

Hydrogeological Impact Assessment

Gas to Bord na Mona, GNI Edenderry/Kilwarden




Client: Murphy International Limited

Prepared By: Minerex Environmental Limited

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EXECUTIVE SUMMARY

Minerex Environmental Limited (MEL) has prepared this Hydrogeological Impact Assessment for the proposed gas pipeline from Kilwarden offtake, Co. Meath to the Edenderry Power Station, Co. Offaly for Murphy International Limited. This report includes a hydrogeological review of the site and an assessment of lateral connectivity and potential impacts during the construction phase.

The assessment focuses on the northern section of the pipeline alignment, which lies in proximity to the Mount Hevey Bog Special Area of Conservation (SAC). Baseline conditions were established using desk-based data from Geological Survey Ireland (GSI) and the Environmental Protection Agency (EPA), together with ground investigation data, groundwater monitoring, and water quality sampling undertaken by IGSL (October 2025) and MEL (December 2025).

Groundwater flow within the groundwater body is controlled by regional and local topography. The Mount Hevey Bog SAC occupies a topographically elevated position relative to the works area, and both groundwater and surface water flow direction are likely away from the SAC. A Source-Pathway-Receptor (SPR) risk assessment was undertaken for the construction phase. Risks to the Mount Hevey Bog SAC was assessed as negligible to low risk, due to limited aquifer productivity, cohesive overburden, short groundwater flow paths, topography and likely absence of hydraulic connectivity with the SAC.

With the implementation of standard construction phase mitigation measures, including water management measures, the proposed pipeline development is not expected to result in significant adverse impacts on groundwater, surface water or the Mount Hevey Bog SAC.

INTRODUCTION

BACKGROUND

Minerex Environmental Limited (hereafter referred to as MEL) was appointed by Murphy International Limited (hereafter referred to as the Client) to prepare a hydrogeological assessment for the proposed development for Gas Network Ireland (GNI) for the new gas pipeline to Bord na Mona power station in Edenderry Co. Offaly from Kilwarden Co. Meath.

OBJECTIVE & SCOPE

The objective of this report is to establish the baseline hydrogeological conditions on site and identify the potential for any significant impacts on receiving waters and protected areas during the construction phase. The focus of this report will be to review the baseline conditions, proposed project alignment and identify lateral connectivity between the receptors and potential impacts to the nearby special area of conservation (SAC), Mount Hevey Bog SAC. The summary of this report is to be incorporated in the Environmental Impact Assessment Report (EIAR) for the project which is prepared by AWN Consulting Limited.

This assessment is reliant on the information for the site provided by the Client. The following documents/reports provided include the following:

- Ground Site Investigation Reports
 - 25882_Gas to Bord na Mona, Edenderry_IGSL GIR_COMBINED_16-02-26 Rev1
 - 25882_Gas to Bord na Mona, Edenderry_IGSL GIR_HCC1_12-08-25
 - 25882_Gas to Bord na Mona, Edenderry_IGSL GIR_HCC2_19-09-25
 - 25882_Gas to Bord na Mona, Edenderry_IGSL GIR_HCC3_29-09-25 Rev2
 - 25882_Gas to Bord na Mona, Edenderry_IGSL GIR_HCC4_05-09-25
 - Borehole Logs
- Groundwater Sample Results (IGSL)
- Groundwater Level Monitoring (IGSL)
- Proposed Pipeline Route
- Preliminary Health & Safety Plan (1718-PP-02001-R1 Preliminary Health and Safety Plan - Phase 1 GI)
- Draft Construction Methodology (1718-RT-01002-RX Gas to Bord na Mona Edenderry Construction Methodology DRAFT – provided 02/03/2026)

The compilation of this report is also based on information acquired from the sources below:

- Geohive (Ordnance Survey Ireland) – aerial photographs and historical mapping
- Geological Survey Ireland (GSI) – online mapping and groundwater datasets
- Geological Survey Ireland (GSI) – Athboy Groundwater Body (GWB) characterisation and hydrogeological data
- Environmental Protection Agency (EPA) – website mapping and database information
- Water Framework Directive (2000/60/EC)
- The Irish Meteorological Service (Met Eireann)– rainfall data and river/estuary levels

METHODOLOGY, GUIDANCE & LEGISLATION

This hydrogeological assessment has been undertaken in accordance to recognised European guidance and best practices. Key guidance documents and legislation which were consulted include the following:

- Water Framework Directive
- Surface Water and Groundwater Regulations
- EPA - Guidance on the Authorisation of Discharges to Groundwater (2011)
- CIRIA - Control of water pollution from construction sites. Guidance for consultants and contractors (C532).
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (Inland Fisheries Ireland)

A comprehensive desktop study was undertaken to gather existing information on the hydrogeological conditions on the site. This review included geological maps, hydrogeological data such as groundwater vulnerability, aquifer classification, surface water features, hydrology, site investigation reports and groundwater monitoring data. This desktop study also reviewed information from recent site investigation on site such as borehole logs, groundwater water level readings, groundwater monitoring data and water samples by IGSL.

Additionally, a site visit was conducted by MEL which consisted of additional groundwater sampling, water level readings and assessment of site drainage patterns. These water samples were then sent to an accredited laboratory for analysis. Furthermore, these results were compared to regulations and guidelines previously mentioned to determine any contamination or potential issues with the proposed project.

The data collected from the desktop study, field investigation and laboratory analysis were interpreted with regard to the hydrogeological conditions on the site. A conceptual site model (CSM) was developed and a risk assessment was conducted to assess the source pathway receptor (SPR) linkages that may occur during the construction phase and operational phase of the gas pipeline.

This report has been compiled to assess the baseline hydrogeological conditions within the project area and how the works may impact groundwater, surface waters or other sensitive receptors.

1 PROPOSED DEVELOPMENT

SITE DESCRIPTION & LOCATION

The proposed development comprises of a new gas pipeline connecting the existing Bord na Móna power station at Ballykilleen, Edenderry, Co. Offaly, to the gas transmission network located approximately 23 kilometres to the north in the townland of Kilwarden, Co. Meath.

Various streams, rivers, fields and roadways will be crossed as part of the proposed pipeline alignment. These crossing points include public roads, the M4 motorway, the Grand Canal and watercourses including the Kinnegad 07/ Kilwarden River and the Yellow River. The new pipeline will be installed using a combination of trenchless and open-cut methods and includes 17 no. road crossings and 32 no. watercourse crossings. The proposed pipeline alignment will be in proximity to agricultural lands, farms and residential properties. The largest communities nearby include Kinnegad and Edenderry.



Figure 2.1: Site Location – Aerial Map

According to the Geological Survey of Ireland, the proposed alignment is underlain by the Edenderry Oolite Member (CDEDEN), Waulsortian Limestones (CDWAUL), Lucan Formation (CDLUCN) and Volcanics (in Carboniferous) (LTVOLC). A more detailed description of the geology and geotechnical conditions is provided in Section 3 of this report.

For the larger crossings, horizontal directional drilling (HDD) method will likely be used. The majority of the pipeline will be installed by an open cut methods. There will be an area of approximately 20-30m that will be stripped prior to the excavation for the pipeline. Excavations are anticipated to extend to approximately 2.5m below ground level (mbGL) for the pipeline installation. For the Kilwarden offtake, the excavation is expected to be approximately 10m by 10m and to a depth of 3.4mbGL.

The IGSL borehole logs and reports (September 2025) indicate that the sequence of strata encountered across the site was typically comprising of topsoil, peaty silt/clay, cohesive deposits (in some areas granular deposits) and bedrock. Groundwater strikes were recorded in multiple boreholes and groundwater level monitoring was recorded using data loggers by IGSL, see Section 3 for further details.

In this report, there will be a focus on the north section of the pipeline alignment which is in close proximity to the Special Area of Conservation (SAC) Mount Hevey Bog SAC. This focus area is defined in Figure 2.2 below.



Figure 2.2: Site Location – Aerial Map (Focus Area)

TOPOGRAPHY

The topography of the focus area is characterised by gradually sloping lowland topography, with ground levels decreasing from approximately 74 m AOD in the northwest to 70 m AOD in the southeast, based on available online mapping. The site slopes towards the Kinnegad 07/Kilwarden River, which is the main surface water feature and drainage receptor. Borehole log information indicates the topsoil thickness across the site is generally shallow, typically ranging from 0.1 m to 0.3 m. The Mount Hevey Bog SAC, located immediately to the north of the site, occupies a topographically elevated position as a raised bog. Ground levels within the SAC are higher than those of within the focus area. Both surface water and groundwater flow from the site are directed away from the SAC, towards lower lying areas, further limiting the potential for hydrogeological connectivity towards the SAC from the proposed works.

RECENT SITE ASSESSMENTS

The following assessments were recently completed for this site.

- Ground Site Investigation Reports
- Groundwater Sample Results
- Groundwater Level Monitoring

Ground investigation, groundwater sampling and monitoring were carried out for the proposed works by IGSL, in September 2025.

This investigation was divided into five reports (HCC1, HCC2, HCC3, HCC4 and COMBINED), the following was included:

HCC1

- Cable Percussion Boring (8 No.)
- Rotary Drillholes (6 No.)
- Groundwater Monitoring
- Surveying of Exploratory Hole Locations

HCC2

- Cable Percussion Boring (8 No.)
- Rotary Drillholes (7 No.)
- Groundwater Monitoring / Data Loggers
- Surveying of Exploratory Hole Locations

HCC3

- Cable Percussion Boring (10 No.)
- Rotary Drillholes (9 No.)
- Groundwater Monitoring / Data Loggers
- Surveying of Exploratory Hole Locations

HCC4

- Cable Percussion Boring (7 No.)
- Rotary Drillholes (4 No.)
- Groundwater Monitoring
- Surveying of Exploratory Hole Locations

A site visit conducted by MEL was completed on December 10, 2025.

This site visit included the following:

- Groundwater sampling from 2 no. boreholes (BH40, BH43)
- Groundwater Level Monitoring (RC01, RC02, RC03, RC04, BH40, BH42, BH43)
- Visual inspections of drainage ditches and surface water flow near the SAC

2 ENVIRONMENTAL SITE SETTING

Hydrogeological and hydrological maps pertaining to the site are presented in Appendix A.

GEOLOGY

Geological Survey Ireland mapping (GSI Maps, accessed 12/12/2025) indicates that the bedrock underlying the proposed alignment belongs to the Edenderry Oolite Member (CDEDEN), Waulsortion Limestones (CDWAUL), Lucan Formation (CDLUCN) and Volcanics (in Carboniferous) (LTVOLC). The description of these bedrock units are listed below.

Table 3.1: Bedrock Units

Bedrock Unit	Newcode	Description
Edenderry Oolite Member	CDEDEN	Oolite limestone
Waulsortion Limestones	CDWAUL	Massive unbedded lime-mudstone
Lucan Formation	CDLUCN	Dark limestone & shale
Volcanics (in Carboniferous)	LTVOLC	Mafic & felsic volcanic tuff

The bedrock units in the focus area near the SAC are the Edenderry Oolite Member and Waulsortion Limestones.

The GSI bedrock geology map for the focus area is presented in Figure 3.1.

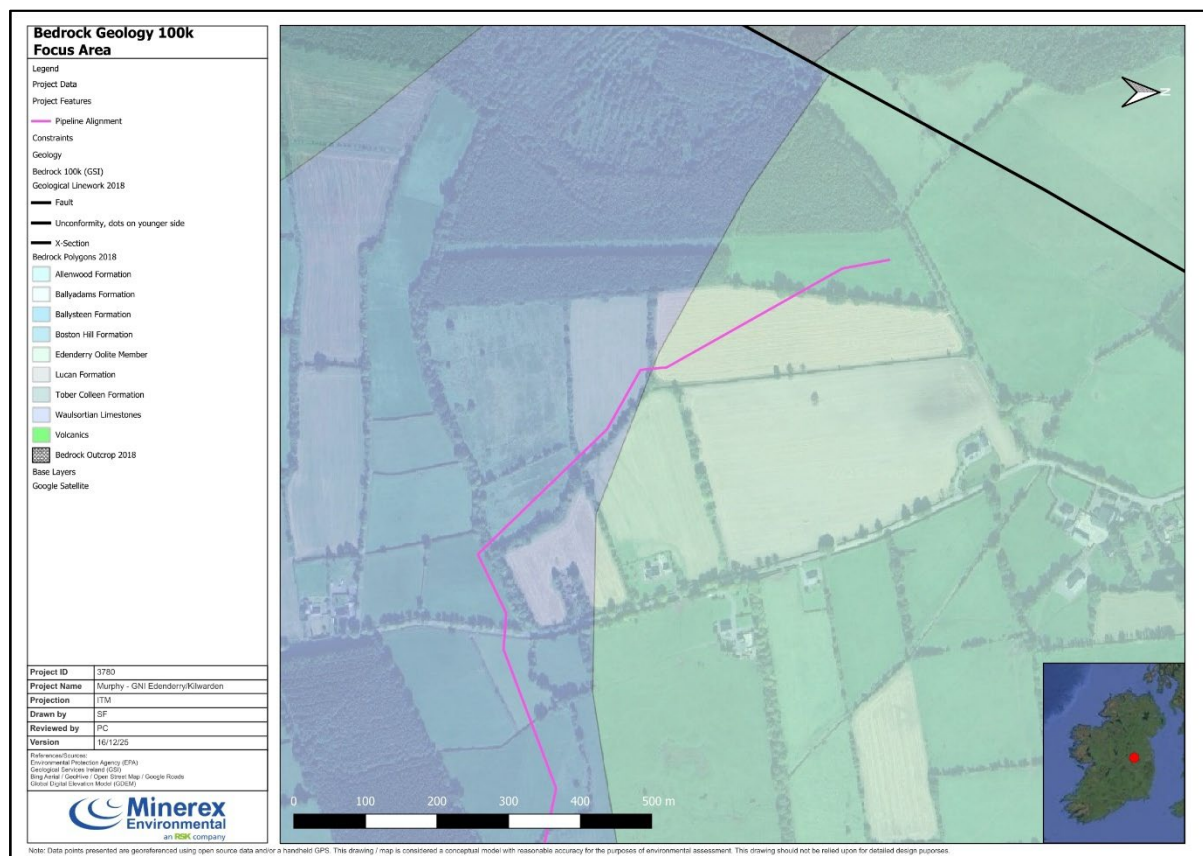


Figure 3.1: Bedrock Geology (Local)

GEOLOGICAL STRATIFICATION

The geological strata within the focus area was determined based on the borehole logs and site investigation reports provided. The encountered strata consists of the following:

- Topsoil
- Peaty silt/clay
- Cohesive Deposits
- Granular Deposits
- Bedrock

The borehole logs indicate that topsoil thickness across the focus area typically ranges from 0.0 to 0.3 m below ground level (mbGL). These deposits occurred either as interbedded silt/clay or as silt alone, with occasional inclusion of fine cobbles, boulders and gravel.

Boreholes RC01-RC04 encountered peaty silt, described as brown or grey in colour. Stiff grey clay was recorded in all boreholes within the focus area. Excavation levels are anticipated to encounter clay at depths of approximately 2.5m in the vicinity of boreholes BH40-BH45 and BH05-BH06, and at approximately 3.5m at the off-take excavation associated with boreholes RC01-RC04.

Granular deposits predominately gravel, were encountered in the lower sections of the boreholes at depths ranging from approximately 3.0 to 7.0 mbGL. All boreholes were

terminated due to obstruction. A geological cross section summarising the geological conditions is presented in Figure 3.2 below. The borehole locations within the focus area for the site investigation completed by IGSL are presented in Figure 3.3.

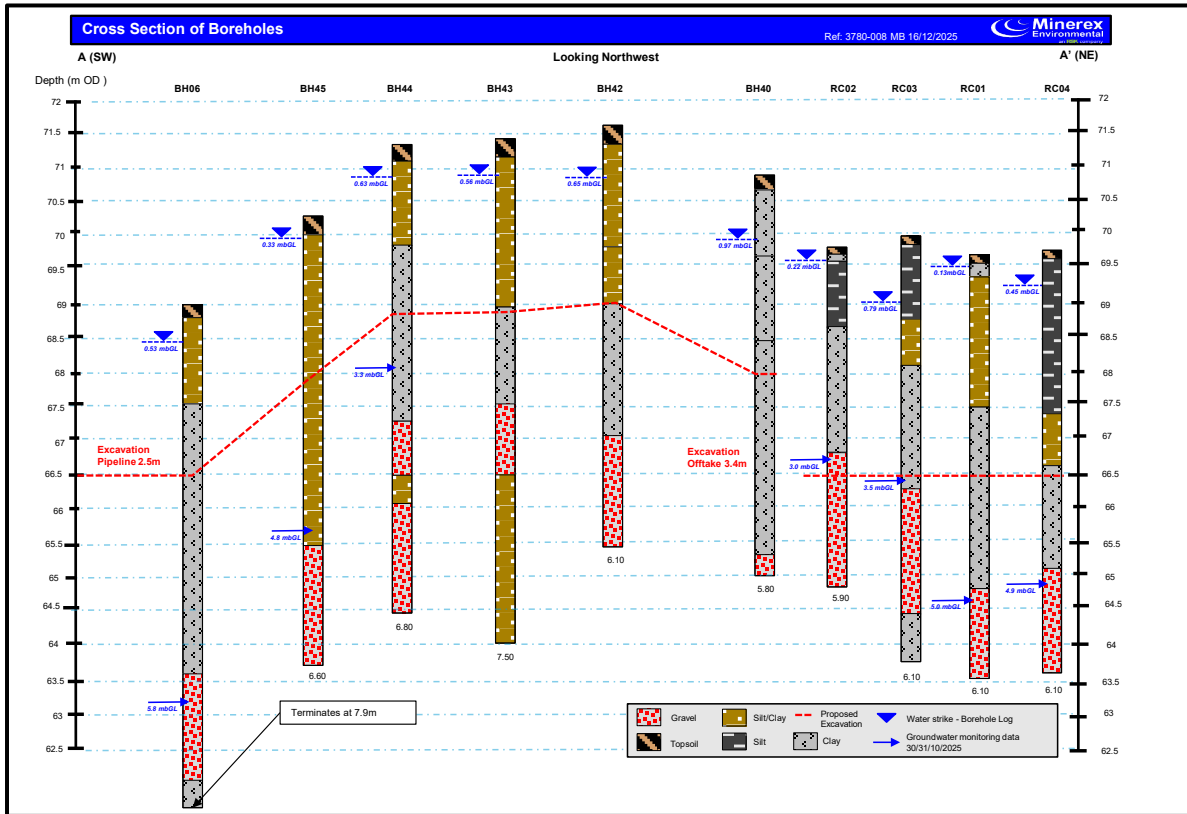


Figure 3.2: Geological Cross Section

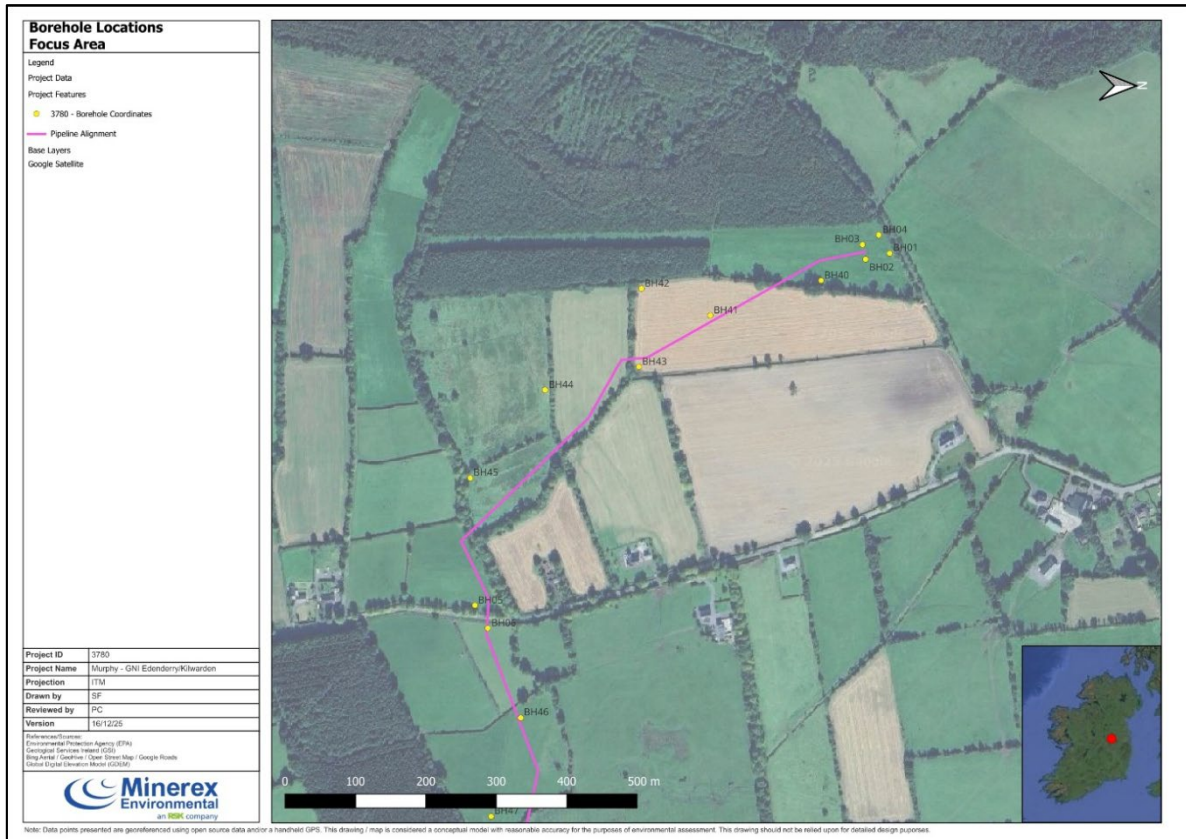


Figure 3.3: Borehole Locations

REGIONAL HYDROGEOLOGY

According to EPA maps (accessed 15/12/2025), the proposed pipeline route traverses two distinct underlying bedrock aquifers, as illustrated in Figure 3.1. The northern section of the pipeline is predominantly underlain by a Locally Important Bedrock Aquifer that is moderately productive only in localised zones. In contrast, the southern section overlies a Locally Important Bedrock Aquifer that is generally moderately productive. The GSI Groundwater Aquifer resource map is provided in Figure 3.4 below.

