Environmental Impact Assessment Report

KILLALA DATA CENTRE DEVELOPMENT

MULLAFARRY AND TAWNAGHMORE UPPER, KILLALA, CO. MAYO

Volume 3 - EIA Report Appendix

Prepared by: AWN Consulting, November 2024

Prepared for: Mayo Data Hub Limited

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APPENDIX 2.1

RELEVANT PLANNING HISTORY WITHIN THE VICINITY OF THE SUBJECT SITE

AWN CONSULTING

Table 1: Relevant Planning History within the vicinity of the subject site

Planning Reference, Application and Location	Development Description	Decision Date	Grant Date
2360182 BP Mitchell Haulage and Plant Hire Ltd. Mullafarry Townland, Killala, Co. Mayo, F26 XY45	The development will consist of an Inert Waste Recovery Facility within an application area of c. 1.8 Ha.	01/02/2024	-
2360376 Brendan & Lorraine Cattigan Farragh, Killala, Co. Mayo	The application will consist of planning permission to (1) Demolish part of existing house and existing porch, (2) Demolish existing shed, (3) Construct extension and carry out alterations to existing dwelling house (4) Construct new Effluent Treatment System with all associated works, (5) Connect to all services, and (6) Carry out all required ancillary works on site.	09/11/2023	10/12/2023
2360218 Olivia & Tony Browne Crosspatrick, Killala, Co. Mayo, F26WC81	1. Demolish existing dwelling house 2. Construct new Dwelling House 3. All ancillary services associated with the development	01/08/2023	01/09/2023
22757 Lorcan Brennan Coonealcauran, Ballina, Co. Mayo	Filling of approximately 15,000 square metres of existing land by the importation of construction and demolition waste material to an average depth of 2m, level and reseed the site on completion of the fill, together with all associated site works	17/05/2023	17/06/2023
2360266 Constant Energy Old Ashai Plant, Killala Business Park, Killala	The Proposed Development will consist of a Hydrogen Plant and an Energy Centre. The Hydrogen Plant, to the south of the site ,will consist of a Double Storey Electrolyser Building of up to 24m height; Fin Fan Coolers of up to 10.5m height; Hydrogen Storage Area of 7m height; Hydrogen Gas Tube Filling Station of up to 9m height, Gas Injection Compound and Gas Above Ground Installation Building of 4m height; Electrical Substation up to 15m height and Ancillary Equipment Building of up to 3m height; Fire Water Tank of up to 14m height; Pump House of up to 5m height; Administration/welfare building and control block building of up to 4m height. The Energy Centre, to the north of the site, will consist	Further Information requested on 21/08/2023 and Further Information received on 04/09/2024 (Decision still pending)	-

Planning Reference, Application and Location	Development Description	Decision Date	Grant Date
	of 9no. Gas Engines generating up to 106MW of power, housed in a Gas Engine Building of up to 13.6m height with two stacks of up to 25m height, Distillate fuel tank of up to 11.2m height, Firewater tank of up to 10m height, associated pumps, sludge tank of 2.1m height and Pump house of 5m Height, Electrical Building of 4m Height, Gate House of up to 4m Height, Administration/Welfare building of up to 4m Height. The Proposed Development includes the demolition and removal of the existing Asahi Plant buildings, foundations, as well as decommissioning and removal of the existing overhead, above ground drainage system and underground services. The Proposed Development will also include Resurfacing, Repair and Improvement of Existing Site Entrance and new Internal Access Roads which in turn opens onto the existing entrance road to the Ballina/Killala regional road (R314). The provision for 23 no. car parking spaces, footpaths, street lighting, external lighting, CCTV cameras, signage, security fencing, construction compound, and all other associated site development plant and equipment and other works including, utilities connections, potable water, stormwater, sewage, and foul wastewater drainage infrastructure, within a total overall application boundary of 6.88ha.		
2360134 Mayo Renewable Limited Tawnaghmore Upper and Tawnaghmore Lower, Killala, Co. Mayo, F26 X7NP	A nominal 50 megawatt electricity generating station, combusting woody biomass chips (domestic and imported) as well as a small proportion of fuel oil for boiler start-up. The total site area is 19.0 ha of which approximately 7 ha will be developed. The elements of the station are: weighbridges (2 no.), scale house, roundwood storage area, log deck, enclosed wood chipper, wood chip truck dump, wood chip receiving hopper, wood chip screen, wood chip hog, wood chip bins (2 no.), wood chip storage building, wood chip reclaimer, wood chip conveyors with associated magnetic separators, fuel oil storage tank and associated pumps, fuel oil generator, boiler house, baghouse, ash silo, induced draft fan room, boiler stack, combustion air and flue gas fans, boiler additive material receiving hoppers (3 no.), boiler additive conveyors with associated magnetic separators, boiler additive silos (3 no.), boiler water treatment tanks and associated pumps, ammonia tank and associated pumps, turbine hall (existing), control room (existing), cooling tower and associated pumps,	20/02/2024	22/03/2024

Planning Reference, Application and Location	Development Description	Decision Date	Grant Date
	water treatment building, waste water storage tank, fire water storage tank and associated pumps, compressed air system, high voltage transfer lines (3 no.), low voltage transfer lines (3 no.), GSU transformer, switchyard, switchyard MCC room (existing), storage and maintenance building (existing), garage, car park, HGV parking, flagpoles (3 no.), external lighting, CCTV cameras, internal road system, signage, construction compound, landscaping, foul and storm water disposal systems, storm water attenuation, wheel washes, gatehouses (2 no.), entrance gates, security fencing, and all associated site works and services. (See attached Description of Proposed Development document for more details.)		
22927 Vincent & Gillian McGuire Carrowreagh, Killala, co. Mayo	Demolish existing detached dormer bungalow dwelling house and construct a replacement two storey dwelling house with all associated ancillary site works	03/02/2023	10/03/2023
22288 Tom & Grace Zajac Meelick, Killala, Co. Mayo	Construction of a dwelling house and domestic garage with effluent treatment system and for all associated site works on this site	13/10/2022	12/11/2022
211284 Mullafarry Quarry LTD. Mullafarry & Cloonawillin, Killala, Co. Mayo	1.0 Hectare extension to an existing authorised quarry and will comprise of the following: Extraction of material by blasting means down to a level of -2.0mod; transportation of extracted material to the existing quarry for processing; landscaping and restoration of the site upon completion of work and all associated ancillary facilities. The applicant is seeking a 10-year permission.	23/09/2022	-

Planning Reference, Application and Location	Development Description	Decision Date	Grant Date
22562 Aqua Comms (Ireland) Ltd. Killala Business Park, Killala, Co. Mayo	Erection of a one-storey extension to existing cable landing station, proposed esb substation and all associated site works	29/08/2022	29/09/2022
211313 Alec McGregor Leadymore, Killala, Co. Mayo	Construction of a walled silage slab and slatted cubicle shed and underground slurry storage tank along with all associated site works	03/08/2022	03/09/2022
22464 Eamon Killeen On Behalf of Killala Gaa Club Rathowen East, Killala, Co. Mayo	construct new clubhouse, proprietary effluent treatment unit and percolation area including all ancillary site works	22/07/2022	22/08/2022
2193 Lisglennon Ad Limited Lisglennon, Ballybroony, Coonealmore, Coonealcauraun, Rathrooen, Culleens,, Laghtadawannagh & Farrannoo, Ballina, Co. Mayo	An anaerobic digestion (ad) biogas facility and associated gas pipeline. Comprising of: renewable energy project consisting of an ad biogas facility using locally sourced silage & slurry as feedstock to generate biogas for export to the national grid with residual digestate being available for use locally as bio-fertiliser; 2 no grass silage storage clamps; access & circulation tract from the l1110 of c.832m with average width of 6m; new site entrance on the Mullafarry Road and c.236 of new 4m wide site access track and upgrade of c.92m; pipeline of c.8.6km located in the public road and verges to connect the ad facility to the national grid north of Ballina; all ancillary development including a site office building, weighbridge, perimeter landscaping berm, fencing,	07/06/2022	-

Planning Reference, Application and Location	Development Description	Decision Date	Grant Date
	lighting, attenuation tank and on-site drainage; nis accompanies the application		
211228 Marcus Hannick Crosspatrick, Killala, Co. Mayo	Construction of a new dwelling house and domestic garage new entrance on-site wastewater treatment system together with ancillary site development works	26/01/2022	01/03/2022
211290 Joesph & Annie McDonnell Meelick, Killala, Co Mayo	Construction of new dwelling house and on-site wastewater treatment system together with ancillary site development works	23/03/2022	26/04/2022
21708 BP Mitchell Haulage and Plant Hire Ltd. Mullafarry Townland, Killala, Co. Mayo	Continued use and operation of the existing limestone quarry (c. 3.97 ha) including wheelwash, settlement lagoons, portable office, workshop and all associated ancillary activities, permitted under plan reg. Ref. No. 02/1931 and 08/1563; installation of a packaged wastewater treatment system and polishing filter	11/01/2022	14/02/2022
21795 Helen Stephens Farragh, Killala, Co. Mayo	Extend and reconstruct dwelling house, construct domestic garage, retain minor alterations to include gable window, retain extension to rear of dwelling house	13/12/2021	25/01/2022
21640 Brian & Marie Campbell Moyne, Killala, Co. Mayo	Demolition of an existing 2 storey dwelling and construction of a replacement 2 storey dwelling and associated ancillary works	04/08/2021	07/09/2021
21241	Construct a dwelling house and septic tank/proprietary effluent treatment system together with all ancillary site works and services	01/07/2021	04/08/2021

Planning Reference, Application and Location	Development Description	Decision Date	Grant Date
Wesley & Stephanie Langdon Moyne, Killala, Co. Mayo			
21487 Declan & Mary Nolan Moyne, Killala, Co. Mayo	Demolish existing detached house, construct replacement detached dwelling house together with all associated site works	01/07/2021	04/08/2021
21257 Michael Lynn and Susan Cummins Moyne, Killala, Co. Mayo	Demolish an existing house and construct a new dwelling house, garage and septic tank/proprietary effluent treatment system together with all ancillary site works (including removal of sheds/existing septic tank) and services	01/07/2021	04/08/2021
21342 Mullafarry Quarry LTD. Mullafarry, Killala, Co. Mayo	Filling of lands with inert waste for the purpose of quarry restoration, and all associated ancillary works.	22/11/2021	27/12/2021
2122 Gerard & Valarie Adams Carrowreagh, Killala, Co. Mayo	Demolish existing detached dwelling house, construct replacement detached dwelling house, together with all associated site works	08/03/2021	11/04/2026
20644 Ray Carroll Mullafarry, Killala, Co. Mayo	Construct new dwelling house, proprietary effluent treatment system, percolation area including all ancillary site works.	04/03/2021	08/04/2021
20266 Nicholas Bourke Rathoma, Killala, Co. Mayo	Construct a 4-bay double slatted shed with a creep area and underground slurry storage tank along with all associated site works	07/12/2020	-

Planning Reference, Application and Location	Development Description	Decision Date	Grant Date
19967 B.O.M. Newtownwhite Educate Together N.S. Newtownwhite, Ballina, Co. Mayo	Retention for the erection of a prefabricated structure (84sqm) for use as a temporary classroom, full planning permission for the construction of a new single storey extension (278sqm) consisting of 2 no. Classrooms and 1 no. Multi purpose resource room, alterations of internal layout of existing school building and the installation of a new effluent treatment system and percolation area together with new boundary treatments and all associated site works	13/10/2020	18/11/2020
20460 Kevin & Antoinette Maheady Ballinteean, Killala, Co. Mayo	Extend and reconstruct dwelling house including all ancillary site works.	02/09/2020	06/10/2020
20123 Jonathan & Oonagh Petrie RAthowen East, Killala, CO. Mayo	Construct new dwelling house, domestic garage, on-site wastewater treatment system together with ancillary site development works	29/06/2020	13/08/2020
19295 Kevin & Mary Mcdonnell Townplots West, Killala, Co. Mayo	construction of 3 no. 2 storey terraced houses, connect to all public utilities and carry out all ancillary site works	20/03/2020	19/06/2020
19724 Bob Sweeny Rosserrk, Ballina, Co. Mayo	Construct an indoor horse arena complete with stable block, horse handling area, domestic kitchen/canteen and toilet facilities (2,635.2 sqm), construction of a 4 bay machinery shed (252 sqm), construction of a 2 bay manure shed (99.2 sqm), complete with domestic septic system, boundary treatment, parking and all ancillary site development works	21/02/2020	27/03/2020
19312 Alcam Retail Ltd	Extension of existing supermarket at ground floor level into the adjoining shop premises to the north side with an 80 sq.m. increase in floor area. Associated revisions to shop front to facilitate extension into adjoining shop and refurbishment of existing shop, including new street front entrance and associated signage. Extension into existing adjoining premises to the north side at lower ground floor/basement level for storage with an	06/02/2020	12/03/2020

Planning Reference, Application and Location	Development Description	Decision Date	Grant Date
Market Street, Killala, Co. Mayo	increase in floor area of 26 sq.m. Filling in of a portion of unusable lower ground floor/basement area of adjoining premises to the north side. Breaking out of a fire escape door on the south side to the lower ground floor of the existing premises onto the car park. Revisions to first floor of adjoining premises to north to provide a 1-bedroom apartment accessed from stairs serving first floor of existing building. Conversion of existing 5-bedroom apartment to first floor of existing building to 2 apartments, comprising 1 no. 2 bedroom apartment and 1 no. 1 bedroom apartment. All associated revisions to elevations, all associated demolitions and breaking out and all ancillary site works and services		
19205 Mullafarry Quarry Ltd. Mullafarry, Killala, Co. Mayo	Construct an ESB electricity substation with switch room building and the erection and operation of an asphalt mixing plant (height 20m), aggregate loading bins, hot storage bins and all associated ancillary works on 0.2-hectare area within the existing quarry complex	24/10/2019	28/11/2019
19260 Killala Community Windfarm Designated Activity Company Mullafarry and Tawnaghmore Lower, Killala, Co. Mayo	25-year permission for a single electricity generating wind turbine with an overall maximum height of up to 125m. The development will also consist of a turbine hardstand, access track of c.394m, internal cable trench of c.1,775m and ancillary site works. The planning application is accompanied by a Natura Impact Statement	10/09/2019	15/10/2019
19136 Carr & Sons Seafood Ltd. Townplots West, Killala, Co. Mayo	1. Demolition of existing storage extensions to the north and south of the existing administration building; 2. Construct three new extensions to existing administration building comprising of cold storage extension to the north, workshop and compressor room extension to the west and extension to facilitate dispatch cold room, salting room and washing room to the south; 3. Construct new extension to the north of existing factory building to comprise of washing room and covered canopy; 4). Retention of	29/08/2019	30/09/2019

Planning Reference, Application and Location	Development Description	Decision Date	Grant Date
	existing extension building to the west of the existing administration building used for purposes of blast freezer, retention of compressor room to the north along with all ancillary site works; 5). Retention of the existing stand-alone building for the purposes of waste recycling, along with all ancillary and site works		
19351 Westland Networks LTD Tawnaghmore Upper, Killala Business Park	A 20m free-standing structure carrying telecommunications equipment together with associated infrastructure including underground cabling and all ancillary development.	08/07/2019	12/08/2019
18764 Killala Sports & Social Club Ltd., T/A Killala Fc Courthouse Street, Townplots East, Killala, Co. Mayo	First floor extension to the existing club house to include a meeting room, office, gym, general purpose room, plant/storage area and toilet facilities. A wheelchair accessible toilet and two additional changing rooms shall be provided on the existing ground floor of the club house with minor modifications to the existing layout together with all ancillary site works	26/11/2018	02/01/2019
17619 Killala Community Windfarm Designated Activity Company	10-year planning permission for 5 turbine wind farm. Proposed development will be located in the townlands of Magherabrack, Mullafarry, Tawnaghmore lower, Mellick and Tawnaghmore upper, Killala approx. 1.3km south of Killala. Development is an updated application to the consented 6 turbine wind farm p09/780. Proposal is for a wind energy development comprising 5 electricity generating wind turbines, each with a rotor diameter not exceeding 103.2m a hub height not exceeding 73.5m and a blade tip height of not exceeding 126m. The development will include a meteorological mast not exceed 82m in height, internal underground electrical cabling, a substation building, an external underground grid connection cable and ducting to the existing 110kv Tawnaghmore substation, associated grid substation works, associated site access roads and ancillary site works including upgrades to existing site access, a temporary	11/01/2018	15/02/2018

Planning Reference, Application and Location	Development Description	Decision Date	Grant Date
Magherabrack/Mullafarry, Tawnaghmore Lower/Upper, Meelick/Killala	construction compound and haulage route works. The max output capacity of the wind farm will be up to 18mw and has an intended operation life of 25 years		

Figure 1: Planning History within the vicinity of the subject site

APPENDIX 5.1

NRA CRITERIA FOR RATING THE MAGNITUDE AND SIGNIFICANCE OF IMPACTS ON GEOLOGICAL AND HYDROLOGICAL ATTRIBUTES AT EIA STAGE

NRA-TII, 2009

Impact Ratings and Assessment Criteria (Soils, Geology and Hydrogeology)

Table 1 *Criteria for rating site Attributes – Estimation of Importance of Soil and Geology Attributes (NRA)*

Importance	Criteria	Typical Examples
Very High	Attribute has a high quality, significance or value on a regional or national scale Degree or extent of soil contamination is significant on a national or regional scale Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale*	Geological feature rare on a regional or national scale (NHA) Large existing quarry or pit Proven economically extractable mineral resource
High	Attribute has a high quality, significance or value on a local scale. Degree or extent of soil contamination is significant on a local scale. Volume of peat and/or soft organic soil underlying route is significant on a local scale. *	Contaminated soil on site with previous heavy industrial usage Large recent landfill site for mixed wastes Geological feature of high value on a local scale (County Geological Site) Well drained and/or high fertility soils Moderately sized existing quarry or pit Marginally economic extractable mineral resource
Medium	Attribute has a medium quality, significance or value on a local scale Degree or extent of soil contamination is moderate on a local scale Volume of peat and/or soft organic soil underlying route is moderate on a local scale*	Contaminated soil on site with previous light industrial usage Small recent landfill site for mixed wastes Moderately drained and/or moderate fertility soils Small existing quarry or pit Sub-economic extractable mineral resource
Low	Attribute has a low quality, significance or value on a local scale Degree or extent of soil contamination is minor on a local scale. Volume of peat and/or soft organic soil underlying route is small on a local scale*	Large historical and/or recent site for construction and demolition wastes. Small historical and/or recent landfill site for construction and demolition wastes. Poorly drained and/or low fertility soils. Uneconomically extractable mineral resource.

** relative to the total volume of inert soil disposed of and/or recovered*

Source: *Box 4.1: 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009)*

Table 2 *Criteria for Rating Impact Significance at EIA Stage - Estimation Of Magnitude of Impact on Soil / Geology Attribute (NRA)*

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute	Loss of high proportion of future quarry or pit reserves Irreversible loss of high proportion of local high fertility soils Removal of entirety of geological heritage feature Requirement to excavate / remediate entire waste site Requirement to excavate and replace high proportion of peat, organic soils and/or soft mineral soils beneath alignment
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Loss of moderate proportion of future quarry or pit reserves Removal of part of geological heritage feature Irreversible loss of moderate proportion of local high fertility soils Requirement to excavate / remediate significant proportion of waste site Requirement to excavate and replace moderate proportion of peat, organic soils and/or soft mineral soils benath alignment
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Loss of small proportion of future quarry or pit reserves Removal of small part of geological heritage feature Irreversible loss of small proportion of local high fertility soils and/or high proportion of local low fertility soils Requirement to excavate / remediate small proportion of waste site Requirement to excavate and replace small proportion of peat, organic soils and/or soft mineral soils beneath alignment
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	No measurable changes in attributes
Minor Beneficial	Results in minor improvement of attribute quality	Minor enhancement of geological heritage feature
Moderate Beneficial	Results in moderate improvement of attribute quality	Moderate enhancement of geological heritage feature
Major Beneficial	Results in major improvement of attribute quality	Major enhancement of geological heritage feature

Source: *Box 5.1: 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009)*

Table 3 *Criteria for rating Site Attributes - Estimation of Importance of Hydrogeology Attributes (NRA)*

Magnitude of Impact	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status
Very High	Attribute has a high quality or value on a regional or national scale	Regionally Important Aquifer with multiple well fields Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – NHA status Regionally important potable water source supplying >2500 homes Inner source protection area for
High	Attribute has a high quality or value on a local scale	Regionally Important Aquifer Groundwater provides large proportion of baseflow to local rivers Locally important potable water source supplying >1000 homes Outer source protection area for regionally important water source Inner source protection area for locally important water source
Medium	Attribute has a medium quality or value on a local scale	Locally Important Aquifer Potable water source supplying >50 homes Outer source protection area for locally important water source
Low	Attribute has a low quality or value on a local scale	Poor Bedrock Aquifer Potable water source supplying <50 homes

Source: *Box 4.3: 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009)*

Table 4 *Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Hydrogeology Attribute (NRA)*

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute	Removal of large proportion of aquifer. Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems. Potential high risk of pollution to groundwater from routine run- off. [1] Calculated risk of serious pollution incident >2% annually. [2]
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Removal of moderate proportion of aquifer. Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems. Potential medium risk of pollution to groundwater from routine run-off. [1] Calculated risk of serious pollution incident >1% annually. [2]
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Removal of small proportion of aquifer. Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems. Potential low risk of pollution to groundwater from routine run- off. [1] Calculated risk of serious pollution incident >0.5% annually. [2]
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Calculated risk of serious pollution incident <0.5% annually. [2]

1 *refer to Annex 1, Method C, Annex 1 of HA216/06*

2 *refer to Appendix B3 / Annex 1, Method D, Annex 1 of HA216/06*

Source: *Box 5.3: 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009)*

Table 5 *Rating of Significant Environmental Impacts at EIA Stage (NRA)*

Importance of Attribute	Magnitude of Importance			
	Negligible	**Small Adverse**	**Moderate Adverse**	**Large Adverse**
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

Source: *Box 5.4: 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009)*

APPENDIX 5.2

KILLALA PROJECT,
KILLALA, CO. MAYO
SITE INVESTIGATION REPORT

PREPARED BY SITE INVESTIGATIONS LTD

S.I. Ltd Contract No: 6344

Client:	Private Client
Engineer:	Clifton Scannell Emerson Associates
Contractor:	Site Investigations Ltd

Killala Project,
Killala, Co. Mayo
Site Investigation Report

Prepared by:

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Stephen Letch

Issue Date:	04/10/2024
Status	Draft
Revision	0

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Appendices:

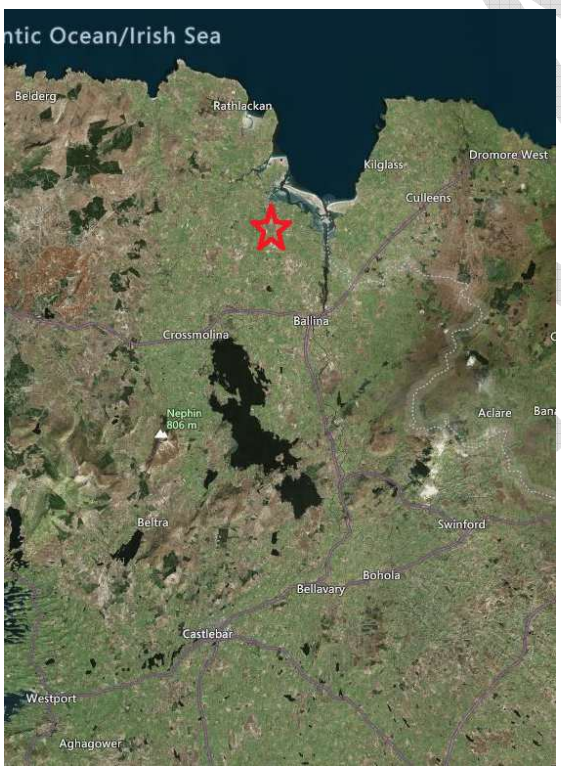
1. Introduction

On the instructions of Clifton Scannell Emerson Associates, Site Investigations Ltd (SIL) was appointed to complete a ground investigation at Killala, Co. Mayo. The investigation was for a commercial development and was completed on behalf of a Private Client. The fieldworks were started in August and completed in September 2024.

This draft report presents the factual geotechnical data obtained from the field and laboratory testing with interpretation of the ground conditions discussed. The report may be used for reference only with no permission for the report to be used in planning permission submissions. The final report will be issued on receipt of payment and at that time, the report may be used for design purposes and planning permission submissions.

2. Site Location

The site location is to the south of Killala in north Co. Mayo. The map on the left below shows the location of the site in north Co. Mayo and the second map shows the location of the site in the local area.



3. Fieldwork

All fieldwork was carried out in accordance with BS 5930:2015, Engineers Ireland GI Specification and Related Document 2nd Edition 2016 and Eurocode 7: Geotechnical Design. The fieldworks comprised of the following:

- 4 No. cable percussive boreholes with 2 No. rotary coreholes
- 5 No. trial pits
- 2 No. soakaway tests
- 4 No. slit trenches

3.1. Cable Percussive Boreholes

Cable percussion boring was undertaken at 4 No. locations using a Dando 2000 rig and constructed 200mm diameter boreholes. The boreholes terminated at shallow depths of 0.50mbgl (BH03 and BH04) to 1.70mbgl (BH01) after an hour and a half chiselling was completed and no further progress was made. It was not possible to collect undisturbed samples due to the granular soils encountered so bulk disturbed samples were recovered at regular intervals.

To test the strength of the stratum, Standard Penetration Tests (SPT's) were performed at 1.00m intervals in accordance with BS 1377 (1990). In soils with high gravel and cobble content it is appropriate to use a solid cone (60°) (CPT) instead of the split spoon and this was used throughout the testing. The test is completed over 450mm and the cone is driven 150mm into the stratum to ensure that the test is conducted over an undisturbed zone. The cone is then driven the remaining 300mm and the blows recorded to report the N-Value. The report shows the N-Value with the 75mm incremental blows listed in brackets (e.g., BH01 at 1.00mbgl where N=14-(2,2/3,3,4,4)). Where refusal of 50 blows across the test zone was encountered was achieved during testing, the penetration depth is also reported (e.g., BH01 at 1.70mbgl where N=50-(25 for 5mm/50 for 5mm)).

Following completion of the boreholes, 2 No. rotary coreholes were completed to investigate the depth of the bedrock. The rotary drilling was carried out using a Sondeq SS71 top drive rig and open hole drilling and coring techniques used to advance through the overburden. The bedrock was encountered at 0.80mbgl and 0.50mbgl at BH02 and BH03 respectively. The core recovered was placed in a channelled core box and returned to SIL for logging.

The core was logged by a SIL Engineer and the engineering geological descriptions of the rock cores with details of the discontinuities and mechanical indices for each core run are provided on the logs, i.e., TCR, SCR, RQD and Fracture Index.

The combined cable percussive borehole and rotary corehole logs are presented in Appendix 1 along with the rotary core photographs.

3.2. Trial Pits

5 No. trial pits were excavated using a tracked excavator and they were logged and photographed by SIL geotechnical engineer. Representative disturbed bulk samples were

recovered as the pits were excavated, which were returned to the laboratory for geotechnical testing. Pit wall stability and any groundwater ingresses were recorded as the pit was excavated and they were backfilled with the arisings upon completion.

