabilitation measures. Silt ponds will continue to function during this phase. Longer term actions (>3 years) include the evaluation of the success of the short-term rehabilitation measures and undertake further remediation where necessary. Long-term monitoring, aftercare and maintenance will be completed until the IPC licence is surrendered. We understand that during this phase of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan, silt ponds will be assessed and decommissioned if necessary.

Much of the work associated with the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan will occur during the initial stages of the plan. Once drain blocking and other measures have been implemented the operational activities will comprise non-intrusive ecological and hydrological monitoring and may also include minimal maintenance and repair works.

5.2 POTENTIAL EFFECTS (UNMITIGATED)

All activities associated with the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan are required to operate in accordance with IPC Licence (P0500-01) until

the licence is surrendered. Therefore, an unmitigated scenario is not applicable to the WFD assessment of the Remedial Phase.

5.3 POTENTIAL EFFECTS (MITIGATED)

5.3.1 Surface Water Quality Effects and Mitigation Measures

Whereas draining the Application Site to facilitate peat extraction has likely had a negative impact on downstream surface watercourses, improvements in flow and water quality can be achieved through bog rehabilitation and rewetting.

International studies have shown a long-term reduction in pollutant concentrations, including nitrate and ammonia, following rewetting in comparison to drained peatlands (Pschenyckj, C. et al. 2021). Several studies have shown that the magnitude of these positive effects depends on site-specific factors such as the degree of degradation and local peat characteristics. Some studies have shown a short-term increase in phosphorous and suspended solids following restoration linked to initial drain-blocking activities before the hydrogeological regime of the site becomes stabilised (Pschenyckj, C. et al. 2021). These will be short term impacts and will not impact the overall status of downstream waterbodies.

The greatest improvement in water quality will occur in the receiving waterbodies directly downstream of the Application Site (Boor_020, Brosna_090, Lemanaghan Stream_010 and Brosna_110 SWBs). In the long term, enhanced water quality associated with bog rehabilitation will aid these waterbodies in achieving an improved WFD status. The Boor_020 and Lemanaghan Stream_010 SWBs will have the greatest potential to experience an improvement in WFD status due to their small upstream catchments. The Boor_020 SWB may increase in status from 'Good' to 'High' whilst the Lemanaghan Stream_010 SWB may achieve 'Good' status. The overall status of the Brosna_100 and Brosna_110 SWBs will be influenced by more catchment scale changes due to the large catchment areas associated with these SWBs.

Any works undertaken as part of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan will be completed under licence from the EPA with BnM reporting to the EPA until the IPC Licence is surrendered. The existing drainage systems which have proven effect will continue to operate during this period. Including the operation, maintenance and monitoring of silt ponds to prevent silt-run-off from the Application Site.

The Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan state that the effects of any management activities will be monitored and assessed.

5.3.2 Groundwater Quality Effects from Leakages and Spills

During the Remedial Phase, there will be some activity at the Application Site involving machinery and plant with which there is always a risk of accidental spillage of hydrocarbons. This activity will be greatest during the initial stages of rehabilitation when works associated with rewetting and revegetation such as drain blocking will be completed. Once this work has been completed there will only be very limited activity at the Application Site which will mainly comprise of non-intrusive monitoring and minimal repairs to peat blockages and or additional fertilization to aid the development of successional vegetation communities.

Due to the presence of peat at the Application Site and the bulk low permeability of the underlying mineral soil deposits, groundwater recharge at this site is limited. A shallow perched groundwater table exists in the peat stratum, and this is isolated from the underlying regional groundwater system and the Athboy GWB. Therefore, even in an unmitigated scenario any groundwater contamination will occur within the perched water table which discharges to nearby surface watercourses. No deterioration in groundwater quality in the underlying bedrock aquifer or the Clara, Inny or Ferbane GWBs will occur.

Mitigation measures will be implemented and adhered to until the IPC Licence for the Application Site is surrendered. These measures significantly decrease the risk of groundwater contamination. No further mitigation measures, beyond those implemented to date, are deemed necessary.