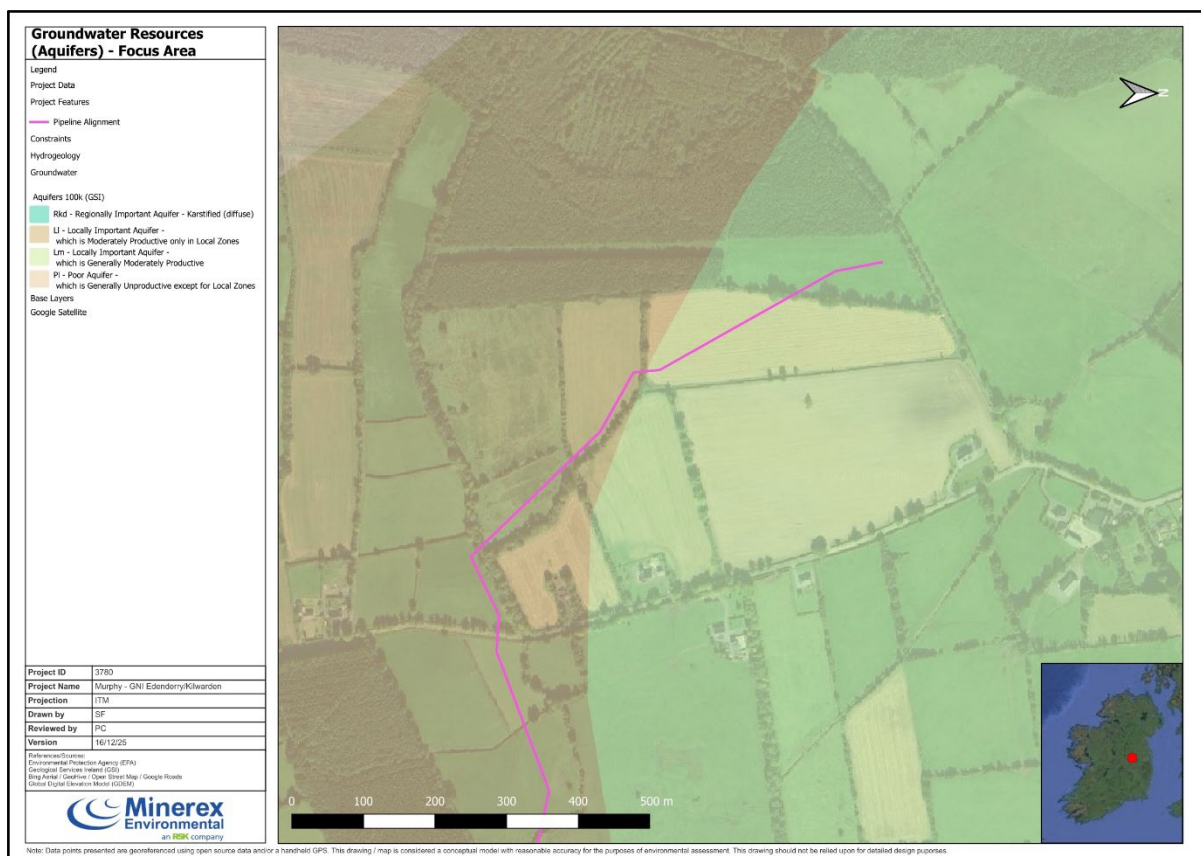


Figure 3.4: Groundwater Resources

The full pipeline route intersects areas of varying groundwater vulnerability, as classified by the Geological Survey of Ireland (GSI), ranging from Low to Extreme. Majority of the proposed development overlies areas of Moderate to High groundwater vulnerability. A “High” classification indicates natural subsurface conditions that allow pollutants from human activities to readily infiltrate into the aquifer.

The hydrogeological conditions within the defined focus area indicate a high level of groundwater vulnerability. Majority of the area is classified as having extreme vulnerability to contamination from human activities. Certain zones are identified as having high vulnerability, reflecting natural characteristics that make them susceptible to human contamination. The remaining area is classified as moderate vulnerability. Groundwater Vulnerability map is presented in Figure 3.5 below.

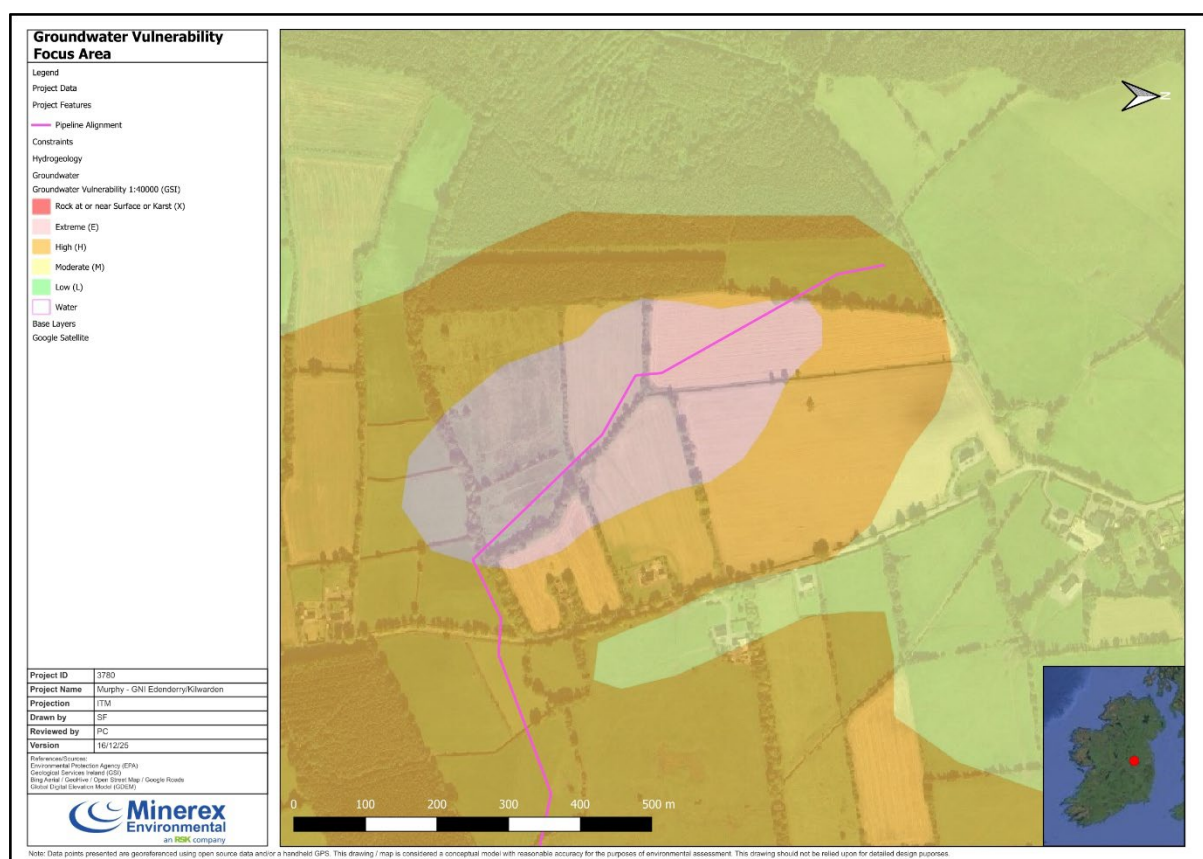


Figure 3.5: Groundwater Vulnerability

The focus area lies within the Athboy Groundwater Body (GWB), which covers approximately 939 km² and is characterised as poorly productive bedrock. The full pipeline route traverses two groundwater bodies: the Athboy GWB and the Trim GWB, the latter covering an area of approximately 703 km² and described as productive fissured bedrock. According to the most recent Water Framework Directive (WFD) groundwater status assessment (2019-2024), both groundwater bodies are classified as having “Good” status. The Athboy GWB is currently assessed as “Not at Risk”, while the Trim GWB is classified as “At Risk”.

Based on information provided by the GSI summary of initial characterisation, the Athboy GWB underlying the focus area demonstrates a general decrease in elevation from a northwestern to southeastern pathway. This is consistent with the regional discharge pathway. Groundwater recharge is primarily diffuse, allowing the infiltration of rainfall to the aquifer. A significant portion the groundwater discharges directly to surface waters, mainly through the upper part of the aquifer. The typical groundwater flow path length within the Athboy GWB is estimated to be 0.75km, as reported in GSI groundwater body description. In this case, the Kinnegad 07/Kilwarden River represents the nearest principle point of discharge based on pathway and distance area.

Within a 2km radius of the proposed alignment, there are 61 groundwater sources or boreholes recorded (GSI, 2025). The groundwater wells and springs in proximity of the site are shown in Figure 3.6 and listed in Appendix B. Within the focus area, there are 7 groundwater sources or boreholes recorded. These sources are listed in Table 3.2 below.

Table 3.2: Groundwater Wells and Springs

Well ID	Source Type	Depth (m)	Drill Date	Coordinates	Accuracy	Source Use	Yield (m3/d)
2623NWW057	Dug well	6.4	01/08/1970	264550, 248200	to 1km	Domestic use only	11.3
2623NWW098	Borehole	91.5	12/07/1995	263930, 246400	to 50m	Other	25
2623NWW054	Dug well	3	18/03/1973	263200, 246600	to 1km	Domestic use only	11.8
2623NWW055	Dug well	3.7	1899/12/30	263200, 246550	to 1km	Domestic use only	n/a
2623NWW056	Dug well	4.9	1899/12/30	262350, 246600	to 100m	n/a	n/a
2623NWW077	Dug well	2.7	1899/12/30	263640, 246260	to 100m	Public supply	n/a
2623NWW086	Dug well	2.7	1899/12/30	263860, 246390	to 100m	Public supply	n/a



Figure 3.6: Groundwater Wells and Springs

There are four public supply source protection areas within a 15km radius of the focus area according to the GSI 2025, given the distance to the nearest protection area (approximately 9km), there is minimal hydrogeological connectivity between the focus area and these abstractions. Therefore, no significant impact on public water supply Source Protection Areas is expected. A summary of distances to the nearest public water supply abstractions and their associated protection areas is provided in Table 3.3.

Table 3.3: Distance to GSI Public Supply Source Protection Areas

Name	Proximity to focus area
LONGWOOD PWS	≈ 9.9km
BALLIVOR PWS	≈ 11.5km
EDENDERRY PWS	≈ 12.9km
ENFIELD PWS	≈ 14.8km

SITE HYDROGEOLOGY

During the site investigation works, groundwater strikes were recorded during the drilling of the boreholes. These strikes were encountered at depths ranging from approximately 3.3 m to 5.8 m below ground level (mbGL), with observed rates of groundwater ingress varying from moderate to rapid. Majority of proposed excavations are anticipated to be within clay deposits; therefore, a reduced rate of groundwater ingress is expected during construction works.

Groundwater level monitoring was undertaken by IGSL, with data available from 25/10/2025 to 09/12/2025 for RC01, RC04, BH06, BH40, and BH43. Monitoring data for BH45 is available for the period from 28/10/2025 to 19/11/2025. No significant fluctuations in groundwater levels were observed during the monitoring period, with groundwater levels remaining relatively stable and ranging from approximately 0.0 to 1.0 mbGL across all monitored boreholes during the monitoring period. Groundwater levels recorded in RC01, RC04, BH06, BH43, and BH45 were generally within the range of 0.0 to 0.5 mbGL. Hydrographs are attached in Appendix C.

Water level dipper readings obtained by IGSL on 30/10/2025 indicate groundwater levels ranging from approximately 0.1 to 0.97 mbGL. A visual representation of the groundwater strikes, and dipper readings is provided in Figure 3.2. A summary of dipper readings recorded by MEL during the site visit on 10 December 2025 is presented in Table 3.4 below.

Table 3.4: MEL Groundwater Level Measurements

Borehole	Water Level (mbGL)	Water Level (moD)
RC01	0.0	69.55
RC02	0.0	69.76
RC03	0.39	69.56
RC04	0.2	69.51
BH40	0.88	69.98
BH42	0.32	71.21
BH43	0.33	71.12

IGSL groundwater monitoring data sheet is presented in Appendix D. Groundwater contour maps were produced using logger data from ISGL for the month of September (12/09/25 00:00) and December (01/12/25 00:00). These maps are attached in Appendix E.

SURFACE WATER FEATURES / HYDROLOGY

According to the EPA web mapper (accessed on 15/12/2025), the proposed pipeline alignment is within the Boyne (Catchment ID. 07) and Barrow Catchment (Catchment ID. 14) and is within the local Boyne_SC_030, Boyne_SC_010 and Figile_SC_010 sub catchments. The focus area is within the Boyne (Catchment ID. 07) and the local Boyne_SC_030 sub catchment. As previously mentioned, the pipeline alignment is situated in the Athboy and Trim groundwater body catchment. The focus area is within the Athboy GWB.

The mapped surface water features located in the focus area along the pipeline alignment are the Kinnegad 07/Kilwarden River (Boyne_040, IE_EA_07B040600). The Kinnegad 07/Kilwarden River flows eastwards and the receiving surface waterbody is the Boyne River which ultimately discharges in Drogheda at the Boyne Coast and Estuary. The River Waterbody Status results recorded in accordance with European Communities (Water Policy) Regulations 2003 (SI no. 722/2003), classify this water feature as “poor”. The pipeline is expected to cross the river, and it is anticipated to be installed using horizontal directional drilling (HDD).

The surface waters features throughout the pipeline alignment are listed in Table 3.5.

Table 3.5: Surface Water Features

Crossing Number	Surface Water Feature	Code	Name	River Status
1	Kilwarden River	IE_EA_07B040600	BOYNE_040	Poor
2	Arghnagillagh	IE_EA_07B040600	BOYNE_040	Poor
3	Knockersally	IE_EA_07B040400	BOYNE_030	Good
4	Park	IE_EA_07B040400	BOYNE_030	Good
5	Ballynakill	IE_EA_07B040400	BOYNE_030	Good
6	Castlejordan	IE_EA_07B040400	BOYNE_030	Good
7	Rahin	IE_EA_07B040400	BOYNE_030	Good
8	Yellow	IE_EA_07B040400	BOYNE_030	Good
9	Roosk	IE_EA_07B040400	BOYNE_030	Good
10	Mountwilson	IE_EA_07B040300	BOYNE_020	Moderate
11	Rogerstown	IE_EA_07B040300	BOYNE_020	Moderate
12	Grand Canal	IE_07_AWB_GCMLW	Grand Canal Main Line (Boyne)	Good
13	Ballyleakin	IE_SE_14F010200	FIGILE_030	Moderate
14	Ballykilleen	IE_SE_14F010200	FIGILE_030	Moderate
15	Ballykilleen	IE_SE_14F010200	FIGILE_030	Moderate

During the MEL site visit, drainage ditches were identified around the fields in the focus area of the alignment. Based on the site survey and observed flows from drains and ditches, it can be certain that the surface water flows south to east towards Kinnegad 07/Kilwarden River. The locations of surface water features and watercourses for the focus area are indicated on Figure 3.7.



Figure 3.7: Surface Water Features

NATURA 2000 SITES

The focus area lies within a 2 km radius of the Mount Hevey Bog Special Area of Conservation (SAC), located approximately 20 m to the north. This raised bog SAC is designated for the following qualifying interests: active raised bogs, degraded raised bogs still capable of natural regeneration, and depressions on peat substrates of the Rhynchosporion. Works proposed within the 2 km zone consist of pipeline replacement using an open-cut method. Beyond the 2 km radius, the River Boyne and Blackwater SAC are located approximately 3.5 km north of the focus area. Minimal hydrogeological connectivity is anticipated with this SAC due to the established groundwater flow pathways within the groundwater body and distance. Within a 5 km radius of the wider pipeline replacement works, the Long Derries, Edenderry SAC is located at approximately 3.63 km as shown in Figure 3.8.

Based on the established groundwater flow direction from northwest to southeast, provided by the GSI summary of initial characterisation which reflects the regional topographic gradient, and the absence of direct hydrological connectivity with surrounding streams due to flow directions, minimal hydrogeological connectivity is expected between the proposed works and Mount Hevey Bog SAC. Based on the groundwater monitoring undertaken for the scheme and the groundwater contour maps attached in Appendix E further support that the groundwater flow is in southeast direction and controlled by local and regional topography, together with the relatively short groundwater flow path length of approximately 0.75 km flowing away from the SAC in southeastern direction.

Table 3.6 below lists the nearest Natura 2000 sites to the proposed development.

Table 3.6: Natura 2000 sites

Site Code	Site Name	Status	Proximity to Site
002342	Mount Hevey Bog	SAC	≈ 0.02km
002299	River Boyne and River Blackwater	SAC	≈ 3.5km
000925	The Long Derries, Edenderry	SAC	≈ 3.6km

The locations of nearby Natura 2000 sites are depicted in Figure 3.8.

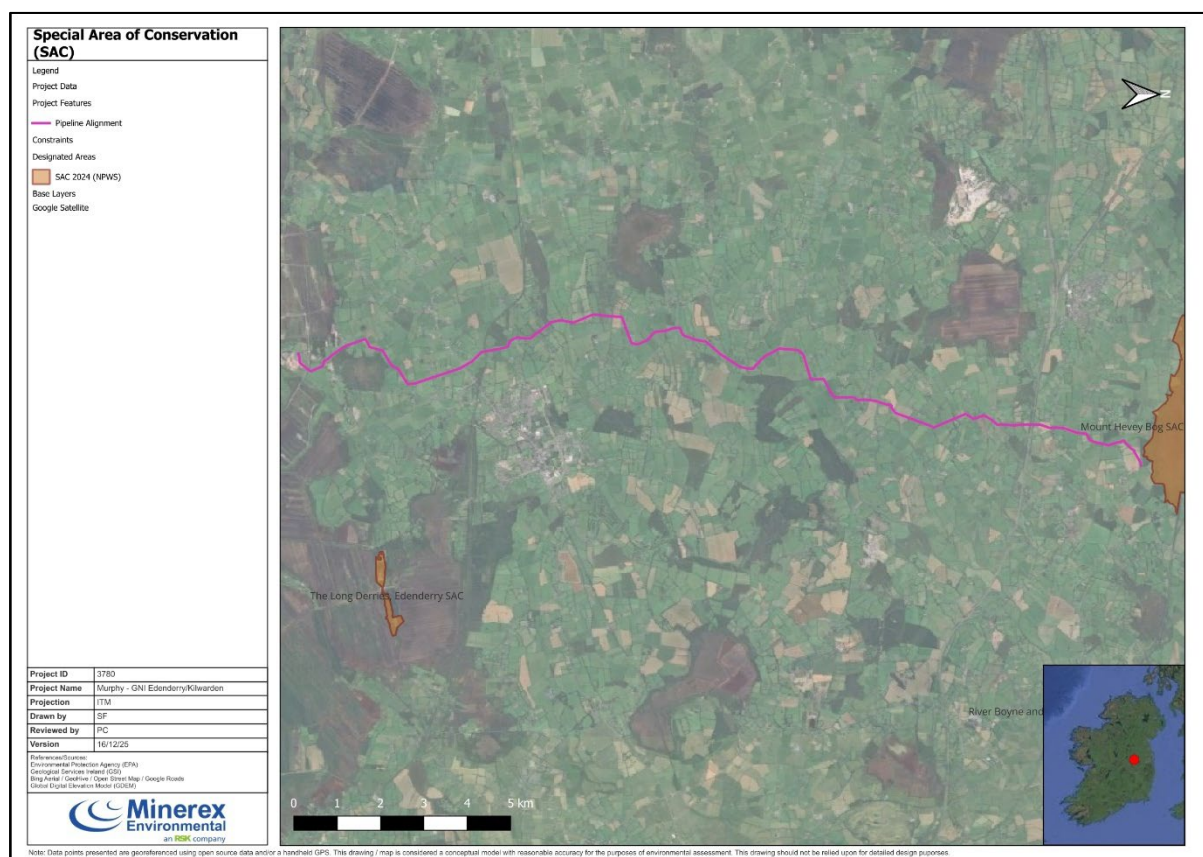


Figure 3.8: Natura 2000 Sites

3 SITE HYDROCHEMISTRY & WATER QUALITY

As previously mentioned, there are multiple surface water features that will be crossed along the proposed pipeline route, as established based on the available drawings, and EPA web mapper. The river water bodies listed along the alignments are listed as poor, moderate and good. The only river within the focus area is the Kinnegad 07/Kilwarden River which is listed as poor and at risk of meeting objectives.