The trial pit logs and photographs are presented in Appendix 2.

3.3. Soakaway Tests

At 2 No. locations, soakaway tests were completed and logged by SIL geotechnical engineer. BRE Special Digest 365 stipulates that the pit should be filled three times and that the final cycle is used to provide the infiltration rate. The time taken for the water level to fall from 75% volume to 25% volume is required to calculate the rate of infiltration. However, if the water level does not fall at a steady rate, then the test is deemed to have failed and the area is unsuitable for storm water drainage.

The soakaway test results and photographs are presented in Appendix 3.

3.4. Slit Trenches

Slit trenching was completed at 4 No. locations. The trenches were completed to check the location and depth of any services that were identified from plans by the Engineer.

The slit trench logs with photographs are presented in Appendix 4.

3.5. Surveying

Following completion of all the fieldworks, a survey of the exploratory hole locations was completed using a GeoMax GPS Rover. The data is supplied on each individual log and along with a site plan in Appendix 9.

4. Laboratory Testing

4.1. Geotechnical Testing

Geotechnical laboratory testing was completed on representative soil samples in accordance with BS 1377 (1990). Testing included:

- 2 No. Moisture contents
- 2 No. Atterberg limits
- 2 No. Particle size gradings with hydrometers
- 4 No. California Bearing Ratio tests
- 2 No. Compaction – Moisture condition value (MCV) calibrations
- 2 No. pH, acid and water-soluble sulphate content and chloride content

Rock testing was completed on the core samples recovered from the coreholes and comprised:

- 2 No. unconfined compressive strength tests
- 2 No. point loads

The geotechnical soil laboratory test results are presented in Appendix 5 with the rock test results in Appendix 6.

4.2. Environmental Testing

Environmental testing was completed by ALS Environmental Ltd. and consists of the following:

- 1 No. Suite I analysis

The environmental test results are reported in Appendix 7 and a Waste Classification Report in Appendix 8.

5. Ground Conditions

5.1. Overburden

The natural ground conditions are dominated by brown sandy slightly gravelly silty CLAY with cobbles. The locations to the south east of the site achieved depths greater than 1.00mbgl, with TP01 achieving 1.80m depth before terminating.

BH01 was the only borehole to record a SPT N-value and that was 14 at 1.00mbgl indicating firm soils.

The laboratory tests of the cohesive soils show CLAY soils with low to intermediate plasticity indexes of 9 to 16%. The particle size distribution curves were poorly sorted straight-line curves with low fines content of 17% to 54%.

5.2. Bedrock

Bedrock was encountered at 0.80mbgl and 0.50mbgl at BH02 and BH03 respectively and although highly fractured core was initially encountered, the bedrock was logged as a strong grey muddy LIMESTONE, with calcite veins and fossils recorded and is part of the Ballina Limestone Formation. The core quality improved at 1.35mbgl and 1.90mbgl in the coreholes and they were terminated after 3m of core was recovered.

5.3. Groundwater

Groundwater was not recorded in the boreholes but was recorded in TP01, TP02 and SA01 to the south east of the site. The depth of the strikes was at 1.60mbgl at TP01 and 1.20mbgl at TP02 and SA01, with medium to rapid ingress rates recorded.

6. Recommendations and Conclusions

Please note the following caveats:

The recommendations given, and opinions expressed in this report are based on the findings as detailed in the exploratory hole records. Where an opinion is expressed on the material between the exploratory hole locations or below the final level of excavation, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for adjacent unexpected conditions that have not been revealed by the exploratory holes. It is further recommended that all bearing surfaces when excavated should be inspected by a suitably qualified Engineer to verify the information given in this report.

Excavated surfaces in clay strata should be kept dry to avoid softening prior to foundation placement. Foundations should always be taken to a minimum depth of 0.50mBGL to avoid the effects of frost action and possible seasonal shrinkage/swelling.

If it is intended that on-site materials are to be used as fill, then the necessary laboratory testing should be specified by the Client to confirm the suitability. Also, relevant lab testing should be specified where stability of side slopes to excavations is a concern, or where contamination may be an issue.

6.1. Shallow Foundations

Due to the unknown depth of foundation and no longer-term groundwater information, this analysis assumes the groundwater will not influence the construction or performance of these foundations.

For cohesive soils, a correlation proposed by Stroud and Butler between SPT N-values and plasticity indices can be used to calculate the undrained shear strength. Dependent on the plasticity index at each site, the Stroud and Butler correlation is C_u=4 to 6N. With the low to intermediate plasticity indexes recorded in the laboratory for the soils on this site, the correlation chosen is C_u=6N. Therefore, using the SPT value of 14, this indicates that the undrained shear strength of the CLAY is 84kN/m^2. This can be used to calculate the ultimate bearing capacity, and this has been calculated to be 446kN/m^2. Finally, a factor of safety is applied and with a factor of 3, an allowable bearing capacity of 150kN/m^2 would be anticipated using the lowest SPT value.

The site recorded shallow bedrock across the site and therefore, it may be more suitable to excavate to bedrock and found the structures on this to avoid any differential settlement. The bedrock will also provide a much greater allowable bearing capacity of 500kN/m^2 for the weathered bedrock and 750 to 1000kN/m^2 for the competent bedrock.

The following assumptions were made as part of these analyses. If any of these assumptions are not in accordance with detailed design or observations made during construction these recommendations should be re-evaluated.

- Foundations are to be constructed on a level formation of uniform material type.
- All man-made or filled material is to be removed prior to construction.
- The bulk unit weight of the material in this stratum has a minimum density of 19kN/m^3.
- Based on groundwater observations this analysis assumes the groundwater will not influence the construction or performance of these foundations.
- All bearing capacity calculations allow for 25mm settlement.

The trial pit walls remained stable during excavation but it would be recommended that all excavations should be checked immediately and battered back accordingly. Regular inspection of temporary excavations should be completed during construction to ensure that all slopes are stable. Temporary support should be used on any excavation that will be left open for an extended period.

6.2. Groundwater

The caveats below relating to interpretation of groundwater levels should be noted:

There is always considerable uncertainty as to the likely rates of water ingress into excavations in clayey soil sites due to the possibility of localised unforeseen sand and gravel lenses acting as permeable conduits for unknown volumes of water.

Furthermore, water levels noted on the borehole and trial pit logs do not generally give an accurate indication of the actual groundwater conditions as the borehole or trial pit is rarely left open for sufficient time for the water level to reach equilibrium.

Also, during boring procedures, a permeable stratum may have been sealed off by the borehole casing, or water may have been added to aid drilling. Therefore, an extended period of groundwater monitoring using any constructed standpipes is required to provide more accurate information regarding groundwater conditions. Finally, groundwater levels vary with time of year, rainfall or any nearby construction sites.

Pumping tests would be required to determine likely seepage rates and persistence into excavations taken below the groundwater level. Deep trial pits also aid estimation of seepage rates.

As discussed previously, groundwater was recorded in three excavations between 1.20mbgl and 1.60mbgl.

There is always considerable uncertainty as to the likely rates of water ingress into excavations in cohesive soil sites due to the possibility of localised unforeseen sand and gravel lenses acting as permeable conduits for unknown volumes of water. Based on this information at the exploratory hole locations to date, it is considered likely that any shallow ingress into excavations will be medium to rapid.

If groundwater is encountered during excavations then mechanical pumps will be required to remove the groundwater from sumps. Sumps should be carefully located and constructed to ensure that groundwater is efficiently removed from excavations and trenches.

6.3. Soakaway Tests

The soakaway test at SA01 failed the specification as the pits recorded water ingresses and the soils are therefore saturated and unsuitable for soakaway design.

The soakaway test at SA02 failed the specification as the water level did not fall sufficiently enough to complete the test. The BRE Digest stipulates that the pit should half empty within 24hrs, and extrapolation indicates this condition would not be satisfied. The tests were terminated at the end of the first (of a possible three) fill/empty cycle since further testing would give even slower fall rates due to increased soil saturation.

6.4. Contamination

Environmental testing was carried out on one sample from the investigation and the results are shown in Appendix 7. For material to be removed from site, Suite I testing was carried out to determine if the material is hazardous or non-hazardous and then the leachate results were compared with the published waste acceptance limits of BS EN 12457-2 to determine whether the material on the site could be accepted as 'inert material' by an Irish landfill.

The Waste Classification report created using HazWasteOnline™ software shows that the material tested can be classified as non-hazardous material.

Following this analysis of the solid test results, the leachate disposal suite results indicate that the soil tested would generally be able to be treated as Inert Waste.

One sample was tested for analysis but it cannot be discounted that any localised contamination may have been missed. Any MADE GROUND excavated on site should be stockpiled separately to natural soils to avoid any potential cross contamination of the soils. Additional testing of these soils may be requested by the individual landfill before acceptance and a testing regime designed by an environmental engineer would be recommended to satisfy the landfill.

6.5. Aggressive Ground Conditions

The chemical test results in Appendix 6 indicate a general pH value between 8.07 and 8.20, which is close to neutral and below the level of 9.

The maximum value obtained for water soluble sulphate was 129mg/l as SO_3. The BRE Special Digest 1:2005 – '*Concrete in Aggressive Ground*' guidelines require SO_4 values and after conversion ($SO_4 = SO_3 \times 1.2$), the maximum value of 155mg/l. This shows that DS-1 conditions apply from Table C1 in the Special Digest.

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Appendix 1
Cable Percussive Borehole and Rotary Corehole Logs and Photographs

Contract No: 6344	**Cable Percussion and Rotary Corehole Log**				Corehole No: **BH01**
Contract:	Killala Project	Easting:	520358.730	Date Started:	03/09/2024
Location:	Killala, Co. Mayo	Northing:	827533.430	Date Completed:	11/07/2022
Client:	Private Client	Elevation:	47.46	Drilled By:	G. Macken
Engineer:	Clifton Scannell Emerson Associates	Rig Type:	Dando 2000	Status:	FINAL

Depth (m) Scale	Depth	Stratum Description	Legend	Level (mOD) Scale	Depth	Samples	Rock Indices TCR/%	SCR/%	RQD/%	FI/m	Backfill
0		TOPSOIL.		47.5							
	0.20	Firm brown sandy slightly gravelly silty CLAY with low cobble content.			47.26						
0.5				47.0							
1.0				46.5		N=14 (2,2/3,3,4,4) B / 1.00					
1.5				46.0							
	1.60	Obstruction - possible boulders or weathered bedrock.			45.86						
	1.70	End of Corehole at 1.70m			45.76	50 (25 for 5mm/50 for 5mm)					
2.0				45.5							
2.5				45.0							
3.0				44.5							
3.5				44.0							
4.0				43.5							
4.5				43.0							
				42.5							

Chiselling:			Water Strikes:			Water Details:			Installations:			Backfill:			Remarks:	Legend:
From:	To:	Time:	Strike:	Rose:	Sealed:	Date:	Hole Depth:	Water Depth:	From:	To:	Pipe:	From:	To:	Type:		B: Bulk D: Disturbed U: Undisturbed ES: Environmental W: Water
1.60	1.70	01:30				03/09	1.70	Dry				0.00	1.70	Arisings	Borehole terminated due to obstruction. No rotary coring scheduled.	

Contract No: 6344	**Cable Percussion and Rotary Corehole Log**		Corehole No: **BH02**
Contract:	Killala Project	Easting: 520319.990	Date Started: 03/09/2024
Location:	Killala, Co. Mayo	Northing: 827641.610	Date Completed: 13/09/2024
Client:	Private Client	Elevation: 52.01	Drilled By: G. Macken / MEDL
Engineer:	Clifton Scannell Emerson Associates	Rig Type: Dando 2000 / Sondeq	Status: FINAL

Depth (m) Scale	Depth	Stratum Description	Legend	Level (mOD) Scale	Depth	Samples	Rock Indices TCR/%	SCR/%	RQD/%	FI/m	Backfill
		TOPSOIL.			51.81						
	0.20	Brown sandy slightly gravelly silty CLAY with low cobble content.									
0.5				51.5							
	0.70	Obstruction - weathered bedrock.			51.31						
	0.80	Strong grey muddy LIMESTONE with some calcite veins (<10mm thick) and occasional fossils. Fresh to slightly weathered.			51.21	~~50 (25 for 5mm/50 for 5mm)~~					
1.0		*Discontinuities - non-intact.*		51.0						NI	
		Discontinuities - rough, occasionally smooth, planar to slightly undulating, tight to open, sub-horizontal, occasionally sub-vertical dip, clean with occasional grey staining.				0.80 - 1.80	99	51	36		
1.5				50.5							
2.0				50.0		1.80 - 2.80	94	94	85		
2.5				49.5						5	
3.0				49.0		2.80 - 3.80	95	95	71		
3.5				48.5							
	3.80	End of Corehole at 3.80m			48.21						
4.0				48.0							
4.5				47.5							

Chiselling: From:	To:	Time:	Water Strikes: Strike:	Rose:	Sealed:	Water Details: Date:	Hole Depth:	Water Depth:	Installations: From:	To:	Pipe:	Backfill: From:	To:	Type:	Remarks:
0.70	0.80	01:30				03/09	0.80	Dry				0.00	3.80	Arisings	Cable percussive borehole terminated at 0.80mbgl due to obstruction.

Legend:
B: Bulk
D: Disturbed
U: Undisturbed
ES: Environmental
W: Water

Contract No: 6344	**Cable Percussion and Rotary Corehole Log**			Corehole No: **BH03**
Contract:	Killala Project	Easting:	520256.950	Date Started: 04/09/2024
Location:	Killala, Co. Mayo	Northing:	827728.130	Date Completed: 13/09/2024
Client:	Private Client	Elevation:	60.26	Drilled By: G. Macken / MEDL
Engineer:	Clifton Scannell Emerson Associates	Rig Type:	Dando 2000 / Sondeq	Status: FINAL

Depth (m) Scale	Depth	Stratum Description	Legend	Level (mOD) Scale	Depth	Samples	Rock Indices TCR/%	SCR/%	RQD/%	FI/m	Backfill
		TOPSOIL.									
	0.30			60.0	59.96						
	0.40	Brown sandy slightly gravelly silty CLAY with low cobble content.			59.86						
0.5	0.50	Obstruction - weathered bedrock.			59.76	~~50 (25 for 5mm/50 for 5mm)~~					
		Strong grey muddy LIMESTONE. Slightly to moderately weathered.		59.5							
		Discontinuities - non-intact.									
1.0						0.50 - 1.50	100	30	0	NI	
1.5				59.0							
				58.5							
	1.90				58.36						
2.0		Strong grey muddy LIMESTONE with occasional calcite veins (<6mm thick) and fossils. Fresh weathered state.				1.50 - 2.50	95	67	46		
		Discontinuities - rough, occasionally smooth, planar to slightly undulating, occasionally stepped, tight to open, sub-horizontal to 30°, occasionally 75° dip, clean with occasional grey staining.		58.0							
2.5											
				57.5						6	
3.0						2.50 - 3.50	93	93	71		
				57.0							
3.5	3.50	End of Corehole at 3.50m			56.76						
				56.5							
4.0											
				56.0							
4.5											
				55.5							

Chiselling: From:	To:	Time:	Water Strikes: Strike:	Rose:	Sealed:	Water Details: Date:	Hole Depth:	Water Depth:	Installations: From:	To:	Pipe:	Backfill: From:	To:	Type:	Remarks:
0.40	0.50	01:30				04/09	0.50	Dry				0.00	3.50	Arisings	Cable percussive borehole terminated at 0.50mbgl due to obstruction.

Legend:
B: Bulk
D: Disturbed
U: Undisturbed
ES: Environmental
W: Water

Contract No: 6344	**Cable Percussion and Rotary Corehole Log**				Corehole No: **BH04**
Contract:	Killala Project	Easting:	520138.310	Date Started:	04/09/2024
Location:	Killala, Co. Mayo	Northing:	827724.920	Date Completed:	14/07/2022
Client:	Private Client	Elevation:	59.41	Drilled By:	G. Macken
Engineer:	Clifton Scannell Emerson Associates	Rig Type:	Dando 2000	Status:	FINAL

Depth (m) Scale	Depth	Stratum Description	Legend	Level (mOD) Scale	Depth	Samples	Rock Indices TCR/%	SCR/%	RQD/%	FI/m	Backfill
0.5	0.20	TOPSOIL.		59.0	59.21	50 (25 for 5mm/50 for 5mm)					
	0.40	Brown sandy slightly gravelly silty CLAY with low cobble content.			59.01						
	0.50	Obstruction - possible boulders or weathered bedrock.			58.91						
		End of Corehole at 0.50m									
1.0				58.5							
1.5				58.0							
2.0				57.5							
2.5				57.0							
3.0				56.5							
3.5				56.0							
4.0				55.5							
4.5				55.0							
				54.5							

Chiselling:

From:	To:	Time:
0.40	0.50	01:30

Water Strikes:

Strike:	Rose:	Sealed:

Water Details:

Date:	Hole Depth:	Water Depth:
04/09	0.50	Dry

Installations:

From:	To:	Pipe:

Backfill:

From:	To:	Type:
0.00	0.50	Arisings

Remarks:

Borehole terminated due to obstruction.
No rotary coring scheduled.

Legend:
B: Bulk
D: Disturbed
U: Undisturbed
ES: Environmental
W: Water

BH02 Box 1 of 1

BH03 Box 1 of 1

Appendix 2
Trial Pit Logs and Photographs

Contract No: 6344	**Trial Pit Log**				Trial Pit No: **TP01**
Contract:	Killala Project	Easting:	520365.660	Date:	29/08/2024
Location:	Killala, Co. Mayo	Northing:	827478.960	Excavator:	3T Tracked Excavator
Client:	Private Client	Elevation:	43.34	Logged By:	P. McGonagle
Engineer:	Clifton Scannell Emerson Associates	Dimensions (LxWxD) (m):	2.30 x 0.50 x 1.80	Status:	FINAL

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples / Field Tests Depth	Type	Result	Water Strike
		TOPSOIL.							
	0.20	Firm brown sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone.			43.14				
0.5				43.0					
				42.5					
1.0						1.00	B	PMc03	
	1.20	Firm brown grey sandy slightly gravelly silty CLAY with high cobble and boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 300mm diameter).			42.14				
				42.0					
1.5						1.50	B	PMc04	▼
	1.80	Obstruction - possible boulders or weathered bedrock. **Pit terminated at 1.80m**			41.54				
				41.5					
2.0									
				41.0					
2.5									
				40.5					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - possible boulders or weathered bedrock.	Pit walls stable.	1.60 Medium	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 6344	**Trial Pit Log**				Trial Pit No: **TP02**
Contract:	Killala Project	Easting:	520439.340	Date:	29/08/2024
Location:	Killala, Co. Mayo	Northing:	827566.310	Excavator:	3T Tracked Excavator
Client:	Private Client	Elevation:	43.74	Logged By:	P. McGonagle
Engineer:	Clifton Scannell Emerson Associates	Dimensions (LxWxD) (m):	1.90 x 0.50 x 1.60	Status:	FINAL

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples / Field Tests Depth	Type	Result	Water Strike
		TOPSOIL.							
	0.20	Firm brown sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone.		43.5	43.54				
0.5									
				43.0					
1.0						1.00	B	PMc01	
	1.10	Firm brown grey sandy slightly gravelly silty CLAY with high cobble and boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 300mm diameter).			42.64				▼
				42.5					
1.5						1.50	B	PMc02	
	1.60	Obstruction - possible boulders or weathered bedrock. **Pit terminated at 1.60m**			42.14				
				42.0					
2.0									
				41.5					
2.5									
				41.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - possible boulders or weathered bedrock.	Pit walls stable.	1.20 Rapid	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 6344	**Trial Pit Log**				Trial Pit No: **TP03**
Contract:	Killala Project	Easting:	520334.050	Date:	29/08/2024
Location:	Killala, Co. Mayo	Northing:	827673.720	Excavator:	3T Tracked Excavator
Client:	Private Client	Elevation:	51.91	Logged By:	P. McGonagle
Engineer:	Clifton Scannell Emerson Associates	Dimensions (LxWxD) (m):	2.20 x 0.50 x 0.70	Status:	FINAL

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples / Field Tests Depth	Type	Result	Water Strike
		TOPSOIL.							
	0.30	Firm brown sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone.			51.61				
0.5				51.5		0.40	B	PMc05	
						0.50	ES	PMc06	
	0.60	Brown silty sandy fine to coarse, angular to subangular GRAVEL of limestone. Sand is fine to coarse.			51.31	0.60	B	PMc07	
	0.70	Obstruction - possible boulders or weathered bedrock.			51.21				
		Pit terminated at 0.70m							
1.0				51.0					
				50.5					
1.5									
				50.0					
2.0									
				49.5					
2.5									
				49.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - possible boulders or weathered bedrock.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 6344	**Trial Pit Log**				Trial Pit No: **TP04**
Contract:	Killala Project	Easting:	520123.630	Date:	29/08/2024
Location:	Killala, Co. Mayo	Northing:	827558.290	Excavator:	3T Tracked Excavator
Client:	Private Client	Elevation:	51.74	Logged By:	P. McGonagle
Engineer:	Clifton Scannell Emerson Associates	Dimensions (LxWxD) (m):	2.00 x 0.50 x 0.50	Status:	FINAL

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples / Field Tests Depth	Type	Result	Water Strike
		TOPSOIL.		51.5					
	0.30	Firm brown sandy gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone.			51.44	0.40	B	PMc10	
0.5	0.50	Obstruction - possible boulders or weathered bedrock.			51.24				
		Pit terminated at 0.50m		51.0					
1.0				50.5					
1.5				50.0					
2.0				49.5					
2.5				49.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - possible boulders or weathered bedrock.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 6344	**Trial Pit Log**				Trial Pit No: **TP05**
Contract:	Killala Project	Easting:	520093.530	Date:	29/08/2024
Location:	Killala, Co. Mayo	Northing:	827732.630	Excavator:	3T Tracked Excavator
Client:	Private Client	Elevation:	59.37	Logged By:	P. McGonagle
Engineer:	Clifton Scannell Emerson Associates	Dimensions (LxWxD) (m):	2.20 x 0.50 x 0.60	Status:	FINAL

Level (mbgl) Scale:	Depth	Stratum Description	Legend	Level (mOD) Scale:	Depth:	Samples / Field Tests Depth	Type	Result	Water Strike
		TOPSOIL.							
	0.30	Firm brown sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone.			59.07				
0.5	0.50	Brown silty sandy fine to coarse, angular to subangular GRAVEL of limestone. Sand is fine to coarse.		59.0	58.87	0.40	B	PMc08	
	0.60	Obstruction - possible boulders or weathered bedrock.			58.77	0.60	B	PMc09	
		Pit terminated at 0.60m							
1.0				58.5					
1.5				58.0					
2.0				57.5					
2.5				57.0					
				56.5					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - possible boulders or weathered bedrock.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

TP01 Sidewall

TP01 Spoil

TP02 Sidewall

TP02 Spoil

TP03 Sidewall

TP03 Spoil

TP04 Sidewall

TP04 Spoil

TP05 Sidewall

TP05 Spoil

Appendix 3

Soakaway Test Results and Photographs

SOAKAWAY TEST

Project Reference:	6344
Contract name:	Killala Project
Location:	Killala, Co. Mayo
Test No:	SA01
Date:	29/08/2024

Ground Conditions

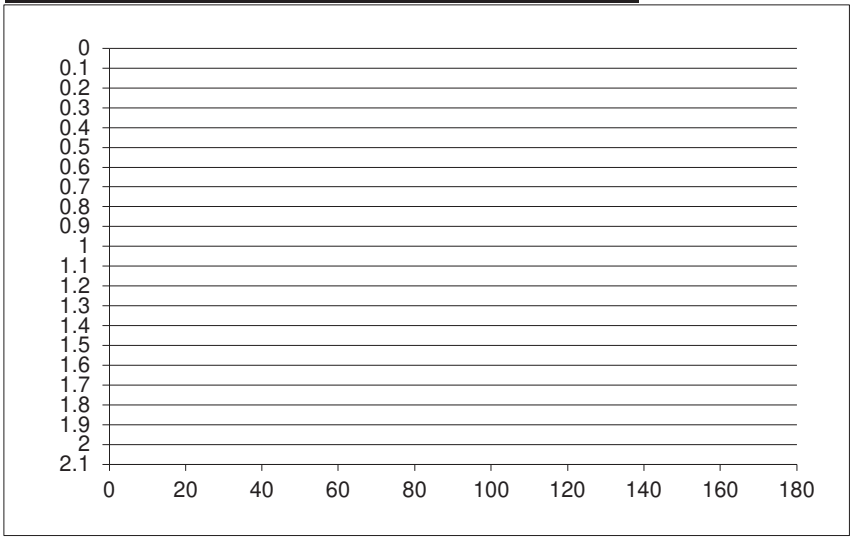
From	To	
0.00	0.40	TOPSOIL.
0.40	0.90	Firm brown slightly sandy slightly gravelly silty CLAY.
0.90	1.70	Firm black slightly sandy slightly gravelly silty CLAY with medium cobble and boulder content.

Remarks:

Obstruction at 1.70mbgl.
Rapid wate ingress at 1.20mbgl - soils saturated and unsuitable for soakaway design.

Elapsed Time (mins)	Fall of Water (m)
0	-
0.5	-
1	-
1.5	-
2	-
2.5	-
3	-
3.5	-
4	-
4.5	-
5	-
6	-
7	-
8	-
9	-
10	-
12	-
14	-
16	-
18	-
20	-
25	-
30	-
40	-
50	-
60	-
75	-
90	-
120	-
150	-
180	-

Pit Dimensions (m)		
Length (m)	2.20	m
Width (m)	0.50	m
Depth	1.70	m
Water		
Start Depth of Water	-	m
Depth of Water	-	m
75% Full	-	m
25% Full	-	m
75%-25%	-	m
Volume of water (75%-25%)	**-**	m3
Area of Drainage	**-**	m2
Area of Drainage (75%-25%)	**-**	m2
Time		
75% Full	-	min
25% Full	-	min
Time 75% to 25%	**-**	min
Time 75% to 25% (sec)	**-**	sec



f = Fail m/min or **Fail** m/s

SOAKAWAY TEST

Project Reference:	6344
Contract name:	Killala Project
Location:	Killala, Co. Mayo
Test No:	SA02
Date:	29/08/2024

Ground Conditions

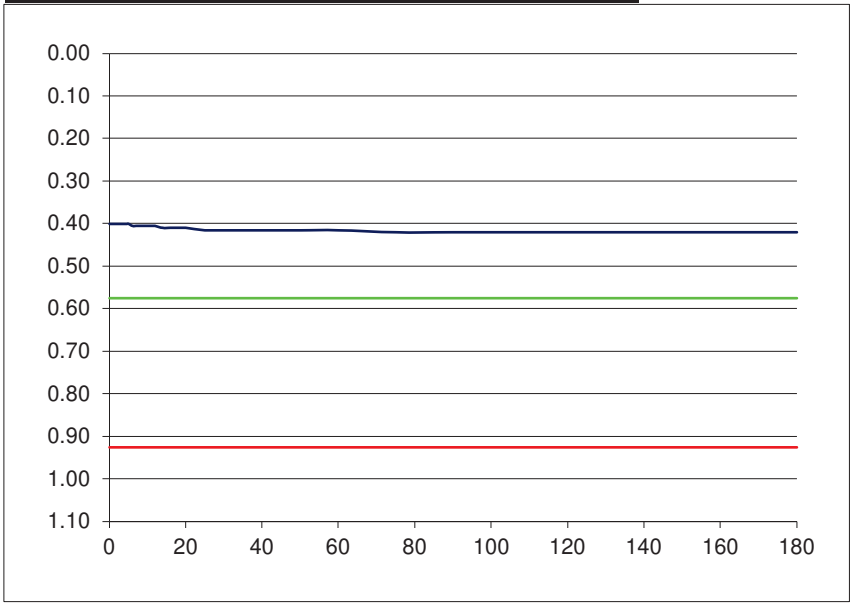
From	To	
0.00	0.30	TOPSOIL.
0.30	1.10	Firm brown slightly sandy slightly gravelly silty CLAY with medium cobble content.