5.3.3 Surface Water Quality Effects from Leakages and Spills

As stated in **Section 5.3.2** above, there is a risk of accidental spillage of hydrocarbons during initial rehabilitation works. Due to the local hydrogeological regime and low rates of groundwater recharge, contaminants will enter the bog drainage network and downstream river waterbodies, resulting in a deterioration in surface water quality. This will have a potential negative effect on the WFD status of river waterbodies directly downstream of the Application Site (Boor_020, Brosna_100, Lemanaghan Stream_010 and Brosna_110 SWBs).

Control measures will be implemented and adhered to until the IPC Licence for the Application Site is surrendered.

5.3.4 Effects on Protected Areas

The surface water connections from the Application Site to the Boor and Brosna which in turn discharge into the River Shannon and the River Shannon Callows SAC/pNHA and the Middle Shannon Callows SPA may improve in water quality due to improvements in flow and water quality that can be achieved through bog rehabilitation and rewetting.

Any works undertaken as part of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan will be completed under licence from the EPA with BnM reporting to the EPA until the IPC Licence is surrendered. The existing drainage systems which have proven effect will continue to operate during this period. Including the operation, maintenance and monitoring of silt ponds to prevent silt-run-off from the Application Site.

Therefore, it can be concluded that the potential to negatively affect the qualifying interests of the River Shannon Callows SAC/pNHA and the Middle Shannon Callows SPA throughout the Remedial Phase is significantly reduced. On the contrary, the potential for the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan to positively affect the qualifying interests of the River Shannon Callows SAC/pNHA and the Middle Shannon Callows SPA is a more likely outcome as improvements in flow and water quality can be achieved through bog rehabilitation and rewetting, which in turn will positively affect the watercourses and associated qualifying interests of these designated sites.

All mitigation measures will also ensure that there are no significant effects on the Brosna River NSA.

5.3.5 Summary Potential Effects of Remedial Phase

In all instances, the mitigation measures described above are sufficient to meet the WFD objectives. The assessment of WFD elements for the WFD waterbodies for the short-term and long-term is summarised in **Table O** below.

With the implementation of the requirements of the IPC Licence at the Application Site during this period, the site rehabilitation works will have no potential to cause a deterioration in the status of downstream SWBs and/or jeopardise their attainment of good surface water status. The long-term impacts of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan may lead to an improvement in the status of those waterbodies directly downstream of the Application Site, however this is dependent on several site-specific factors.

Table O: Summary of WFD Status for Unmitigated and Mitigated Scenarios

SWB	WFD Code	Current Status (2016-2021)	Assessed Short-term Status	Assessed Long-term Status
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Boor_020	IE_SH_26B071200	Good	Good	Good/High
Blackwater(Shannon bridge)_010	IE_SH_25B270110	Poor	Poor	Poor
Brosna_100	IE_SH_25B090761	Moderate	Moderate	Moderate
Lemanaghan Stream_010	IE_SH_25L040890	Moderate	Moderate	Good/Moderate
Brosna_110	IE_SH_25B090800	Moderate	Moderate	Moderate
Brosna_120	IE_SH_25B090950	Moderate	Moderate	Moderate
Brosna_130	IE_SH_25B091000	Moderate	Moderate	Moderate
Brosna_140	IE_SH_25B091200	Moderate	Moderate	Moderate

6. SUMMARY AND CONCLUSION

6.1.1 Summary

WFD status for SWBs (Surface Water Bodies) and GWBs (Groundwater Bodies) hydraulically linked to the Application Site are defined in **Section 2** above.

From a hydrological perspective, the main impacts associated with peat extraction and ancillary activities at the Application Site occurred during the initial stages of peat extraction with the installation of the drainage infrastructure to facilitate peat extraction. Drainage works commenced at the Application Site in 1950 and by 1988 the vast majority of the Application Site had been drained. Therefore, these activities and their potential effect on the underlying GWBs and downstream SWBs pre-date the required transposition of the WFD into Irish Law in 2003.