There are National Water Monitoring Stations within the surface water features along the alignment of the proposed pipeline. The list of these stations is included in Appendix F. In relation to the focus area, the monitoring station upstream of the proposed alignment is Kilwarden Bridge (RS07K010200) and downstream is Clonard Bridge (RS07K010300).

IGSL has monitored water levels and water quality in all boreholes with the monitoring wells installed. The results from these water samples are included in Appendix G. These water samples were analysed for:

- pH
- Sulphate
- Cyanide
- Total petroleum hydrocarbons (TPH)
- Polyaromatic hydrocarbons (PAH)
- Phenols
- Various metals (arsenic, boron, cadmium, copper, mercury, nickel, lead, zinc, chromium)

The results were compared against the following regulations and guidelines:

- Groundwater Regulations S.I. No. 9 of 2010, S.I. No. 366 of 2016 (Amendments)
- Surface Water Regulations S.I. No. 272 of 2009, S.I. No. 77 of 2019 (Amendments)
- S.I. No. 293/1988 - European Communities (Quality of Salmonid Waters) Regulations, 1988
- Interim Guideline Values (IGV's) (EPA 2003)

The summary of the IGSL results is listed below:

- Total petroleum hydrocarbons (TPH) are below the limit of detection
- Polyaromatic hydrocarbons (PAH) are below the limit of detection
- Sulphate above limits in BH34
- Nickel above limits in BH34, RC03, RC01

Additional sampling and testing was completed by MEL during a site visit in December 2025. Boreholes BH40 and BH43 were sampled and laboratory analysis for the following parameters was completed. The certificate of analysis is attached in Appendix H.

Table 4.2: Chemistry Results

Sample Location		BH40	BH43
Carbon			
Organic Carbon, Total	mg/L	5.05	5.28
Inorganics			
Ammoniacal Nitrogen as N	mg/L	0.639	1.17
BOD, filtered	mg/L	<1	<1
COD, unfiltered	mg/L	45.4	32.2
Nitrate as N	mg/L	<0.07	0.402
Nitrogen, Total	mg/l	<1	6.88
pH	pH Units	7.46	7.24
Phosphate (Ortho as PO4)	mg/L	<0.05	<0.05
Sulphate	mg/L	14.3	21.8
Suspended solids, Total	mg/L	41.1	5.8

Unfiltered (Total) Metals			
Aluminum (tot.unfilt)	ug/L	228	39.3
Antimony (tot.unfilt)	ug/L	<4	<4
Arsenic (tot.unfilt)	ug/L	13.7	4.52
Iron (tot. unfilt.)	mg/L	0.671	0.33
Lead (tot.unfilt)	ug/L	1.41	<1
Manganese (tot.unfilt)	ug/L	460	916
Molybdenum (tot.unfilt)	ug/L	13.6	<9
Nickel (tot.unfilt)	ug/L	36.2	6.89
Phosphorus (tot.unfilt)	ug/L	24.2	<20
Zinc (tot.unfilt)	ug/L	10.9	<5
Mineral Oil / Oils & Greases			
Mineral Oil	mg/L	<1	<1
TPH / Oil & Greases	mg/L	<1	<1
Dissolved Gases			
Methane, dissolved	ug/L	3.77	479
Other Parameters			
Phenols	mg/L	<0.025	<0.025
SVOCs	ug/L	Below LOD	Below LOD
VOCs	ug/L	Below LOD	Below LOD

The comparison of the baseline hydrochemistry and groundwater/surface water regulations (listed above) have identified a few parameters which may be of concern. Table 4.3 below summarizes the parameters that exceed groundwater regulations and guidelines.

Table 4.3: Comparison of Results to Regulatory Limits/Guidelines

Parameter of Concern	Unit	BH40	BH43	Expected Limit	Source of Limit
Ammoniacal Nitrogen	mg/L	0.639	1.17	0.065-0.175	Groundwater Regulations S.I. No. 9 of 2010, S.I. No. 366 of 2016 (Amendments)
				0.15	Interim Guideline Values (IGV's) (EPA 2003)
Aluminium (tot.unfilt)	µg/L	228	39.3	150	Groundwater Regulations S.I. No. 9 of 2010, S.I. No. 366 of 2016 (Amendments)
Arsenic (tot.unfilt)	µg/L	13.7	4.52	7.5	Groundwater Regulations S.I. No. 9 of 2010, S.I. No. 366 of 2016 (Amendments)
Iron (tot.unfilt)	mg/L	0.671	0.33	0.2	Interim Guideline Values (IGV's) (EPA 2003)
Manganese (tot.unfilt)	µg/L	460	916	50	Interim Guideline Values (IGV's) (EPA 2003)
Nickel (tot.unfilt)	ug/l	36.2	6.89	15	Groundwater Regulations S.I. No. 9 of 2010, S.I. No. 366 of 2016 (Amendments)
				20	Interim Guideline Values (IGV's) (EPA 2003)
				34	Surface Water Regulations S.I. No. 272 of 2009, S.I. No. 386 of 2015 (Amendments), S.I. No. 77 of 2019 (Amendments) – MAC-EGS Inland Surface Waters

The main parameter of concern would be the ammoniacal nitrogen. This is likely high due to the agricultural activities in the area. The metals concentration that exceed the limits from the groundwater regulations are unlikely to be issues of concern for any discharge to surface waters (if required).

4 CONCEPTUAL SITE MODEL (CSM)

A conceptual site model (CSM) has been developed based on current understanding of the hydrological and hydrogeological environment, potential contaminant sources, pathways, and receptors. This allows potential Source Pathway Receptor (S-P-R) linkages to be identified. If no S-P-R linkages are identified, then there is no risk to identified receptors.

The groundwater level on the site based on the recent groundwater monitoring by IGSL in standpipes within the focus area (RC01, RC02, RC03, RC04, BH06, BH40, BH42, BH43, BH44, BH45) depict equilibrium groundwater levels around 0.10 to 0.97 mbGL. There would likely be fluctuations to the groundwater level after rain. The groundwater monitoring indicates the response to rainfall in this area and seasonal variations in groundwater levels at the site.

POTENTIAL SOURCES

Potential contaminant sources during both the construction and operational phases have been considered. For the purposes of identifying potential S-P-R linkages, all potential sources of contamination are considered without taking account of mitigation measures by way of a conservative worst-case approach. Mitigation measures are presented in Section 6.

Construction Phase

- Spillages of fuels, hydraulic oils and or lubricants associated with the refuelling and operation of plant equipment and drilling equipment onsite (single short-term event).
- Suspended sediment entrained in runoff from bare ground, stockpiles of excavated material, dewatering of excavations, water crossings, drilling, groundworks and/or other construction activities (short term events).
- Spillages of any potential hazardous substances used on-site during construction or wastewater from welfare facilities (single short-term event).
- Spillages or hazardous material released during concrete works on-site which may include high alkalinity runoff and waste from washouts (short term events).
- If HDD method is used for the trenchless crossings, frac out during drilling.

Operation Phase

- Spillages of fuels, hydraulic oils and or lubricants associated with operation of plant equipment during maintenance or other works on-site (single short-term event).
- Release of methane, VOCs and other toxic compounds due to a gas leak from pipeline.

These potential sources are considered short-term events in a worst-case scenario.

POTENTIAL PATHWAYS

Potential pathways for the migration of contaminants from the sources outlined in section above are as follows:

- Vertical and lateral migration through the unsaturated and/or saturated overburden to the bedrock aquifer.
- Potential migration from the bedrock aquifer to surface water receptors via a baseflow pathway.
- Surface runoff via an overland flow pathway to water courses and downstream surface water bodies.
- Migration through dewatering works to surface water bodies.
- In-water works for crossings.

POTENTIAL RECEPTORS

Potential receptors are as follows:

- Bedrock aquifer (Locally Important Bedrock Aquifer that is moderately productive only in localised zones)

- Surface waterbodies including the Kinnegad 07/Kilwarden River.
- Mount Hevey Bog SAC

5 HYDROGEOLOGICAL RISK ASSESSMENT

A risk-based assessment of the Source-Pathway-Receptor Model and the potential risk linkages associated with the construction and operation phase of the proposed works was undertaken. The Kilwarden offtake is likely to be a battered excavation. Consequently, this type of excavation will likely allow for moderate groundwater inflow/outflow during the works. The results were evaluated to determine if the proposed development could potentially impact any potential receptors associated with the focus area for the site.

The term pollutant linkage is used to describe any potential connections between the sources, pathways, and/or receptors within the model. Where pollutant linkages are not present or are considered incomplete, the potential for adverse impacts on any potential receptor is limited. Where pollutant linkages are complete the receptor can be deemed at risk of adverse impacts from the contaminant source.

A summary of all potential sources, pathways and receptors as well as an assessment of the linkages and risks is presented in Table 6.1. As outlined previously, by way of a conservative approach, the worst-case source scenarios with no mitigations are assumed. Consequently, all events are considered highly likely (worst case). In practice, embedded mitigation measures will significantly reduce the probability of occurrence, the magnitude of occurrence and then in turn the risks posed. Mitigation measures are outlined in section below.

This risk assessment was completed specifically for the focus area which includes the north section of the pipeline alignment in proximity to the Mount Hevey Bog SAC.

Table 6.1: Hydrogeological Risk Assessment SPR Model

Source	Pathway	Receptor	Risk Evaluation
Spillages of hydrocarbon fuels and or lubricants from the refuelling and operation of plant equipment and/or the spillages of any potential hazardous substances (construction phase and operation phase).	Vertical and lateral migration through overburden to the bedrock aquifer.	Locally Important Bedrock Aquifer that is moderately productive only in localised zones – Athboy GWB	Moderate Risk. Groundwater vulnerability is classified as High to Extreme; however, the underlying limestone aquifer is moderately productive and partially protected by cohesive deposits. Any impact would be localised and short-term.
Spillages of domestic wastewater from welfare facilities in the event of an accidental spill (construction phase).	Potential migration from bedrock aquifer to surface water receptors via a baseflow pathway.	Kinnegad 07/Kilwarden River Mount Hevey Bog SAC	Low Risk. Limited aquifer productivity and short groundwater flow paths reduce the potential for significant contaminant transport to surface waters.

<p>Spillages or hazardous material released during concrete works on-site which may include high alkalinity runoff and waste from washouts (construction phase).</p>	<p>Surface water runoff via an overland flow pathway (ie. existing drainage ditches) to water courses and downstream surface water bodies.</p>	<p>Kinnegad 07/Kilwarden River</p>	<p>Moderate Risk (worst-case, unmitigated). A complete source pathway receptor linkage exists in the absence of controls, particularly during periods of heavy rainfall. Potential impacts would be temporary.</p>
	<p>Non-compliant discharge from dewatering and water treatment system (if required)</p>	<p>Kinnegad 07/Kilwarden River</p>	<p>Moderate Risk Direct pathway linkage for the migration of contaminated runoff from the listed potential source(s) to surface water courses onsite from the discharge of the dewatering system to surface waters during the construction phases.</p>
<p>Suspended sediment entrained in runoff from bare ground or excavations as part of groundworks and/or other construction activities (construction phase).</p>	<p>Vertical and lateral migration through overburden to the bedrock aquifer.</p>	<p>Locally Important Bedrock Aquifer that is moderately productive only in localised zones – Athboy GWB</p>	<p>No perceptible risk given the nature of both suspended sediments and the pathway.</p>
	<p>Potential migration from bedrock aquifer to surface water receptors via a baseflow pathway.</p>	<p>Kinnegad 07/Kilwarden River, Mount Hevey Bog SAC</p>	<p>No perceptible risk given the nature of both suspended sediments and the pathway.</p>

	Surface runoff via an overland flow pathway to water courses and downstream surface water bodies	Kinnegad 07/Kilwarden River	Moderate Risk (worst-case unmitigated scenario) Direct pathway linkage for the migration of contaminated runoff from the listed potential source(s) to surface water courses where complete linkage is possible. Risk to water quality downstream is considered moderate for the worst-case unmitigated scenario, taking account of the nature of sources (single short-term events) and the potential for assimilation within the receiving water bodies.
Excavation/Drilling below groundwater level resulting in exposure of groundwater If HDD method is used for trenchless crossing, release of drill fluids.	Direct interaction with groundwater within excavation	Locally Important Bedrock Aquifer that is moderately productive only in localised zones – Athboy GWB	Low Risk. Excavations are shallow and largely within cohesive clay deposits. Groundwater interaction is expected to be localised and temporary, with no significant impact on aquifer integrity.
	Frac out	Kinnegad 07/Kilwarden River	High Risk (worst-case, unmitigated). A complete pathway exists if drill fluid is released during a frac out. Potential impacts would likely require remediation of the watercourse.
Peat drainage from Mount Hevey Bog SAC during dewatering works	Surface runoff via an overland flow pathway to water courses and downstream surface water bodies	Mount Hevey Bog SAC	Very Low Risk. Unlikely that drainage will increase from the raised bog during any dewatering works due to the distance from the SAC and lateral connectivity via clay rich soils.
Release of methane, VOCs during gas leak (operational phase)	Vertical and lateral migration through	Locally Important Bedrock Aquifer that is moderately	Moderate Risk. Groundwater vulnerability is classified as High to

	overburden to the bedrock aquifer.	productive only in localised zones – Athboy GWB	Extreme; however, the underlying limestone aquifer is moderately productive and partially protected by cohesive deposits. Any impact would be localised and short-term for early leak detection.
	Potential migration from bedrock aquifer to surface water receptors via a baseflow pathway.	Kinnegad 07/Kilwarden River, Mount Hevey Bog SAC	Low Risk. Limited aquifer productivity and short groundwater flow paths reduce the potential for significant contaminant transport to surface waters.

MITIGATION MEASURES

Linkages and risks assessed above assume a worst-case source scenario in the absence of mitigation measures. Mitigation and control measures would reduce the potential for release and the risk to receptors.

Recommended preliminary run-off & pollution control measures on site are to include the following:

1. The Construction Environmental Management Plan (CEMP) and the relevant documents produced will be formulated in consideration of standards of best practices.
2. Regular groundwater monitoring and sampling with the existing monitoring wells installed near the pipeline alignment.
3. For water management during the construction phase, mitigation measures will include:
 - Excluding contaminating materials such as fuels and hydrocarbons from sensitive parts of the site.
 - Ensuring double bunding of fuel tanks and designating fuel area on site.
 - If required, dewatering and appropriate treatment prior to discharge to authorised discharge point.
 - All works carried out as part of the proposed development will comply with all Statutory Legislation including the Local Government (Water Pollution) acts, 1977 and 1990.
4. Areas surrounding the site are to be protected as necessary from sediments and erosion due to direct surface water runoff generated onsite during construction phase.
 - To prevent this from occurring, surface water runoff from the site will be managed and controlled for the duration of the construction works, as noted in the points above.
 - Buffer zones should be identified around existing drainage ditches and at site boundaries to reduce the risk of surface water runoff or other contaminants entering these pathways.
5. Bunded areas will be created for the storage or use of any fuels, oils, greases.
6. Emergency spill kits will be kept close to the works.
7. Regular toolbox talks on environmental best practices on site.

Additional mitigation measures may be implemented. The EIAR or CEMP may provide other project specific environmental protection measures.

6 DEWATERING STRATEGY

Based on the water level monitoring and recent water level readings, water may be encountered during the excavations and drilling under surface water features. If water is required to be discharged from the site, it would be subject to agreements with respective Local Authorities (Meath County Council and Offaly County Council).

Further details and other specifics regarding the dewatering strategy can be developed at a later stage.

7 SUMMARY, CONCLUSIONS & RECOMMENDATIONS

Minerex Environmental Limited (MEL) was commissioned by Murphy International Limited to carry out a Hydrogeological Impact Assessment for the new proposed gas pipeline from Kildwarden, Co. Meath to the Edenderry Power Station, Co. Offaly. This report established the baseline hydrogeological conditions and identified lateral connectivity between the receptors and potential impacts to environmentally sensitive features. The specific focus area was the nearby special area of conservation (SAC), Mount Hevey Bog SAC.

- The site is underlain by the oolite limestone of the Edenderry Oolite Member which is classified as a Locally Important Aquifer (Lm) describing bedrock which is generally moderately productive. A moderate to extreme groundwater vulnerability classification (M) has been assigned to the focus area.
- IGSL and MEL site visits recorded groundwater at shallow depths or near ground level.
- There are multiple crossings of watercourses within the pipeline alignment. These surface water features will be directly connected to the works.
- A conceptual site model (CSM) has been developed based on the local geology, hydrogeology, and identified sources, pathways, and receptors.
- The risk of significant impacts to the underlying bedrock aquifer is considered low, given its poor productivity and the protection afforded by cohesive deposits overlying the limestone. However, the shallow groundwater table increases potential interaction with construction works, particularly at the offtake excavation area.
- The main hydrogeological risk arises from uncontrolled surface water runoff during construction phase, which could transport sediments or contaminants into nearby drainage features and surface waters if not appropriately managed.
- Natura 2000 sites in the wider area include Mount Hevey Bog SAC, River Boyne and River Blackwater SAC, and The Long Derries, Edenderry SAC. No direct hydrological connectivity has been identified between the proposed works and these designated sites; however, a precautionary approach is recommended due to the sensitivity of the receiving environment.
- Mitigation measures, including controlled water management and treatment, attenuation of surface water runoff, bunded fuel storage, and silt control measures, will significantly reduce risks.

With these measures in place, the proposed pipeline can proceed without expected significant adverse impact on groundwater, surface water, or designated ecological receptors.

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S.I. No. 117/1977 – Local Government (Water Pollution) Act, 1977 (including amendments)

Appendix A

Maps & Drawings

Project Location - Aerial

Legend

Project Data

Project Features

— Pipeline Alignment

Base Layers

Google Satellite



Project ID	3780
Project Name	Murphy - GNI Edenderry/Kilwarden
Projection	ITM
Drawn by	SF
Reviewed by	PC
Version	16/12/25

References/Sources:
Environmental Protection Agency (EPA)
Geological Services Ireland (GSI)
Bing Aerial / GeoHive / Open Street Map / Google Roads
Global Digital Elevation Model (GDEM)



Note: Data points presented are georeferenced using open source data and/or a handheld GPS. This drawing / map is considered a conceptual model with reasonable accuracy for the purposes of environmental assessment. This drawing should not be relied upon for detailed design purposes.

Project Location - Aerial Focus Area

Legend

Project Data

Project Features

— Pipeline Alignment

Base Layers

Google Satellite



Project ID	3780
Project Name	Murphy - GNI Edenderry/Kilwarden
Projection	ITM
Drawn by	SF
Reviewed by	PC
Version	16/12/25

References/Sources:
Environmental Protection Agency (EPA)
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Bing Aerial / GeoHive / Open Street Map / Google Roads
Global Digital Elevation Model (GDEM)



Note: Data points presented are georeferenced using open source data and/or a handheld GPS. This drawing / map is considered a conceptual model with reasonable accuracy for the purposes of environmental assessment. This drawing should not be relied upon for detailed design purposes.