Remarks:

Obstruction at 1.10mbgl - pit terminated and test completed.

Elapsed Time (mins)	Fall of Water (m)
0	0.40
0.5	0.40
1	0.40
1.5	0.40
2	0.40
2.5	0.40
3	0.40
3.5	0.40
4	0.40
4.5	0.40
5	0.40
6	0.41
7	0.41
8	0.41
9	0.41
10	0.41
12	0.41
14	0.41
16	0.41
18	0.41
20	0.41
25	0.42
30	0.42
40	0.42
50	0.42
60	0.42
75	0.42
90	0.42
120	0.42
150	0.42
180	0.42

Pit Dimensions (m)		
Length (m)	2.00	m
Width (m)	0.50	m
Depth	1.10	m
Water		
Start Depth of Water	0.40	m
Depth of Water	0.70	m
75% Full	0.58	m
25% Full	0.93	m
75%-25%	0.35	m
Volume of water (75%-25%)	**0.35**	m3
Area of Drainage	**5.50**	m2
Area of Drainage (75%-25%)	**2.75**	m2
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	**N/A**	min
Time 75% to 25% (sec)	**N/A**	sec



f = Fail m/min or **Fail m/s**

SA01 Sidewall

SA01 Spoil

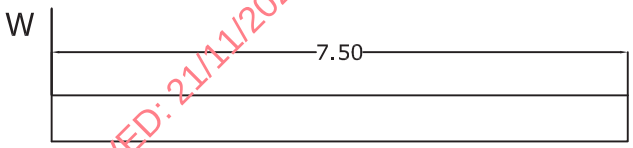
SA02 Sidewall

SA02 Spoil

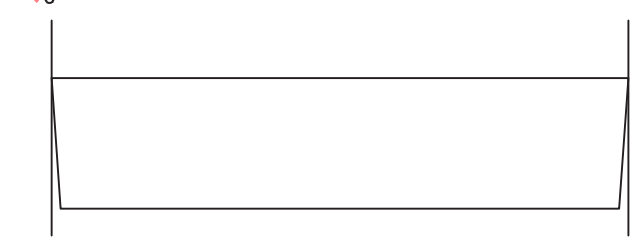
Appendix 4
Slit Trench Logs

ST01

Plan



Cross Section



Services

No:	Diameter:	Colour:	Utility:	Distance:	Depth:	Alignment:
No Services Encountered						

Ground Conditions

From:	To:	Description:
0.00m	0.40m	TOPSOIL.
0.40m	0.90m	Firm brown slightly sandy slightly gravelly silty CLAY with medium cobble content.
0.90m	1.70m	Stiff black slightly sandy slightly gravelly silty CLAY with medium cobble and low boulder content.

Trench Dimensions

Point:	Easting:	Northing:	Level:
Start	520419.46	827458.72	41.81
End	520426.96	827459.50	41.67

Length:	Width:	Depth:
7.50m	0.60m	1.70m

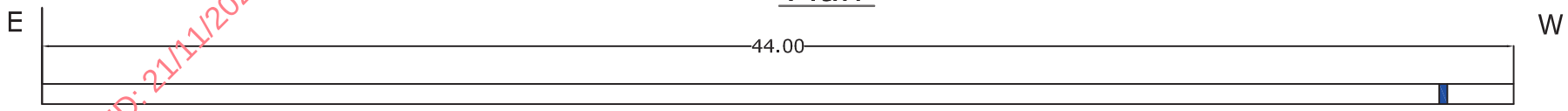
Photographs

SITE INVESTIGATIONS LTD

Project:	Killala Project	Logged by: P. McGonagle	Excavation Started: 29/08/2024	Excavation Finished: 29/08/2024	CONTRACT NUMBER
Client:	Private Client	Scale: NOT TO SCALE, ALL DISTANCES IN m			6344
Consultant:	Clifton Scannell Emerson Associates	DEPTH ARE TO THE TOP OF SERVICES			

ST02

Plan



Cross Section

Services

No:	Diameter:	Colour:	Utility:	Distance:	Depth:	Alignment:
1	225mm	Blue	PVC Water	41.90m	1.40m	90°

Ground Conditions

From:	To:	Description:
0.00m	0.30m	TOPSOIL.
0.30m	0.60m	Stiff brown slightly sandy slightly gravelly silty CLAY with medium cobble content.
0.60m		Obstruction - possible weathered bedrock.

Trench Dimensions

Point:	Easting:	Northing:	Level:
Start	520364.150	827758.250	54.37
Water Pipe	520322.570	827751.260	55.42
End	520320.320	827750.950	56.56

Length:	Width:	Depth:
44.00m	0.60m	1.50m

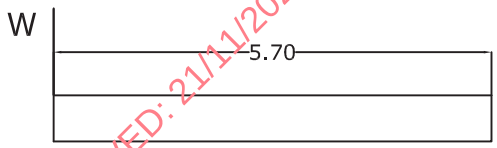
Photographs

SITE INVESTIGATIONS LTD

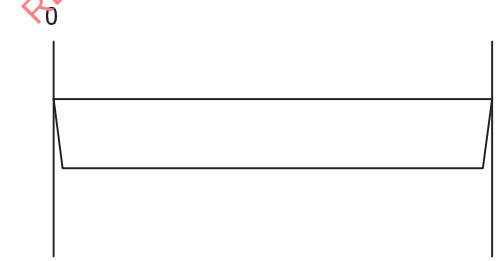
Project:	Killala Project	Logged by: P. McGonagle	Excavation Started: 29/08/2024	Excavation Finished: 29/08/2024	CONTRACT NUMBER
Client:	Private Client	Scale: NOT TO SCALE, ALL DISTANCES IN m			6344
Consultant:	Clifton Scannell Emerson Associates	DEPTH ARE TO THE TOP OF SERVICES			

ST03

Plan



Cross Section



Services

No:	Diameter:	Colour:	Utility:	Distance:	Depth:	Alignment:
No Services Encountered						

Ground Conditions

From:	To:	Description:
0.00m	0.30m	TOPSOIL.
0.30m	0.90m	Firm brown slightly sandy slightly gravelly silty CLAY with low cobble content.
0.90m		Obstruction - possible weathered bedrock.

Trench Dimensions

Point:	Easting:	Northing:	Level:
Start	520398.65	827514.16	44.07
End	520404.49	827513.99	43.32

Length:	Width:	Depth:
5.70m	0.60m	0.90m

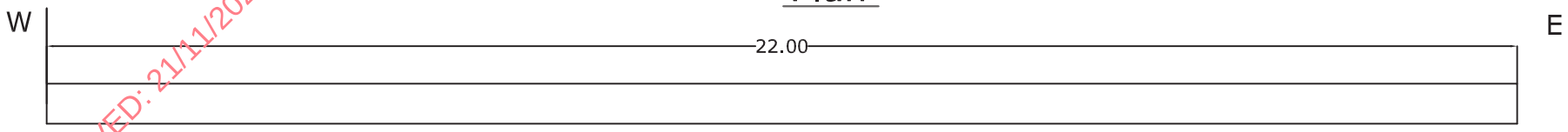
Photographs

SITE INVESTIGATIONS LTD

Project:	Killala Project	Logged by: P. McGonagle	Excavation Started: 29/08/2024	Excavation Finished: 29/08/2024	CONTRACT NUMBER
Client:	Private Client	Scale: NOT TO SCALE, ALL DISTANCES IN m			6344
Consultant:	Clifton Scannell Emerson Associates	DEPTH ARE TO THE TOP OF SERVICES			

ST04

Plan



Cross Section

Services

No:	Diameter:	Colour:	Utility:	Distance:	Depth:	Alignment:
No Services Encountered						

Ground Conditions

From:	To:	Description:
0.00m	0.30m	TOPSOIL.
0.30m	1.10m	Firm brown slightly sandy slightly gravelly silty CLAY with low cobble content.
1.10m		Obstruction - possible weathered bedrock.

Trench Dimensions

Point:	Easting:	Northing:	Level:
Start	520404.36	827512.63	43.26
End	520426.28	827513.55	42.04

Length:	Width:	Depth:
22.00m	0.60m	1.10m

Photographs

SITE INVESTIGATIONS LTD

Project:	Killala Project	Logged by: P. McGonagle	Excavation Started: 29/08/2024	Excavation Finished: 29/08/2024	CONTRACT NUMBER
Client:	Private Client	Scale: NOT TO SCALE, ALL DISTANCES IN m			6344
Consultant:	Clifton Scannell Emerson Associates	DEPTH ARE TO THE TOP OF SERVICES			

Appendix 5

Geotechnical Soil Laboratory Test Results

Classification Tests
In accordance with BS 1377: Part 2

Client	CSEA
Site	Killala Project, Co. Mayo
S.I. File No	6344 / 24
Test Lab	Site Investigations Ltd., Carhugar The Grange, 12th Lock Rd., Lucan Co. Dublin. Tel (01) 6108768 Email:info@siteinvestigations.ie
Report Date	1st October 2024

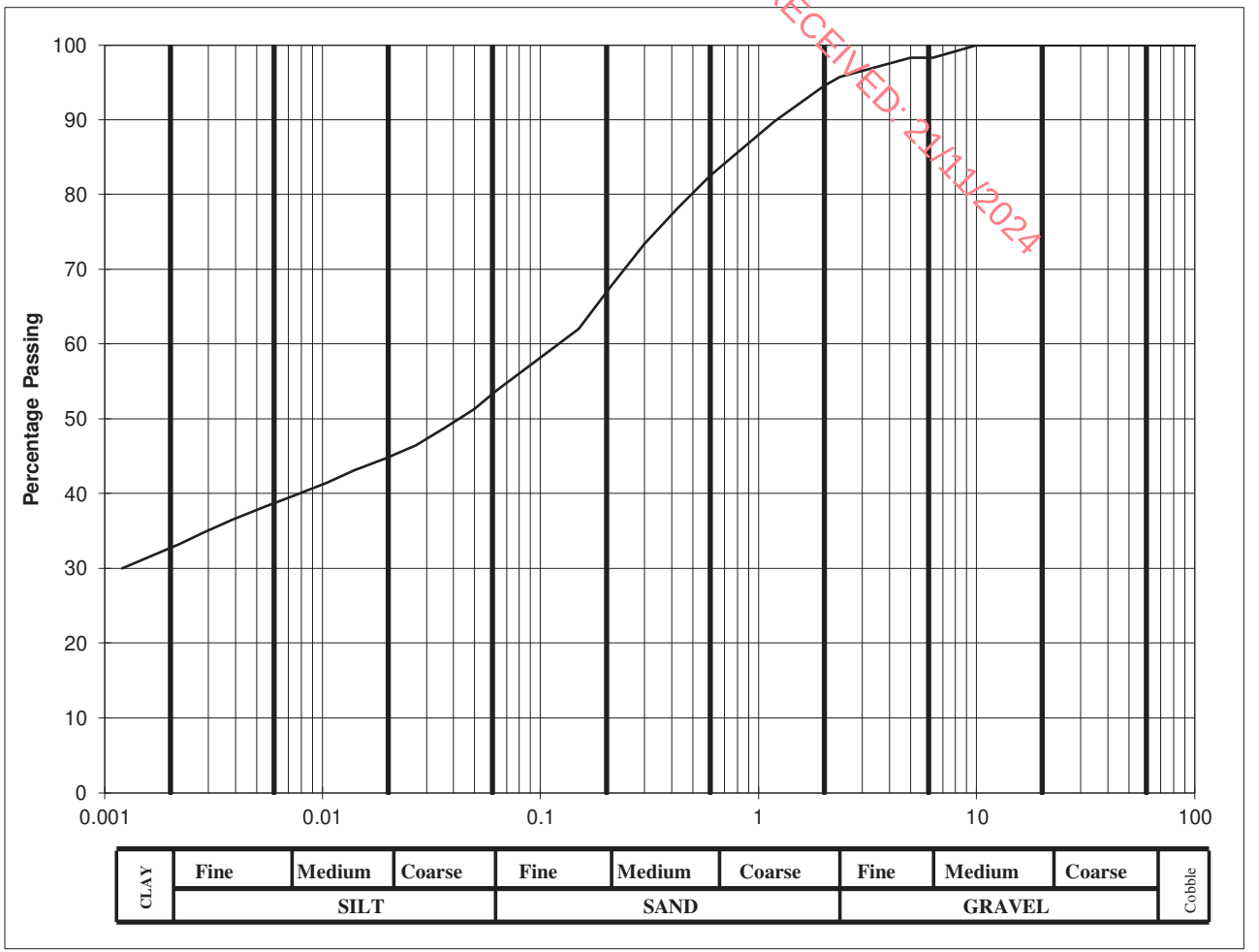
Hole ID	Depth	Sample No	Lab Ref No.	Sample Type	Natural Moisture Content %	Liquid Limit %	Plastic Limit %	Plastic Index %	Max. Density Mg/m^2	Bulk Density Mg/m^3	% passing 425um	Comments	**Remarks** **C**=Clay; **M**=Silt **Plasticity**: **L**=Low; **I**=Intermediate; **H**=High; **V**=Very High; **E**=Extremely High
TP01	1.00	PMc03	24/1275	B	28.9	37	21	16			78.1		CI
TP04	0.40	PMc10	24/1276	B	16.0	27	18	9			30.2		CL

BS 1377 Particle Size Analysis

Site Investigations Limited

BS Sieve size, mm	Percent passing	Hydrometer analysis	
		Diameter, mm	% passing
100	100	**0.0630**	54
90	100	**0.0200**	45
75	100	**0.0060**	39
63	100	**0.0020**	33
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	98.3		
5.0	98.3		
2.36	95.7		
2.00	94.5		
1.18	89.7		
0.600	82.5		
0.425	78.1		
0.300	73.4		
0.212	67.8		
0.150	62		
0.063	54		

Cobbles, %	0
Gravel, %	6
Sand, %	41
Silt, %	21
Clay, %	33



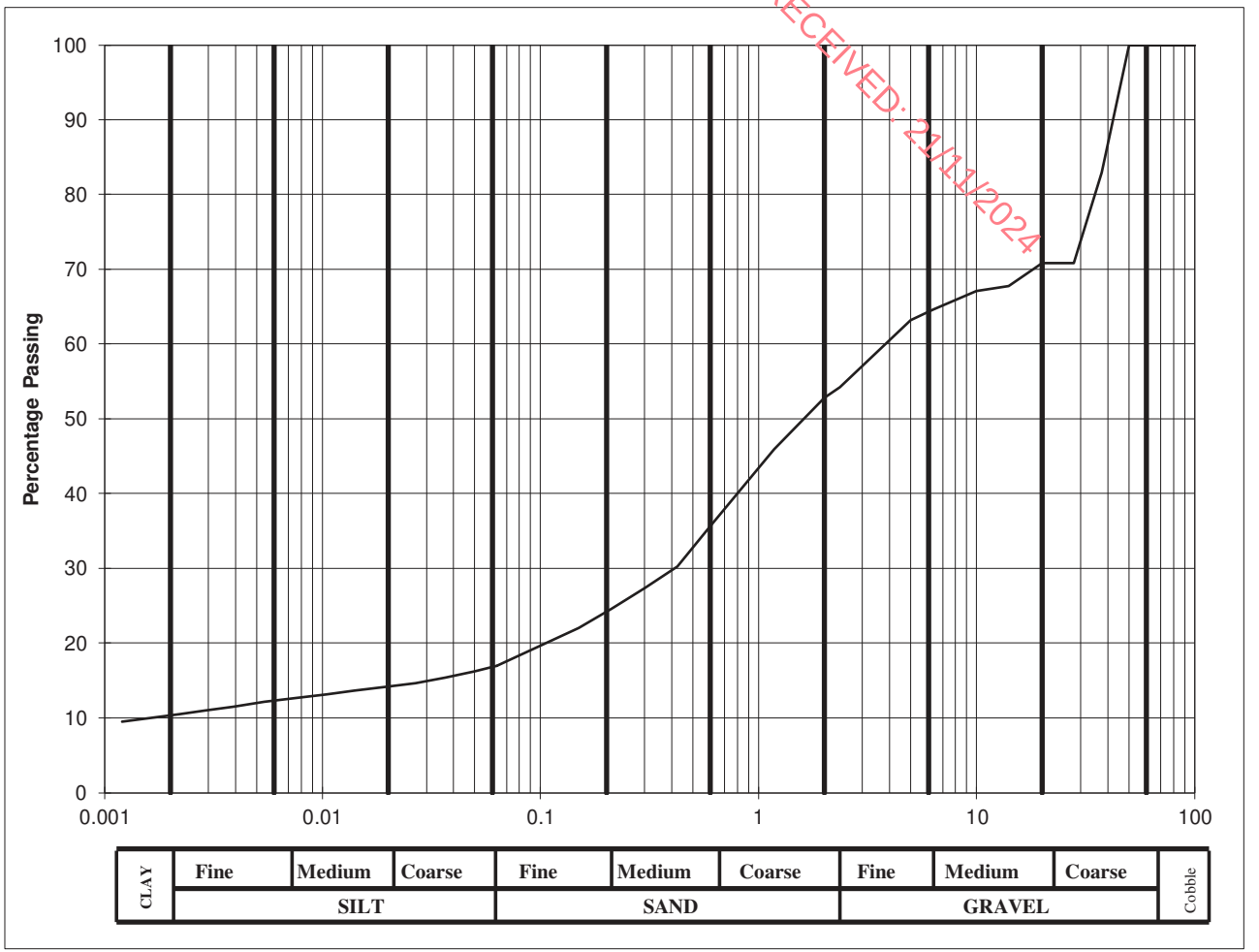
Client :	CSEA	Lab. No :	24/1275	Hole ID :	TP 01
Project :	Killala Project, Co. Mayo	Sample No :	PMc03	Depth, m :	1.00

Material description :	sandy slightly gravelly silty CLAY
Remarks :	Soils with clay or silt content between 15% - 35% can be classified as clay or silt depending on the field Engineers assessment of in-situ behaviour. Where material is for re-use and therefore disturbed, only soils with clay or silt >35% are classified as clay or silt

BS 1377 Particle Size Analysis

Site Investigations Limited

BS Sieve size, mm	Percent passing	Hydrometer analysis	
		Diameter, mm	% passing
100	100	**0.0630**	17
90	100	**0.0200**	14
75	100	**0.0060**	13
63	100	**0.0020**	11
50	100		
37.5	82.9		
28	70.8		
20	70.8		
14	67.7		
10	67.1		
6.3	64.6		
5.0	63.2		
2.36	54.2		
2.00	52.8		
1.18	45.9		
0.600	35.6		
0.425	30.2		
0.300	27.3		
0.212	24.6		
0.150	22		
0.063	17		



Cobbles, %	0
Gravel, %	47
Sand, %	36
Silt, %	6
Clay, %	11

Client :	CSEA
Project :	Killala Project, Co. Mayo

Lab. No :	24/1276
Sample No :	PMc10

Hole ID :	TP 04
Depth, m :	0.40

Material description :	sandy gravelly silty CLAY
Remarks :	Soils with clay or silt content between 15% - 35% can be classified as clay or silt depending on the field Engineers assessment of in-situ behaviour. Where material is for re-use and therefore disturbed, only soils with clay or silt >35% are classified as clay or silt

California Bearing Ratio (CBR) In accordance with BS1377: Part 4: Method 7

Client	CSEA
Site	Killala Project, Co. Mayo
S.I. File No	6344 / 24
Test Lab	Site Investigations Ltd., Carhugar The Grange, 12th Lock Rd., Lucan Co. Dublin. Tel (01) 6108768 Email info@siteinvestigations.ie
Report Date	1st October 2024

CBR No	Depth (mBGL)	Sample No	Sample Type	Lab Ref	Moisture Content (%)	CBR Value (%)	Location / Remarks
TP01	1.00	PMc03	B	24/1275	28.9	6.4	
TP02	0.50	PMc20	CBR	24/1277	22.6	5.8	
TP04	0.40	PMc10	B	24/1276	16.0	9.4	
TP05	0.30	PMc21	CBR	24/1278	13.2	10.2	

Dry Density / Moiture Content relationship in accordance with BS 1377 : Part 4

Client	CSEA
Site	Killala Project, Co. Mayo
S.I.File No	6344 / 24
Test Lab	Site Investigations Ltd., Carhugar, The Grange, 12th Lock Rd., Lucan, Co. Dublin Tel 01 6108768
Report Date	1st October 2024

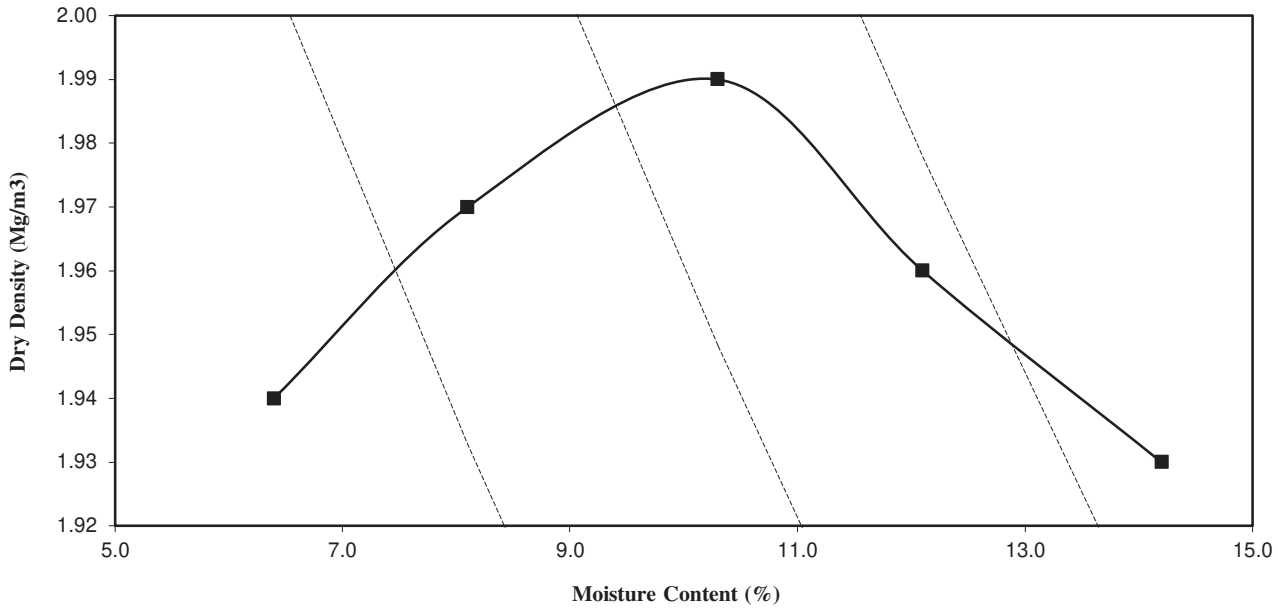
Hole Id:	TP01
Depth (mBGL):	1.00
Lab Ref:	24/1275
Sample No	PMc03

Particle Density
2.6
Assumed

Natural Moisture Content (%)	28.9
Rammer Used	2.5Kg
Maximum Dry Density (Mg/m^3)	1.99
Optimum Moisture Content (%)	10.1

Point Number	**1**	**2**	**3**	**4**	**5**
Moisture content	6.4	8.1	10.3	12.1	14.2
Dry Density (Mg/m3)	1.94	1.97	1.99	1.96	1.93

Material Description
sandy slightly gravelly silty CLAY



Dry Density / Moiture Content relationship in accordance with BS 1377 : Part 4

Client	CSEA
Site	Killala Project, Co. Mayo
S.I.File No	6344 / 24
Test Lab	Site Investigations Ltd., Carhugar, The Grange, 12th Lock Rd., Lucan, Co. Dublin Tel 01 6108768
Report Date	1st October 2024

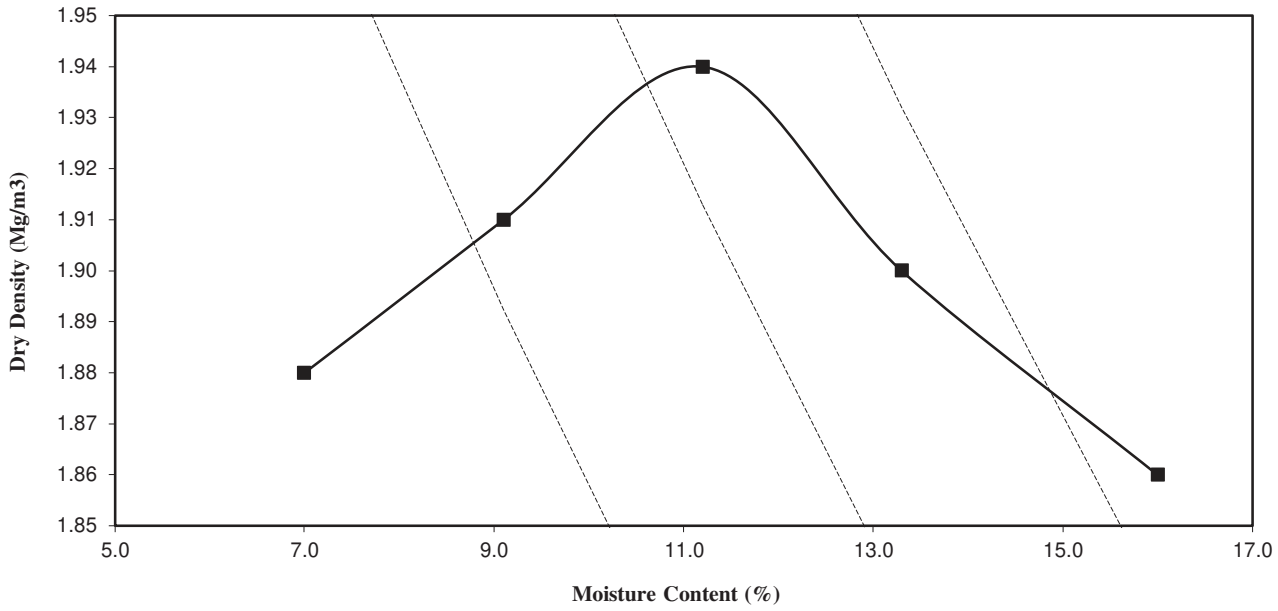
Hole Id:	TP04
Depth (mBGL):	0.40
Lab Ref:	24/1276
Sample No	PMc10

Particle Density
2.6
Assumed

Natural Moisture Content (%)	16
Rammer Used	2.5Kg
Maximum Dry Density (Mg/m^3)	1.94
Optimum Moisture Content (%)	11.1

Point Number	**1**	**2**	**3**	**4**	**5**
Moisture content	7.0	9.1	11.2	13.3	16.0
Dry Density (Mg/m3)	1.88	1.91	1.94	1.90	1.86