The WFD Directive came into effect in Ireland in 2003 and this report assesses the effects of the peat extraction and ancillary activities at the Application Site from this date until the formal cessation of peat extraction in June 2020. During this time period, all activities at the Application Site were operating under IPC Licence requirements. The IPC Licence (P0500-01) sets out several conditions and emission limits designed to ensure the protection of surface and groundwaters. These measures likely led to an improvement in the status of local surface waterbodies in the vicinity of the Application Site.

Peat extraction ceased at the Application Site in June 2020 and no significant changes to the hydrological and/or hydrogeological environments will have occurred from the termination of peat extraction to the present day.

While no WFD status reports are available for the period predating 2010, the EPA have been completing ecological monitoring on downstream waterbodies since the 1970s. The Q-values suggest that the peat extraction and ancillary activities from 2003 to 2010 did not have a significant negative impact before the first WFD cycle in 2010. Review of the available WFD reports show that many of the downstream SWBs achieved a 'Good' or 'Moderate' status during the Peat Extraction Phase (2003-2020). The only SWB in the vicinity of the Application Site to achieve a 'Poor' WFD status was the Blackwater(Shannonbridge)_010 SWB. It is worth noting that there is no surface water discharge from the Application Site to this SWB or any of its tributaries. Whilst several waterbodies experienced a deterioration in WFD status this is unlikely to be related to peat extraction and ancillary activities which were being scaled back at this time and operating in accordance with IPC requirements. It is important to note that river waterbodies upstream of the Application Site have experienced a similar trend in Q-values over time. Therefore, the trend is likely to reflect wider land-use changes in the Boor and Brosna sub-catchments rather than any specific peat extraction activities within the Application Site.

The Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan for the Application Site have also been assessed (Remedial Phase). The plan will generally involve the rewetting and revegetation of the drained bog. The plan will likely have a positive effect on hydrogeology within the Application Site where groundwater tables in the peat bog is stabilised and closer to the bog surface. However, the Application Site will never return to the original intact raised bog condition which was present before the commencement of drainage. Studies from elsewhere (e.g., Pschenycky, C. et al. 2021) have shown that bog rewetting can also result in improvements in local and downstream surface water quality.

During the Remedial Phase the Application Site will be operated in accordance with IPC Licence requirements. These mitigation measures will ensure the protection of downstream surface waterbodies.

Several SWBs downstream of the Application Site are 'at risk' of failing to meet their respective WFD objectives. Therefore, catchment pressures (on water quality and water quantity/volume) appear to be significant at present. Peat extraction is not listed as a significant pressure on the waterbodies downstream of the Application Site in the Boor and Brosna sub-catchments. Agriculture and hydromorphology are the main pressures on these SWBs. Whilst the Blackwater(Shannonbridge)_010 SWB is under pressure due to peat extraction, we note that the Application Site does not discharge surface water within this sub-catchment. Therefore, the pressure must be from a different peat bog and is not related to the Application Site.

The local hydrogeological regime at the Application Site with low permeability peat and glacial deposits ensure that the perched groundwater table within the bog is isolated from the underlying GWBs. Therefore, historic peat extraction and ancillary activities are unlikely to have impacted the qualitative (chemical) or quantitative (volume) status of the Clara, Inny or Ferbane GWBs. Similarly, there will be no change in GWB status associated with the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan.

As such, the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan will not negatively impact upon any SWB or GWB as it will not cause a deterioration in the status of the waterbody and/or it will not jeopardise the attainment of good status.

Furthermore, the Draft Boord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan will not negatively impact upon any downstream protected areas.

Table P presents a summary of the estimated WFD status of downstream SWBs and the underlying GWB as discussed in **Section 4.2**, **Section 4.3** and **Section 5.3** above.