Bedrock Geology 100k

Legend

Project Data

Project Features

 Pipeline Alignment


Constraints


Geology

Bedrock 100k (GSI)


Geological Linework 2018

 Fault

 Unconformity, dots on younger side


 X-Section

Bedrock Polygons 2018


 Allenwood Formation

 Ballyadams Formation

 Ballysteen Formation

 Boston Hill Formation

 Edenderry Oolite Member

 Lucan Formation

 Tober Colleen Formation

 Waulsortian Limestones

 Volcanics

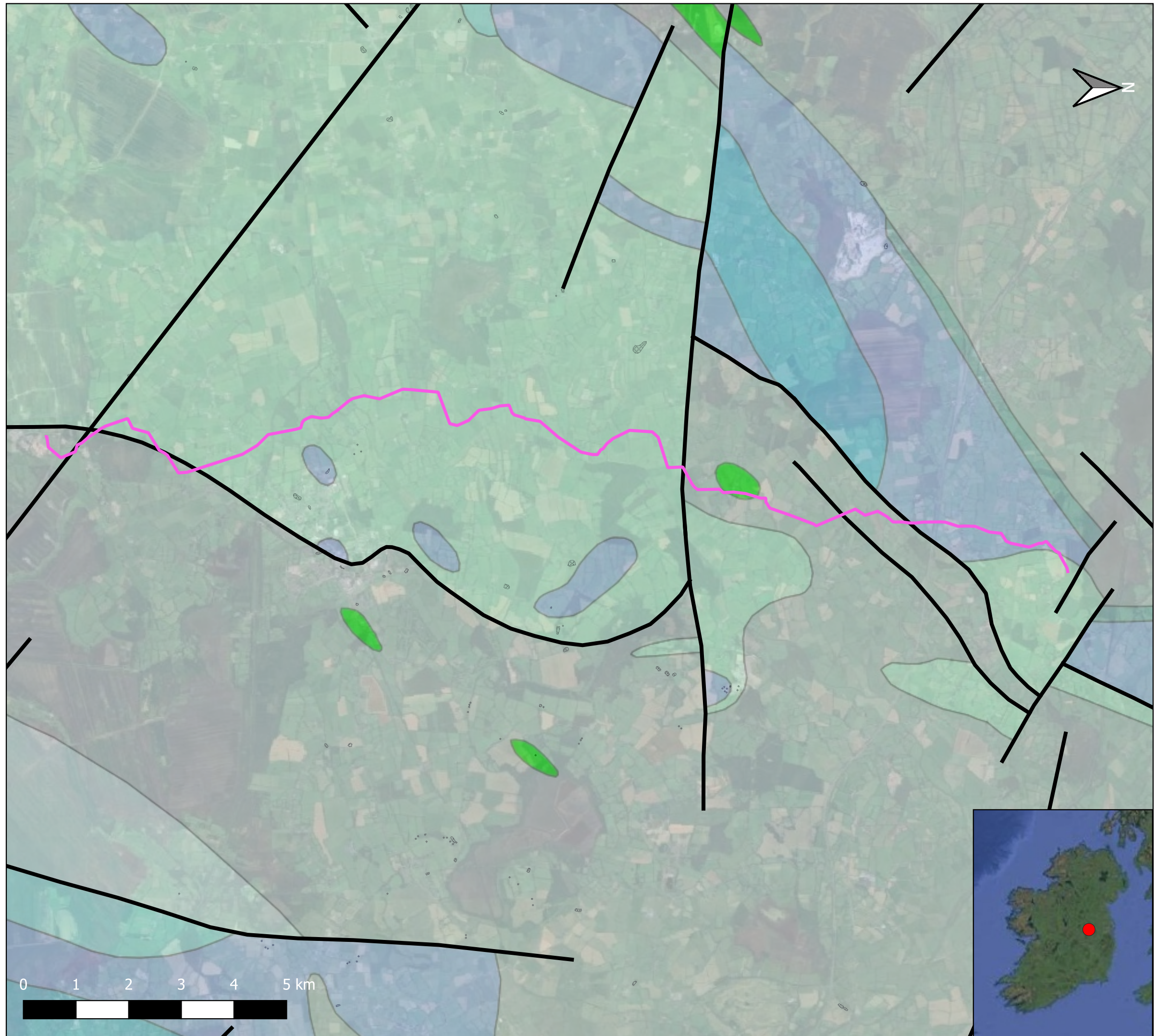
 Bedrock Outcrop 2018

Base Layers

Google Satellite

Project ID	3780
Project Name	Murphy - GNI Edenderry/Kilwarden
Projection	ITM
Drawn by	SF
Reviewed by	PC
Version	16/12/25

References/Sources:
 Environmental Protection Agency (EPA)
 Geological Services Ireland (GSI)
 Bing Aerial / GeoHive / Open Street Map / Google Roads
 Global Digital Elevation Model (GDEM)



Note: Data points presented are georeferenced using open source data and/or a handheld GPS. This drawing / map is considered a conceptual model with reasonable accuracy for the purposes of environmental assessment. This drawing should not be relied upon for detailed design purposes.

Bedrock Geology 100k Focus Area

Legend

Project Data

Project Features

 Pipeline Alignment


Constraints


Geology

Bedrock 100k (GSI)


Geological Linework 2018


 Fault

 Unconformity, dots on younger side


 X-Section


Bedrock Polygons 2018


 Allenwood Formation

 Ballyadams Formation

 Ballysteen Formation


 Boston Hill Formation

 Edenderry Oolite Member

 Lucan Formation

 Tober Colleen Formation

 Waulsortian Limestones

 Volcanics

 Bedrock Outcrop 2018

Base Layers

Google Satellite

Project ID	3780
Project Name	Murphy - GNI Edenderry/Kilwarden
Projection	ITM
Drawn by	SF
Reviewed by	PC
Version	16/12/25

References/Sources:
 Environmental Protection Agency (EPA)
 Geological Services Ireland (GSI)
 Bing Aerial / GeoHive / Open Street Map / Google Roads
 Global Digital Elevation Model (GDEM)



Note: Data points presented are georeferenced using open source data and/or a handheld GPS. This drawing / map is considered a conceptual model with reasonable accuracy for the purposes of environmental assessment. This drawing should not be relied upon for detailed design purposes.

Borehole Locations

Legend

Project Data

Project Features

● 3780 - Borehole Coordinates

— Pipeline Alignment

Base Layers

Google Satellite



Project ID	3780
Project Name	Murphy - GNI Edenderry/Kilwarden
Projection	ITM
Drawn by	SF
Reviewed by	PC
Version	16/12/25

References/Sources:
 Environmental Protection Agency (EPA)
 Geological Services Ireland (GSI)
 Bing Aerial / GeoHive / Open Street Map / Google Roads
 Global Digital Elevation Model (GDEM)



Note: Data points presented are georeferenced using open source data and/or a handheld GPS. This drawing / map is considered a conceptual model with reasonable accuracy for the purposes of environmental assessment. This drawing should not be relied upon for detailed design purposes.

Borehole Locations Focus Area

Legend

Project Data

Project Features

● 3780 - Borehole Coordinates

— Pipeline Alignment

Base Layers

Google Satellite

Project ID	3780
Project Name	Murphy - GNI Edenderry/Kilwarden
Projection	ITM
Drawn by	SF
Reviewed by	PC
Version	16/12/25

References/Sources:
 Environmental Protection Agency (EPA)
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 Bing Aerial / GeoHive / Open Street Map / Google Roads
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Groundwater Resources (Aquifers)

Legend

Project Data

Project Features

— Pipeline Alignment

Constraints

Hydrogeology

Groundwater

Aquifers 100k (GSI)

■ Rkd - Regionally Important Aquifer - Karstified (diffuse)

■ LI - Locally Important Aquifer - which is Moderately Productive only in Local Zones

■ Lm - Locally Important Aquifer - which is Generally Moderately Productive

■ PI - Poor Aquifer - which is Generally Unproductive except for Local Zones

Base Layers

Google Satellite

Project ID	3780
Project Name	Murphy - GNI Edenderry/Kilwarden
Projection	ITM
Drawn by	SF
Reviewed by	PC
Version	16/12/25

References/Sources:
 Environmental Protection Agency (EPA)
 Geological Services Ireland (GSI)
 Bing Aerial / GeoHive / Open Street Map / Google Roads
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Groundwater Resources (Aquifers) - Focus Area

Legend

Project Data

Project Features

— Pipeline Alignment

Constraints

Hydrogeology

Groundwater

Aquifers 100k (GSI)

■ Rkd - Regionally Important Aquifer - Karstified (diffuse)

■ LI - Locally Important Aquifer - which is Moderately Productive only in Local Zones

■ Lm - Locally Important Aquifer - which is Generally Moderately Productive

■ PI - Poor Aquifer - which is Generally Unproductive except for Local Zones

Base Layers

Google Satellite

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Groundwater Vulnerability

Legend

Project Data

Project Features

— Pipeline Alignment

Constraints

Hydrogeology

Groundwater

Groundwater Vulnerability 1:40000 (GSI)

Rock at or near Surface or Karst (X)

Extreme (E)

High (H)

Moderate (M)

Low (L)

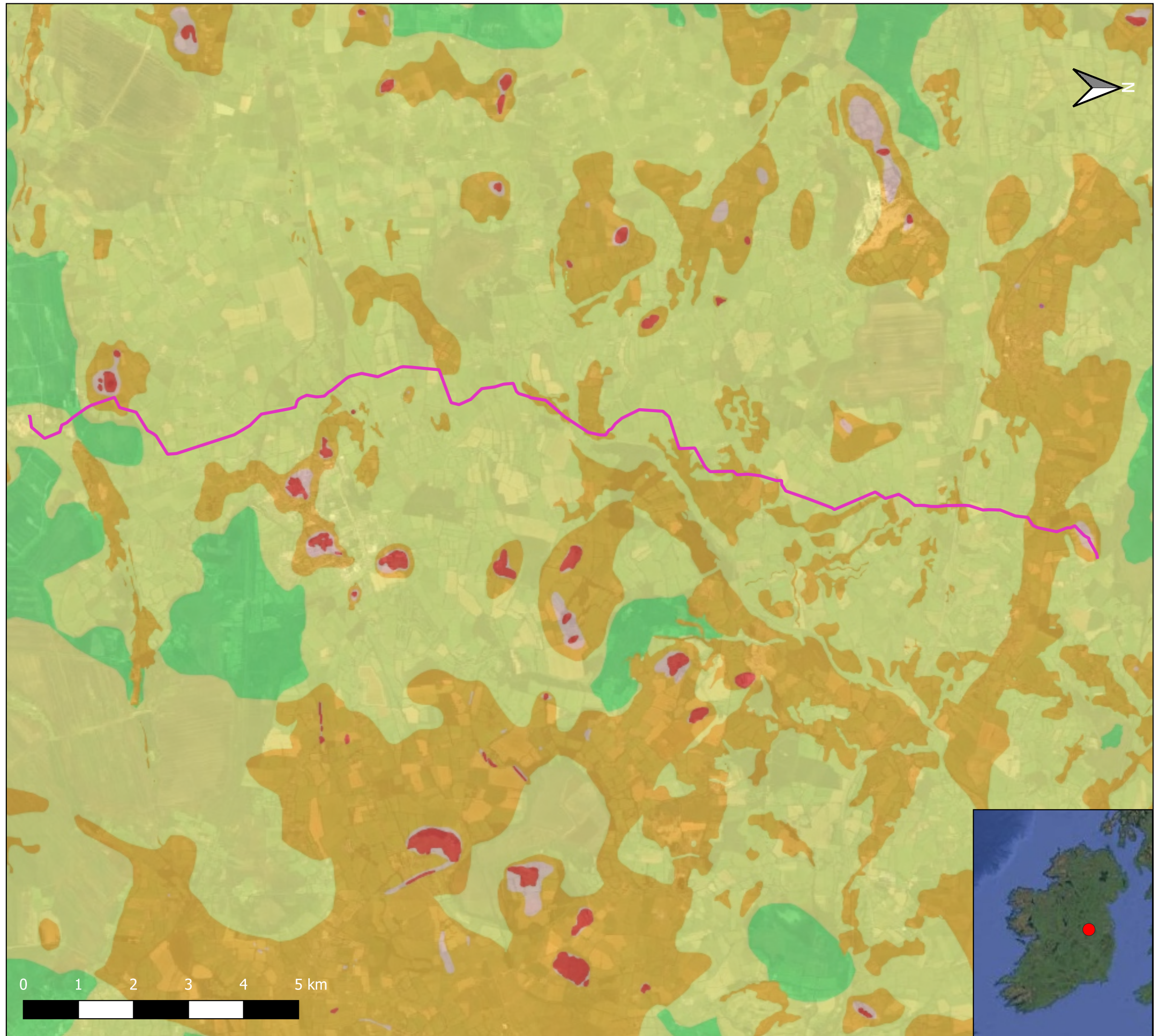
Water

Base Layers

Google Satellite

Project ID	3780
Project Name	Murphy - GNI Edenderry/Kilwarden
Projection	ITM
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Reviewed by	PC
Version	16/12/25

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Groundwater Vulnerability Focus Area

Legend

Project Data

Project Features

— Pipeline Alignment

Constraints

Hydrogeology

Groundwater

Groundwater Vulnerability 1:40000 (GSI)

Rock at or near Surface or Karst (X)

Extreme (E)

High (H)

Moderate (M)

Low (L)

Water

Base Layers

Google Satellite

Project ID	3780
Project Name	Murphy - GNI Edenderry/Kilwarden
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Drawn by	SF
Reviewed by	PC
Version	16/12/25

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Wells & Springs

Legend

Project Data

Project Features

 Pipeline Alignment

Constraints


Hydrogeology

Groundwater

Wells

 Wells10to50

 Wells100_50B

 Wells1km_500B

 Wells500_250B

 Wells200_100B

Base Layers

Google Satellite

Project ID	3780
Project Name	Murphy - GNI Edenderry/Kilwarden
Projection	ITM
Drawn by	SF
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References/Sources:
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Wells & Springs Focus Area

Legend

Project Data

Project Features

 Pipeline Alignment

Constraints

Hydrogeology


Groundwater

Wells

 Wells10to50

 Wells100_50B

 Wells1km_500B

 Wells500_250B

 Wells200_100B

Base Layers

Google Satellite

Project ID	3780
Project Name	Murphy - GNI Edenderry/Kilwarden
Projection	ITM
Drawn by	SF
Reviewed by	PC
Version	16/12/25

References/Sources:
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Public Supply Source Protection Areas

Legend

Project Data

Project Features

 Pipeline Alignment

Constraints

Hydrogeology

 Public Supply Source Protection Areas (GSI)

Base Layers

Google Satellite

Project ID	3780
Project Name	Murphy - GNI Edenderry/Kilwarden
Projection	ITM
Drawn by	SF
Reviewed by	PC
Version	16/12/25

References/Sources:
 Environmental Protection Agency (EPA)
 Geological Services Ireland (GSI)
 Bing Aerial / GeoHive / Open Street Map / Google Roads
 Global Digital Elevation Model (GDEM)



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Surface Water Features

Legend

Project Data

Project Features

— Pipeline Alignment

Constraints

Hydrology

— Rivers net route (EPA)

Topography

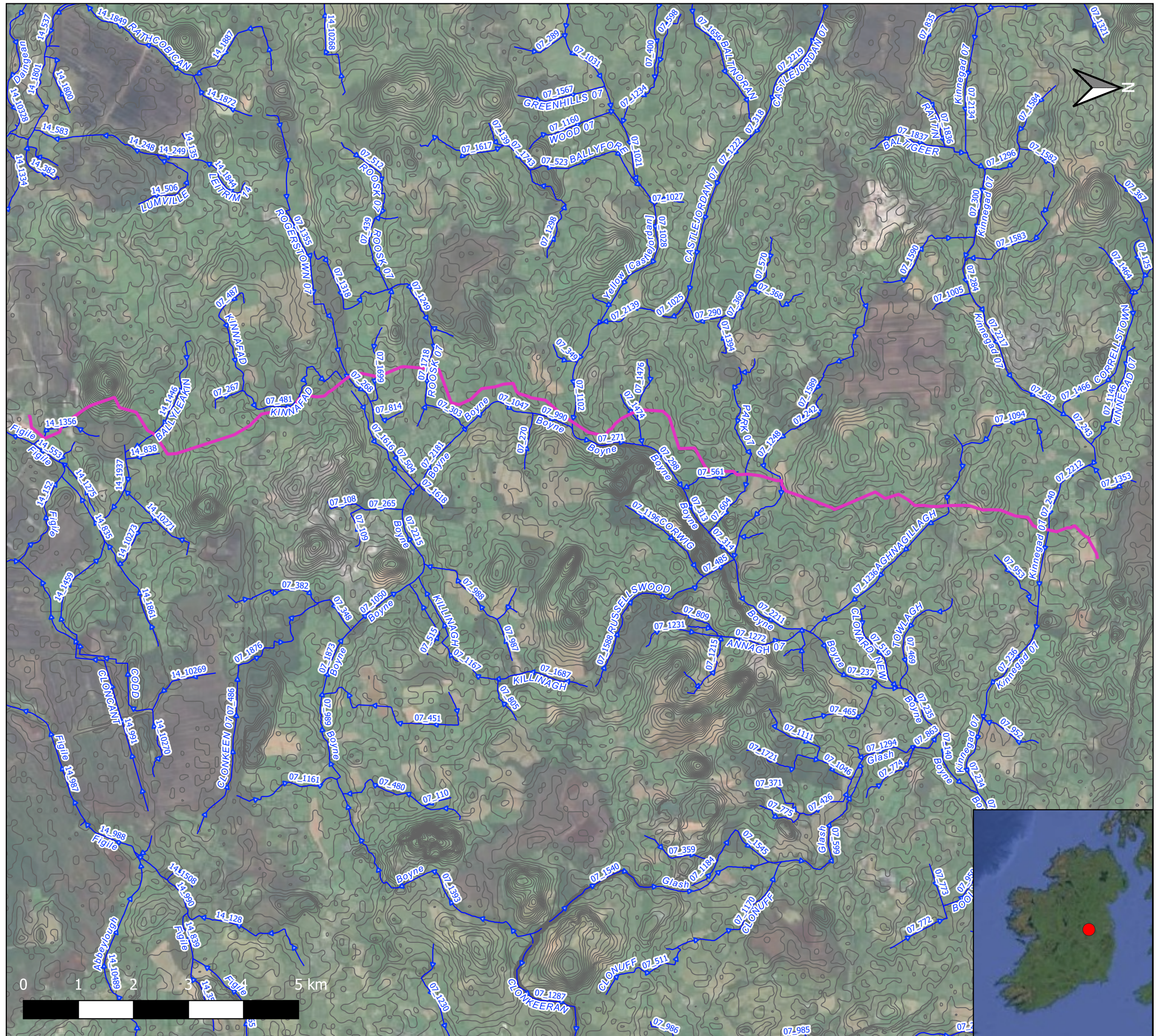
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Base Layers

Google Satellite

Project ID	3780
Project Name	Murphy - GNI Edenderry/Kilwarden
Projection	ITM
Drawn by	SF
Reviewed by	PC
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References/Sources:
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Surface Water Features Focus Area

Legend

Project Data

Project Features

— Pipeline Alignment

Constraints

Hydrology

— Rivers net route (EPA)

Topography

— DEM_2m_Contour_clipped

Base Layers

Google Satellite

Project ID	3780
Project Name	Murphy - GNI Edenderry/Kilwarden
Projection	ITM
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Reviewed by	PC
Version	16/12/25

References/Sources:
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Special Area of Conservation (SAC)