Material Description
sandy gravelly silty CLAY



Chemical Testing
In accordance with BS 1377: Part 3

Client	CSEA
Site	Killala Project, Co. Mayo
S.I. File No	6344 / 24
Test Lab	Site Investigations Ltd., Carhugar The Grange, 12th Lock Rd., Lucan Co. Dublin. Tel (01) 6108768 Email:info@siteinvestigations.ie
Report Date	1st October 2024

Hole Id	Depth (mBGL)	Sample No	Lab Ref	pH Value	Water Soluble Sulphate Content (2:1 Water-soil extract) (SO_3) g/L	Water Soluble Sulphate Content (2:1 Water-soil extract) (SO_3) %	Acid Soluble Sulphate Content (2:1 Water-soil extract) (SO_3) g/L	Acid Soluble Sulphate Content (2:1 Water-soil extract) (SO_3) %	Chloride ion Content (water:soil ratio 2:1) %	% passing 2mm
TP01	1.00	PMc03	24/1275	8.20	0.122	0.064	0.152	0.080		52.8
TP04	0.40	PMc10	24/1276	8.07	0.129	0.122	0.161	0.152		94.5

Appendix 6

Geotechnical Rock Laboratory Test Results

Point Load Test Broch,E. & Franklin,J.A.,IRSM Point Load Test Method

Uniaxial Compressive Strength in accordance with BS1881

Client	CSEA
Site	Killala Project, Co. Mayo
S.I. File No	6344 / 24
Test Lab	Site Investigations Ltd., Carhugar The Grange, 12th Lock Rd., Lucan Co. Dublin. Tel (01) 6108768 Email:info@siteinvestigations.ie
Report Date	1st October 2024

Hole ID	Depth From (m)	Depth To (m)	Lab Ref No.	Sample Type	Diameter / Height (mm)	Test Type	Is (MN/m^2)	Compressive Strength (MPa)	Strength Designation	Approx. Equivalent UCS Value (MPa)	Remarks
BH02	1.90	1.90	24/1277	C	64	PL	2.69		Strong	68.0	Tested Diametrically
BH02	2.60	2.70	24/1278	C	64 /120	UCS		88.5	Strong		Tested Axially
BH03	2.10	2.10	24/1279	C	64	PL	3.91		Strong	98.5	Tested Diametrically
BH03	3.20	3.30	24/1280	C	64 /120	UCS		77.0	Strong		Tested Axially

Appendix 7

Environmental Laboratory Test Results

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

Site Investigations Ltd
The Grange
Carhugar
12th Lock Road
Lucan
Co. Dublin

Attention: Stephen Letch

CERTIFICATE OF ANALYSIS

Date of report Generation:	23 September 2024
Customer:	Site Investigations Ltd
Sample Delivery Group (SDG):	240909-55
Your Reference:	6344
Location:	Kilalla Project
Report No:	741484
Order Number:	34/B/24

We received 1 sample on Monday September 09, 2024 and 1 of these samples were scheduled for analysis which was completed on Monday September 23, 2024. 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:

Lauren Ellis
General Manager Western Europe Environmental

1291

CERTIFICATE OF ANALYSIS

SDG: 240909-55 Report Number: 741484 Superseded Report:
Client Ref.: 6344 Location: Kilalla Project

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
30336685	TP 03		0.50 - 0.50	04/09/2024

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

Validated

CERTIFICATE OF ANALYSIS

SDG: 240909-55 **Report Number:** 741484 **Superseded Report:**
Client Ref.: 6344 **Location:** Kilalla Project

RECEIVED: 21/11/2024

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)			30336685		
Customer Sample Reference			TP 03		
AGS Reference					
Depth (m)			0.50 - 0.50		
Container			1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type			S	S	S
Anions by Kone (w)	All	NDPs: 0 Tests: 1	X		
CEN Readings	All	NDPs: 0 Tests: 1	X		
Chromium III	All	NDPs: 0 Tests: 1		X	
Coronene	All	NDPs: 0 Tests: 1		X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1	X		
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 1	X		
EPH by GCxGC-FID	All	NDPs: 0 Tests: 1		X	
EPH CWG GC (S)	All	NDPs: 0 Tests: 1		X	
Fluoride	All	NDPs: 0 Tests: 1	X		
GRO by GC-FID (S)	All	NDPs: 0 Tests: 1			X
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 1		X	
Loss on Ignition in soils	All	NDPs: 0 Tests: 1		X	
Mercury Dissolved	All	NDPs: 0 Tests: 1	X		
Metals in solid samples by OES	All	NDPs: 0 Tests: 1		X	
PAH 16 & 17 Calc	All	NDPs: 0 Tests: 1		X	

CERTIFICATE OF ANALYSIS

SDG: 240909-55 **Report Number:** 741484 **Superseded Report:**
Client Ref.: 6344 **Location:** Kilalla Project

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)			30336685		
Customer Sample Reference			TP 03		
AGS Reference					
Depth (m)			0.50 - 0.50		
Container			1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type			S	S	S
PAH by GCMS	All	NDPs: 0 Tests: 1		X	
PCBs by GCMS	All	NDPs: 0 Tests: 1		X	
pH	All	NDPs: 0 Tests: 1		X	
pH Value of Filtered Water	All	NDPs: 0 Tests: 1	X		
Phenols by HPLC (W)	All	NDPs: 0 Tests: 1	X		
Sample description	All	NDPs: 0 Tests: 1		X	
Total Organic Carbon	All	NDPs: 0 Tests: 1		X	
TPH CWG GC (S)	All	NDPs: 0 Tests: 1		X	
VOC MS (S)	All	NDPs: 0 Tests: 1			X

CERTIFICATE OF ANALYSIS

SDG: 240909-55 Report Number: 741484 Superseded Report:
Client Ref.: 6344 Location: Kilalla Project

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
30336685	TP 03	0.50 - 0.50	Dark Brown	Loamy Sand	Stones	Vegetation

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

CERTIFICATE OF ANALYSIS

SDG: 240909-55 **Report Number:** 741484 **Superseded Report:**
Client Ref.: 6344 **Location:** Kilalla Project

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.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
(F)	Trigger breach confirmed
1-4+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	
			Depth (m)	0.50 - 0.50
			Sample Type	Soil/Solid (S)
			Date Sampled	04/09/2024
			Sample Time	-
			Date Received	09/09/2024
			SDG Ref	240909-55
			Lab Sample No.(s)	30336685
			AGS Reference	
Moisture Content Ratio (% of as received sample)	%	PM024	25	
Loss on ignition	<0.7 %	TM018	6.36	M
Organic Carbon, Total	<0.2 %	TM132	1.58	M
pH	1 pH Units	TM133	8.21	M
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6	M
PCB congener 28	<3 µg/kg	TM168	<3	M
PCB congener 52	<3 µg/kg	TM168	<3	M
PCB congener 101	<3 µg/kg	TM168	<3	M
PCB congener 118	<3 µg/kg	TM168	<3	M
PCB congener 138	<3 µg/kg	TM168	<3	M
PCB congener 153	<3 µg/kg	TM168	<3	M
PCB congener 180	<3 µg/kg	TM168	<3	M
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168	<21	
Chromium, Trivalent	<0.9 mg/kg	TM181	18.8	
Antimony	<0.6 mg/kg	TM181	<0.6	#
Arsenic	<0.6 mg/kg	TM181	11.6	M
Barium	<0.6 mg/kg	TM181	29.1	#
Cadmium	<0.02 mg/kg	TM181	1.36	M
Chromium	<0.9 mg/kg	TM181	18.8	M
Copper	<1.4 mg/kg	TM181	15.3	M
Lead	<0.7 mg/kg	TM181	10	M
Mercury	<0.1 mg/kg	TM181	<0.1	M
Molybdenum	<0.1 mg/kg	TM181	4.5	#
Nickel	<0.2 mg/kg	TM181	46.5	M
Selenium	<1 mg/kg	TM181	1.37	#
Zinc	<1.9 mg/kg	TM181	112	M
PAH Total 17 (inc Coronene) Moisture Corrected	<10 mg/kg	TM410	<10	
Coronene	<200 µg/kg	TM410	<200	
Mineral Oil >C10-C40 (EH_2D_AL)	<5 mg/kg	TM415	<5	

CERTIFICATE OF ANALYSIS

SDG: 240909-55 Report Number: 741484 Superseded Report:
Client Ref.: 6344 Location: Kilalla Project

PAH by GCMS

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.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
- (F) Trigger breach confirmed
- 1-4♦§@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	
			Depth (m)	0.50 - 0.50
			Sample Type	Soil/Solid (S)
			Date Sampled	04/09/2024
			Sample Time	-
			Date Received	09/09/2024
			SDG Ref	240909-55
			Lab Sample No.(s)	30336685
			AGS Reference	
Naphthalene	<9 µg/kg	TM218	<9 @ M	
Acenaphthylene	<12 µg/kg	TM218	<12 @ M	
Acenaphthene	<8 µg/kg	TM218	<8 @ M	
Fluorene	<10 µg/kg	TM218	<10 @ M	
Phenanthrene	<15 µg/kg	TM218	<15 @ M	
Anthracene	<16 µg/kg	TM218	<16 @ M	
Fluoranthene	<17 µg/kg	TM218	<17 @ M	
Pyrene	<15 µg/kg	TM218	<15 @ M	
Benz(a)anthracene	<14 µg/kg	TM218	<14 @ M	
Chrysene	<10 µg/kg	TM218	<10 @ M	
Benzo(b)fluoranthene	<15 µg/kg	TM218	<15 @ M	
Benzo(k)fluoranthene	<14 µg/kg	TM218	<14 @ M	
Benzo(a)pyrene	<15 µg/kg	TM218	<15 @ M	
Indeno(1,2,3-cd)pyrene	<18 µg/kg	TM218	<18 @ M	
Dibenzo(a,h)anthracene	<23 µg/kg	TM218	<23 @ M	
Benzo(g,h,i)perylene	<24 µg/kg	TM218	<24 @ M	
PAH, Total Detected USEPA 16	<118 µg/kg	TM218	<118	

CERTIFICATE OF ANALYSIS

SDG: 240909-55 Report Number: 741484 Superseded Report:
Client Ref.: 6344 Location: Kilalla Project

TPH CWG (S)

Results Legend
- # ISO17025 accredited.
- M mCERTS accredited.
- aq Aqueous / settled sample.
- diss.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
- (F) Trigger breach confirmed
- 1-4+§@ Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.					
			TP 03					
Depth (m)			0.50 - 0.50					
Sample Type			Soil/Solid (S)					
Date Sampled			04/09/2024					
Sample Time			-					
Date Received			09/09/2024					
SDG Ref			240909-55					
Lab Sample No.(s)			30336685					
AGS Reference								
GRO Surrogate % recovery**	%	TM089	99.6					
Aliphatics >C5-C6 (HS_1D_AL)	<10 µg/kg	TM089	<10					
Aliphatics >C6-C8 (HS_1D_AL)	<10 µg/kg	TM089	<10					
Aliphatics >C8-C10 (HS_1D_AL)	<10 µg/kg	TM089	<10					
Aliphatics >C10-C12 (EH_2D_AL_#1)	<1000 µg/kg	TM414	<1000 #					
Aliphatics >C12-C16 (EH_2D_AL_#1)	<1000 µg/kg	TM414	<1000 #					
Aliphatics >C16-C21 (EH_2D_AL_#1)	<1000 µg/kg	TM414	<1000 #					
Aliphatics >C21-C35 (EH_2D_AL_#1)	<1000 µg/kg	TM414	1550 #					
Aliphatics >C35-C44 (EH_2D_AL_#1)	<1000 µg/kg	TM414	<1000					
Total Aliphatics >C10-C44 (EH_2D_AR_#1)	<5000 µg/kg	TM414	<5000					
Total Aliphatics & Aromatics >C10-C44 (EH_2D_Total_#1)	<10000 µg/kg	TM414	<10000					
Aromatics >EC5-EC7 (HS_1D_AR)	<10 µg/kg	TM089	<10					
Aromatics >EC7-EC8 (HS_1D_AR)	<10 µg/kg	TM089	<10					
Aromatics >EC8-EC10 (HS_1D_AR)	<10 µg/kg	TM089	<10					
Aromatics > EC10-EC12 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000 #					
Aromatics > EC12-EC16 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000 #					
Aromatics > EC16-EC21 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000 #					
Aromatics > EC21-EC35 (EH_2D_AR_#1)	<1000 µg/kg	TM414	2240 #					
Aromatics >EC35-EC44 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000					
Aromatics > EC40-EC44 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000					
Total Aromatics > EC10-EC44 (EH_2D_AR_#1)	<5000 µg/kg	TM414	<5000					
Total Aliphatics & Aromatics >C5-C44 (EH_2D_Total_#1+HS_1D_Total)	<10000 µg/kg	TM414	<10000					
GRO >C5-C6 (HS_1D)	<20 µg/kg	TM089	<20					
GRO >C6-C7 (HS_1D)	<20 µg/kg	TM089	<20					
GRO >C7-C8 (HS_1D)	<20 µg/kg	TM089	<20					
GRO >C8-C10 (HS_1D)	<20 µg/kg	TM089	<20					
GRO >C10-C12 (HS_1D)	<20 µg/kg	TM089	<20					
Total Aliphatics >C5-C10 (HS_1D_AL_TOTAL)	<50 µg/kg	TM089	<50					
Total Aromatics >EC5-EC10 (HS_1D_AR_TOTAL)	<50 µg/kg	TM089	<50					
GRO >C5-C10 (HS_1D_TOTAL)	<20 µg/kg	TM089	<20					

CERTIFICATE OF ANALYSIS

SDG: 240909-55 Report Number: 741484 Superseded Report:
Client Ref.: 6344 Location: Kilalla Project

VOC MS (S)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.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
(F)	Trigger breach confirmed
1-4+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	
			TP 03	
			Depth (m)	0.50 - 0.50
			Sample Type	Soil/Solid (S)
			Date Sampled	04/09/2024
			Sample Time	-
			Date Received	09/09/2024
			SDG Ref	240909-55
			Lab Sample No.(s)	30336685
			AGS Reference	
Dibromofluoromethane**	%	TM116	119	
Toluene-d8**	%	TM116	102	
4-Bromofluorobenzene**	%	TM116	78.6	
Methyl Tertiary Butyl Ether	<0.5 µg/kg	TM116	<0.5 M	
Benzene	<1 µg/kg	TM116	<1 M	
Toluene	<1 µg/kg	TM116	4.18 M	
Ethylbenzene	<1 µg/kg	TM116	<1 M	
p/m-Xylene	<2 µg/kg	TM116	5.47 #	
o-Xylene	<2 µg/kg	TM116	<2 M	

Validated

CERTIFICATE OF ANALYSIS

SDG: 240909-55 | Report Number: 741484 | Superseded Report:
Client Ref.: 6344 | Location: Kilalla Project

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

RECEIVED: 21/11/2024

Client Reference		**Site Location**	Kilalla Project
Mass Sample taken (kg)	0.120	**Natural Moisture Content (%)**	33.1
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	74.8
Particle Size <4mm	>95%		

Case	
SDG	240909-55
Lab Sample Number(s)	30336685
Sampled Date	04-Sep-2024
Customer Sample Ref.	TP 03
Depth (m)	0.50 - 0.50

Solid Waste Analysis	**Result**	**Landfill Waste Acceptance Criteria Limits**		
		Inert Waste Landfill	**Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon (%)	1.58	3	5	6
Loss on Ignition (%)	6.36	-	-	10
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg) (EH_2D_AL)	<5	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.21	-	>6	-
ANC to pH 6 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

Eluate Analysis	**C_2 Concⁿ in 10:1 eluate (mg/l)**		**A_2 10:1 concⁿ leached (mg/kg)**		**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Arsenic	<0.0005	<0.0005	<0.005	<0.005	0.5	2	25
Barium	0.00374	<0.0002	0.0374	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.00229	<0.0003	0.0229	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	<0.003	<0.003	<0.03	<0.03	0.5	10	30
Nickel	0.00196	<0.0004	0.0196	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<0.002	0.5	10	50
Antimony	<0.001	<0.001	<0.01	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.00125	<0.001	0.0125	<0.01	4	50	200
Chloride	<2	<2	<20	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	<2	<2	<20	<20	1000	20000	50000
Total Dissolved Solids	147	<10	1470	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	7	<3	70	<30	500	800	1000

Leach Test Information

Date Prepared	10-Sep-2024
pH (pH Units)	8.47
Conductivity (µS/cm)	192
Volume Leachant (Litres)	0.870

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Leachates prepared in accordance with BS EN 12457 will be carried out at room temperature (20±5°C)
Stated limits are for guidance only and ALS Laboratories (UK) Limited cannot be held responsible for any discrepancies with current legislation

23/09/2024 16:22:00

16:21:50 23/09/2024

Table of Results - Appendix

Method No	Description
TM104	Determination of Fluoride using the Kone Analyser
TM183	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM414	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID
TM089	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM151	Determination of Hexavalent Chromium using Kone analyser
TM181	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
PM024	Soil preparation including homogenisation, moisture, screens of soils for Asbestos Containing Material
PM115	Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM018	Determination of Loss on Ignition
TM090	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM116	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	ELTRA CS800 Operators Guide
TM133	Determination of pH in Soil and Water using the GLpH pH Meter
TM259	Determination of Phenols in Waters and Leachates by HPLC
TM410	Determination of Coronene in soils by GCMS
TM152	Analysis of Aqueous Samples by ICP-MS
TM168	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils
TM218	The determination of PAH in soil samples by GC-MS
TM256	Determination of pH, EC, TDS and Alkalinity in Aqueous samples
TM415	Determination of Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.

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

CERTIFICATE OF ANALYSIS

SDG: 240909-55 Report Number: 741484 Superseded Report:
Client Ref.: 6344 Location: Kilalla Project

Test Completion Dates

Lab Sample No(s)	30336685
Customer Sample Ref.	TP 03
AGS Ref.	
Depth	0.50 - 0.50
Type	Soil/Solid (S)
Anions by Kone (w)	12-Sep-2024
CEN 10:1 Leachate (1 Stage)	11-Sep-2024
CEN Readings	13-Sep-2024
Chromium III	16-Sep-2024
Coronene	13-Sep-2024
Dissolved Metals by ICP-MS	13-Sep-2024
Dissolved Organic/Inorganic Carbon	13-Sep-2024
EPH by GCxGC-FID	13-Sep-2024
EPH CWG GC (S)	12-Sep-2024
Fluoride	12-Sep-2024
GRO by GC-FID (S)	11-Sep-2024
Hexavalent Chromium (s)	11-Sep-2024
Loss on Ignition in soils	13-Sep-2024
Mercury Dissolved	13-Sep-2024
Metals in solid samples by OES	23-Sep-2024
Moisture at 105C	10-Sep-2024
PAH 16 & 17 Calc	18-Sep-2024
PAH by GCMS	18-Sep-2024
PCBs by GCMS	12-Sep-2024
pH	13-Sep-2024
pH Value of Filtered Water	13-Sep-2024
Phenols by HPLC (W)	13-Sep-2024
Sample description	10-Sep-2024
Total Organic Carbon	16-Sep-2024
TPH CWG GC (S)	12-Sep-2024
VOC MS (S)	11-Sep-2024

Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) 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 for 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.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials and soils are obtained from supplied bulk materials andd 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 Anthophyllite	-
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.

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.

Appendix 8

Waste Classification Report

HazWasteOnline™

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

a) understand the origin of the waste
b) select the correct List of Waste code(s)
c) confirm that the list of determinands, results and sampling plan are fit for purpose
d) select and justify the chosen metal species (Appendix B)
e) correctly apply moisture correction and other available corrections
f) add the meta data for their user-defined substances (Appendix A)
g) check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

3DU3B-4WR1X-WY9C8

Job name

6344

Description/Comments

Client: Private Client
Engineer: Clifton Scannell Emerson Associates

Project

Killala Project

Site

Killala, Co. Mayo

Classified by

Name:
Stephen Letch
Date:
03 Oct 2024 13:52 GMT
Telephone:
00353 86817 9449

Company:
Site Investigations Ltd
The Grange
12th Lock Road
Lucan
K78 F598

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification: **CERTIFIED**

Course	Date
Hazardous Waste Classification	09 Oct 2019
Most recent 3 year Refresher	04 Oct 2022

Next 3 year Refresher due by Oct 2025

Purpose of classification

2 - Material Characterisation

Address of the waste

Killala Project, Killala, Co. Mayo **Post Code** N/A

SIC for the process giving rise to the waste

43130 Test drilling and boring

Description of industry/producer giving rise to the waste

Site Investigation

Description of the specific process, sub-process and/or activity that created the waste

Soils recovered for environmental testing

Description of the waste

Natural soils

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	WAC Results		Page
					Inert	Non Haz	
1	TP03-0.50	0.50	Non Hazardous		Pass	Pass	3

Related documents

#	Name	Description
1	240909-55.hwol	ALS Hawarden .hwol file used to populate the Job
2	Rilta Suite NEW	waste stream template used to create this Job

WAC results

WAC Settings: samples in this Job constitute a single population.

WAC limits used to evaluate the samples in this Job: "Ireland"
The WAC used in this report are the WAC defined for the inert and non-hazardous classes of landfill in the Republic of Ireland. You should check the actual acceptance criteria when the disposal site is identified as they may differ from the generic WAC used in this report.

Report

Created by: Stephen Letch

Created date: 03 Oct 2024 13:52 GMT

Classification of sample: TP03-0.50

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP03-0.50
Sample Depth:
0.50 m
Moisture content:
25%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 25% Wet Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		**<LOD**
2	confirm TPH has NOT arisen from diesel or petrol					☑					
3	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<0.6 mg/kg	1.197	<0.718 mg/kg	<0.0000718 %		**<LOD**
4	arsenic { arsenic pentoxide }	033-004-00-6	215-116-9	1303-28-2		11.6 mg/kg	1.534	13.345 mg/kg	0.00133 %	✓	
5	barium { barium sulphide }	016-002-00-X	244-214-4	21109-95-5		29.1 mg/kg	1.233	26.921 mg/kg	0.00269 %	✓	
6	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		1.36 mg/kg	1.855	1.892 mg/kg	0.000189 %	✓	
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		15.3 mg/kg	1.126	12.92 mg/kg	0.00129 %	✓	
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	10 mg/kg		7.5 mg/kg	0.00075 %	✓	
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		**<LOD**
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		4.5 mg/kg	1.5	5.063 mg/kg	0.000506 %	✓	
11	nickel { nickel sulfate }	028-009-00-5	232-104-9	7786-81-4		46.5 mg/kg	2.637	91.954 mg/kg	0.0092 %	✓	
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				1.37 mg/kg	1.405	1.444 mg/kg	0.000144 %	✓	
13	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		112 mg/kg	2.469	207.421 mg/kg	0.0207 %	✓	
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		18.8 mg/kg	1.462	20.608 mg/kg	0.00206 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
15		chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.6	mg/kg	1.923	<1.154	mg/kg	<0.000115 %		<LOD
		024-001-00-0	215-607-8	1333-82-0									
16		naphthalene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
		601-052-00-2	202-049-5	91-20-3									
17		acenaphthylene				<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<LOD
			205-917-1	208-96-8									
18		acenaphthene				<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		<LOD
			201-469-6	83-32-9									
19		fluorene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
			201-695-5	86-73-7									
20		phenanthrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
			201-581-5	85-01-8									
21		anthracene				<0.016	mg/kg		<0.016	mg/kg	<0.0000016 %		<LOD
			204-371-1	120-12-7									
22		fluoranthene				<0.017	mg/kg		<0.017	mg/kg	<0.0000017 %		<LOD
			205-912-4	206-44-0									
23		pyrene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
			204-927-3	129-00-0									
24		benzo[a]anthracene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
25		chrysene				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
26		benzo[b]fluoranthene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
27		benzo[k]fluoranthene				<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
28		benzo[a]pyrene; benzo[def]chrysene				<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
29		indeno[123-cd]pyrene				<0.018	mg/kg		<0.018	mg/kg	<0.0000018 %		<LOD
			205-893-2	193-39-5									
30		dibenz[a,h]anthracene				<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
31		benzo[ghi]perylene				<0.024	mg/kg		<0.024	mg/kg	<0.0000024 %		<LOD
			205-883-8	191-24-2									
32		polychlorobiphenyls; PCB				<0.021	mg/kg		<0.021	mg/kg	<0.0000021 %		<LOD
		602-039-00-4	215-648-1	1336-36-3									
33		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.0005	mg/kg		<0.0005	mg/kg	<0.00000005 %		<LOD
		603-181-00-X	216-653-1	1634-04-4									
34		benzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
35		toluene				0.0041	mg/kg		0.0031	mg/kg	0.000000314 %	✓	
		601-021-00-3	203-625-9	108-88-3									
36		ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<LOD
		601-023-00-4	202-849-4	100-41-4									
37		coronene				<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
			205-881-7	191-07-1									
38		pH				8.21	pH		8.21	pH	8.21 pH		
				PH									
39		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]				0.0054	mg/kg		0.0041	mg/kg	0.00000041 %	✓	
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
										Total:	0.0402 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"
Force this Hazardous Property to non-hazardous for cumulative determinand results below the threshold of: 1000 mg/kg (0.1%) because: HP 3 can be discounted as this is a solid waste without a free draining liquid phase.

Hazard Statements hit:

Flam. Liq. 2; H225 "Highly flammable liquid and vapour."

Because of determinand:

toluene: (conc.: 3.14e-07%)

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]: (conc.: 4.1e-07%)

WAC results for sample: TP03-0.50

WAC Settings: samples in this Job constitute a single population.

WAC limits used to evaluate this sample: "Ireland"
The WAC used in this report are the WAC defined for the inert and non-hazardous classes of landfill in the Republic of Ireland. You should check the actual acceptance criteria when the disposal site is identified as they may differ from the generic WAC used in this report.

The sample PASSES the Inert (Inert waste landfill) criteria.

The sample PASSES the Non Haz (Non hazardous waste landfill) criteria.