Table P: Summary WFD Status

WFD Element	Assessed Pre IPC Licence Status (Pre 2000)	Assessed Post IPC Licence Status (2003- 2010)	WFD Status (2010-2015)	WFD Status (2013-2018)	WFD Status (2016-2021)	Current Phase (2020– Present)	Short-term Rehabilitation Phase	Long-term Rehabilitation Phase
Boor_020	Moderate/Poor	Moderate	Moderate	Moderate	Good	Good	Good	Good/High
Blackwater(Shannonbridge)_010	Moderate/Poor	Moderate	Moderate	Good	Poor	Poor	Poor	Poor
Brosna_100	Moderate/Poor	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Lemanaghan Stream_010	Unassigned	Unassigned	Unassigned	Good	Moderate	Moderate	Moderate	Good/Moderate
Brosna_110	Good/Moderate	Good	Good	Good	Moderate	Moderate	Moderate	Moderate
Brosna_120	High/Good	High	High	Good	Moderate	Moderate	Moderate	Moderate
Brosna_130	Good/Moderate	Good	Good	Moderate	Moderate	Moderate	Moderate	Moderate
Brosna_140	Moderate/Poor	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Clara GWB	Good	Good	Good	Good	Good	Good	Good	Good
Ferbane GWB	Good	Good	Good	Good	Good	Good	Good	Good
Inny GWB	Good	Good	Good	Good	Good	Good	Good	Good

6.1.2 Conclusion

WFD status for SWBs (Surface Water Bodies) and GWBs (Groundwater Bodies) hydraulically linked to the Application Site are defined in **Section 2** above.

Historic peat extraction and ancillary activities at the Application Site would have had the potential to impact on the status of downstream SWBs and underlying GWBs. However, since the required transposition of the WFD into Irish Law in 2003, all peat extraction and ancillary activities at the Application Site have been operating in under strict IPC Licence requirements designed for the protection of surface and groundwaters and the protection of the status of these waterbodies.

Therefore, there has been no change in GWB or SWB status in the underlying GWB or downstream SWBs resulting from the historic peat extraction and ancillary activities. The mitigation measures have ensured that there was no change in quantitative (volume) or qualitative (chemical) status, and the underlying GWB, downstream SWBs and downstream protected areas have been protected from any potential deterioration.

As such, the Peat Extraction Phase (2003-2020) and the Current Phase (2020-Present):

- Have not caused a deterioration in the status of all surface and groundwater bodies assessed;
- Have not jeopardised the objectives to achieve 'Good' surface water/groundwater status;
- Have not jeopardised the attainment of 'Good' surface water/groundwater chemical status;
- Have not jeopardised the attainment of 'Good' surface water/groundwater quantity status;
- Have not permanently excluded or compromised the achievement of the objectives of the WFD in other waterbodies within the same river basin district;
- Have been compliant with the requirements of the Water Framework Directive (2000/60/EC); and,
- Have been consistent with other Community Environmental Legislation including the EIA Directive (2014/52/EU), the Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC) (Note that a full list of legislation complied with in relation to hydrology and hydrogeology is included in Section 8.1.4 of rEiAR Chapter 8).

Furthermore, the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan for the Application Site will be completed in accordance with IPC Licence conditions and will not impact the status of any waterbody. In addition, there will be no potential effects on any downstream protected areas as a result of the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan. Indeed, the Draft Bord na Móna Cutaway Bog Decommissioning and Rehabilitation Plan will likely have a positive long-term effect to the Water Framework Directive Classification of downstream waterbodies.

As such, the Remedial Phase:

- will not cause a deterioration in the status of all surface and groundwater bodies assessed;
- will not jeopardise the objectives to achieve 'Good' surface water/groundwater status;
- does not jeopardise the attainment of 'Good' surface water/groundwater chemical status;
- does not jeopardise the attainment of 'Good' surface water/groundwater quantity status;
- does not permanently exclude or compromise the achievement of the objectives of the WFD in other waterbodies within the same river basin district;

- is compliant with the requirements of the Water Framework Directive (2000/60/EC); and,
- is consistent with other Community Environmental Legislation including the EIA Directive (2014/52/EU), the Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC) (Note that a full list of legislation complied with in relation to hydrology and hydrogeology is included in Section 8.1.4 of rEIAR Chapter 8).

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