Legend


Project Data

Project Features

 Pipeline Alignment

Constraints

Designated Areas

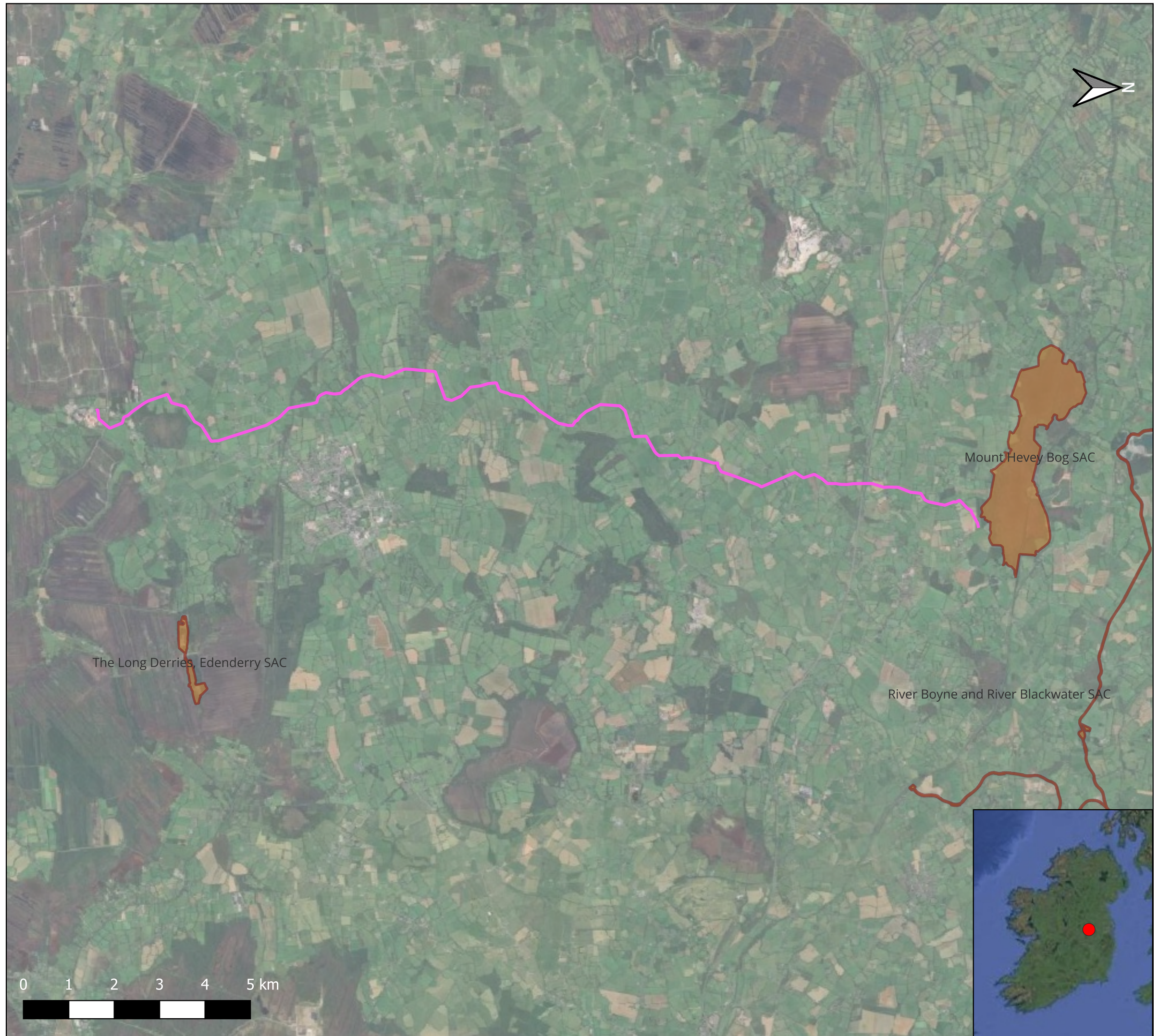
 SAC 2024 (NPWS)

Base Layers

Google Satellite

Project ID	3780
Project Name	Murphy - GNI Edenderry/Kilwarden
Projection	ITM
Drawn by	SF
Reviewed by	PC
Version	16/12/25

References/Sources:
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 Geological Services Ireland (GSI)
 Bing Aerial / GeoHive / Open Street Map / Google Roads
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Appendix B

Groundwater Wells & Springs

Appendix B - Groundwater Wells Springs

Number	Well ID	Source Type	Depth (m)	Bedrock	Drill Date	Coordinates		Accuracy	Townland	Source Use	Yield (m3/d)
						X	Y				
1	2623NWW030	Borehole	20.1	Unknown	1899/12/30	264800	245080	to 50m	ANNEVILLE		
2	2623NWW049	Dug well	3	Bedrock Not Met	1899/12/30	262250	244850	to 1km	ARDNAMULLAN	Domestic use only	
3	2623NWW080	Dug well	5.5	Bedrock Not Met	1899/12/30	262200	244650	to 100m	ARDNAMULLAN	Public supply	
4	2623NWW088	Dug well			1899/12/30	263410	244870	to 100m	ARDNAMULLAN	Public supply	
5	2623NWW057	Dug well	6.4	Bedrock Not Met	01/08/1970	264550	248200	to 1km	BALLASPORT	Domestic use only	11.3
6	2321NEW017	Dug well	3.7	Bedrock Not Met	1899/12/30	259820	228400	to 1km	BALLINAKILL	Domestic use only	
7	2623NWW027	Dug well	7.3	Bedrock Not Met	10/07/1961	262070	241150	to 50m	BALLYBOGGAN		
8	2623NWW028	Dug well	4	Bedrock Not Met	23/03/1973	262170	241090	to 50m	BALLYBOGGAN		
9	2623NWW029	Dug well	3.7	Bedrock Not Met	22/03/1973	261150	240580	to 50m	BALLYBOGGAN		
10	2623NWW052	Dug well	6.7	Bedrock Not Met	1899/12/30	263750	241900	to 1km	BALLYBOGGAN		
11	2323SEW033	Borehole	21.9	Unknown	26/07/1968	259400	231800	to 1km	BALLYCOLGAN		21.8
12	2623SWW342	Dug well	7.8	Unknown	1899/12/30	262200	234940	to 50m	BALLYGIBBON WEST	Domestic use only	
13	2621NWW007	Dug well	5.2	Bedrock Not Met	1899/12/30	260400	228330	to 1km	BALLYKILLEEN	Domestic use only	
14	2621NWW008	Dug well	9.1	Bedrock Not Met	1899/12/30	260400	228420	to 1km	BALLYKILLEEN	Domestic use only	
15	2321NEW014	Borehole	18.3	Bedrock Not Met	01/01/1940	258300	229500	to 1km	BALLYLEAKIN	Domestic use only	19.6
16	2621NWW010	Borehole	33.5	Bedrock Met	03/12/1971	262350	226100	to 1km	CLONCANT		29.4
17	2621NWW011	Borehole	49.7	Bedrock Met	05/05/1955	262350	226100	to 1km	CLONCANT		
18	2621NWW012	Borehole	32.6		30/09/1972	262300	226450	to 1km	CLONCANT		32.7
19	2323SEW021	Borehole	32.3	Unknown	1899/12/30	258100	236700	to 1km	CLONMORE	Domestic use only	
20	2623SWW006	Dug well	4.3	Bedrock Not Met	1899/12/30	262090	231500	to 1km	COLGANS BRIDGE	Domestic use only	
21	2623SWW012	Borehole	56	Bedrock Met	01/09/1992	262470	230660	to 20m	DRUMCOOLY	Group Scheme	100
22	2623SWW013	Borehole	32	Bedrock Met	01/09/1992	262450	230640	to 20m	DRUMCOOLY	Group Scheme	100
23	2623SWW014	Borehole	41	Bedrock Met	01/09/1992	262540	230730	to 20m	DRUMCOOLY	Group Scheme	250
24	2623SWW007	Dug well	4.3	Bedrock Not Met	1899/12/30	262910	233350	to 1km	EDENDERRY	Domestic use only	
25	2623SWW009	Dug well	6.1	Bedrock Not Met	01/03/1962	262850	233350	to 1km	EDENDERRY	Domestic use only	
26	2623SWW256	Borehole	16.8	Bedrock Not Met	1899/12/30	261900	236950	to 20m	GRANGE WEST	Domestic use only	38.2
27	2623SWW276	Dug well	6.2	Unknown	1899/12/30	261980	236830	to 50m	GRANGE WEST	Domestic use only	
28	2623SWW432	Dug well	5.5	Unknown	1899/12/30	261980	236820	to 50m	GRANGE WEST	Domestic use only	
29	2623NWW050	Borehole	91.4	Unknown	06/05/1975	260900	245000	to 50m	HARDWOOD		16.4
30	2623NWW053	Dug well	7.6	Unknown	18/08/1971	261300	245500	to 1km	HARDWOOD		14.2

Hydrogeological Assessment

Minerex Environmental
 For Murphy International
 GNI Edenderry/Kilwarden

Appendix B - Groundwater Wells Springs

31	2623NWW066	Borehole	91.4	Unknown	01/09/1974	261300	245450	to 1km	HARDWOOD	Domestic use only	16.4
32	2623NWW078	Dug well	3.7	Bedrock Not Met	1899/12/30	261490	245700	to 100m	HARDWOOD	Domestic use only	
33	2623NWW079	Borehole	27.4	Bedrock Met	1899/12/30	260570	244830	to 100m	HARDWOOD	Public supply	
34	2623NWW098	Borehole	91.5	Unknown	12/07/1995	263930	246400	to 50m	KILWARDEN	Other	25
35	2623NWW054	Dug well	3	Unknown	18/03/1973	263200	246600	to 1km	KILWARDEN	Domestic use only	11.8
36	2623NWW055	Dug well	3.7	Bedrock Not Met	1899/12/30	263200	246550	to 1km	KILWARDEN	Domestic use only	
37	2623NWW056	Dug well	4.9	Bedrock Not Met	1899/12/30	262350	246600	to 100m	KILWARDEN		
38	2623NWW077	Dug well	2.7	Bedrock Not Met	1899/12/30	263640	246460	to 100m	KILWARDEN	Public supply	
39	2623NWW086	Dug well	2.7	Bedrock Not Met	1899/12/30	263860	246390	to 100m	KILWARDEN	Public supply	
40	2623NWW282	Dug well	2.4	Unknown	1899/12/30	262430	236460	to 50m	KINNAFAD	Domestic use only	
41	2623SWW281	Dug well	3.4	Unknown	1899/12/30	262620	236840	to 50m	KINNAFAD	Domestic use only	
42	2623SWW338	Unknown		Unknown	1899/12/30	261790	236090	to 50m	KINNAFAD	Public supply	
43	2623SWW339	Dug well	2.7	Unknown	1899/12/30	261600	235840	to 50m	KINNAFAD	Domestic use only	
44	2623SWW340	Dug well	12.8	Unknown	1899/12/30	261570	235480	to 50m	KINNAFAD	Domestic use only	
45	2623SWW340	Dug well	9.8	Unknown	1899/12/30	261550	235450	to 50m	KINNAFAD	Domestic use only	
46	2623SWW216	Borehole	24.4		01/02/1966	261740	235990	to 1km	KINNAFAD		14.18
47	2623SWW010	Borehole	11.6	Bedrock Met	07/12/1970	261000	233000	to 1km	MONASTERORIS	Domestic use only	43.6
48	2623NWW051	Dug well	1.5	Bedrock Not Met	1899/12/30	262000	241650	to 1km	PARK	Public supply	
49	2623SWW277	Dug well	4.6	Unknown	1899/12/30	262310	238290	to 50m	RAHIN	Public supply	
50	2623SWW278	Borehole	1803	Unknown	1899/12/30	262760	238850	to 50m	RAHIN	Domestic use only	
51	2623SWW279	Dug well	10.4	Unknown	1899/12/30	262480	238640	to 50m	RAHIN	Domestic use only	
52	2623SWW280	Dug well	12.8	Unknown	1899/12/30	262140	237870	to 50m	RAHIN	Domestic use only	
53	2623SWW008	Dug well	5.2	Bedrock Not Met	1899/12/30	261050	231420	to 1km	RATHMORE	Domestic use only	
54	2621NWW002	Dug well	2.7	Bedrock Not Met	1899/12/30	261750	228550	to 1km	SHEAN	Domestic use only	10.9
55	2623NWW087	Dug well	20.7	Bedrock Not Met	1899/12/30	261860	243460	to 100m	TICROCHAN	Public supply	
56	2623NWW081	Borehole	17.7	Unknown	1899/12/30	261860	243460	to 100m	TICROGHAN	Public supply	
57	2623NWW082	Dug well	5.1	Bedrock Not Met	1899/12/30	263180	242600	to 100m	TICROGHAN	Public supply	
58	2623NWW083	Dug well	6.7	Bedrock Not Met	1899/12/30	263690	243860	to 100m	TICROGHAN	Public supply	
59	2623NWW017	Dug well	7.5	Bedrock Not Met	1899/12/30	264670	245050	to 50m	TOWLAGHT		11.8
60	2623NWW084	Dug well	7.5	Bedrock Not Met	1899/12/30	264730	245070	to 100m	TOWLAGHT	Public supply	11.8
61	2623NWW085	Dug well			1899/12/30	263500	244820	to 100m	TOWLAGHT	Public supply	

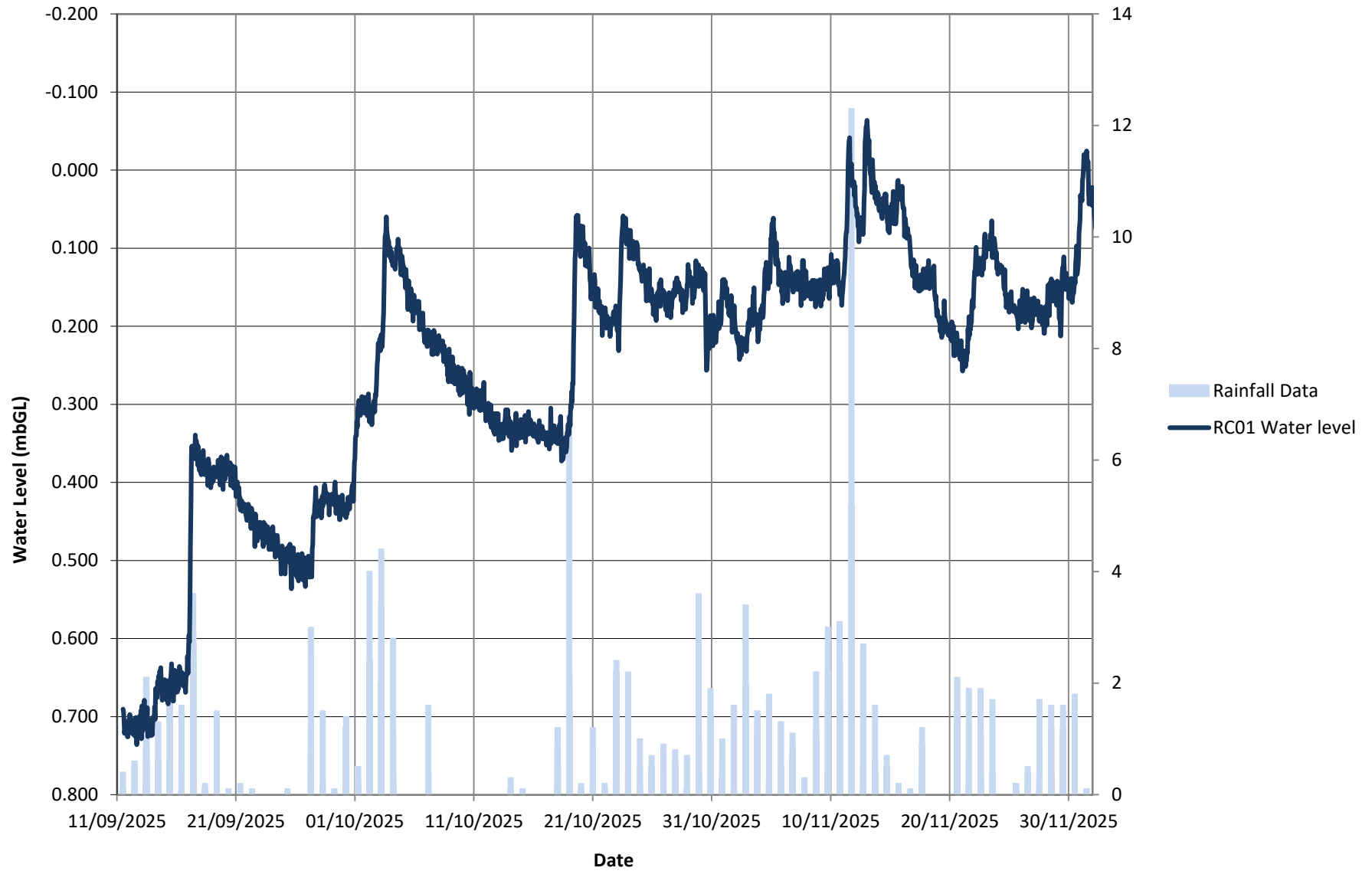
Hydrogeological Assessment

Minerex Environmental
 For Murphy International
 GNI Edenderry/Kilwarden

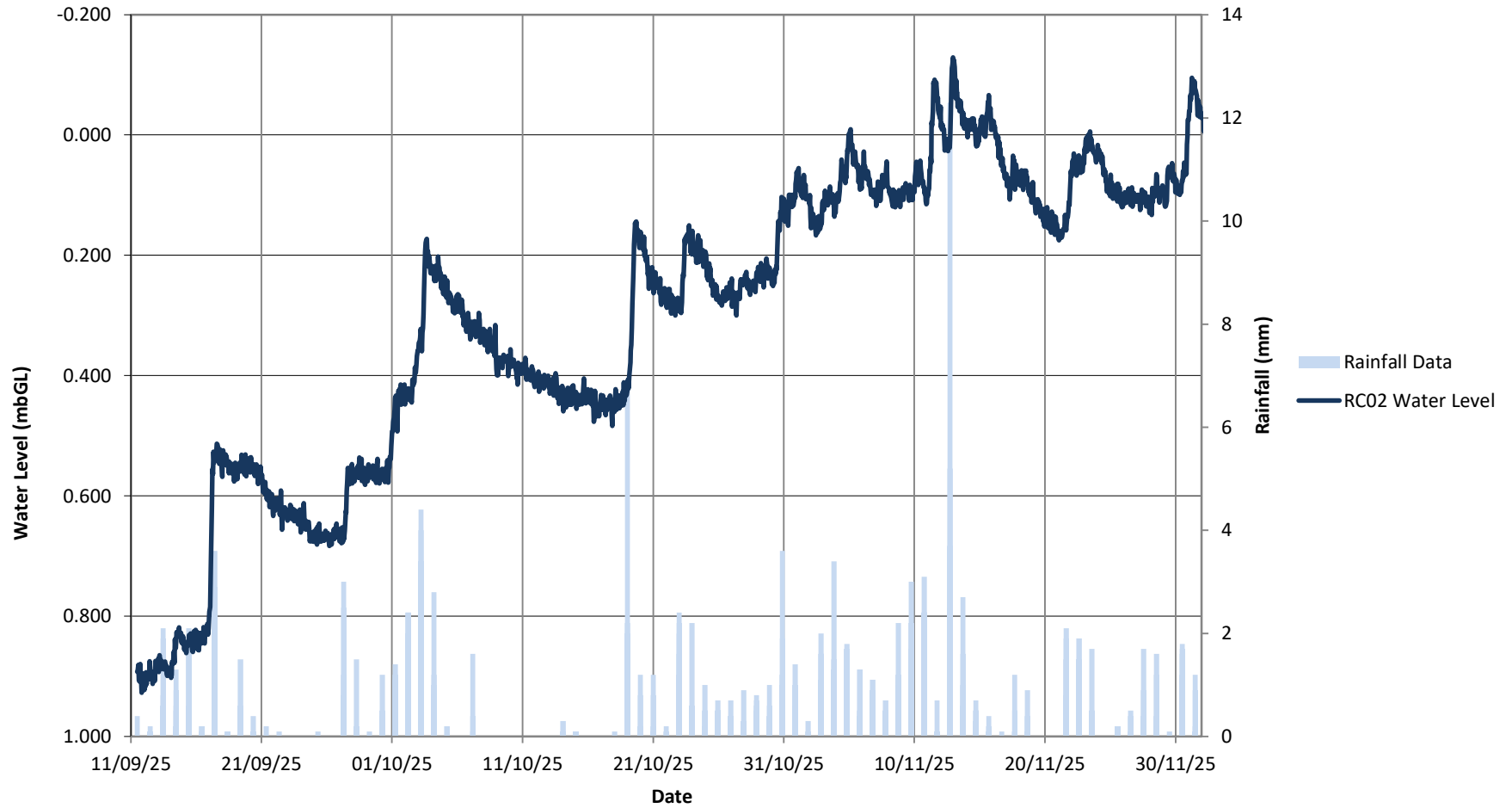
Appendix C

Hydrographs

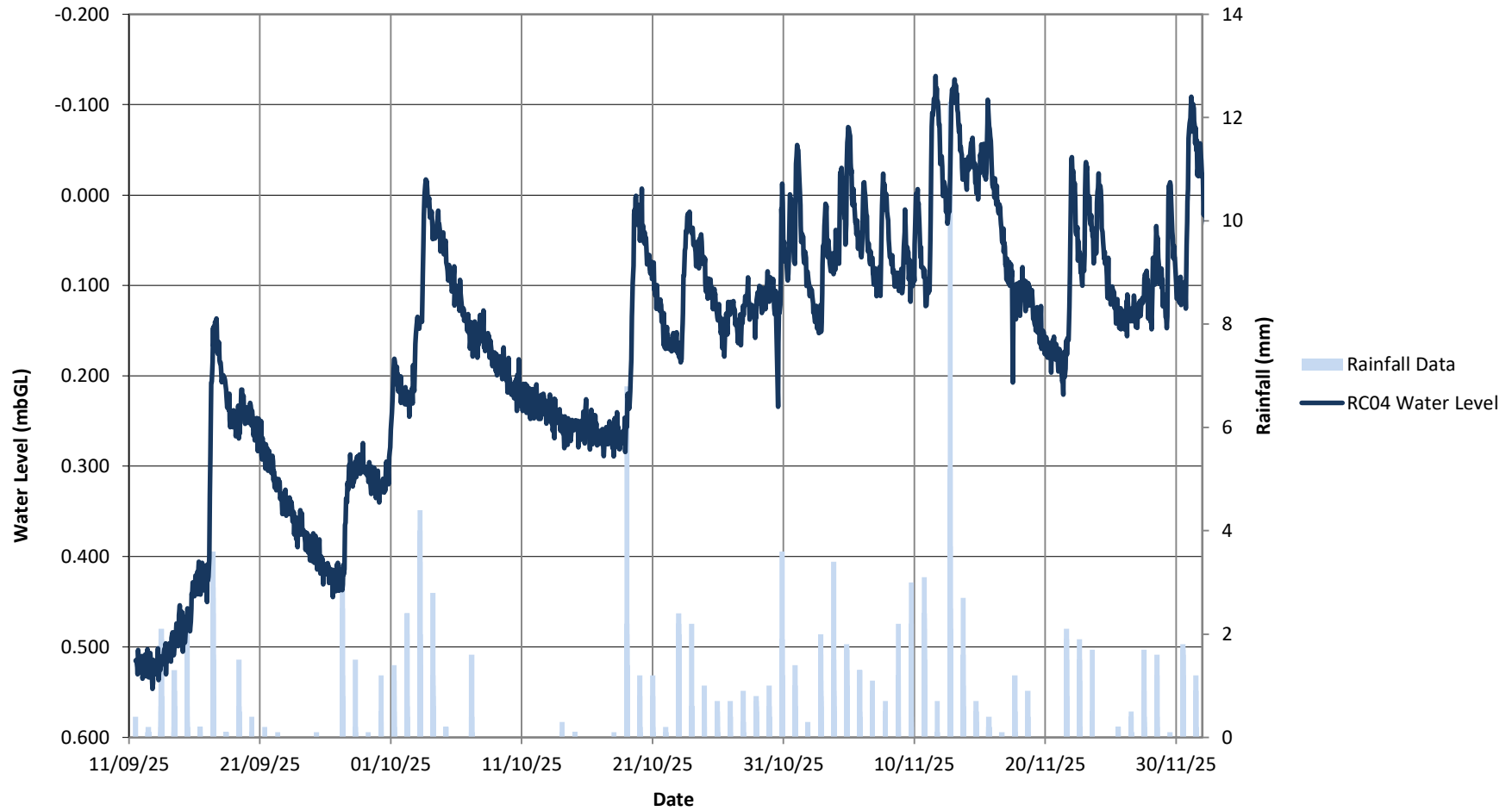
3780 - RC01 Gas to Bord na Mona Edenderry