WAC Determinands

Solid Waste Analysis				Landfill Waste Acceptance Criteria Limits	
#	Determinand		User entered data	Inert waste landfill	Non hazardous waste landfill
1	TOC (total organic carbon)	%	1.58	3	5
2	LOI (loss on ignition)	%	6.36	-	-
3	BTEX (benzene, toluene, ethylbenzene and xylenes)	mg/kg	0.0096	6	-
4	PCBs (polychlorinated biphenyls, 7 congeners)	mg/kg	<0.021	1	-
5	Mineral oil (C10 to C40)	mg/kg	<5	500	-
6	PAHs (polycyclic aromatic hydrocarbons)	mg/kg	<10	100	-
7	pH	pH	8.21	-	>6
8	ANC (acid neutralisation capacity)	mol/kg		-	-
Eluate Analysis 10:1					
9	arsenic	mg/kg	<0.005	0.5	2
10	barium	mg/kg	0.0374	20	100
11	cadmium	mg/kg	<0.0008	0.04	1
12	chromium	mg/kg	<0.01	0.5	10
13	copper	mg/kg	0.0229	2	50
14	mercury	mg/kg	<0.0001	0.01	0.2
15	molybdenum	mg/kg	<0.03	0.5	10
16	nickel	mg/kg	0.0196	0.4	10
17	lead	mg/kg	<0.002	0.5	10
18	antimony	mg/kg	<0.01	0.06	0.7
19	selenium	mg/kg	<0.01	0.1	0.5
20	zinc	mg/kg	0.0125	4	50
21	chloride	mg/kg	<20	800	15,000
22	fluoride	mg/kg	<5	10	150
23	sulphate	mg/kg	<20	1,000	20,000
24	phenol index	mg/kg	<0.16	1	-
25	DOC (dissolved organic carbon)	mg/kg	70	500	800
26	TDS (total dissolved solids)	mg/kg	1470	4,000	60,000

Key

User supplied data

Appendix A: Classifier defined and non EU CLP determinands

TPH (C6 to C40) petroleum group (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3; H226 , Asp. Tox. 1; H304 , STOT RE 2; H373 , Muta. 1B; H340 , Carc. 1B; H350 , Repr. 2; H361d , Aquatic Chronic 2; H411

confirm TPH has NOT arisen from diesel or petrol

Description/Comments: Chapter 3, section 4b requires a positive confirmation for benzo[a]pyrene to be used as a marker in evaluating Carc. 1B; H350 (HP 7) and Muta. 1B; H340 (HP 11)
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

barium sulphide (EC Number: 244-214-4, CAS Number: 21109-95-5)

EU CLP index number: 016-002-00-X
Description/Comments:
Additional Hazard Statement(s): EUH031 >= 0.8 %
Reason for additional Hazards Statement(s):
14 Dec 2015 - EUH031 >= 0.8 % hazard statement sourced from: WM3, Table C12.2

lead compounds with the exception of those specified elsewhere in this Annex (worst case)

EU CLP index number: 082-001-00-6
Description/Comments: Worst Case: IARC considers lead compounds Group 2A; Probably carcinogenic to humans; Lead REACH Consortium, following CLP protocols, considers lead compounds from smelting industries, flue dust and similar to be Carcinogenic category 1A
Additional Hazard Statement(s): Carc. 1A; H350
Reason for additional Hazards Statement(s):
03 Jun 2015 - Carc. 1A; H350 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium www.reach-lead.eu/substanceinformation.html (worst case lead compounds). Review date 29/09/2015

chromium(III) oxide (worst case) (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H332 , Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Resp. Sens. 1; H334 , Skin Sens. 1; H317 , Repr. 1B; H360FD , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

acenaphthylene (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 1; H330 , Acute Tox. 1; H310 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315

acenaphthene (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Aquatic Chronic 2; H411

fluorene (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

phenanthrene (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 2; H351 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Skin Irrit. 2; H315

- **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2; H351

- **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **polychlorobiphenyls; PCB** (EC Number: 215-648-1, CAS Number: 1336-36-3)

EU CLP index number: 602-039-00-4
Description/Comments: Worst Case: IARC considers PCB Group 1; Carcinogenic to humans;

POP specific threshold from ATP1 (Regulation 756/2010/EU) to POPs Regulation (Regulation 850/2004/EC). Where applicable, the calculation method laid down in European standards EN 12766-1 and EN 12766-2 shall be applied.
Additional Hazard Statement(s): Carc. 1A; H350
Reason for additional Hazards Statement(s):
29 Sep 2015 - Carc. 1A; H350 hazard statement sourced from: IARC Group 1 (23, Sup 7, 100C) 2012

- **ethylbenzene** (EC Number: 202-849-4, CAS Number: 100-41-4)

EU CLP index number: 601-023-00-4
Description/Comments:
Additional Hazard Statement(s): Carc. 2; H351
Reason for additional Hazards Statement(s):
03 Jun 2015 - Carc. 2; H351 hazard statement sourced from: IARC Group 2B (77) 2000

- **coronene** (EC Number: 205-881-7, CAS Number: 191-07-1)

Description/Comments: Data from C&L Inventory Database; no entries in Registered Substances or Pesticides Properties databases; SDS: Sigma Aldrich, 1907/2006 compliant, dated 2012 - no entries; IARC – Group 3, not carcinogenic.
Data source: http://clp-inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=17010&HarmOnly=no?fc=true&lang=en
Data source date: 16 Jun 2014
Hazard Statements: STOT SE 2; H371

- **pH** (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

Appendix B: Rationale for selection of metal species

antimony {antimony trioxide}

Worst case scenario.

arsenic {arsenic pentoxide}

Arsenic pentoxide used as most hazardous species.

barium {barium sulphide}

Chromium VI at limits of detection. Barium sulphide used as the next most hazardous species. No chromate present.

cadmium {cadmium sulfate}

Cadmium sulphate used as the most hazardous species.

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected.

lead {lead compounds with the exception of those specified elsewhere in this Annex (worst case)}

Chromium VI at limits of detection. Lead compounds used as the next most hazardous species. No chromate present.

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight

molybdenum {molybdenum(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight.

nickel {nickel sulfate}

Chromium VI at limits of detection. Nickel sulphate used as the next most hazardous species. No chromate present.

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case. Pigment cadmium sulphoselenide not likely to be present in this soil. No evidence for the other CLP entries: sodium selenite, nickel II selenite and nickel selenide, to be present in this soil.

zinc {zinc sulphate}

Chromium VI at limits of detection. Zinc sulphate used as the next most hazardous species. No chromate present.

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass

chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight. Industrial sources include: production stainless steel, electroplating, wood preservation, anti-corrosion agents or coatings, pigments.

Appendix C: Version

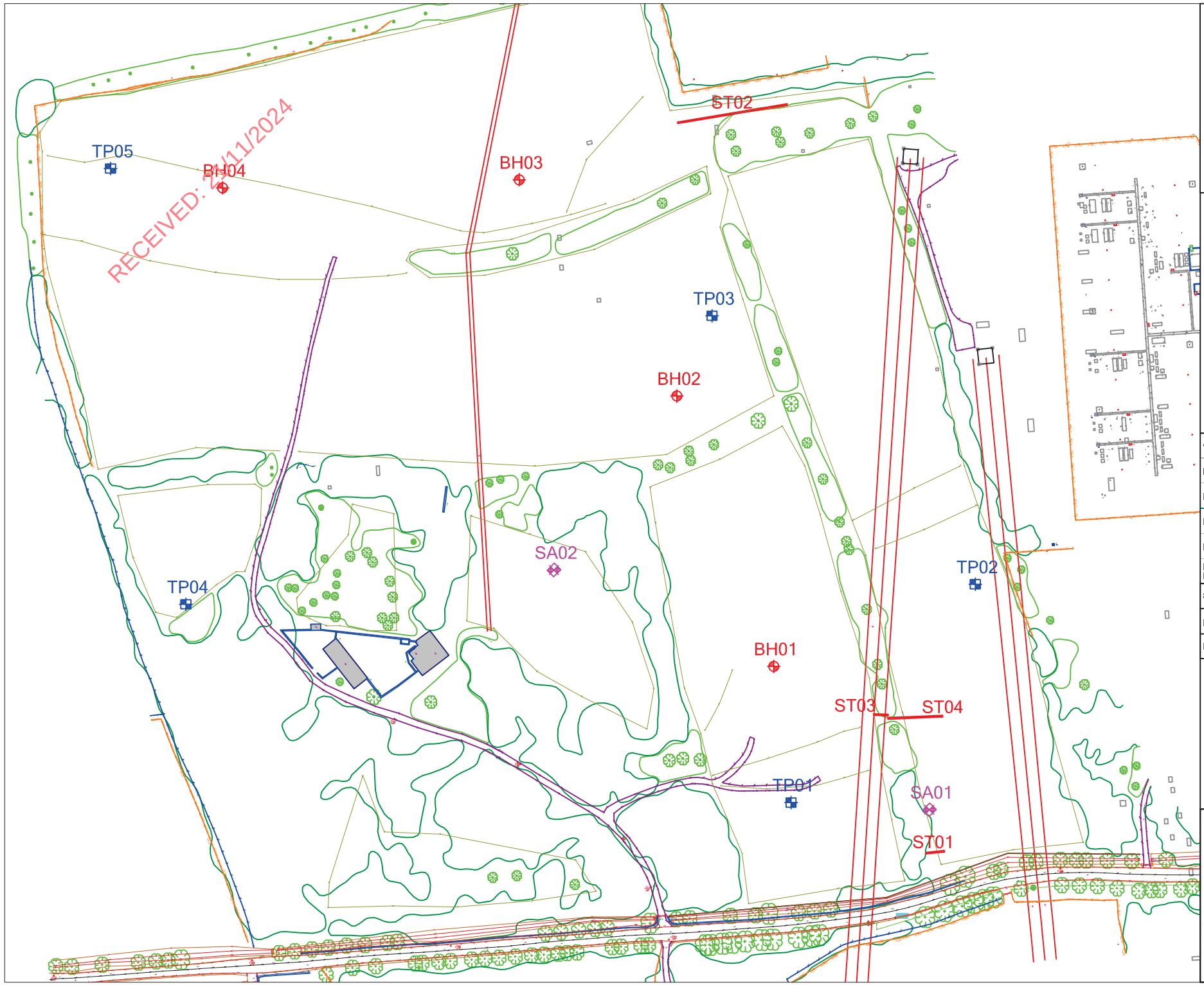
HazWasteOnline Classification Engine: WM3 1st Edition v1.1.NI - Jan 2021
HazWasteOnline Classification Engine Version: 2024.271.6257.11459 (29 Sep 2024)
HazWasteOnline Database: 2024.271.6257.11459 (29 Sep 2024)

This classification utilises the following guidance and legislation:
WM3 v1.1.NI - Waste Classification - 1st Edition v1.1.NI - Jan 2021
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
17th ATP - Regulation (EU) 2021/849 of 11 March 2021
18th ATP - Regulation (EU) 2022/692 of 16 February 2022
19th ATP - Regulation (EU) 2023/1434 of 25 April 2023
20th ATP - Regulation (EU) 2023/1435 of 2 May 2023
21st ATP - Regulation (EU) 2024/197 of 19 October 2023

Appendix 9
Survey Data

Survey Data

Location	Irish Transverse Mercator		Elevation	Irish National Grid	
	Easting	Northing		Easting	Northing
Cable Percussive Boreholes					
BH01	520358.730	827533.430	47.46	120390.324	327526.105
BH02	520319.990	827641.610	52.01	120351.575	327634.308
BH03	520256.950	827728.130	60.26	120288.521	327720.847
BH04	520138.310	827724.920	59.41	120169.855	327717.635
Trial Pits					
TP01	520365.660	827478.960	43.34	120397.256	327471.624
TP02	520439.340	827566.310	43.74	120470.951	327558.993
TP03	520334.050	827673.720	51.91	120365.638	327666.425
TP04	520123.630	827558.290	51.74	120155.173	327550.97
TP05	520093.530	827732.630	59.37	120125.066	327725.347
Soakaway Tests					
SA01	520421.000	827476.070	41.61	120452.608	327468.733
SA02	520270.840	827572.030	51.67	120302.415	327564.713
Slit Trenches					
ST01 Start	520419.460	827458.720	41.81	120451.067	327451.379
ST01 End	520426.960	827459.500	41.67	120458.569	327452.16
ST02 Start	520364.150	827758.250	54.37	120395.743	327750.973
ST02 Water Pipe	520322.570	827751.260	55.42	120354.155	327743.982
ST02 End	520320.320	827750.950	56.56	120351.904	327743.672
ST03 Start	520398.650	827514.160	44.07	120430.253	327506.831
ST03 End	520404.490	827513.990	43.32	120436.094	327506.661
ST04 Start	520404.360	827512.630	43.26	120435.964	327505.301
ST04 End	520426.280	827513.550	42.04	120457.888	327506.221



Client:	Private Client
Engineer:	CSEA
Project:	Killala Project
Date:	19-09-2024
Description:	Site Investigation Plan
Drawing Number:	SIL6344-01
Scale:	NTS
Rev:	1
Drawn by:	SL

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APPENDIX 6.1

CRITERIA FOR RATING THE MAGNITUDE AND SIGNIFICANCE OF IMPACTS ON HYDROLOGICAL ATTRIBUTES AT EIA STAGE

NRA-TII, 2009

Table 1 *Criteria for Rating Site Attributes – Estimation of Importance of Hydrological Attributes (NRA)*

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

Source: *Box 4.2 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009)*

Table 2 *Criteria for Rating Impact Significance at EIA Stage - Estimation Of Magnitude Of Impact On Hydrology Attributes (NRA)*

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute	Loss or extensive change to a waterbody or water dependent habitat. Increase in predicted peak flood level >100mm.[1] Extensive loss of fishery. Calculated risk of serious pollution incident >2% annually.[2] Extensive reduction in amenity value.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Increase in predicted peak flood level >50mm. [1] Partial loss of fishery. Calculated risk of serious pollution incident >1% annually. [2] Partial reduction in amenity value.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Increase in predicted peak flood level >10mm. [1] Minor loss of fishery. Calculated risk of serious pollution incident >0.5% annually. [2] Slight reduction in amenity value.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Negligible change in predicted peak flood level. Calculated risk of serious pollution incident <0.5% annually. [2]
Minor Beneficial	Results in minor improvement of attribute quality	Reduction in predicted peak flood level >10mm. [1] Calculated reduction in pollution risk of 50% or more where existing risk is <1% annually. [2]
Moderate Beneficial	Results in moderate improvement of attribute quality	Reduction in predicted peak flood level >50mm. [1] Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually. [2]
Major Beneficial	Results in major improvement of attribute quality	Reduction in predicted peak flood level >100mm[1]

1 *refer to Annex 1, Methods E and F, Annex 1 of HA216/06*

2 *refer to Appendix B3 / Annex 1, Method D, Annex 1 of HA216/06*

Source: *Box 4.2 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009)*

Table 3 *Rating of Significant Environmental Impacts at EIA Stage (NRA)*

Importance of Attribute	Magnitude of Importance			
	Negligible	**Small Adverse**	**Moderate Adverse**	**Large Adverse**
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

Source: *Box 5.4: 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009)*

APPENDIX 6.2

WATER FRAMEWORK DIRECTIVE (WFD) SCREENING ASSESSMENT

PREPARED BY AWN CONSULTING

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WATER FRAMEWORK DIRECTIVE (WFD) SCREENING ASSESSMENT FOR THE PROPOSED DATA CENTRE LOCATED AT, KILLALA, CO. MAYO

Report Prepared For
Mayo Data Hub Limited

Report Prepared By

Alan Wilson, Environmental Consultant

Teri Hayes, Director

Our Reference
AW/247501.0366/WR01

Date of Issue
15 November 2024

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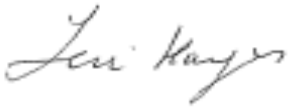
Signature		
Name	Alan Wilson	Teri Hayes
Title	Environmental Consultant	Director (Water Services)
Date	15 November 2024	15 November 2024

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1.0 INTRODUCTION

1.1 OBJECTIVE OF ASSESSMENT

AWN Consulting Limited (AWN) has prepared this Water Framework Directive (WFD) Screening Assessment to support the competent authority, in determining if there is a likelihood of significant effects on the Water Framework status of the receiving waterbodies for a proposed single data centre. The proposed development site is currently a greenfield site comprising c. 10.58 hectares of undeveloped, agricultural lands within the southwest portion of Killala Business Park, traversing the townlands of Mullafarry and Tawnaghmore Upper, Killala, Co. Mayo.

This WFD Screening Assessment has been prepared in response to the requirements of the Water Framework Directive 2000/60/EC and is provided to support the Environmental Impact Assessment Screening Report (EIAR) and should, therefore, be read together with this report.

The objective of the assessment is to address the following:

- Does the development cause deterioration of a water body from its current status or potential for reaching “Good” status?
- Does the development impact on any water dependent protected areas, priority species, habitats etc.?
- Does the development support the achievement of water body objectives and programme of measures?

The surface water assessment and the groundwater assessment both examine the potential effects of the proposed development, which includes the construction and operation of the proposed development.

The proposed development comprises a single data centre building located towards the north of the site. The building will accommodate data halls, associated electrical and mechanical plant rooms, maintenance and storage space, ancillary office administration areas, with plant at roof level. To the north of and adjacent to the main data centre building it is proposed to provide for 25 no. backup generators and associated flues within a fenced compound.

1.2 SITE SETTING

The proposed development site is currently a greenfield site comprising c. 10.58 hectares of undeveloped, agricultural lands within the southwest portion of Killala Business Park, traversing the townlands of Mullafarry and Tawnaghmore Upper, Killala, Co. Mayo, just west of the main Ballina/Killala Road (R314), c. 1.8km south of Killala town, c. 10.5 km north of Ballina, c. 46 km west of Sligo town and c. 39 km north of Castlebar.

The entire area is undeveloped and in agricultural use with the exception of the south west corner of this parcel of land where there is an old rectory house (unoccupied but formerly the residence of a Church of Ireland Rector) and associated structures (sheds). The rectory and associated structures occupy approximately 800 m^2 of this parcel of land. The area of land between the rectory and the Mullafarry Road is boggy and contains a stand of trees and shrubs. There is a compacted gravel access road leading from Mullafarry Road to the old rectory house.

To the east of the site is an area which is reserved for a 110kV substation which will connect the proposal to the electricity network. This substation will be subject to a

separate pre-application request to An Bord Pleanála, to determine whether it constitutes Electricity Transmission Strategic Infrastructure Development under section 182A of the Planning and Development Act 2000, as amended. A sprinkler tank and pumphouse compound is located to the north east of the site.

A small drainage ditch is located along the southern boundary, adjacent to the Mullafarry Road, which eventually discharges into the Moyne 34 Stream. The only other feature observed across this area of land was improved grassland (for grazing), hedgerows and a historic Lime Kiln, located c. 110 m east of the old rectory house.

The existing ground is characterised by a steep gradient, descending from the highest point at approximately 61.0 m along the northern boundary to the lowest point at around 42.0 m, resulting in a level change of nearly 20 m.

Refer to **Error! Reference source not found.** for the proposed site location and surrounding land use/environment.

Figure 1.1 *Site Location and Surrounding Land Use Map (Source: Google Earth Pro, 2024)*

1.3 EXPERIENCE OF AUTHORS

This report was prepared by Alan Wilson (BSc) and Teri Hayes ((BSc MSc PGeol EurGeol, Adv Dip in Environmental & Planning Law). Alan Wilson is an Environmental Consultant at AWN. Alan holds a BSc Honours in Environmental Management in Agriculture/ Environmental and Geographical Sciences. Alan has worked on a range of large scale projects involving EIA reports, site specific flood risk assessments, baseline studies, hydrological and hydrogeological risk assessments, environmental due diligences, site investigations and groundwater, surface water and soil monitoring on various operational developments and greenfield and brownfield sites. Alan also has previous experience as an Environmental Consultant in Ecology and Forestry related work. Alan is a member of the International Association of Hydrogeologists (IAH) Irish Group.

Teri Hayes (BSc MSc PGeol EurGeol, Dip Env & Planning Law) is a Director and Senior Hydrogeologist with AWN Consulting with over 30 years of experience in water resource management, environmental assessment and environmental licensing. Teri is a former President of The International Association of Hydrogeologists (IAH, Irish Group) and is a professional member of the Institute of Geologists of Ireland (IGI) and European Federation of Geologists (EurGeol). She has qualified as a competent person for contaminated land assessment as required by the IGI and EPA. Her project experience includes contributions to a wide range of complex Environmental Impact Statements, planning applications and environmental reports for Industry Infrastructure and residential developments. Teri's specialist area of expertise is water resource management, eco-hydrogeology, hydrological assessment and environmental impact assessment.

1.4 LEGISLATION AND GUIDANCE

The Water Framework Directive (WFD) 2000/60/EC aims to protect and enhance the quality of the water environment (both surface water and groundwater) across all European Union member states.

The concept of 'deterioration of the status' of a body of surface water in Article 4(1)(a)(i) of Directive 2000/60 must be interpreted as meaning that there is deterioration as soon as the status of at least one of the quality elements, within the meaning of Annex V to the directive, falls by one class, even if that fall does not result in a fall in classification of the body of the surface water as a whole. However, if the quality element concerned, within the meaning of that annex, is already in the lowest class, any deterioration of that element constitutes a 'deterioration of the status' of a body of surface water, within the meaning of Article 4(1)(a)(i).

As part of its role, the EPA and other stakeholders such as local authorities must consider whether proposals for new developments (other than where exemptions apply Article 4.4 - 4.7 of the WFD) have the potential to:

- Cause a deterioration of a water body from its current status or potential; and/ or
- Prevent future attainment of good status or potential where not already achieved.

As a result, new developments that have the potential to impact on current or predicted WFD status are required to assess their compliance against the WFD objectives of the potentially affected water bodies.

The WFD is implemented through River Basin Management Plans (RBMPs) in six year cycles. We are currently in WFD third cycle 2022-2027 – a draft RBMP is in operation.

The primary aim of the RBMP is that water bodies identified as being 'At Risk' of not achieving their environmental objectives need to have targeted measures implemented to achieve objectives under this Plan. The draft 3rd cycle RBMP has been reviewed in the context of ensuring mitigation measures comply with current and expected future measures required to be implemented for protection of water body status within the context of the proposed development.

1.5 METHODOLOGY

This WFD assessment was based on desktop review of the Environmental Protection Agency (EPA) dataset which was obtained from the portal www.catchments.ie (accessed October 2024).

The water bodies identified for this assessment are related to the vicinity of the proposed construction area and its direct or indirect hydrological or hydrogeological connection. From the aforementioned source of information, the WFD Status classification and Risk score were obtained for the identified water bodies.

1.5.1 WFD Risk Status

The WFD Risk score is the risk for each waterbody of failing to meet their WFD objectives by 2027. The risk of not meeting WFD objectives has been determined by assessment of monitoring data, data on the pressures and data on the measures that have been implemented. Waterbodies that are At Risk are prioritised for implementation of measures. This assessment was completed in 2020 by the EPA Catchments Unit in conjunction with other public bodies and was primarily based on monitoring data up the end of 2018. The three risk categories are:

- Waterbodies that are 'At Risk' of not meeting their Water Framework Directive objectives. For these waterbodies an evidence-based process was undertaken to identify the significant pressures; once a pressure is designated as 'significant', measures and accompanying resources are needed to mitigate the impact(s) from this pressure. These 'At Risk' waterbodies require not only implementation of the existing measures described in the various regulations, e.g., the Good Agricultural Practices Regulations, but also in many instances more targeted supplementary measures.
- Waterbodies that are categorised as 'Review' either because additional information is needed to determine their status before resources and more targeted measures are initiated or the measures have been undertaken, e.g., a wastewater treatment plant upgrade, but the outcome hasn't yet been measured/monitored.
- Waterbodies that are 'Not at Risk' and therefore are meeting their Water Framework Directive objectives. These require maintenance of existing measures to protect the satisfactory status of the water bodies.

1.5.2 WFD Water Body Status

Surface water body status is classified on the basis of chemical and ecological status or potential. This system is summarised in Appendix B Figure 1. Under the WFD, groundwater body status is classified on the basis of quantitative and chemical status. This system is summarised in Appendix B Figure 2.

1.5.3 Methodology for Determination of No Deterioration Assessment

Proposed developments that have the potential to impact on current or predicted WFD status are required to assess their compliance against the objectives defined for potentially affected water bodies.

1.5.4 Surface Water No Deterioration Assessment

Table 1.1 below presents the matrix used to assess the effect of the proposed development on surface water status or potential class. It ranges from a major beneficial effect (i.e., a positive change in overall WFD status) through no effect to deterioration in overall status class. The colour coding used in Table 2.1 is applied to the No Deterioration Assessment' spreadsheet provided in Appendix A of this report.

Table 1.1 *Surface Water Assessment Matrix*

Effect	Description/ Criteria	Outcome
Major Beneficial	Impacts that taken on their own or in combination with others have the potential to lead to the improvement in the ecological status or potential of a WFD quality element for the entire waterbody	Increase in status of one or more WFD element giving rise to a predicted rise in status class for that waterbody.
Minor/ localised beneficial	Impacts when taken on their own or in combination with others have the potential to lead to a minor localised or temporary improvement that does not affect the overall WFD status of the waterbody or any quality elements	Localised improvement, no change in status of WFD element
No Impact	No measurable change to any quality elements.	No change
Localised / temporary adverse effect	Impacts when taken on their own or in combination with others have the potential to lead to a minor localised or temporary deterioration that does not affect the overall WFD status of the waterbody or any quality elements. Consideration will be given to habitat creation measures.	Localised deterioration, no change in status of WFD element when balanced against mitigation measures embedded in the project.
Adverse effect on class of WFD element	Impacts when taken on their own or in combination with others have the potential to lead to the deterioration in the WFD status class of one or more biological quality elements, but not in the overall status of the waterbody. Consideration will be given to habitat creation measures.	Decrease in status of WFD element when balanced against positive measures embedded in the project.
Adverse effect on overall WFD class of waterbody	Impacts when taken on their own or in combination with others have the potential to lead to the deterioration in the ecological status or potential of a WFD quality element, which then lead to a deterioration of status/potential of waterbody.	Decrease in status of overall WFD waterbody status when balanced against positive measures embedded in the project.

1.5.2 Groundwater No Deterioration Assessment

Table 1.2 below presents the matrix used to assess the effect of the proposed development on groundwater status class. It ranges from a beneficial effect but no change in status to deterioration in overall status class. The colour coding used in Table 2.2 is applied to the final 'No Deterioration Assessment' spreadsheet in Appendix A of this report.

Table 1.2 *Groundwater Assessment Matrix*

Magnitude of Impact of the proposed development on WFD Element	**Effect on WFD Element within the assessment boundary**	**Effect on Status of WFD element at the Groundwater Body Scale**
Impacts lead to beneficial effect	Combined impacts have the potential to have a beneficial effect on the WFD element.	Improvement but no change to status of WFD element
No measurable change to groundwater levels or quality.	No measurable change to WFD elements.	No change and no deterioration in status of WFD element
Impacts when taken on their own have the potential to lead to a minor localised or temporary effect	Combined impacts have the potential to lead to a minor localised or temporary adverse effect on the WFD element.	Combined impacts have the potential to lead to a minor localised or temporary effect on the WFD element. No change to status of WFD element and no significant deterioration at groundwater body scale.
Impacts when taken on their own have the potential to lead to a widespread or prolonged effect.	Combined impacts have the potential to have an adverse effect on the WFD element.	Combined impacts have the potential to have an adverse effect on the WFD element, resulting in significant deterioration but no change in status class at groundwater body scale.
Impacts when taken on their own have the potential to lead to a significant effect.	Combined impacts in combination with others have the potential to have a significant adverse effect on the WFD element.	Combined impacts in combination with others have the potential to have an adverse effect on the WFD element AND change its status at the groundwater body scale

1.5.2 Assessment against Future Status Objectives

River Basin Management Plans are used to outline water body pressures and the actions that are required to address them. The future status objective assessment considers the ecological potential of a surface water body and the mitigation measures that defined the ecological potential. Assessments are based on the project (including mitigation measures) risks (construction and operation) with regard to the objectives for achieving good status as set out in the 2nd Cycle RBMP 2018-2021 and *draft* 3rd Cycle RBMP 2022-2027. The assessment considers whether the proposed development has the potential to prevent the implementation or impact the effectiveness of the defined measures in these plans.

1.6 SOURCES OF INFORMATION

The following sources of information were used in the preparation of this report:

- Geological Survey of Ireland- online mapping (GSI, 2024).
- GSI - Geological Heritage Sites & Sites of Special Scientific Interest.
- Ordnance Survey of Ireland (OSI).
- Teagasc subsoil database.
- National Parks and Wildlife services (NPWS, 2024).
- Environmental Protection Agency (EPA) – website mapping and database information. Envision water quality monitoring data for watercourses in the area.
- WFD Cycle 2 –Moy & Killala Bay Catchment Report - Sub-Catchment: Abbeystown_010 (EPA, 2019).
- River Basin Management Plan for Ireland 2018-2021.
- Draft River Basin Management Plan for Ireland 2022-2027.
- Mayo County Council Development Plan 2022-2028.
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW).
- Office of Public Works (OPW) flood mapping data (www.floodmaps.ie)
- 'Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors' (CIRIA 532, 2001).
- National Parks and Wildlife Services (NPWS) – Protected Site Register.
- Killala Project, Killala, Co. Mayo – Site Investigation Report (Site Investigation Ltd, October 2024).
- Engineering Planning Report – Proposed Killala Data Centre Development (CSEA, 2024).
- Various design site plans and drawings; and
- Consultation with design engineers.

Relevant legislation and guidance is as follows:

- European Communities 920030, Common Implementation Strategy for the Water Framework Directives (2000/60/EC) Guidance Document No.2.
- EPA (May 2015), An approach to characterisation as part of the Water Framework Directive V2 revised.
- EPA (2010) Methodology for Establishing Groundwater Threshold Values, the Assessment of Chemical and Quantitative Status for Groundwater and Groundwater Trends.
- Common Implementation Strategy (CIS) (2017) Guidance Document No. 36 'Exemptions to the environmental objectives according to Article 4(7) provides comprehensive guidance on the application of Article 4(7).

- Joint Assistance to Support Projects in European Regions (JASPERS) (2018) Water Framework Directive Project assessment checklist tool.
- UKTAG (2012) Groundwater Chemical Classification for the Water Framework Directive. Paper 11b(i).
- UK Technical Advisory Group on the Water Framework Directive.
- UKTAG (2012) Groundwater Quantitative Classification for the Water Framework Directive. Paper 11b(ii), UK Technical Advisory Group on the Water Framework Directive.
- Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors' (CIRIA 532, 2001).

This WFD assessment was based on desktop review of the Environmental Protection agency (EPA) and Local Authority Waters Programme water quality records which were obtained from the portal www.catchments.ie (accessed October 2024). From the aforementioned source of information, the WFD Status classification and Risk score were obtained for the identified water bodies.

2.0 DESCRIPTION OF EXISTING HYDROLOGICAL AND HYDROGEOLOGICAL ENVIRONMENT

2.1 HYDROLOGY

The proposed development site is located within the former ERBD (now the Irish River Basin District), as defined under the European Communities Directive 2000/60/EC, establishing a framework for community action in the field of water policy – this is commonly known as the Water Framework Directive (WFD). The site is located in the Western River Basin District (WRBD).

Figure 2.1 below presents the site location in the context of the regional hydrological environment.

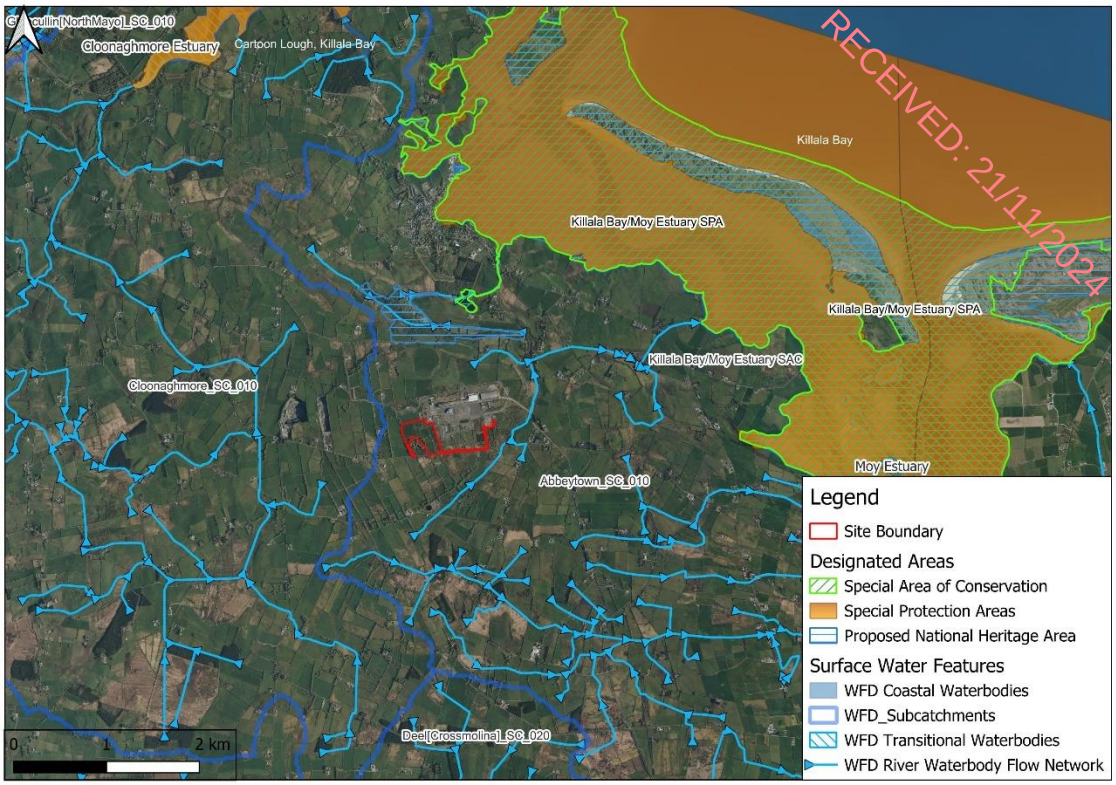


Figure 2.1 *Site Location, Hydrological Environment & Sub-Catchments (EPA, 2024)*

According to the EPA maps, the proposed development site lies within the Moy and Killala Bay Catchment (Catchment ID: 34) and the Abbeytown_SC_010 Sub-Catchment (Sub-Catchment ID: 34_19).

A small drainage ditch is located along the southern boundary of the site, adjacent to the Mullafarry Road, which eventually discharges into the Moyne 34 Stream (Moyne_010 WFD surface waterbody) located c. 3.5 km downstream (0.55 km south-east of the site - linear distance). The Moyne 34 Stream flows in a north-easterly direction and eventually discharges to Killala Bay coastal waterbody a further c. 3.25 km downstream (c. 2.52 km north-east/linear distance), where the receiving environment is designated as part of the Killala Bay/Moy Estuary SAC and the Killala Bay/Moy Estuary SPA.

Refer to Figure 2.2 below for the site location in the context of the Water Framework Directive (WFD) surface waterbodies.

Figure 2.2 *Site Location and WFD Surface Waterbodies (EPA, 2024)*

There is a disused area of land to the immediate east which contains a reservoir associated with former Asahi activities. The reservoir was used by the Asahi Company to receive raw water from Lough Conn, located c. 12 km south of the proposed development site.

2.1.1 Conservation Areas

According to the NPWS (2024) on-line database there are no special protected areas (SPA's) or special areas of conservation (SAC's) on or within the boundary of the site. The lands in which the development is located have no formal designations. The nearest designated lands to the site are as follows:

- Killala Bay/Moy Estuary SAC (Site Code: 000458), located c. 1.26 km north-east of the site; and
- Killala Bay/Moy Estuary SPA (Site Code: 004036), located c. 1.95 km north-east of the site.

There is an existing '*indirec*t' hydrological pathway/connection between the site and Killala Bay SAC/SPA through the drainage ditch located along the sites southern boundary which discharges to the Moyne 34 Stream c. 3.5 km downstream (0.55 km south-east of the site - linear distance). The Moyne 34 Stream eventually discharges to Killala Bay coastal waterbody a further c. 3.25 km downstream (c. 2.52 km north-east/linear distance), where the receiving environment is designated as part of the Killala Bay/Moy Estuary SAC/SPA. Albeit at a significant hydrological distance and large dilution factor through the existing drainage ditch, the Moyne 34 Stream and Killala Bay.

Figure 2.3 below presents the location of these conservation areas in the context of the site.

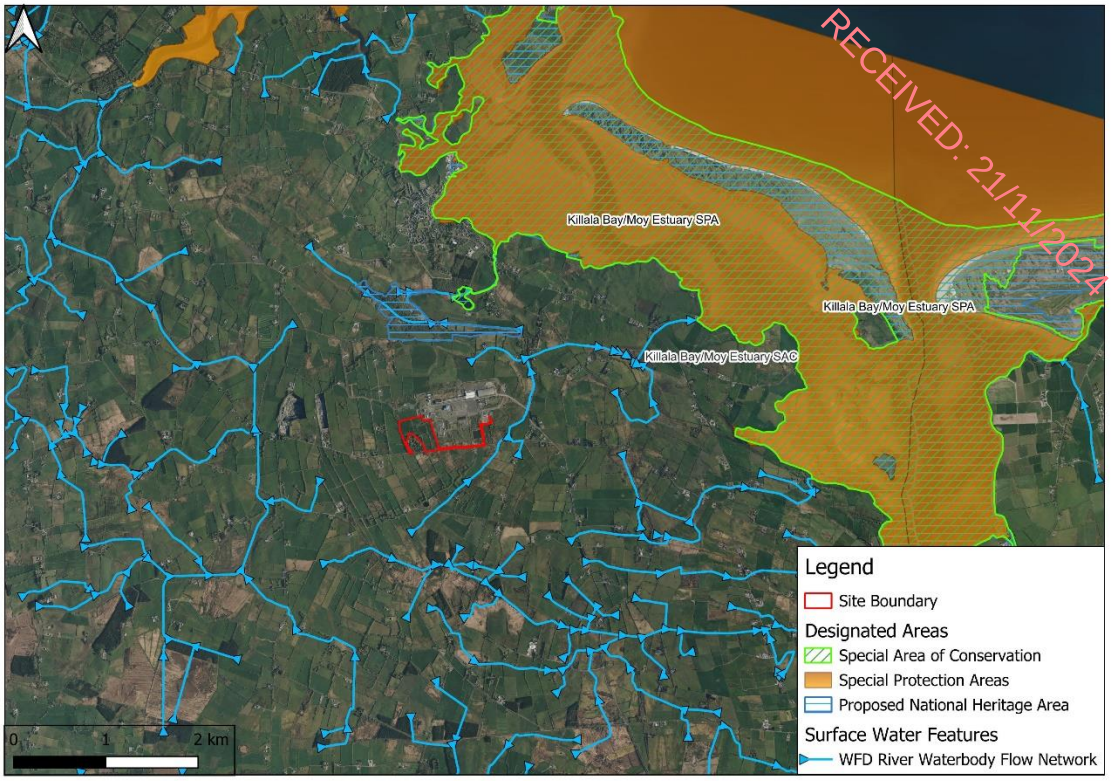


Figure 2.3 *Conservation Areas in the Context of the Site (EPA, 2024)*

2.2 HYDROGEOLOGY

2.2.1 Groundwater Quality

The Water Framework Directive (WFD) 2000/60/EC was adopted in 2000 as a single piece of legislation covering rivers, lakes, groundwater, transitional (estuarine) and coastal waters. In addition to protecting said waters, its objectives include the attainment of 'Good Status' in water bodies that are of lesser status at present and retaining 'Good Status' or better where such status exists at present. 'Good Status' was to be achieved in all waters by 2015, as well as maintaining 'high status' where the status already exists. The EPA co-ordinates the activities of the River Basin Districts, local authorities and state agencies in implementing the directive, and operates a groundwater quality monitoring programme undertaking surveys and studies across the Republic of Ireland.

The groundwater body (GWB) underlying the site is the Bellacorick-Killala Groundwater Body (European Code: IE_WE_G_0041), which has been investigated by the GSI and is described as having a groundwater flow regime of '*PP*' which is a poorly productive bedrock aquifer. Based on the most recent data (www.epa.ie), the Bellacorick-Killala GWB for which the site is located entirely within, has a WFD status of "*Good*" (2016-2021) and a WFD risk score of "*Not at Risk*" of not achieving good status. Therefore, the overall status is considered Good. Refer to Figure 2.4 below for the WFD groundwater bodies (Cycle 3) in the context of the proposed development site.

There are no groundwater source protection zones, which are zones defined by the GSI within which development is limited in order to protect drinking water supplies from potential pollution, located within the proposed development site or in the immediate vicinity. A group scheme borehole was identified c. >1.5 km north of the site (well no. 1131NWW004). However according to the latest GSI and EPA online mapping there

is no groundwater source protection zone associated with this supply. Due to the discrete nature of fracturing withing the bedrock aquifer there is no potential for temporary dewatering or contamination to impact on any group or public water scheme. Therefore, there are no risks to water supplies from the proposed development.

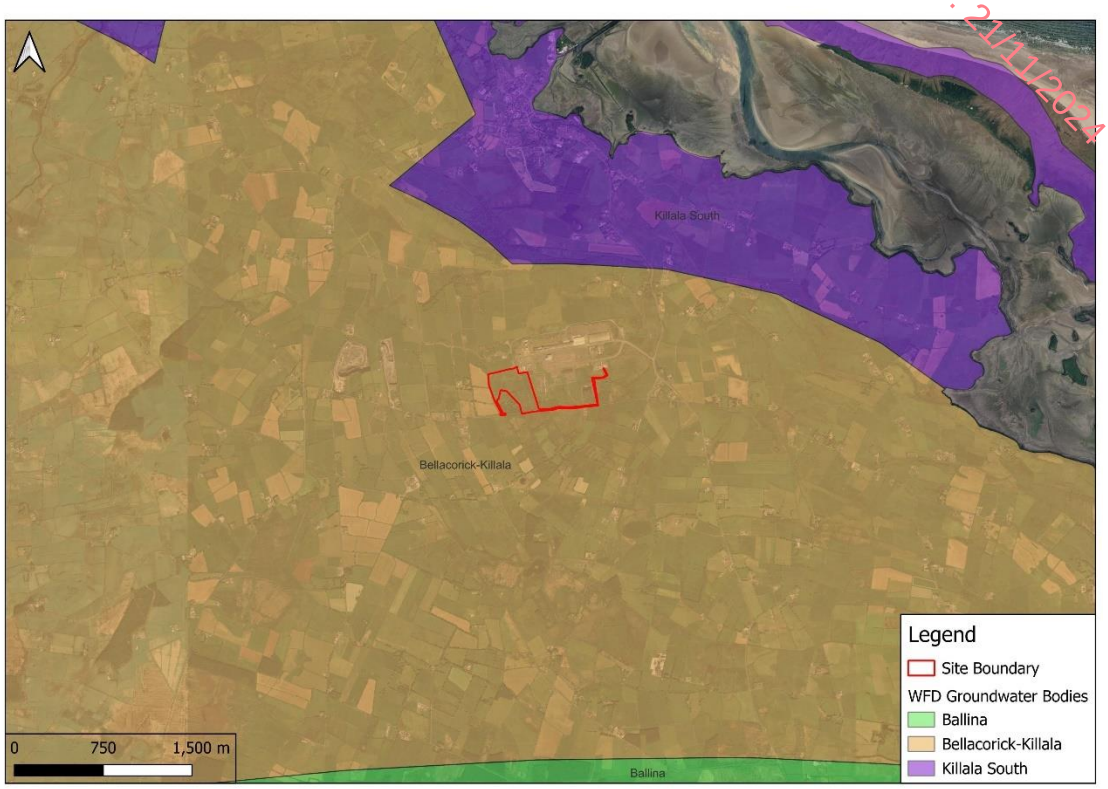


Figure 2.4 *WFD Groundwater Bodies – Cycle 3 (EPA, 2024)*

2.2.2 Aquifer Classification & Vulnerability

The GSI has devised a system for classifying the bedrock aquifers in Ireland. The aquifer classification for bedrock depends on a number of parameters including, the area extent of the aquifer (km^2), well yield (m^3/d), specific capacity ($m^3/d/m$) and groundwater throughput (mm^3/d). There are three main classifications: regionally important, locally important and poor aquifers. Where an aquifer has been classified as regionally important, it is further subdivided according to the main groundwater flow regime within it. This sub-division includes regionally important fissured aquifers (Rf) and regionally important karstified aquifers (Rk). Locally important aquifers are sub-divided into those that are generally moderately productive (Lm) and those that are generally moderately productive only in local zones (Ll). Similarly, poor aquifers are classed as either generally unproductive except for local zones (Pl) or generally unproductive (Pu).

Presently, from the GSI (2024) National Bedrock Aquifer Map, the GSI classifies the bedrock aquifer beneath the subject site as a '*Locally Important Aquifer*' (Ll), which is described by the GSI as bedrock as "*Bedrock which is Moderately Productive only in Local Zones*".

The GSI/ Teagasc (2024) mapping database of the subsoils in the vicinity of the site indicates (2) no. principal subsoil types, comprising "Bedrock outcrop or subcrop (Rck)" underlying the majority of the site and "Till derived from limestones (Tls)" underlying the southern and eastern portions of the site and immediate vicinity (south, west and east). Further areas of bedrock outcrops or near surface subcrop occur in the west and east of the proposed development site and at several locations within the wider

surrounding lands, primarily to the north and further west of the site, according to the latest GSI mapping.

The lithology described in the Site Investigations Report carried out by Site Investigations Ltd between August and September 2024, identified the natural ground conditions to be dominated by brown sandy slightly gravelly silty CLAY with cobbles. The locations to the south east of the site achieved depths greater than 1.00mbgl, with TP01 achieving 1.80m depth before terminating. Bedrock was encountered at 0.80mbgl and 0.50mbgl at BH02 (centre of site) and BH03 (north-east of site) respectively and although highly fractured core was initially encountered, the bedrock was logged as a strong grey muddy LIMESTONE, with calcite veins and fossils recorded and is part of the Ballina Limestone Formation.

Aquifer vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated generally by human activities. Due to the nature of the flow of groundwater through bedrock in Ireland, which is almost completely through fissures/ fractures, the main feature that protects groundwater from contamination, and therefore the most important feature in the protection of groundwater, is the subsoil (which can consist solely of/ or of mixtures of peat, sand, gravel, glacial till, clays or silts).

The GSI presently classifies the aquifer with a vulnerability classification of “Rock at or near Surface or Karst” (X) for the majority of the site and lands to the immediate north and west. The south and eastern portion of the site is classified as “Extreme” (E). To the immediate south of the site the GSI classifies the aquifer vulnerability as being “High” (H).

The GSI vulnerability classification is relatively consistent with data obtained from the site investigations carried out by Site Investigations Limited between August and September 2024 at the proposed development site. As summarised in **Error! Reference source not found.** above, the natural ground conditions are dominated by brown sandy slightly gravelly silty CLAY with cobbles ranging in depth between 0.4m BGL at BH04 (north-west of site) to 1.8m BGL at TP01 (south-east of site). Bedrock was encountered at 0.80mbgl and 0.50mbgl at BH02 (centre of site) and BH03 (north-east of site).

Refer to Figure 2.5 below for the groundwater vulnerability at the proposed development site.

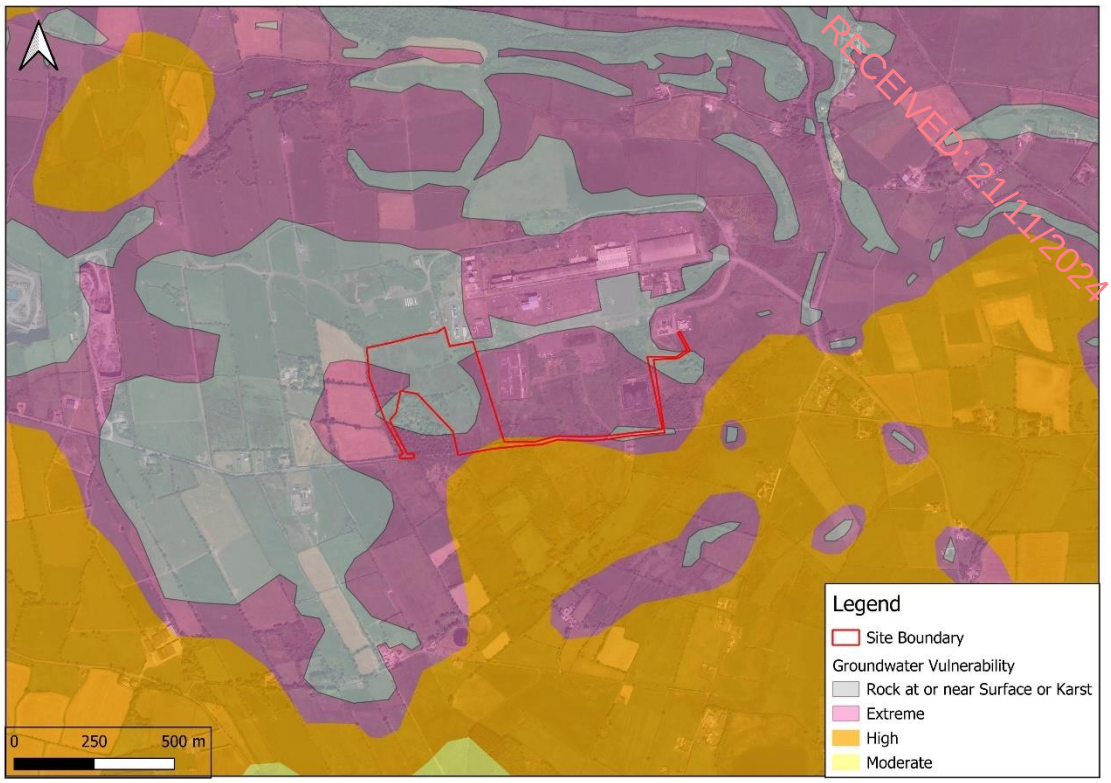


Figure 2.5 *Aquifer Vulnerability (GSI, 2024)*

3.0 WATER BODY IDENTIFICATION & STATUS

This section presents the water bodies identified for assessment, reasoning and water body status.

The proposed development site lies within the Moy and Killala Bay Catchment (Catchment ID: 34) and the Abbeytown_SC_010 Sub-Catchment (Sub-Catchment ID: 34_19). (EPA, 2024). This WFD Screening has identified 2 no. WFD surface water bodies and 1 no. groundwater body which need to be considered: The Moyne_010 (European Code: IE_WE_34M190890), Killala Bay coastal waterbody (European Code: IE_WE_420_0000) and the Bellacorick-Killala groundwater body (European Code: IE_WE_G_0041). There are no adverse effects anticipated on the aforementioned surface waterbodies or the Natura 2000 sites located within Killala Bay coastal waterbody during construction or operation of the proposed development, due to the proposed mitigation design and mitigation measures, the distance of removal from the proposed development site, the potential loading of contaminant from the site and significant dilution through its pathway.

As stated in Section 2.1 above, there is an '*indirect*' hydrological connection/pathway through the drainage ditch located along the southern boundary of the site, adjacent to the Mullafarry Road, which eventually discharges into the Moyne 34 Stream located c. 3.5 km downstream (0.55 km south-east of the site - linear distance), and eventually to Killala Bay coastal waterbody a further c. 3.25 km downstream (c. 2.52 km north-east/linear distance). There is also an '*indirect*' hydrological connection/pathway with the Moyne 34 Stream, through the proposed surface water management design, where it is proposed to discharge to the drainage ditch located along the southern boundary of the site, post attenuation.

The groundwater body (GWB) underlying the site is the Bellacorick-Killala groundwater body (European Code: IE_WE_G_0041). Local minor dewatering may be required during excavation and groundworks depending on the time of year development works are carried out, in order to achieve the necessary foundation base level of c. 2.5m BGL. It is estimated that c. 22,648 m^3 of rock will be excavated and transported off site. This will increase the aquifer vulnerability during construction prior to paving and installation of stormwater drainage and services.

However, it should be noted that the groundwater ingresses were located within the bedrock interface and due to the discrete nature of fracturing and lengthy pathway of flow allowing time for attenuation and dispersion, there is no potential for change in water quality or levels as a result of local changes in the groundwater regime at the site. The aforementioned surface and groundwater bodies are listed in Table 3.1 below. For each waterbody, the most recent WFD status (2016-2021), risk score and location in relation to the proposed development site are provided (EPA, 2024).

Note: The Moyne 34 Stream belongs to the Moyne_010 WFD surface waterbody.

Table 3.1 WFD Waterbodies located within the study area

Type	WFD Classification	WFD Status (2016-2021)	WFD Risk Score	WFD Name/ID	Location
Surface Water	River Waterbody	*'Moderate'*	Under '*Review*'	Moyne_010 (European Code: IE_WE_34M190890)	c. 3.5 km downstream (Linear Distance: c. 0.55 km south-east)
	Coastal Waterbody	*'Good'*	*'Not at Risk'*	Killala Bay coastal waterbody (European Code: IE_WE_420_0000)	c. 6.75 km downstream (Linear Distance: c. 2.52 km north-east)
Groundwater	Groundwater Body	*'Good'*	*'Not at Risk'*	Bellacorick-Killala (GWB) (European Code: IE_WE_0041)	Underlying Site

Figure 3.1 and Figure 3.2 below summaries the surface water quality of the Moyne_010 and Killala Bay WFD surface waterbodies. Figure 3.3 summaries the groundwater quality of the underlying aquifer "Bellacorick-Killala" groundwater body (GWB). This data was obtained from the most recent Sub-Catchment Assessment carried out by the EPA in 2019 on the Abbeytown_SC_010 Sub-Catchment.

The Moyne_010 WFD surface waterbody (European Code: IE_WE_34M190890) has a '*Moderate*' WFD status (2016-2021) and its WFD risk score is currently under '*Review'*. This '*Moderate*' status is related to its ecological status or potential. The most recent Sub-Catchment Assessment (2019) carried out by the EPA on the Abbeytown_SC_010 Sub-Catchment states there are no significant pressures on the Moyne_010 WFD surface water body. Refer to Figure 3.1 below.

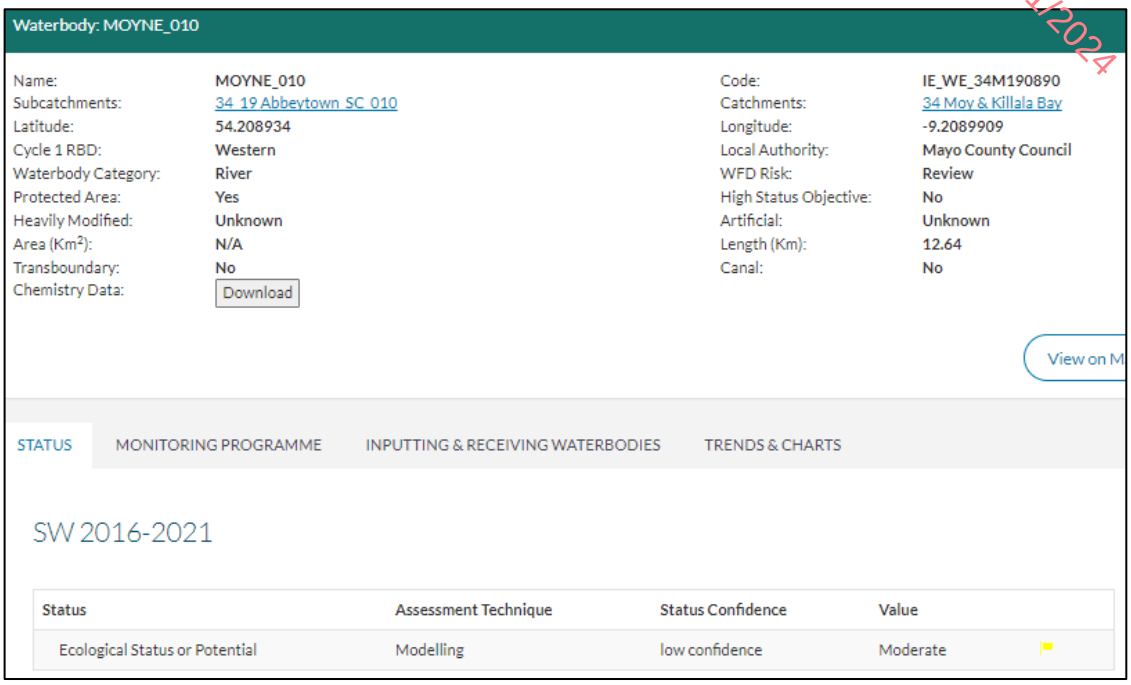


Figure 3.1 *Surface Water Quality for the Moyne_010 WFD Surface Waterbody (EPA Catchments, 2024)*

The Killala Bay coastal waterbody (European Code: IE_WE_420_0000) has a '*Good*' WFD status (2016-2021) and its WFD risk score is '*Not at risk'* of not achieving good status. This '*Good*' status is related to its ecological status or potential. The main pressure on Killala Bay WFD surface waterbody is from anthropogenic pressures. Refer to Figure 3.2 below.