3780 - RC02 Gas to Bord na Mona Edenderry



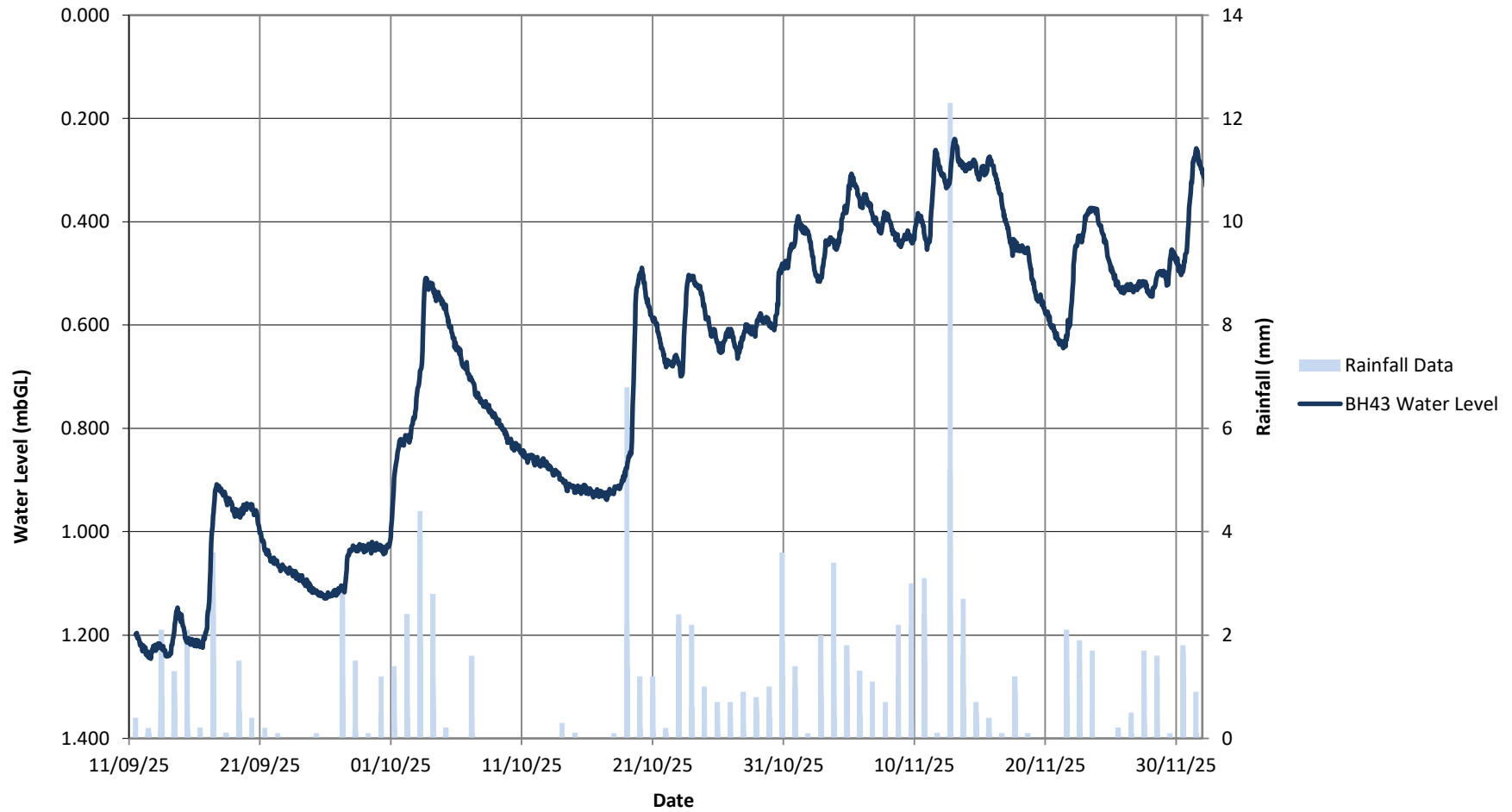
3780 - RC04 Gas to Bord na Mona Edenderry



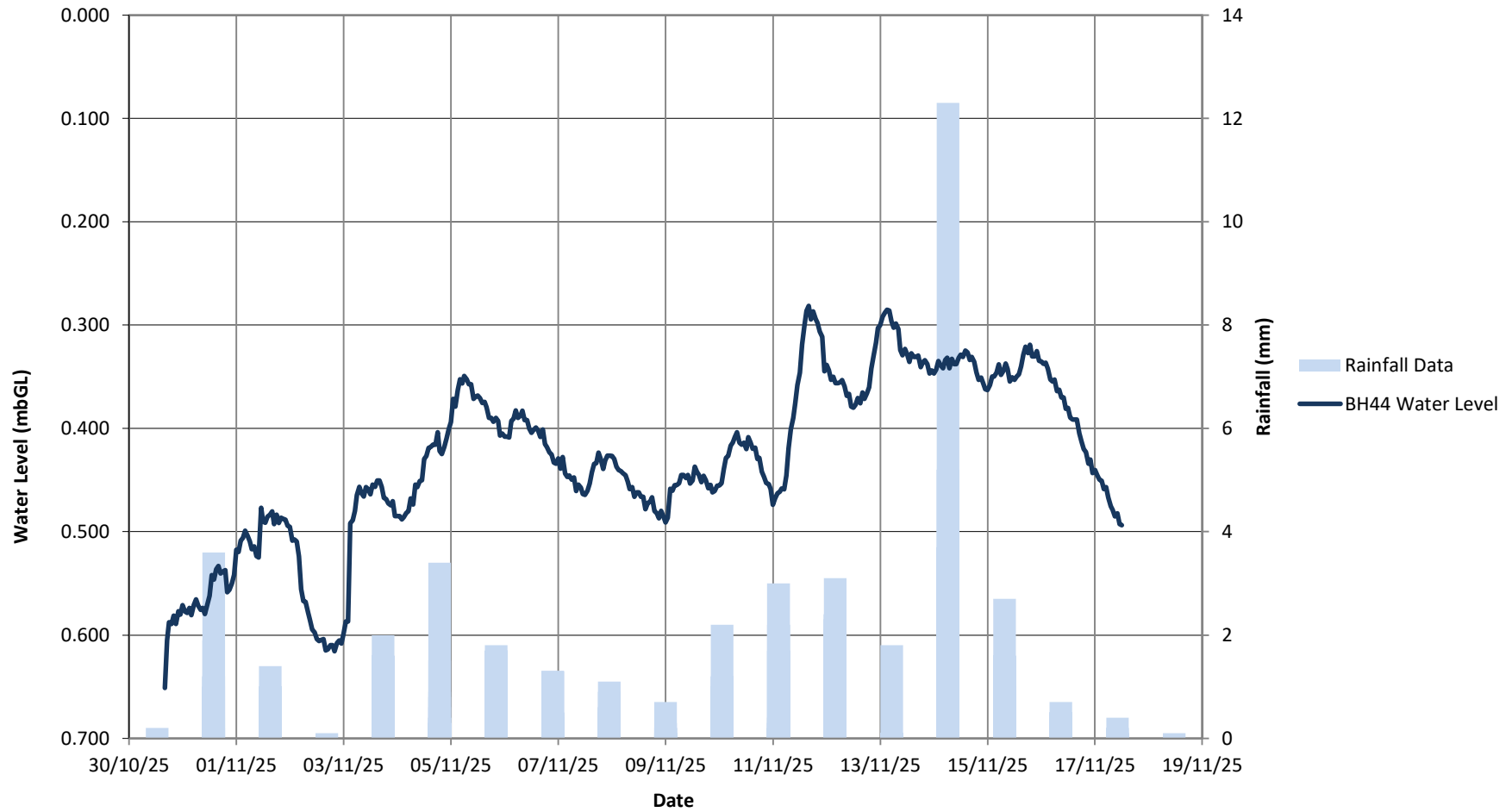
3780 - BH40 Gas to Bord na Mona Edenderry



3780 - BH43 Gas to Bord na Mona Edenderry



3780 - BH44 Gas to Bord na Mona Edenderry



3780 - BH45 Gas to Bord na Mona Edenderry



3780 - BH06 Gas to Bord na Mona Edenderry



Appendix D

IGSL Monitoring Sheet – Dipper Readings

Project: Gas to Bord na Mona Edenderry
 Engineer: Fingleton White

Exploratory Hole		Ground Elevation m OD	10/09/2025		11/09/2025		30/10/2025		31/10/2025		06/11/2025	
Name	Ø [mm]		m bgl	m OD	m bgl	m OD	m bgl	m OD	m bgl	m OD	m bgl	m OD
RC 01	50	69.55	0.72	68.83	-	-	0.13	69.42	-	-	0.10	69.45
RC 02	50	69.76	0.77	68.99	-	-	0.22	69.54	-	-	0.20	69.56
RC 03	19	69.95	1.25	68.70	-	-	0.79	69.16	-	-	0.60	69.35
RC 04	50	69.71	0.73	68.98	-	-	0.45	69.26	-	-	0.40	69.31
	19	69.71	0.85	68.86	-	-	0.45	69.26	-	-	0.40	69.31
BH 06	50	69.00	1.39	67.61	-	-	-	-	0.53	67.08	0.56	68.44
RC 07	50	67.85	1.98	65.87	-	-	-	-	1.10	66.75	0.82	67.03
BH 14	50	77.34	3.63	73.71	-	-	-	-	3.20	73.94	-	-
RC 18	50	74.69	2.79	71.90	-	-	-	-	2.50	71.99	-	-
RC 24	50	66.15	3.23	62.92	-	-	-	-	2.77	63.38	-	-
BH 27A	50	73.20	-	-	2.23	70.97	-	-	1.10	72.10	-	-
RC 30A	50	78.26	2.88	75.38	-	-	-	-	2.28	75.98	-	-
BH 32R	50	80.79	-	-	2.65	78.14	-	-	1.70	79.09	-	-
BH 34R	50	67.51	-	-	1.31	66.20	-	-	1.13	66.38	-	-
BH 40	50	70.86	1.48	69.38	-	-	0.97	69.89	-	-	0.44	70.42
BH 42	50	71.53	1.49	70.04	-	-	0.65	70.88	-	-	0.63	70.90
	19	71.53	1.50	70.03	-	-	0.65	70.88	-	-	-	-
BH 43	50	71.45	1.08	70.37	-	-	0.56	70.89	-	-	-	-
BH 44	50	71.40	<i>Not drilled yet</i>		<i>Not drilled yet</i>		0.63	70.77	-	-	-	-
BH 45	50	70.32	<i>Not drilled yet</i>		<i>Not drilled yet</i>		0.33	69.99	-	-	-	-

Remarks: Water levels measured using electric dipmeter

Sheet 1 of 1

Appendix E

Groundwater Contour Maps

Groundwater Contours - September

Legend

Project Data

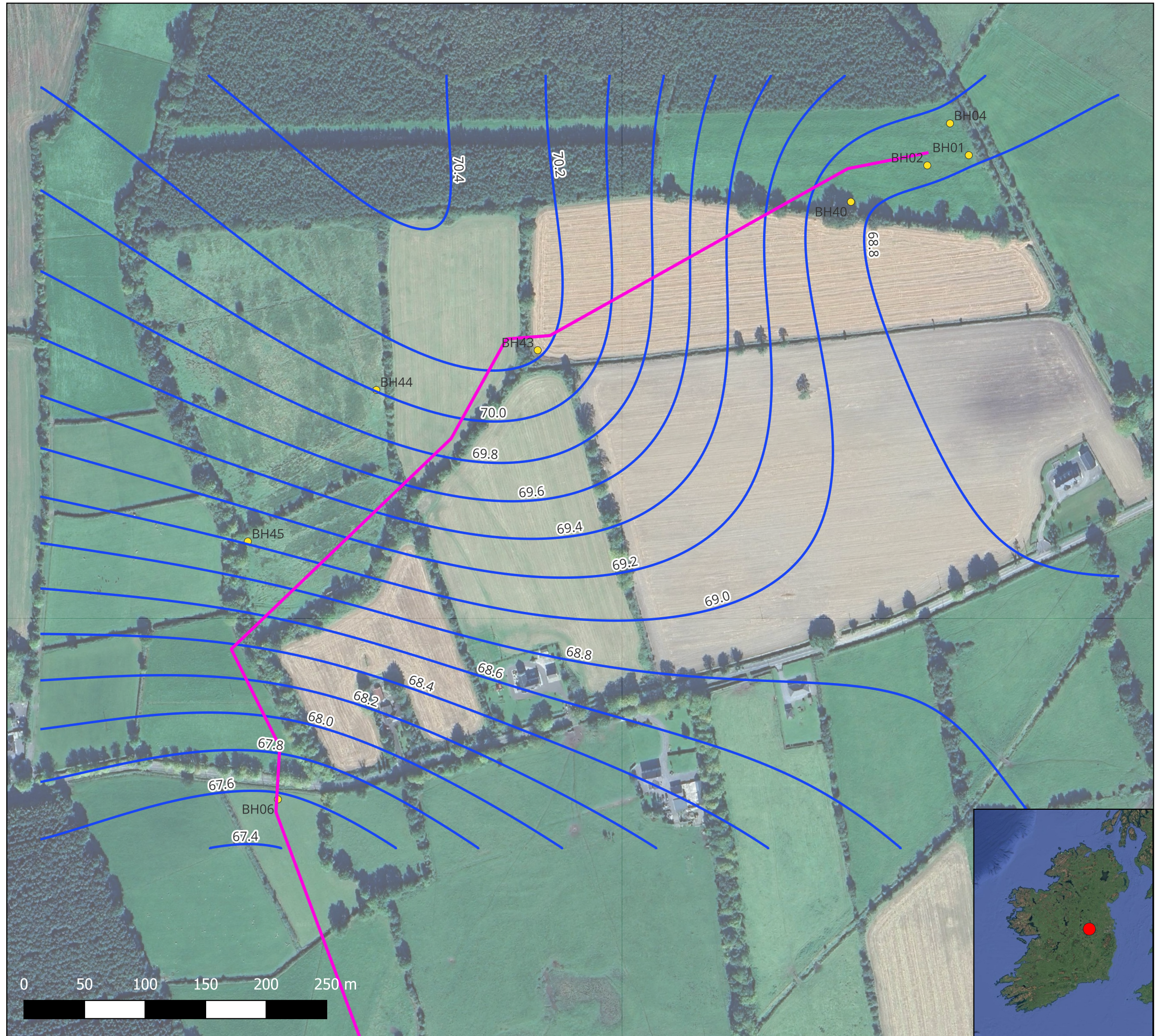
- Pipeline Alignment
- GW Contours - Sept
- 3780 - Borehole Coordinates

Base Layers

Google Satellite

Project ID	3780
Project Name	Murphy - GNI Edenderry/Kilwarden
Projection	ITM
Drawn by	SF
Reviewed by	PC
Version	03/02/26

References/Sources:
 Environmental Protection Agency (EPA)
 Geological Services Ireland (GSI)
 Bing Aerial / GeoHive / Open Street Map / Google Roads
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Groundwater Contours - December

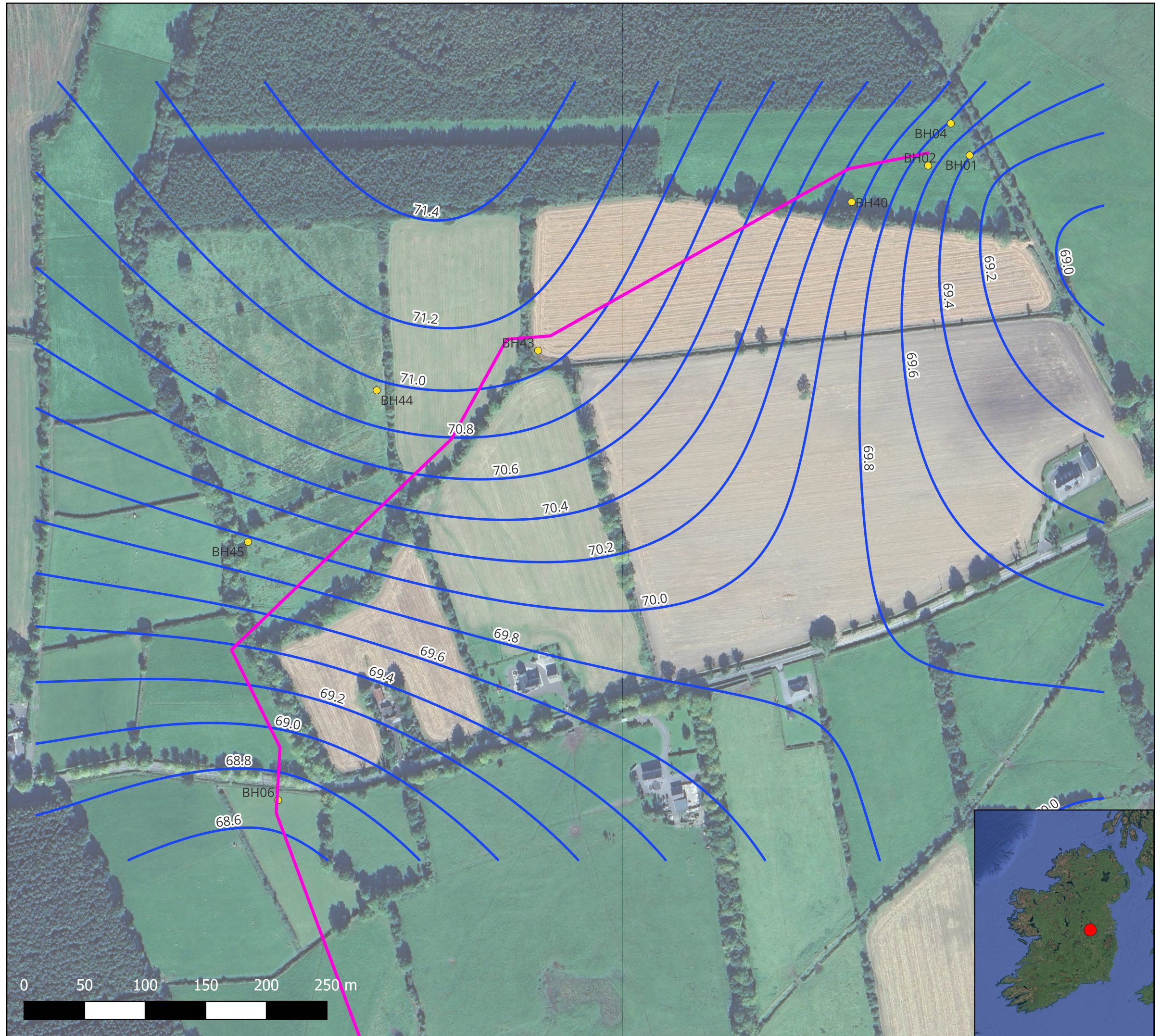
Legend

Project Data

- Pipeline Alignment
- 3780 - Borehole Coordinates
- GW Contours - Dec

Base Layers

Google Satellite



Project ID	3780
Project Name	Murphy - GNI Edenderry/Kilwarden
Projection	ITM
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Reviewed by	PC
Version	03/02/26

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 Bing Aerial / GeoHive / Open Street Map / Google Roads
 Global Digital Elevation Model (GDEM)



Note: Data points presented are georeferenced using open source data and/or a handheld GPS. This drawing / map is considered a conceptual model with reasonable accuracy for the purposes of environmental assessment. This drawing should not be relied upon for detailed design purposes.