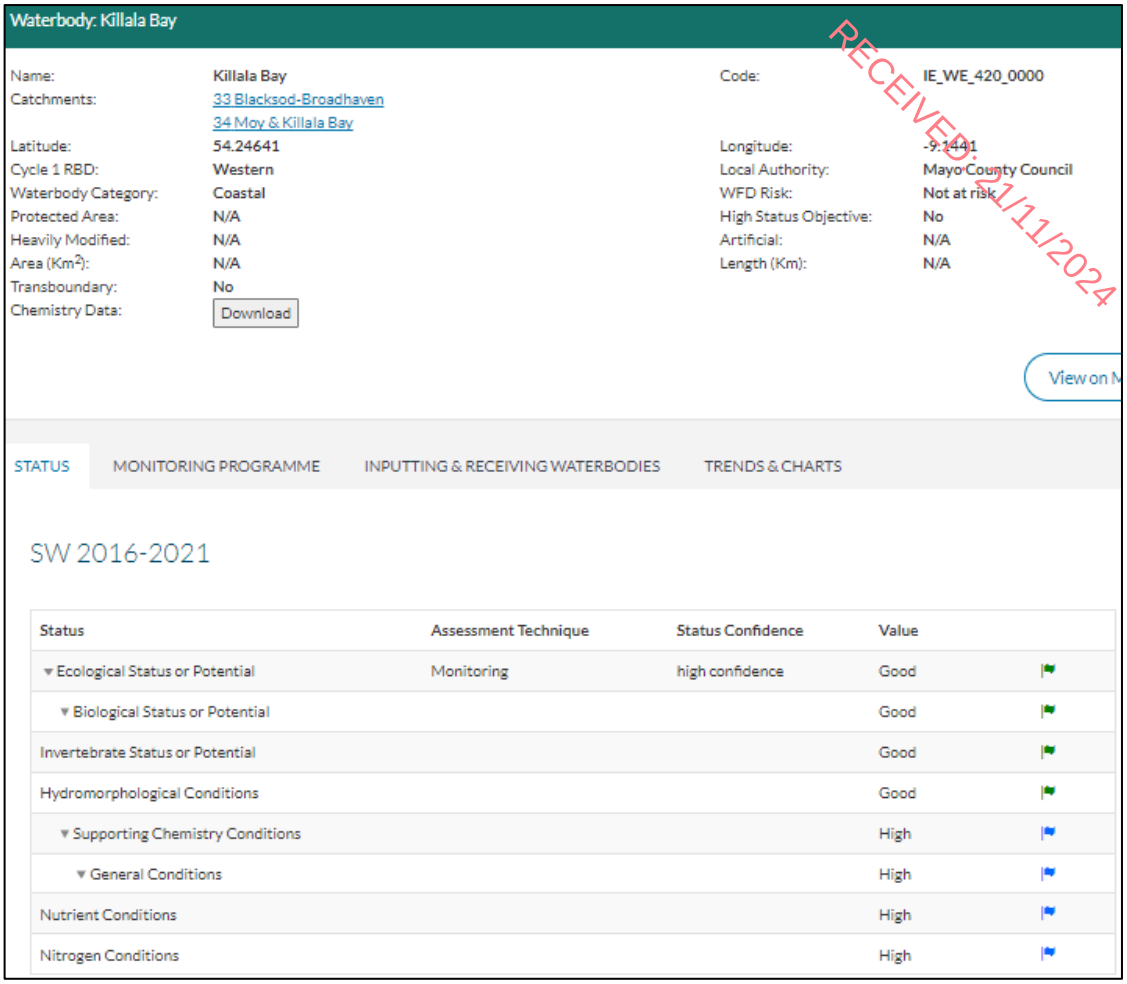
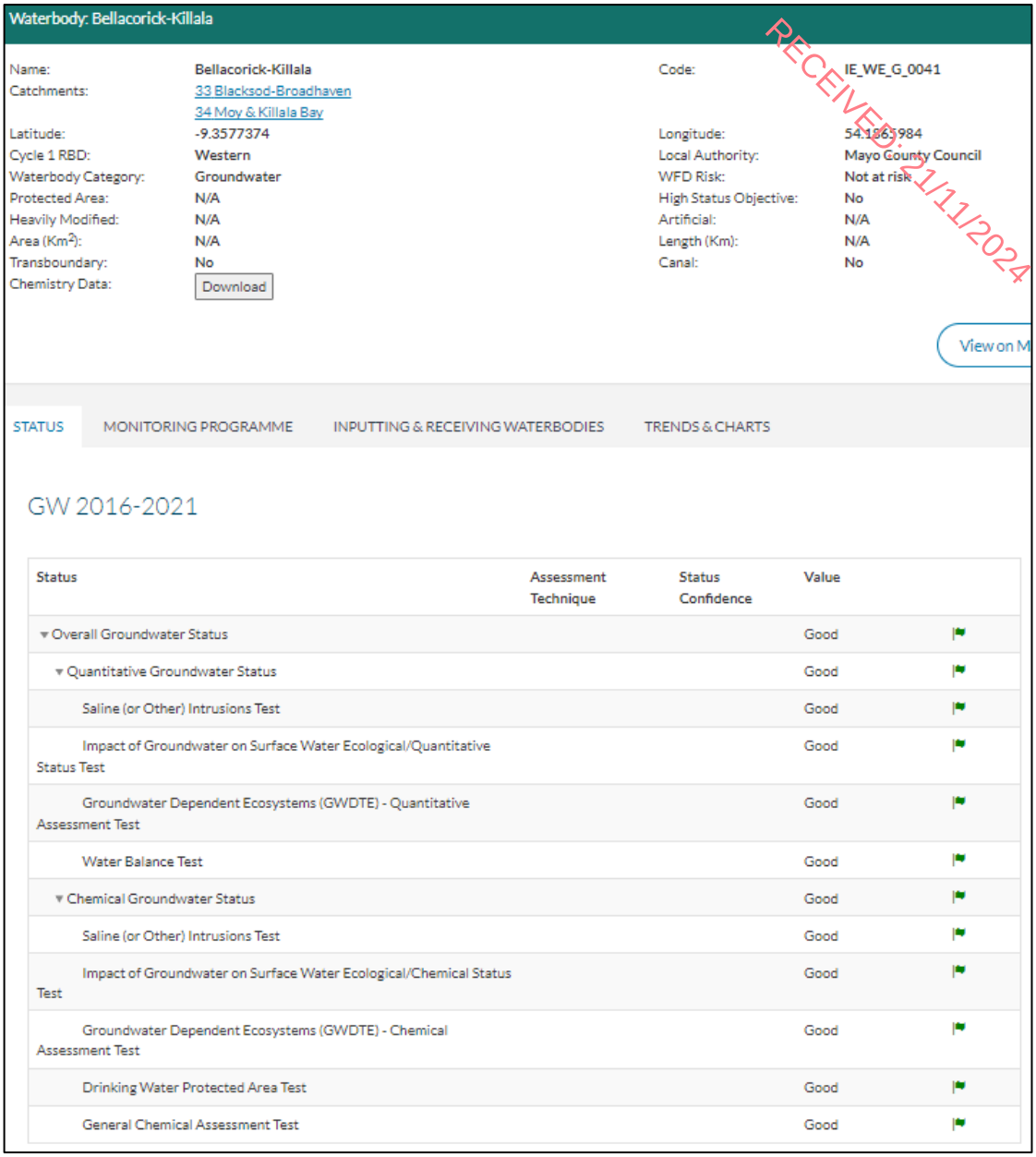


Figure 3.2 *Surface Water Quality for the Killala Bay Coastal Waterbody (EPA Catchments, 2024)*

As stated in Section 2.2.1 above, the Bellacorick-Killala groundwater body (European Code: IE_WE_G_0041) is classified under the WFD Status (2016-2021) as having a '*Good'* status and a WFD Risk Score of "*Not at Risk*" of not achieving good status. This '*Good*' status is related to the overall groundwater status i.e. quantitative groundwater status and chemical groundwater status. Refer to Figure 3.3 below.



Waterbody: Bellacorick-Killala

Name:	Bellacorick-Killala	Code:	IE_WE_G_0041
Catchments:	33 Blacksod-Broadhaven 34 Moy & Killala Bay		
Latitude:	-9.3577374	Longitude:	54.1863984
Cycle 1 RBD:	Western	Local Authority:	Mayo County Council
Waterbody Category:	Groundwater	WFD Risk:	Not at risk
Protected Area:	N/A	High Status Objective:	No
Heavily Modified:	N/A	Artificial:	N/A
Area (Km^2):	N/A	Length (Km):	N/A
Transboundary:	No	Canal:	No
Chemistry Data:	Download		

View on M

STATUS | MONITORING PROGRAMME | INPUTTING & RECEIVING WATERBODIES | TRENDS & CHARTS

GW 2016-2021

Status	Assessment Technique	Status Confidence	Value
Overall Groundwater Status			Good
Quantitative Groundwater Status			Good
Saline (or Other) Intrusions Test			Good
Impact of Groundwater on Surface Water Ecological/Quantitative Status Test			Good
Groundwater Dependent Ecosystems (GWDTE) - Quantitative Assessment Test			Good
Water Balance Test			Good
Chemical Groundwater Status			Good
Saline (or Other) Intrusions Test			Good
Impact of Groundwater on Surface Water Ecological/Chemical Status Test			Good
Groundwater Dependent Ecosystems (GWDTE) - Chemical Assessment Test			Good
Drinking Water Protected Area Test			Good
General Chemical Assessment Test			Good

Figure 3.3 *Groundwater Quality for Kilcullen Groundwater Body (EPA Catchments, 2024)*

4.0 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The proposed development comprises the construction of a single data centre building along with all associated and ancillary development, sprinkler tank and pump house, and all associated works. The building will accommodate data halls, associated electrical and mechanical plant rooms, maintenance and storage space, ancillary office administration areas, with plant at roof level.

To the north of and adjacent to the main data centre building it is proposed to provide for 25 no. backup generators (HVO) and associated flues within a fenced compound. There is no required bulk diesel store on site. HVO will be utilised to power the 25 no. backup generators.

An attenuation pond is proposed to facilitate sustainable drainage and a range of planting will be incorporated to screen the site and to increase biodiversity across the site.

All foul water generated on the proposed development will be collected in the sealed piping system and conveyed to a 24hr holding tank. The proposed pumping station and adjoining rising main will send the foul water flows to Killala Waste Water Treatment Plant (WWTP) (Licence Number: D0067-01), located c. 550m to the east of the site in Killala Business Park. There is an existing 750mm concrete outfall pipe (which formerly served Asahi Chemical Plant) to Killala Bay coastal waterbody. The outfall pipe is located c. 850 m east of the site. A Pre Connection Enquiry (PCE) has been submitted to Irish Water in relation to this development. Connection to the WWTP is subject to permission from Irish Water.

The surface water network records indicate no surface water infrastructure is located within the site. An existing drainage ditch is located along the southern boundary of the site where it is the proposed to discharge surface water, post attenuation. The proposed development stormwater drainage network design includes sustainable drainage systems (SuDS). These measures by design ensure the stormwater leaving the site is to be attenuated and treated within the new development site boundary to ensure suitable quality, before discharging to the existing drainage ditch (post attenuation), located along the sites southern boundary and eventually to the Moyne 34 Stream.

A full description of the proposed development can be found in Chapter 2 of the EIA (Description of the Proposed Development)

The proposed storm water drainage and foul water drainage plans are shown in Figure 4.1 and Figure 4.2 below, respectively.

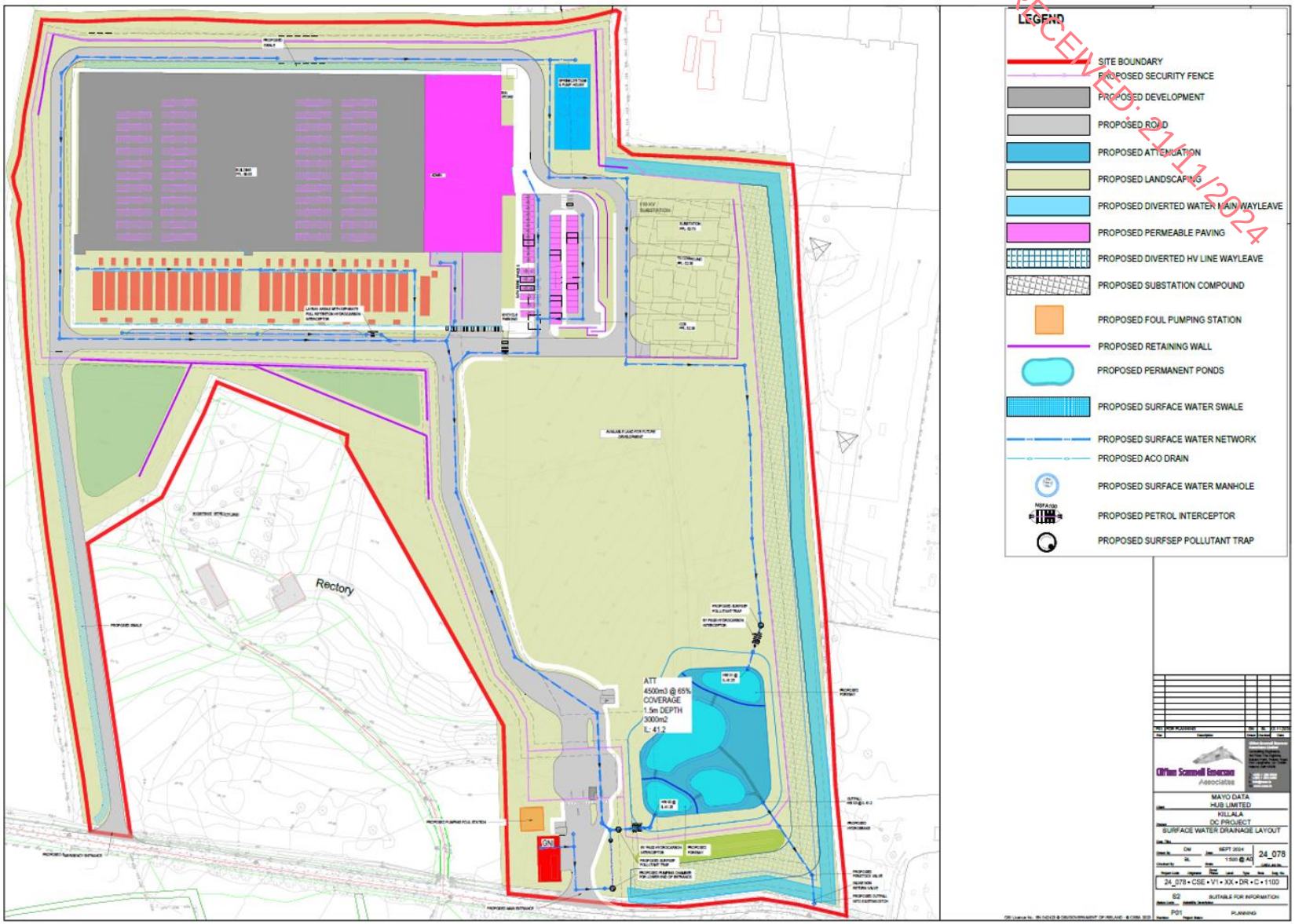


Figure 4.1 *Surface Water Drainage Layout for Proposed Development – Drawing Ref: 24_078 - CSE - V1 - XX - DR - C - 1100 (CSEA, 2024)*

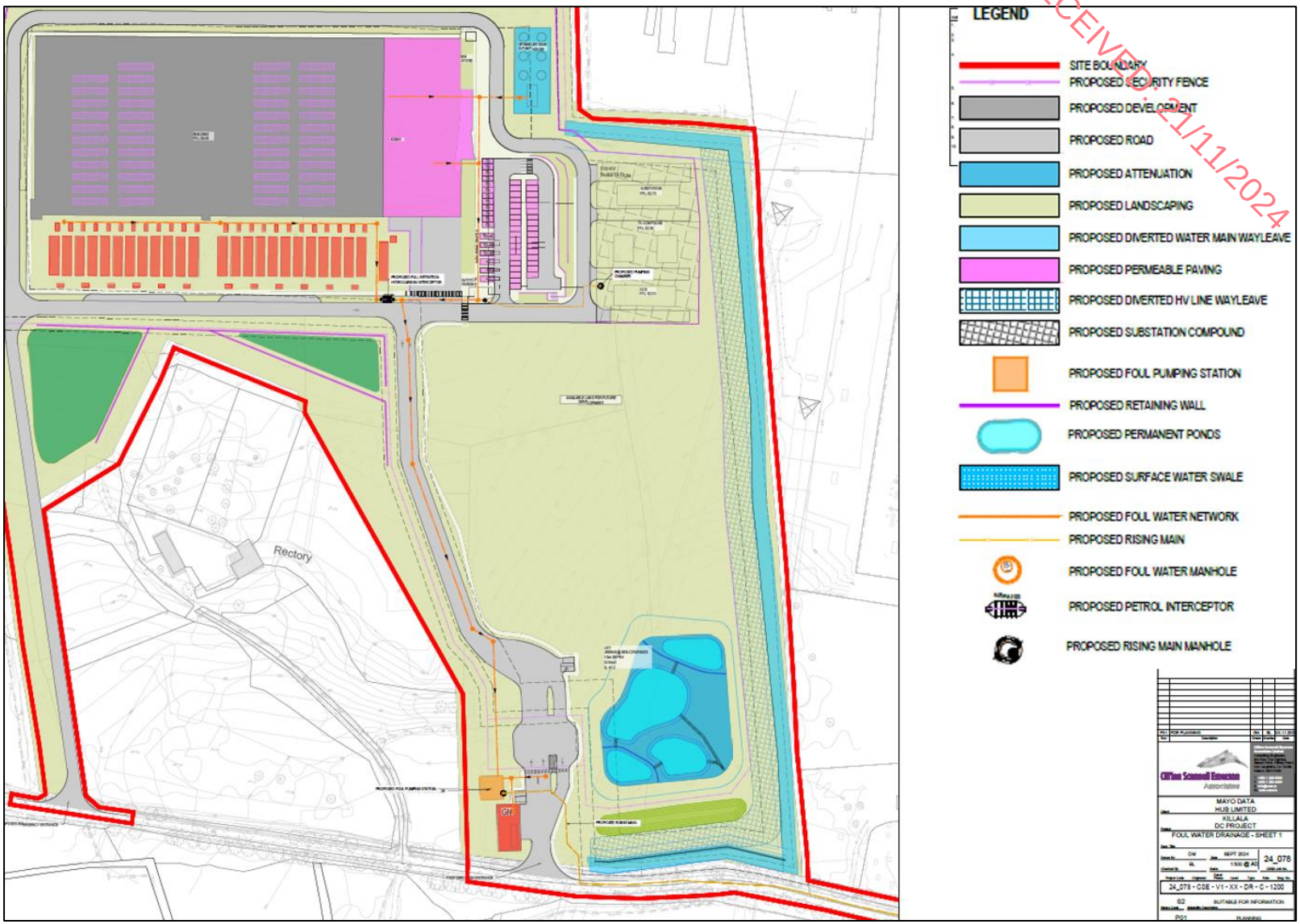


Figure 4.2 *Foul Water Drainage Layout for Proposed Development – Drawing Ref: 24_078 - CSE - V1 - XX - DR - C - 1200 (CSEA, 2024)*

The elements of the development which would have potential impact are summarised in Sections 4.1.1 and 4.1.2 below.

4.1.1 Construction Phase

During construction the contractor will be obliged to operate in compliance with a construction management plan (CMP) and mitigation measures as outlined in the EIA provided with planning.

Temporary impacts on discharging surface water to the Moyne 34 Stream (Moyne_010 WFD surface waterbody) via the drainage ditch located along the sites southern boundary could occur if mitigation measures to attenuate and treat construction runoff water fail, resulting in:

- Run-off with high levels of suspended solids (muddy water with increased turbidity – arising from excavation and ground disturbance;
- Run-off with high pH as a result of cement/concrete works on site
- Run-off with hydrocarbons as a result of accidental spillages from construction plant or onsite oil storage;
- Run-off with wastewater (nutrient and microbial rich) arising from poor on-site toilets and washrooms.

There is potential for groundwater (Bellacorick-Killala GWB) to become locally contaminated with pollutants associated with construction activity such as excavation of topsoil, subsoil and rock. The potential main contaminants include:

- Pollution due to discharges or spillages during the construction phase;
    - Cement/concrete (increase turbidity and pH) – arising from construction materials;
    - Hydrocarbons (ecotoxic) – accidental spillages from construction plant or onsite storage;
    - Wastewater (nutrient and microbial rich) – arising from accidental discharge from on-site toilets and washrooms.

Local removal and reinstatement (including infilling) of the 'protective' topsoil and subsoil cover across the development area will increase the aquifer vulnerability during construction prior to paving and installation of stormwater drainage and services, which is already "*Rock at or near Surface or Karst*" (X) for the majority of the site and "*Extreme*" (E) to the south and eastern portion of the site. Capping of significant areas of the site by hardstand/building following construction and installation of drainage will minimize the potential for contamination of the aquifer beneath the site.

It is predicted that c. c. 27,962 m^3 of topsoil will be excavated. After the removal of topsoil, it is predicted that a further c. 36,150 m^3 of subsoil and c. 22,648 m^3 of rock will be removed and transported off site, while c. 36,150 m^3 of material will be re-used as fill material. To support the construction of proposed roads, car parks, and buildings, additional fill (sands and gravels) material may need to be imported.

Local minor dewatering may be required during excavation works and groundworks. However, there is no potential for change in water quality or levels as a result of local changes in the groundwater regime at the site due to the discrete nature of fracturing within the poorly connected bedrock. In addition, the groundwater ingresses recorded were located in the south-east of the site at 1.60m BGL (TP01) and 1.20m BGL at (TP02 and SA01) within the bedrock interface, and did not occur near the proposed data centre building towards the north of the site. Therefore, there is no potential for change in water quality or levels as a result of local changes in the groundwater regime at the site.

The proposed development will require a temporary crossing of the drainage ditch for the proposed foul sewer that will connect to Killala WWTP to the east of the site. The construction activity will require surface water management to prevent pollution and degradation of habitats from a chemical spill or run off containing excessive suspended solids.

At a minimum, the works will be carried out according to standard best international practice including, but not limited, to:

- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, (C532) Construction Industry Research and Information Association;
- CIRIA (2002) Control of water pollution from construction sites: guidance for consultants and contractors (SPI56) Construction Industry Research and Information Association;
- CIRIA (2005), Environmental Good Practice on Site (C650); Construction Industry Research and Information Association;
- BPGCS005, Oil Storage Guidelines;
- CIRIA 697 (2007), The SUDS Manual; and UK Pollution Prevention Guidelines, (PPG) UK Environment Agency, 2004.

4.1.2 Operational Phase

There is no abstraction of groundwater proposed or discharge to ground during operation. As HVO is to be used rather than bulk diesel for the 25 no. backup generators, there is minimal impact for contamination of surface waterbodies (Moyne_010 & Killala Bay) or groundwater bodies (Bellacorick-Killala GWB) in the event of a spill/leak. The required HVO to operate the generators will be supplied by individual double lined/bunded tanks or 'belly tanks' (36,000 litres) within the container at each generator. Bulk fuel (HVO) will be stored in bunded areas with hardstanding floors. All areas where accidental leaks could occur are drained to oil interceptors prior to discharge to public storm sewer via an oil interceptor. The refuelling area is drained to the foul sewer.

As such, surface water runoff from roads, car parking, and hardstanding areas are the potential are the primary potential source of contamination such as petroleum hydrocarbons. The surface water drainage strategy includes the proposed development to be served by a sustainable drainage system that is to be integrated with the developments landscaping features and is typically a combination of multiple measures comprising pollutant traps, hydrocarbon interceptors, hydrobrakes, swales, forebay berms and an attenuation pond. Any surface water flows from the development will be routed to the existing drainage ditch located along the southern boundary of the site. Any releases to drainage will be mitigated through hydrocarbon interceptors.

A number of design measures will be put in place to minimise the likelihood of any spills entering the water environment to include the design of the car park with hydrocarbon interceptors. In the event of an accidental leakage of oil from the parking areas, this will be intercepted by the drainage infrastructure proposed. An attenuation basin with a forebay is proposed to meet the remaining storage requirements for the 1 in 100-year storm event with 40% climate change. Sediment build-up in the forebay is easily monitored and concentrates sediment removal of suspended solids and biological pollutants in a small area. This minimises potential damage to the rest of the pond and reduces the risk for a reduction in storage capacity over time, mitigating the potential risk of flooding. It is proposed to ultimately discharge surface water from the proposed development, post attenuation and outflow restrictions into the existing local drainage. The existing Ø450mm surface water sewer shall be diverted to connect to a

new proposed surface water pipeline following the proposed development road networks.

With regard to the wastewater discharge, all foul water generated on the proposed development will be collected in the sealed piping system and conveyed to this holding tank. The proposed pumping station and adjoining rising main will send the foul water flows to the existing Killala Waste Water Treatment Plant (WWTP) (Licence Number: D0067-01), located c. 550m to the east of the site in Killala Business Park. A Pre Connection Enquiry (PCE) has been submitted to Irish Water in relation to this development. Connection to the WWTP is subject to permission from Irish Water.

According to the Killala Waste Water Treatment Plant (WWTP) Annual Environmental Report (AER, 2021) and Uiscé Éireann's (Irish Water) 10 Year Water Supply Capacity Register (June 2023) , there is capacity available at Killala WWTP. Therefore, the proposed peak effluent discharge calculated for the proposed development at 0.25 l/s is not likely to have an impact on the capacity at Killala WWTP or the overall water quality within Killala Bay coastal waterbody or the Natura 2000 sites located herein. A foul water holding tank will provide 24-hour storage and buffering capacity to ensure that there is no peak pressure on the Killala Wastewater treatment system.