Appendix F

Water Monitoring Stations

Appendix F - Water Monitoring Station Locations

Crossing Number	Surface Water Feature	Code	Monitoring Station Upstream		Monitoring Station Downstream	
1	Kilwarden River	IE_EA_07B040600	RS07K010200	Kilwarden Br	RS07K010300	Clonard Br
3	Knockersally	IE_EA_07B040400			RS07B040400	Ballyboggan Br
4	Park	IE_EA_07B040400			RS07B040400	Ballyboggan Br
5	Ballynakill	IE_EA_07B040400			RS07B040400	Ballyboggan Br
8	Yellow	IE_EA_07B040400	RS07Y020300	Clongall Br		
10	Mountwilson	IE_EA_07B040300			RS07B040300	Kinnafad Br
11	Rogerstown	IE_EA_07B040300			RS07B040300	Kinnafad Br
12	Grand Canal	IE_07_AWB_GCMLW			RS99A080200	GCW6-Georges Br.
15	Ballykilleen	IE_SE_14F010200	RS14F010180	FIGILE - Br u/s Kilcumber Br		

Appendix G

Water Samples Results – IGSL



Final Report

Report No.: 25-35724-1

Initial Date of Issue: 14-Nov-2025

Re-Issue Details:

Client IGSL

Client Address: M7 Business Park
 Naas
 County Kildare
 Ireland

Contact(s): Darren Keogh

Project 25882 GAS TO EDENDERRY

Quotation No.: **Date Received:** 06-Nov-2025

Order No.: **Date Instructed:** 06-Nov-2025

No. of Samples: 5

Turnaround (Wkdays): 5 **Results Due:** 12-Nov-2025

Date Approved: 14-Nov-2025

Approved By:



Details: David Smith, Technical Director

For details about application of accreditation to specific matrix types, please refer to the Table at the back of this report

Results - Water

Project: 25882 GAS TO EDENDERRY

Client: IGSL		Chemtest Job No.:								
Quotation No.:		25-35724			25-35724		25-35724		25-35724	
Order No.:		Chemtest Sample ID.:								
		2049875			2049876		2049877		2049878	
		Client Sample Ref.:								
		BH27			RC18		BH34		RC03	
		Client Reference:								
		BH27			RC18		BH34		RC03	
		Sample Type:								
		WATER			WATER		WATER		WATER	
		Sample Sub Type:								
		Top Depth (m):								
		1.1			2.7		1.13		0.79	
		Date Sampled:								
		31-Oct-2025			31-Oct-2025		31-Oct-2025		30-Oct-2025	
Determinand	HWOL Code	Accred.	SOP	Units	LOD					
pH at 20C		U	1010		4.0	8.1	7.5	7.7	8.4	8.5
Sulphate		U	1220	mg/l	1.0	11	16	240	26	38
Cyanide (Total)		U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Arsenic (Dissolved)		U	1455	µg/l	0.20	< 0.20	< 0.20	0.38	3.9	< 0.20
Boron (Dissolved)		U	1455	µg/l	10.0	19	17	24	12	30
Cadmium (Dissolved)		U	1455	µg/l	0.11	< 0.11	< 0.11	0.59	0.44	< 0.11
Copper (Dissolved)		U	1455	µg/l	0.50	5.5	4.5	13	18	8.5
Mercury (Dissolved)		U	1455	µg/l	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (Dissolved)		U	1455	µg/l	0.50	3.0	1.4	52	32	8.3
Lead (Dissolved)		U	1455	µg/l	0.50	0.60	0.60	0.55	0.93	0.58
Zinc (Dissolved)		U	1455	µg/l	2.5	4.7	5.0	39	13	5.3
Chromium (Total)		N	1455	µg/l	0.50	2.8	4.9	5.3	3.3	5.6
Total TPH >C6-C40	EH_1D_Total	U	1670	µg/l	10	< 10	< 10	< 10	< 10	< 10
Naphthalene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's		U	1800	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols		U	1920	mg/l	0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030

Test Methods

SOP	Title	Parameters included	Method summary	Water Accred.
1010	pH Value of Waters	pH at 20°C	pH Meter	RE PW TE TS PL DW GW
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.	RE PW PL LE DW GW
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.	GW
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).	RE PW PL SW DW GW
1670	Total Petroleum Hydrocarbons (TPH) in Waters by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO	Pentane extraction / GC FID detection	PL GW
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection	PL GW SW
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.	PL GW

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Text example All items indicated in italic font represent customer-supplied information that may not be independently verified by the laboratory

This report shall not be reproduced except in full, and only with the prior approval of the laboratory.

Any comments or interpretations are outside the scope of UKAS accreditation.

The Laboratory is not accredited for any sampling activities and reported results relate to the samples 'as received' at the laboratory.

Uncertainty of measurement for the determinands tested are available upon request .

None of the results in this report have been recovery corrected.

All results are expressed on a dry weight basis.

The following tests were analysed on samples 'as received' and the results subsequently corrected to a dry weight basis EPH, VPH, TPH, BTEX, VOCs, SVOCs, PCBs, Phenols.

For all other tests the samples were dried at $\leq 30^{\circ}\text{C}$ prior to analysis.

All Asbestos testing is performed at the indicated laboratory .

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1.

Where analysis is performed on a dried and crushed sample, it has been prepared by crushing all of the sample. If material has been removed prior to crushing, or by request of the client, this will be stated on the report.

NEW_ASB Eurofins Chemtest Limited, 11 Depot Road, Newmarket, CB8 0AL

DURHAM Eurofins Chemtest Limited, Unit A North Wing, Prospect Business Park, Crookhall Lane, Consett, Co Durham, DH8 7PW

Sample Deviation Codes

As a result of any of the below deviations applying, the test results may be unreliable

A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - The required amount of sample for analysis was not received

H - Appropriate cooling measures were not taken for sample transportation

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt.

All water samples will be retained for 14 days from the date of receipt.

Charges may apply to extended sample storage.

Report Information

Water Sample Category Key for Accreditation

DW - Drinking Water (Non-Regulatory)
GW - Ground Water
LE - Land Leachate
NA - Not Applicable
PL - Prepared Leachate
PW - Processed Water
RE - Recreational Water
SA - Saline Water
SW - Surface Water
TE - Treated Effluent
TS - Treated Sewage
UL - Unspecified Liquid

Clean Up Codes

NC - No Clean Up
MC - Mathematical Clean Up
FC - Florisil Clean Up

HWOL Acronym System

HS - Headspace analysis
EH - Extractable hydrocarbons – i.e. everything extracted by the solvent
CU - Clean-up – e.g. by Florisil, silica gel
1D - GC – Single coil gas chromatography
Total - Aliphatics & Aromatics
AL - Aliphatics only
AR - Aromatic only
2D - GC-GC – Double coil gas chromatography
#1 - EH_2D_Total but with humics mathematically subtracted
#2 - EH_2D_Total but with fatty acids mathematically subtracted
+ - Operator to indicate cumulative e.g. EH+EH_Total or EH_CU+HS_Total

Asbestos Tests LOD = LOQ

Limit of Detection = Limit of Quantification for asbestos results only

If you require extended retention of samples, please email your requirements to:
cs@etuki.euofins.com



Final Report

Report No.: 25-35726-1

Initial Date of Issue: 14-Nov-2025

Re-Issue Details:

Client IGSL

Client Address: M7 Business Park
 Naas
 County Kildare
 Ireland

Contact(s): Darren Keogh

Project 25882 GAS TO EDENDERRY

Quotation No.: **Date Received:** 06-Nov-2025

Order No.: **Date Instructed:** 06-Nov-2025

No. of Samples: 6

Turnaround (Wkdays): 5 **Results Due:** 12-Nov-2025

Date Approved: 14-Nov-2025

Approved By:



Details: David Smith, Technical Director

For details about application of accreditation to specific matrix types, please refer to the Table at the back of this report

Results - Water

Project: 25882 GAS TO EDENDERRY

Client: IGSL		Chemtest Job No.:		25-35726	25-35726	25-35726	25-35726	25-35726	25-35726	25-35726	
Quotation No.:		Chemtest Sample ID.:		2049882	2049883	2049884	2049885	2049886	2049887	2049887	
Order No.:		Client Sample Ref.:		RC24	BH14	BH06	BH42	RC30	BH43	BH43	
		Client Reference:		RC24	BH14	BH06	BH42	RC30	BH43	BH43	
		Sample Type:		WATER	WATER	WATER	WATER	WATER	WATER	WATER	
		Sample Sub Type:									
		Top Depth (m):		2.7	3.4	0.53	0.62	2.28	0.56	0.56	
		Date Sampled:		31-Oct-2025	31-Oct-2025	31-Oct-2025	30-Oct-2025	31-Oct-2025	30-Oct-2025	30-Oct-2025	
Determinand	HWOL Code	Accred.	SOP	Units	LOD						
pH at 20C		U	1010		4.0	8.3	8.1	8.0	8.0	8.1	7.8
Sulphate		U	1220	mg/l	1.0	40	13	22	77	10	42
Cyanide (Total)		U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Arsenic (Dissolved)		U	1455	µg/l	0.20	< 0.20	< 0.20	< 0.20	0.76	< 0.20	< 0.20
Boron (Dissolved)		U	1455	µg/l	10.0	14	< 10	16	50	17	23
Cadmium (Dissolved)		U	1455	µg/l	0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11
Copper (Dissolved)		U	1455	µg/l	0.50	23	4.0	5.2	11	5.1	8.9
Mercury (Dissolved)		U	1455	µg/l	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (Dissolved)		U	1455	µg/l	0.50	4.0	0.77	3.9	8.7	1.4	6.1
Lead (Dissolved)		U	1455	µg/l	0.50	0.51	< 0.50	0.52	0.69	< 0.50	0.59
Zinc (Dissolved)		U	1455	µg/l	2.5	9.3	6.6	9.5	25	5.4	5.4
Chromium (Total)		N	1455	µg/l	0.50	2.9	4.2	3.9	4.2	6.9	4.9
Total TPH >C6-C40	EH_1D_Total	U	1670	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's		U	1800	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols		U	1920	mg/l	0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030

Test Methods

SOP	Title	Parameters included	Method summary	Water Accred.
1010	pH Value of Waters	pH at 20°C	pH Meter	RE PW TE TS PL DW GW
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.	RE PW PL LE DW GW
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.	GW
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).	RE PW PL SW DW GW
1670	Total Petroleum Hydrocarbons (TPH) in Waters by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO	Pentane extraction / GC FID detection	PL GW
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection	PL GW SW
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.	PL GW

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
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T	This analysis has been subcontracted to an unaccredited laboratory
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U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Text example All items indicated in italic font represent customer-supplied information that may not be independently verified by the laboratory

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Uncertainty of measurement for the determinands tested are available upon request .

None of the results in this report have been recovery corrected.

All results are expressed on a dry weight basis.

The following tests were analysed on samples 'as received' and the results subsequently corrected to a dry weight basis EPH, VPH, TPH, BTEX, VOCs, SVOCs, PCBs, Phenols.

For all other tests the samples were dried at $\leq 30^{\circ}\text{C}$ prior to analysis.

All Asbestos testing is performed at the indicated laboratory .

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1.

Where analysis is performed on a dried and crushed sample, it has been prepared by crushing all of the sample. If material has been removed prior to crushing, or by request of the client, this will be stated on the report.

NEW_ASB Eurofins Chemtest Limited, 11 Depot Road, Newmarket, CB8 0AL

DURHAM Eurofins Chemtest Limited, Unit A North Wing, Prospect Business Park, Crookhall Lane, Consett, Co Durham, DH8 7PW

Sample Deviation Codes

As a result of any of the below deviations applying, the test results may be unreliable

A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - The required amount of sample for analysis was not received

H - Appropriate cooling measures were not taken for sample transportation

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt.

All water samples will be retained for 14 days from the date of receipt.

Charges may apply to extended sample storage.

Report Information

Water Sample Category Key for Accreditation

DW - Drinking Water (Non-Regulatory)
GW - Ground Water
LE - Land Leachate
NA - Not Applicable
PL - Prepared Leachate
PW - Processed Water
RE - Recreational Water
SA - Saline Water
SW - Surface Water
TE - Treated Effluent
TS - Treated Sewage
UL - Unspecified Liquid

Clean Up Codes

NC - No Clean Up
MC - Mathematical Clean Up
FC - Florisil Clean Up

HWOL Acronym System

HS - Headspace analysis
EH - Extractable hydrocarbons – i.e. everything extracted by the solvent
CU - Clean-up – e.g. by Florisil, silica gel
1D - GC – Single coil gas chromatography
Total - Aliphatics & Aromatics
AL - Aliphatics only
AR - Aromatic only
2D - GC-GC – Double coil gas chromatography
#1 - EH_2D_Total but with humics mathematically subtracted
#2 - EH_2D_Total but with fatty acids mathematically subtracted
+ - Operator to indicate cumulative e.g. EH+EH_Total or EH_CU+HS_Total

Asbestos Tests LOD = LOQ

Limit of Detection = Limit of Quantification for asbestos results only

If you require extended retention of samples, please email your requirements to:
cs@etuki.euofins.com



Final Report

Report No.: 25-35744-1

Initial Date of Issue: 18-Nov-2025

Re-Issue Details:

Client IGSL

Client Address: M7 Business Park
 Naas
 County Kildare
 Ireland

Contact(s): Darren Keogh

Project 25882 Gas to Edenderry

Quotation No.: **Date Received:** 06-Nov-2025

Order No.: **Date Instructed:** 06-Nov-2025

No. of Samples: 3

Turnaround (Wkdays): 7 **Results Due:** 14-Nov-2025

Date Approved: 18-Nov-2025

Approved By:



Details: David Smith, Technical Director

For details about application of accreditation to specific matrix types, please refer to the Table at the back of this report

Results - Water

Project: 25882 Gas to Edenderry

Client: IGSL		Chemtest Job No.:		25-35744	25-35744	25-35744		
Quotation No.:		Chemtest Sample ID.:		2049960	2049961	2049962		
Order No.:		Client Sample Ref.:		BH45	RC01	BH40		
		Client Reference:		BH45	RC01	BH40		
		Sample Type:		WATER	WATER	WATER		
		Sample Sub Type:		Ground Water	Ground Water	Ground Water		
		Top Depth (m):		0.33	0.13	0.97		
		Date Sampled:		30-Oct-2025	30-Oct-2025	30-Oct-2025		
Determinand	HWOL Code	Accred.	SOP	Units	LOD			
pH at 20C		U	1010		4.0	8.3	8.0	8.1
Sulphate		U	1220	mg/l	1.0	11	7.7	15
Cyanide (Total)		U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050
Arsenic (Dissolved)		U	1455	µg/l	0.20	< 0.20	0.23	< 0.20
Boron (Dissolved)		U	1455	µg/l	10.0	26	< 10	11
Cadmium (Dissolved)		U	1455	µg/l	0.11	< 0.11	< 0.11	< 0.11
Copper (Dissolved)		U	1455	µg/l	0.50	4.4	5.5	3.6
Mercury (Dissolved)		U	1455	µg/l	0.05	< 0.05	< 0.05	< 0.05
Nickel (Dissolved)		U	1455	µg/l	0.50	3.6	17	5.5
Lead (Dissolved)		U	1455	µg/l	0.50	0.57	0.61	0.60
Zinc (Dissolved)		U	1455	µg/l	2.5	5.4	30	6.9
Chromium (Total)		N	1455	µg/l	0.50	2.4	2.4	2.5
Total TPH >C6-C40	EH_1D_Total	U	1670	µg/l	10	< 10	< 10	< 10
Naphthalene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Acenaphthene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Fluorene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Phenanthrene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Anthracene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Fluoranthene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Pyrene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Chrysene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene		U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's		U	1800	µg/l	2.0	< 2.0	< 2.0	< 2.0
Total Phenols		U	1920	mg/l	0.030	< 0.030	< 0.030	< 0.030

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Chemtest Sample ID	Clients Sample Ref:	Clients Sample ID:	Clients Reference:	Sampled Date:	Deviation Code(s):	Containers Received:
2049960	<i>BH45</i>		<i>BH45</i>	<i>30-Oct-2025</i>	H	Coloured Winchester 1000ml
2049961	<i>RC01</i>		<i>RC01</i>	<i>30-Oct-2025</i>	H	Coloured Winchester 1000ml
2049962	<i>BH40</i>		<i>BH40</i>	<i>30-Oct-2025</i>	H	Coloured Winchester 1000ml

Test Methods

SOP	Title	Parameters included	Method summary	Water Accred.
1010	pH Value of Waters	pH at 20°C	pH Meter	RE PW TE TS PL DW GW
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.	RE PW PL LE DW GW
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.	GW
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).	RE PW PL SW DW GW
1670	Total Petroleum Hydrocarbons (TPH) in Waters by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO	Pentane extraction / GC FID detection	PL GW
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection	PL GW SW
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.	PL GW

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Text example All items indicated in italic font represent customer-supplied information that may not be independently verified by the laboratory

This report shall not be reproduced except in full, and only with the prior approval of the laboratory.

Any comments or interpretations are outside the scope of UKAS accreditation.

The Laboratory is not accredited for any sampling activities and reported results relate to the samples 'as received' at the laboratory.

Uncertainty of measurement for the determinands tested are available upon request .

None of the results in this report have been recovery corrected.

All results are expressed on a dry weight basis.

The following tests were analysed on samples 'as received' and the results subsequently corrected to a dry weight basis EPH, VPH, TPH, BTEX, VOCs, SVOCs, PCBs, Phenols.

For all other tests the samples were dried at $\leq 30^{\circ}\text{C}$ prior to analysis.

All Asbestos testing is performed at the indicated laboratory .

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1.

Where analysis is performed on a dried and crushed sample, it has been prepared by crushing all of the sample. If material has been removed prior to crushing, or by request of the client, this will be stated on the report.

NEW_ASB Eurofins Chemtest Limited, 11 Depot Road, Newmarket, CB8 0AL

DURHAM Eurofins Chemtest Limited, Unit A North Wing, Prospect Business Park, Crookhall Lane, Consett, Co Durham, DH8 7PW

Sample Deviation Codes

As a result of any of the below deviations applying, the test results may be unreliable

A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - The required amount of sample for analysis was not received

H - Appropriate cooling measures were not taken for sample transportation

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt.

All water samples will be retained for 14 days from the date of receipt.

Charges may apply to extended sample storage.

Report Information

Water Sample Category Key for Accreditation

DW - Drinking Water (Non-Regulatory)
GW - Ground Water
LE - Land Leachate
NA - Not Applicable
PL - Prepared Leachate
PW - Processed Water
RE - Recreational Water
SA - Saline Water
SW - Surface Water
TE - Treated Effluent
TS - Treated Sewage
UL - Unspecified Liquid

Clean Up Codes

NC - No Clean Up
MC - Mathematical Clean Up
FC - Florisil Clean Up

HWOL Acronym System

HS - Headspace analysis
EH - Extractable hydrocarbons – i.e. everything extracted by the solvent
CU - Clean-up – e.g. by Florisil, silica gel
1D - GC – Single coil gas chromatography
Total - Aliphatics & Aromatics
AL - Aliphatics only
AR - Aromatic only
2D - GC-GC – Double coil gas chromatography
#1 - EH_2D_Total but with humics mathematically subtracted
#2 - EH_2D_Total but with fatty acids mathematically subtracted
+ - Operator to indicate cumulative e.g. EH+EH_Total or EH_CU+HS_Total

Asbestos Tests LOD = LOQ

Limit of Detection = Limit of Quantification for asbestos results only

If you require extended retention of samples, please email your requirements to:
cs@etuki.eurofins.com

Appendix H

Water Samples Results – Minerex



Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US

Tel: (01244) 528777
email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

Minerex Environmental
Taney hall
Eglinton Terrace
Dundrum
Dublin
Dublin 14

Attention: Dewatering Minerex

CERTIFICATE OF ANALYSIS

Date of report Generation: 29 December 2025
Customer: Minerex Environmental
Sample Delivery Group (SDG): 251212-133
Your Reference: 3780-028-COC1
Location: Murphy - HIA GNI EdenderryKinnegad
Report No: 787346
Order Number:

This report has been revised and directly supersedes 786772 in its entirety.

We received 2 samples on Friday December 12, 2025 and 2 of these samples were scheduled for analysis which was completed on Monday December 29, 2025. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Justin Keeton
Business Unit Leader - Land





CERTIFICATE OF ANALYSIS

Validated

SDG: 251212-133
Client Ref.: 3780-028-COC1

Report Number: 787346
Location: Murphy - HIA GNI EdenderryKinnegad

Superseded Report: 786772

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
32617870	BH40		0.00 - 0.00	10/12/2025
32617894	BH43		0.00 - 0.00	10/12/2025

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 251212-133
Client Ref.: 3780-028-COC1

Report Number: 787346
Location: Murphy - HIA GNI EdenderryKinnegad

Superseded Report: 786772

Results Legend	Lab Sample No(s)		32617870 - 32617894											
	Customer Sample Reference		BH40 - BH43											
	AGS Reference													
Sample Types - S - Soil/Solid UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage US - Untreated Sewage RE - Recreational Water DW - Drinking Water Non-regulatory UNL - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Depth (m)		0.00 - 0.00											
	Container		0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Unfiltered (ALE204)	Vial (ALE297)	0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Unfiltered (ALE204)	Vial (ALE297)
	Sample Type		GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 2			X							X		
Anions by Kone (w)	All	NDPs: 0 Tests: 2		X						X				
BOD True Total	All	NDPs: 0 Tests: 2		X						X				
COD Unfiltered	All	NDPs: 0 Tests: 2		X						X				
Determination of Dissolved Gases	All	NDPs: 0 Tests: 2						X					X	
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 2	X						X					
pH Value	All	NDPs: 0 Tests: 2		X						X				
Phenols by HPLC (W)	All	NDPs: 0 Tests: 2			X							X		
Phosphate by Kone (w)	All	NDPs: 0 Tests: 2		X						X				
Suspended Solids	All	NDPs: 0 Tests: 2		X						X				
SVOC MS (W) - Aqueous	All	NDPs: 0 Tests: 2	X						X					
Total Metals by ICP-MS	All	NDPs: 0 Tests: 2					X						X	
Total Nitrogen	All	NDPs: 0 Tests: 2		X						X				
Total Organic and Inorganic Carbon	All	NDPs: 0 Tests: 2			X							X		
TPH by IR Oils and Greases	All	NDPs: 0 Tests: 2	X						X					



CERTIFICATE OF ANALYSIS

Validated

SDG: 251212-133
Client Ref.: 3780-028-COC1

Report Number: 787346
Location: Murphy - HIA GNI EdenderryKinnegad

Superseded Report: 786772

Results Legend

- X Test
- N No Determination Possible

- Sample Types -
- S - Soil/Solid
 - UNS - Unspecified Solid
 - GW - Ground Water
 - SW - Surface Water
 - LE - Land Leachate
 - PL - Prepared Leachate
 - PR - Process Water
 - SA - Saline Water
 - TE - Trade Effluent
 - TS - Treated Sewage
 - US - Untreated Sewage
 - RE - Recreational Water
 - DW - Drinking Water
 - Non-regulatory
 - UNL - Unspecified Liquid
 - SL - Sludge
 - G - Gas
 - OTH - Other

Lab Sample No(s)	32617870		32617894
Customer Sample Reference	BH40		BH43
AGS Reference			
Depth (m)	0.00 - 0.00		0.00 - 0.00
Container	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	Vial (ALE297)
Sample Type	GW	GW	GW
VOC MS (W)	All	NDPs: 0 Tests: 2	X



CERTIFICATE OF ANALYSIS

Validated

SDG: 251212-133
Client Ref.: 3780-028-COC1

Report Number: 787346
Location: Murphy - HIA GNI EdenderryKinnegad

Superseded Report: 786772

Results Legend		Customer Sample Ref.	BH40	BH43			
# ISO17025 accredited. M mCERTS accredited. aq Aqueous / settled sample. diss.filt Dissolved / filtered sample. tot.unfiltTotal / unfiltered sample. * Subcontracted - refer to subcontractor report for accreditation status. ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery *** 6.2 FTAB (see appendix) 1-4*\$@Sample deviation (see appendix)		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.00 - 0.00 Ground Water (GW) 10/12/2025 11:30 12/12/2025 251212-133 32617870	0.00 - 0.00 Ground Water (GW) 10/12/2025 13:08 12/12/2025 251212-133 32617894			
Component	LOD/Units	Method					
Suspended solids, Total	<2 mg/l	TM022	41.1	5.8	#	#	
BOD, unfiltered	<1 mg/l	TM045	<1	<1	#	#	
Organic Carbon, Total	<3 mg/l	TM090	5.05	5.28	#	#	
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	0.639	1.17	#	#	
COD, unfiltered	<7 mg/l	TM107	45.4	32.2	#	#	
Aluminium (tot.unfilt)	<10 µg/l	TM152	228	39.3	#	#	
Antimony (tot.unfilt)	<4 µg/l	TM152	<4	<4	#	#	
Arsenic (tot.unfilt)	<2 µg/l	TM152	13.7	4.52	#	#	
Lead (tot.unfilt)	<1 µg/l	TM152	1.41	<1	#	#	
Manganese (tot.unfilt)	<1 µg/l	TM152	460	916	#	#	
Molybdenum (tot.unfilt)	<9 µg/l	TM152	13.6	<9	#	#	
Nickel (tot.unfilt)	<1 µg/l	TM152	36.2	6.89	#	#	
Phosphorus (tot.unfilt)	<20 µg/l	TM152	24.2	<20	#	#	
Zinc (tot.unfilt)	<5 µg/l	TM152	10.9	<5	#	#	
Iron (Tot. Unfilt.)	<0.024 mg/l	TM152	0.671	0.33	#	#	
Phosphate (Ortho as PO4)	<0.05 mg/l	TM184	<0.05	<0.05	#	#	
Sulphate	<2 mg/l	TM184	14.3	21.8	#	#	
Chloride	<2 mg/l	TM184	16.4	22	#	#	
Nitrate as N	<0.07 mg/l	TM184	<0.07	0.402	#	#	
Nitrogen, Total	<1 mg/l	TM212	<1	6.88	#	#	
Methane, dissolved	<1 µg/l	TM223	3.77	479	#	#	
TPH / Oil & Greases	<1 mg/l	TM235	<1	<1	#	#	
Mineral Oil	<1 mg/l	TM235	<1	<1	#	#	
pH	<1 pH Units	TM256	7.46	7.24	#	#	
Conductivity @ 20 deg.C	<0.02 mS/cm	TM256	0.638	0.76	#	#	
Phenol	<0.002 mg/l	TM259	<0.002	<0.002	#	#	
Cresols	<0.006 mg/l	TM259	<0.006	<0.006	#	#	
Xylenols	<0.008 mg/l	TM259	<0.008	<0.008	#	#	
2,3,5-Trimethylphenol	<0.003 mg/l	TM259	<0.003	<0.003	#	#	
2-Isopropylphenol	<0.006 mg/l	TM259	<0.006	<0.006	#	#	
Phenols, Total Detected 5 speciated	<0.025 mg/l	TM259	<0.025	<0.025	#	#	



CERTIFICATE OF ANALYSIS

Validated

SDG: 251212-133
Client Ref.: 3780-028-COC1

Report Number: 787346
Location: Murphy - HIA GNI EdenderryKinnegad

Superseded Report: 786772

SVOC MS (W) - Aqueous

Results Legend			Customer Sample Ref.		BH40	BH43			
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		0.00 - 0.00	0.00 - 0.00			
M	mCERTS accredited.			Ground Water (GW)	Ground Water (GW)				
aq	Aqueous / settled sample.			10/12/2025	10/12/2025				
diss.filt	Dissolved / filtered sample.			11:30	13:08				
tot.unfilt	Total / unfiltered sample.			12/12/2025	12/12/2025				
*	Subcontracted - refer to subcontractor report for accreditation status.			251212-133	251212-133				
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery			32617870	32617894				
***	6.2 FTAB (see appendix)								
1-4**	Sample deviation (see appendix)								
Component	LOD/Units	Method							
1,2,4-Trichlorobenzene (aq)	<1 µg/l	TM176	<1	<1	#	#			
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176	<1	<1	#	#			
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176	<1	<1	#	#			
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176	<1	<1	#	#			
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176	<1	<1	#	#			
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176	<1	<1	#	#			
2,4-Dichlorophenol (aq)	<1 µg/l	TM176	<1	<1	#	#			
2,4-Dimethylphenol (aq)	<1 µg/l	TM176	<1	<1	#	#			
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176	<1	<1	#	#			
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176	<1	<1	#	#			
2-Chloronaphthalene (aq)	<1 µg/l	TM176	<1	<1	#	#			
2-Chlorophenol (aq)	<1 µg/l	TM176	<1	<1	#	#			
2-Methylnaphthalene (aq)	<1 µg/l	TM176	<1	<1	#	#			
2-Methylphenol (aq)	<1 µg/l	TM176	<1	<1	#	#			
2-Nitroaniline (aq)	<1 µg/l	TM176	<1	<1	#	#			
2-Nitrophenol (aq)	<1 µg/l	TM176	<1	<1	#	#			
3-Nitroaniline (aq)	<1 µg/l	TM176	<1	<1	#	#			
4-Bromophenylphenylether (aq)	<1 µg/l	TM176	<1	<1	#	#			
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176	<1	<1	#	#			
4-Chloroaniline (aq)	<1 µg/l	TM176	<1	<1	#	#			
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176	<1	<1	#	#			
4-Methylphenol (aq)	<1 µg/l	TM176	<1	<1	#	#			
4-Nitroaniline (aq)	<1 µg/l	TM176	<1	<1	#	#			
4-Nitrophenol (aq)	<1 µg/l	TM176	<1	<1	#	#			
Azobenzene (aq)	<1 µg/l	TM176	<1	<1	#	#			
Acenaphthylene (aq)	<1 µg/l	TM176	<1	<1	#	#			
Acenaphthene (aq)	<1 µg/l	TM176	<1	<1	#	#			
Anthracene (aq)	<1 µg/l	TM176	<1	<1	#	#			
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176	<1	<1	#	#			
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176	<1	<1	#	#			
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176	<2	<2	#	#			
Butylbenzyl phthalate (aq)	<1 µg/l	TM176	<1	<1	#	#			
Benzo(a)anthracene (aq)	<1 µg/l	TM176	<1	<1	#	#			



CERTIFICATE OF ANALYSIS

Validated

SDG: 251212-133
Client Ref.: 3780-028-COC1

Report Number: 787346
Location: Murphy - HIA GNI EdenderryKinnegad

Superseded Report: 786772

VOC MS (W)

Results Legend		Customer Sample Ref.	BH40	BH43			
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.00 - 0.00	0.00 - 0.00			
M	mCERTS accredited.		Ground Water (GW)	Ground Water (GW)			
aq	Aqueous / settled sample.		10/12/2025	10/12/2025			
diss.filt	Dissolved / filtered sample.		11:30	13:08			
tot.unfilt	Total / unfiltered sample.		12/12/2025	12/12/2025			
	* Subcontracted - refer to subcontractor report for accreditation status.		251212-133	251212-133			
	** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		32617870	32617894			
	*** 6.2 FTAB (see appendix)						
	1-4**@Sample deviation (see appendix)						
Component	LOD/Units	Method					
Dibromofluoromethane**	%	TM208	105	106			
Toluene-d8**	%	TM208	99.8	100			
4-Bromofluorobenzene**	%	TM208	95.6	96.4			
Dichlorodifluoromethane	<1 µg/l	TM208	<1	<1			
Chloromethane	<1 µg/l	TM208	<1	<1	#	#	
Vinyl chloride	<1 µg/l	TM208	<1	<1	#	#	
Bromomethane	<1 µg/l	TM208	<1	<1	#	#	
Chloroethane	<1 µg/l	TM208	<1	<1	#	#	
Trichlorofluoromethane	<1 µg/l	TM208	<1	<1	#	#	
1,1-Dichloroethene	<1 µg/l	TM208	<1	<1	#	#	
Carbon disulphide	<1 µg/l	TM208	<1	<1	#	#	
Dichloromethane	<3 µg/l	TM208	<3	<3	#	#	
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1	<1	#	#	
trans-1,2-Dichloroethene	<1 µg/l	TM208	<1	<1	#	#	
1,1-Dichloroethane	<1 µg/l	TM208	<1	<1	#	#	
cis-1,2-Dichloroethene	<1 µg/l	TM208	<1	<1	#	#	
2,2-Dichloropropane	<1 µg/l	TM208	<1	<1			
Bromochloromethane	<1 µg/l	TM208	<1	<1	#	#	
Chloroform	<1 µg/l	TM208	<1	<1	#	#	
1,1,1-Trichloroethane	<1 µg/l	TM208	<1	<1	#	#	
1,1-Dichloropropene	<1 µg/l	TM208	<1	<1	#	#	
Carbontetrachloride	<1 µg/l	TM208	<1	<1	#	#	
1,2-Dichloroethane	<1 µg/l	TM208	<1	<1	#	#	
Benzene	<1 µg/l	TM208	<1	<1	#	#	
Trichloroethene	<1 µg/l	TM208	<1	<1	#	#	
1,2-Dichloropropane	<1 µg/l	TM208	<1	<1	#	#	
Dibromomethane	<1 µg/l	TM208	<1	<1	#	#	
Bromodichloromethane	<1 µg/l	TM208	<1	<1	#	#	
cis-1,3-Dichloropropene	<1 µg/l	TM208	<1	<1	#	#	
Toluene	<1 µg/l	TM208	<1	<1	#	#	
trans-1,3-Dichloropropene	<1 µg/l	TM208	<1	<1	#	#	
1,1,2-Trichloroethane	<1 µg/l	TM208	<1	<1	#	#	
1,3-Dichloropropane	<1 µg/l	TM208	<1	<1	#	#	



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Superseded Report: 786772

VOC MS (W)

Results Legend		Customer Sample Ref.	BH40	BH43			
#	ISO17025 accredited.						
M	mCERTS accredited.						
aq	Aqueous / settled sample.						
dis.s.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
*	Subcontracted - refer to subcontractor report for accreditation status.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
***	6:2 FTAB (see appendix)						
1-4	@ Sample deviation (see appendix)						
Component	LOD/Units	Method					
Tetrachloroethene	<1 µg/l	TM208	<1 #	<1 #			
Dibromochloromethane	<1 µg/l	TM208	<1 #	<1 #			
1,2-Dibromoethane	<1 µg/l	TM208	<1 #	<1 #			
Chlorobenzene	<1 µg/l	TM208	<1 #	<1 #			
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208	<1 #	<1 #			
Ethylbenzene	<1 µg/l	TM208	<1 #	<1 #			
m,p-Xylene	<1 µg/l	TM208	<1 #	<1 #			
o-Xylene	<1 µg/l	TM208	<1 #	<1 #			
Styrene	<1 µg/l	TM208	<1 #	<1 #			
Bromoform	<1 µg/l	TM208	<1 #	<1 #			
Isopropylbenzene	<1 µg/l	TM208	<1 #	<1 #			
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208	<1 #	<1 #			
1,2,3-Trichloropropane	<1 µg/l	TM208	<1 #	<1 #			
Bromobenzene	<1 µg/l	TM208	<1 #	<1 #			
Propylbenzene	<1 µg/l	TM208	<1 #	<1 #			
2-Chlorotoluene	<1 µg/l	TM208	<1 #	<1 #			
1,3,5-Trimethylbenzene	<1 µg/l	TM208	<1 #	<1 #			
4-Chlorotoluene	<1 µg/l	TM208	<1 #	<1 #			
tert-Butylbenzene	<1 µg/l	TM208	<1 #	<1 #			
1,2,4-Trimethylbenzene	<1 µg/l	TM208	<1 #	<1 #			
sec-Butylbenzene	<1 µg/l	TM208	<1 #	<1 #			
4-iso-Propyltoluene	<1 µg/l	TM208	<1 #	<1 #			
1,3-Dichlorobenzene	<1 µg/l	TM208	<1 #	<1 #			
1,4-Dichlorobenzene	<1 µg/l	TM208	<1 #	<1 #			
n-Butylbenzene	<1 µg/l	TM208	<1 #	<1 #			
1,2-Dichlorobenzene	<1 µg/l	TM208	<1 #	<1 #			
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208	<1 #	<1 #			
1,2,4-Trichlorobenzene	<1 µg/l	TM208	<1 #	<1 #			
Hexachlorobutadiene	<1 µg/l	TM208	<1 #	<1 #			
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208	<1 #	<1 #			
Naphthalene	<1 µg/l	TM208	<1 #	<1 #			
1,2,3-Trichlorobenzene	<1 µg/l	TM208	<1 #	<1 #			
1,3,5-Trichlorobenzene	<1 µg/l	TM208	<1 #	<1 #			



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Table of Results - Appendix

Method No	Description
TM022	Determination of total suspended solids in waters
TM045	Determination of BOD5 (ATU) Filtered by Oxygen Meter on liquids
TM090	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	Determination of Ammonium in Water Samples using the Kone Analyser
TM107	Determination of Chemical Oxygen Demand using COD Dr Lange Kit
TM152	Analysis of Aqueous Samples by ICP-MS
TM176	Determination of SVOCs in Water by GCMS
TM178	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM184	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM208	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM212	Determination of Total Nitrogen by High Temperature Catalytic Oxidation followed by Chemiluminescence Detection
TM223	Determination of Dissolved C1-7 Hydrocarbon gases in waters
TM235	Determination of Total Petroleum Hydrocarbons (TPH) in Waters By Infra-Red Spectroscopy
TM256	Determination of pH, EC, TDS and Alkalinity in Aqueous samples
TM259	Determination of Phenols in Waters and Leachates by HPLC

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden (Method codes TM).



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Test Completion Dates

Lab Sample No(s)	32617870	32617894
Customer Sample Ref.	BH40	BH43
AGS Ref.		
Depth	0.00 - 0.00	0.00 - 0.00
Type	Ground Water	Ground Water

Ammoniacal Nitrogen	18-Dec-2025	18-Dec-2025
Anions by Kone (w)	17-Dec-2025	17-Dec-2025
BOD True Total	18-Dec-2025	18-Dec-2025
COD Unfiltered	16-Dec-2025	16-Dec-2025
Determination of Dissolved Gases	29-Dec-2025	29-Dec-2025
Nitrite by Kone (w)	16-Dec-2025	15-Dec-2025
PAH Spec MS - Aqueous (W)	17-Dec-2025	17-Dec-2025
pH Value	15-Dec-2025	16-Dec-2025
Phenols by HPLC (W)	16-Dec-2025	16-Dec-2025
Phosphate by Kone (w)	16-Dec-2025	18-Dec-2025
Suspended Solids	17-Dec-2025	17-Dec-2025
SVOC MS (W) - Aqueous	18-Dec-2025	19-Dec-2025
Total Metals by ICP-MS	19-Dec-2025	19-Dec-2025
Total Nitrogen	16-Dec-2025	16-Dec-2025
Total Organic and Inorganic Carbon	14-Dec-2025	14-Dec-2025
TPH by IR Oils and Greases	16-Dec-2025	16-Dec-2025
VOC MS (W)	17-Dec-2025	17-Dec-2025



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Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 15 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of 15 days after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. For dried and crushed preparations of soils volatile loss may occur - e.g volatile mercury.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

18. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

19. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Matrix interference
◆	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples
§	Sampled on date not provided

20. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2021), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

If during the search of the two 'pinch' samples by PLM only 1 or 2 fibres or fibre bundles are seen and identified as asbestos, the term 'trace asbestos identified' is reported.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials and soils are obtained from supplied bulk materials and soils which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2021).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining.

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anorthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Potentially respirable fibres are identified by using a Phase Contrast Microscope.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

21. 6:2 FTAB

Recovery of 6:2 FTAB in the quality control samples has been observed to be <50% of the target value. Please note the 6:2 FTAB result is supplied as indicative only.