5.0 ASSESSMENT OF SOURCE-PATHWAY-RECEPTOR (SPR) MODEL

A conceptual site model is developed based on a good understanding of the hydrological and hydrogeological environment, plausible sources of impact and knowledge of receptor requirements. This in turn allows possible 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 proposed development site lies within the Moy and Killala Bay Catchment (Catchment ID: 34) and the Abbeytown_SC_010 Sub-Catchment (Sub-Catchment ID: 34_19).

As stated in Section 2.2.1 above, the site is underlain by the Bellacorick-Killala Groundwater Body (EU code: IE_WE_G_0041) which has been investigated by the GSI and is described as having a groundwater flow regime of '*PP*' which is a poorly productive bedrock aquifer. Local minor dewatering may be required during excavation and groundworks depending on the time of year development works are carried out, in order to achieve the necessary foundation base level of c. 2.5m BGL. It is estimated that c. 22,648 m^3 of rock will be excavated and transported off site. This will increase the aquifer vulnerability during construction prior to paving and installation of stormwater drainage and services. However, there is a low risk of migration through the poorly productive bedrock due to the low permeability and porosity, discrete nature of fracturing and the proposed design and mitigation measures. There is no abstraction of groundwater proposed during the operational phase.

There is an *'indirect'* hydrological connection with the Moyne 34 Stream (Moyne_010 WFD surface waterbody) through the drainage ditch located along the southern boundary of the site where it is proposed to discharge to during construction and operation, post attenuation. The drainage ditch eventually discharges into the Moyne 34 Stream (Moyne_010 WFD surface waterbody), located c. 3.5 km downstream (0.55 km south-east of the site - linear distance). The Moyne 34 Stream (Moyne_010 WFD surface waterbody) flows in a north-easterly direction and eventually discharges to Killala Bay coastal waterbody a further c. 3.25 km downstream (c. 2.52 km north-east/linear distance), where the receiving environment is designated as part of the Killala Bay/Moy Estuary SAC and the Killala Bay/Moy Estuary SPA. It should be noted,

due to the distance of removal and the dilution factor within the drainage ditch, the Moyne 34 Stream (Moyne_010 WFD surface waterbody) and Killala Bay, no potential impacts are anticipated.

There is also an *'indirect'* pathway with Killala Bay and the Natura 2000 sites located herein through the proposed foul sewer connection to Killala Waste Water Treatment Plant (WWTP) (Licence Number: D0067-01), located c. 550m to the east of the site in Killala Business Park (post treatment and in accordance with EPA licence conditions). A foul water holding tank will provide 24-hour storage and buffering capacity to ensure that there is no peak pressure on the Killala Wastewater treatment system. According to the Killala Waste Water Treatment Plant (WWTP) Annual Environmental Report (AER, 2021) and Uiscé Éireann's (Irish Water) 10 Year Water Supply Capacity Register (June 2023) , there is capacity available at Killala WWTP.

Table 5.1 below describes the S-P-R model for the proposed development site and includes the robust mitigation and design measures which will be incorporated into the proposed development throughout the construction phases.

Table 5.1 *Pollutant Linkage Assessment (without mitigation)*

Source	Pathways	Receptors Considered	Risk of Impact	Mitigation Measures
Construction Impacts (Summary)				
Unmitigated leak from an oil tank to ground/ unmitigated leak from construction vehicle (1,000 litres worst case scenario). Discharge to ground of runoff water with High pH from cement process/ hydrocarbons from construction vehicles/run-off containing a high concentration of suspended solids.	Direct pathway to the underlying locally important aquifer classified by the GSI with *Rock at or near Surface or Karst*" (X) for majority of site and "*Extreme*" (E) in the south and south east of site. (Excavations of c. 36,150 m^3 of subsoil and c. 22,648 m^3 of rock will be removed temporarily exposing the bedrock during construction). Migration within weathered/ less competent bedrock is low (low permeability and porosity, local fracturing rather than large and connected fractures). Indirect pathway to the Moyne_010 WFD Surface Waterbody/Moyne 34 Stream through the existing drainage ditch along the sites southern boundary during construction and operation. Indirect pathway to Killala	Underlying Bedrock Aquifer (Locally Important Aquifer). Moyne_010 WFD Surface Waterbody/Moyne 34 Stream (c. 3.5 km downstream / linear distance: c. 0.55 km south-east). Killala Bay Coastal Waterbody (c. 6.75 km downstream / linear distance: c. 2.52 km north-east/downgradient). Killala Bay/Moy Estuary SAC/SPA (c. 6.75 km downstream / linear distance: c. 2.52 km north-east/downgradient).	No likely impact on the status of the locally important aquifer due to low potential loading, mitigation measures (i.e. CEMP), and discrete nature of fracturing reducing potential for any off site migration. No perceptible risk to water requirements for Moyne_010 WFD Surface Waterbody/Moyne 34 Stream, Killala Bay coastal waterbody or Killala Bay/Moy Estuary SAC/SPA based on low potential of loading, mitigation measures (i.e. CEMP), and high level of dilution in the surface water drainage.	Only potential for temporary impacts due to accidental releases. Mitigation measures outlined in a CEMP which will be a live document. It will set out requirements and standards which must be met during the construction stage and will include the relevant mitigation measures outlined in the CEMP and any subsequent conditions relevant to the proposed development. These include management of soils, re-fuelling of machinery and chemical handling, control of water during the construction phase and treatment of discharge water where required.

	Bay through the existing drainage ditch along the sites southern boundary and the Moyne_010 WFD Surface Waterbody/Moyne 34 Stream. Indirect pathway to Killala Bay coastal waterbody through the proposed foul sewer post treatment at Killala WWTP. Indirect pathway to Killala Bay/Moy Estuary SAC/SPA through the proposed foul sewer post treatment at Killala WWTP.			
Operational Impacts (Summary)				
Discharge to ground of hydrocarbons from roads, car parking, and hardstanding areas. Discharge of foul water to Killala Bay post treatment at Killala WWTP.	Indirect pathway to the Moyne_010 WFD Surface Waterbody/Moyne 34 Stream through the existing drainage ditch along the sites southern boundary during construction and operation. Indirect pathway to Killala Bay through the existing drainage ditch along the sites southern boundary and the Moyne_010 WFD Surface Waterbody/Moyne 34 Stream.	Moyne_010 WFD Surface Waterbody/Moyne 34 Stream (c. 3.5 km downstream / linear distance: c. 0.55 km south-east). Killala Bay Coastal Waterbody (c. 6.75 km downstream / linear distance: c. 2.52 km north-east/downgradient). Killala Bay/Moy Estuary SAC/SPA (c. 6.75 km downstream / linear distance: c. 2.52 km	No perceptible risk due to the implementation of the design measures which includes SuDS and the use of interceptors along the drainage system. Furthermore, the extent of loading of contaminant, distance between the source and the protected sites along with significant dilution in the surface water sewer and drainage network will ensure any released hydrocarbons are at background levels (i.e., with no likely impact above water quality objectives as outlined in S.I. No. 272 of 2009, S.I. No. 386 of 2015 and S.I. No. 77 of 2019). No perceptible risk to the hydrological environment following treatment in the EPA licenced Killala WWTP.	The proposed development is designed to ensure the protection of the hydrological environment by incorporating SuDs measures in design including limiting the surface water discharge from the site to pre-development, greenfield rates, and to ensure improvement in the overall surface water quality before ultimate discharge. Wastewater discharge to be agreed with Uisce Éireann (formerly IW, Irish Water) in a Wastewater Connection Application.

	Indirect pathway to Killala Bay coastal waterbody through the proposed foul sewer post treatment at Killala WWTP. Indirect pathway to Killala Bay/Moy Estuary SAC/SPA through the proposed foul sewer post treatment at Killala WWTP.	north-east/downgradient).		

6.0 NO DETERIORATION ASSESSMENT

6.1 HYDROLOGICAL ENVIRONMENT

There is an *'indirect'* hydrological connection/linkage the Moyne 34 Stream (Moyne_010 WFD surface waterbody) located c. 3.5 km downstream (0.55 km south-east of the site - linear distance) though the drainage ditch located along the southern boundary of the site. The Moyne 34 Stream flows in a north-easterly direction and eventually discharges to Killala Bay coastal waterbody a further c. 3.25 km downstream (c. 2.52 km north-east/linear distance), where the receiving environment is designated as part of the Killala Bay/Moy Estuary SAC and the Killala Bay/Moy Estuary SPA. Therefore, the proposed development has an *'indirect'* hydrological connection/linkage with Killala Bay coastal waterbody and the conservation areas/Natura 2000 sites located herein through the existing and proposed surface water drainage.

There is also an *'indirect'* pathway through Killala WWTP through the proposed foul sewer drainage. According to the Killala Waste Water Treatment Plant (WWTP) Annual Environmental Report (AER, 2021) and Uiscé Éireann's (Irish Water) 10 Year Water Supply Capacity Register (June 2023) , there is capacity available at Killala WWTP. Therefore, the proposed peak effluent discharge calculated for the proposed development at 0.25 l/s is not likely to have an impact on the capacity at Killala WWTP or the overall water quality within Killala Bay coastal waterbody or the Natura 2000 sites located herein. In addition, a foul water holding tank has been included within the design along the southern boundary of the site. This tank will provide 24-hour storage and buffering capacity to ensure that there is no peak pressure on the Killala Wastewater treatment system.

There are mitigation and design measures which will be implemented during the construction phase to protect the hydrological and hydrogeological environment. There is a potential of accidental discharges should mitigation fail during the construction phase, however these are temporary short-lived events that will not impact on the water status of waterbodies long-term and as such will not impact on trends in water quality and over all status assessment.

Local minor dewatering may be required during excavation works and groundworks. However, there is no potential for change in water quality or levels as a result of local changes in the groundwater regime at the site due to the discrete nature of fracturing within the bedrock and lengthy pathway of flow allowing time for attenuation and dispersion. In addition, the groundwater ingresses were recorded in the south-east of the site at 1.60m BGL (TP01) and 1.20m BGL at (TP02 and SA01) within the bedrock interface, and did not occur near the proposed data centre building towards the north of the site. Therefore, there is no potential for change in water quality or levels as a result of local changes in the groundwater regime at the site.

The project-specific CEMP which the works contractor will develop will implement strict mitigation measures to ensure the protection of the hydrological (and hydrogeological) environment during construction which will ensure that there will be no negative impact on the quantitative or qualitative or morphology of the nearby watercourses.

During operation, surface water discharge will be managed to greenfield run-off rates and treated through oil interceptor. The discharges will be adequately treated via SuDS measures i.e. hydrobrake (or equivalent) and oil/water interceptor to ensure there is no long-term negative impact to the WFD water quality status of the receiving

waterbodies mentioned in Table 5.1 above. The SuDS and proposed measures have been designed in detail with the ultimate aim of protecting the hydrological (& hydrogeological) environment.

There are no changes to the overall hydrological and hydrogeological regime as a result of the proposed development. There are no proposed diversions of any drainage ditches or waterbodies as part of the proposed development.

Overall, the potential effects on the current status of the waterbodies are considered *no impact i.e. no change to the WFD status or elements in terms of the hydrological environment*.

6.2 HYDROGEOLOGICAL ENVIRONMENT

The proposed development may require local minor dewatering during excavation works and groundworks. However, there is no potential for change in water quality or levels as a result of local changes in the groundwater regime at the site due to the discrete nature of fracturing within the bedrock and lengthy pathway of flow allowing time for attenuation and dispersion between thesites . In addition, the groundwater ingresses were recorded in the south-east of the site at 1.60m BGL (TP01) and 1.20m BGL at (TP02 and SA01) within the bedrock interface, and did not occur near the proposed data centre building towards the north of the site. Therefore, there is no potential for change in water quality or levels as a result of local changes in the groundwater regime at the site. There are no planned discharges to groundwater during the operational phase and no long-term groundwater dewatering for the project. The proposed development design includes hardstand cover across the site.

There is limited potential of accidental discharges during the construction phase. However should these occur they are temporary short-lived events that will not impact on the water status of the underlying bedrock aquifer long-term and as such will not impact on trends in water quality and over all status assessment. The project-specific CMP which the works contractor will develop will implement strict mitigation measures to ensure the protection of the hydrogeological environment during construction which will ensure that there will be no negative impact on the quantitative or qualitative of the underlying locally important limestone aquifer (Bellacorick-Killala GWB).

In terms of the operational phase, the risk to the aquifer is considered to be low due to the presence of handstand and a drainage system incorporating use of oil / hydrocarbon / petrol interceptors (or equivalent) on the stormwater drainage system prior to discharge from the site.

Overall, the potential effects on the WFD status to the waterbodies are considered no impact *i.e., no change to the current status or elements in terms of the underlying hydrogeological environment*.

6.3 ASSESSMENT IN TERMS OF FUTURE GOOD STATUS

The Moyne_010 WFD surface waterbody (European Code: IE_WE_34M190890) has a '*Moderate*' WFD status (2016-2021) and its WFD risk score is currently under '*Review'*. This '*Moderate*' status is related to its ecological status or potential. The most recent Sub-Catchment Assessment (2019) carried out by the EPA on the Abbeytown_SC_010 Sub-Catchment states there are no significant pressures on the Moyne_010 WFD surface water body

The Killala Bay coastal waterbody (European Code: IE_WE_420_0000) has a '*Good*' WFD status (2016-2021) and its WFD risk score is '*Not at risk'* of not achieving good status. This '*Good*' status is related to its ecological status or potential. The main pressure on Killala Bay WFD surface waterbody is from anthropogenic pressures. Therefore, the overall status of Killala Bay coastal waterbody is considered '*Good*' and the WFD objectives are currently being met.

The Bellacorick-Killala groundwater body (European Code: IE_WE_G_0041) underlying the site is classified under the WFD Status (2016-2021) as having a '*Good'* status and a WFD Risk Score of "*Not at Risk*" of not achieving good status. This '*Good*' status is related to the overall groundwater status i.e. quantitative groundwater status and chemical groundwater status. Therefore, the overall status of Bellacorick-Killala groundwater body is considered '*Good*' and the WFD objectives are currently being met.

At present there are no local targeted measures within the catchments to maintain or achieve improvements to the status of the water bodies. However, the following are some pressures associated with waterbody catchments:

- Physical Modifications.
- Management of pollution from agricultural activities.
- Management of pollution from sewage and waste water.
- Management of pollution from urban environments.
- Changes to natural flow and levels of water.
- Managing invasive non-native species.

The proposed development will incorporate SuDs measures within the landscape and drainage design in order to manage run-off quality and foul sewers management will be in compliance with UÉ specifications. No dewatering or discharge to ground is required during operation. As such there will be no change to the existing status as a result of the proposed development.

Based on the above information it is ***not*** considered that any aspects of the proposed development will prevent the WFD objectives from being achieved or to meet the requirements and/or objectives in the second RBMP 2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027.

7.0 CONCLUSIONS

Appendix A contains the background information and the WFD classification elements for surface water and groundwater body status. The colour coded system referred to in Appendix A – Table 1 and Table 2 are used to give a visual impression of the surface water and groundwater assessment, respectively

Appendix B presents the methodology for the surface water and groundwater assessments.

The WFD assessment indicates that, based on the current understanding of the proposed development, there is no potential for adverse or minor temporary/ long-term or localised effects on the Moyne 34 Stream (Moyne_010 WFD surface waterbody), Killala Bay coastal waterbody or the Natura 2000 sites located herein (Killala Bay/Moy Estuary SAC/SPA). Therefore, it has been assessed that the proposed development will not cause any significant deterioration or change in water body status or prevent attainment, or potential to achieve, future good status or to meet the requirements and/or objectives in the second RBMP 2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027.

The WFD assessment indicates that there is no potential for adverse or minor temporary or localised effects on the Bellacorick-Killala groundwater body (GWB). Therefore, it has been assessed that it is unlikely that the proposed development will cause any significant deterioration or change on its water body status or prevent attainment, or potential to achieve the WFD objectives or to meet the requirements and/or objectives in the second RBMP 2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027.

No further assessment of WFD is recommended given that no significant deterioration or change in water body status is expected based on the current understanding of the proposed development during construction and operation.

8.0 STUDY LIMITATIONS

The conclusions and recommendations listed above are based on our current understanding of the site. This has been formed from review of historical maps, review of current and previous environmental and engineering reports for the proposed development site. This information is taken as being accurate and true.

Public databases held by the EPA, GSI, OPW, NPWS and OSI have been consulted and the most recent available data has been referenced.

No subsurface or destructive testing was carried out as part of this assessment.

9.0 REFERENCES

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- Mayo County Council Development Plan 2022-2028.

10.0 APPENDICES

APPENDIX A

BACKGROUND TO SURFACE WATER & GROUNDWATER BODY STATUS

Background to Surface Water Body Status

Under the WFD, surface water body status is classified on the basis of chemical and ecological status or potential. Ecological status is assigned to surface water bodies that are natural and considered by the EPA not to have been significantly modified for anthropogenic purposes (i.e., culverting). Ecological potential is assigned to artificial and man-made water bodies (such as canals), or natural water bodies that have undergone significant modification. The term 'ecological potential' is used as it may be impossible to achieve good ecological status because of modification for a specific use, such as navigation or flood protection. The ecological potential represents the degree to which the quality of the water body approaches the maximum it could achieve. The worst-case classification is assigned as the overall surface water body status, in a 'one-out all-out' system (i.e., by taking the worst case of all the combined risk outcomes). This system is summarised below in Figure 1.

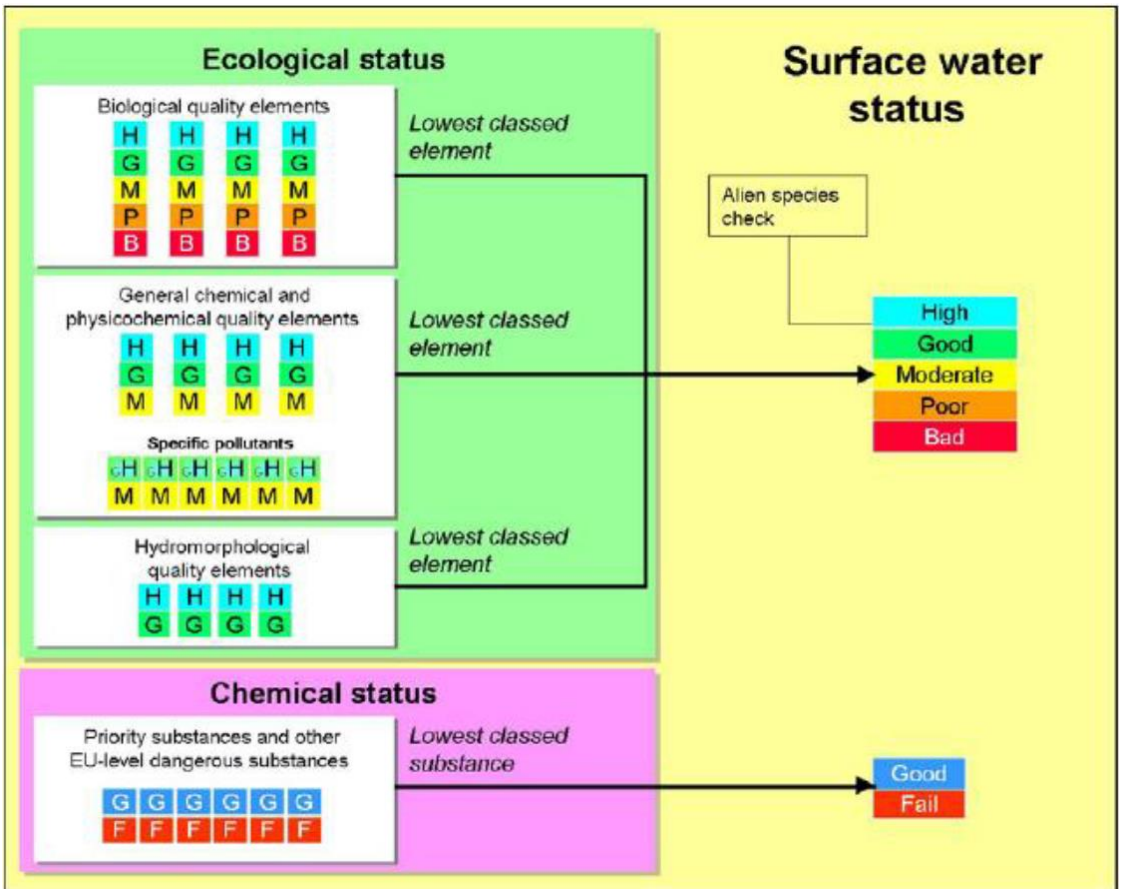

Figure 1 *WFD classification elements for surface water body status (Environmental Agency, 2015)*

In addition, the WFD also requires the assessment of the ecological status of water bodies associated with hydromorphological quality elements. Hydromorphology is a term used in the WFD to describe the processes operating within, and the physical form of a waterbody. The term encompasses both hydrological and geomorphological characteristics that, in combination, help support a healthy ecology. Hydromorphological elements contribute towards WFD status classification.

Chemical Status

Chemical status is defined by compliance with environmental standards for chemicals that are priority substances and/or priority hazardous substances, in accordance with the Environmental Quality Standards Directive (2008/105/EC). This is assigned on a scale of good or fail. Surface water bodies are only monitored for priority substances where there are known discharges of these pollutants; otherwise, surface water bodies are reported as being at good chemical status.

Ecological Status

Ecological status or potential is defined by the overall health or condition of the watercourse. This is assigned on a scale of High, Good, Moderate, Poor or Bad, and on the basis of four classification elements or 'tests', as follows:

- **Biological:** This test is designed to assess the status indicated by a biological quality element such as the abundance of fish, invertebrates or algae and by the presence of invasive species. The biological quality elements can influence an overall water body status from Bad through to High.
- **Physico-chemical:** This test is designed to assess compliance with environmental standards for supporting physicochemical conditions, such as dissolved oxygen, phosphorus and ammonia. The physicochemical elements can only influence an overall water body status from Moderate through to High.
- **Specific pollutants:** This test is designed to assess compliance with environmental standards for concentrations of specific pollutants, such as zinc, cypermethrin or arsenic. As with the physico-chemical test, the specific pollutant assessment can only influence an overall water body status from Moderate through to High.
- **Hydromorphology:** For natural, this test is undertaken when the biological and physicochemical tests indicate that a water body may be of High status. It specifically assesses elements such as water flow, sediment composition and movement, continuity, and structure of the habitat against reference or 'largely undisturbed' conditions. If the hydromorphological elements do not support High status, then the status of the water body is limited to Good overall status. For artificial or highly modified waterbodies, hydromorphological elements are assessed initially to determine which of the biological and physico-chemical elements should be used in the classification of ecological potential. In all cases, assessment of baseline hydromorphological conditions are an important factor in determining possible reasons for classifying biological and physicochemical elements of a water body as less than Good, and hence in determining what mitigation measures may be required to address these failing water bodies. Subsection below further elaborates on the methodology for estimating the hydromorphological status independently.

Hydromorphological Status

Hydromorphology is a relatively new discipline which is described in the Water Framework Directive. Hydromorphology is the study of physical form, condition and processes within a surface water body, that create and maintain habitat. It stems from the term 'fluvial geomorphology', a discipline that focuses on the processes that operate in, for example, a river system (e.g. both water and sediment production and movement, erosion, deposition), and the features that these processes create (e.g. pools, riffles, sediment bars). As these processes create and maintain such features, this in turn will create and maintain habitats for invertebrates, fish and plants.

The Environmental Protection Agency (EPA) in the Republic of Ireland and the Northern Ireland Environment Agency (NIEA), through the North South Shared Aquatic Resource (NS SHARE) project, agreed a field assessment technique for WFD classification called the River Hydromorphology Assessment Technique (RHAT) which newest version was published in 2014.

These guidelines assume that natural systems support ecology better than modified systems. Hence the RHAT method classifies river hydromorphology based on a departure from naturalness. It assigns a morphological classification directly related to that of the WFD: *High*, *Good*, *Moderate*, *Poor* and *Bad*, based on semi-qualitative and quantitative criteria.

The eight criteria that are scored by the RHAT are:

1. Channel morphology and flow types: This attribute evaluates the form of the river and its deviation from natural including the planform, cross-section, natural bed forms, flow types and obstructions.

2. Channel vegetation: This attribute relates to the presence, diversity and habitat potential of any vegetation, including woody habitat (WH), leaf litter and tree roots occurring within the channel. The river type and riparian land cover affect the type and quantity of vegetation present in terms of the amount of leaf litter provided as a source of food and the number of refuges such as underwater roots for habitat.

3. Substrate diversity and condition: This attribute evaluates the type, quantity and diversity of substrate present in the river. The dominant substrate depends on the river type and geology. It will reflect the heterogeneity of the substrate present.

4. Barriers to continuity: This attribute relates to in stream barriers which affect both the variation in velocity across the channel and the longitudinal continuity of the river. It will indicate the impacts of widening, over deepening, straightening, impoundments, weirs and dams on downstream transport of water, sediment and organic matter, and up and downstream migration of fish (salmon, trout, eel and lamprey).

5. Bank structure and stability: This attribute assesses the shape and stability of the banks of the river. Rivers are naturally dynamic entities whose pathways constantly change. The degree of expected lateral movement will depend on typology, geology, soil type and hydrology. It relates to both the degree of bank engineering, e.g. steepening, and the effect of riparian or channel use on the stability of the banks.

6. Bank and bank top vegetation: This attribute assesses the types, continuity and canopy layers of the bank vegetation. Bank top should be taken as the first obvious break in slope to 1m back. The river type, altitude, geology and riparian land use will affect the type and extent of bank vegetation present. Bank vegetation contributes to river habitat and bank stability. It will reflect the amount and extent of vegetation cover.

7. Riparian land use: This attribute relates to land cover within the zone adjacent to the river from 1m to 21m back from the bank top. It will reflect the amount and type of vegetation (i.e. whether native or not) within this zone and the intrusion of human activities. Weight should be given to the nature of the activity, proximity to the river channel, and the importance of the floodplain area to the river ecosystem (most important for lowland rivers that interact regularly with the floodplain zone).

8. Floodplain interaction: This attribute concerns the degree of lateral connectivity between the channel and floodplain. The natural connectivity depends on the river type and valley confinement. For rivers that would naturally flood over bank at high discharges, the score will reflect the degree to which channel and bank work have altered flow regime.

Background to Groundwater Body Status

Under the WFD, groundwater body status is classified on the basis of quantitative and chemical status. Status is assessed primarily using data collected from the EPA monitoring network; therefore, the scale of assessment means that groundwater status is mainly influenced by larger scale effects such as significant abstraction or widespread/ diffuse pollution. The worst-case classification is assigned as the overall groundwater body status, in a 'one-out all-out' system. This system is summarised in Figure 2 below.

Quantitative Status

Quantitative status is defined by the quantity of groundwater available as baseflow to watercourses and water-dependent ecosystems, and as 'resource' available for use as drinking water and other consumptive purposes. This is assigned on a scale of Good or Poor, and on the basis of four classification elements or 'tests' as follows:

- **Saline or other intrusions:** This test is designed to identify groundwater bodies where the intrusion of poor quality water, such as saline water or water of different chemical composition, as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.
- **Surface water:** This test is designed to identify groundwater bodies where groundwater abstraction is leading to a significant diminution of the ecological status of associated surface water bodies.
- **Groundwater Dependent Terrestrial Ecosystems (GWDTEs):** This test is designed to identify groundwater bodies where groundwater abstraction is leading to "significant damage" to associated GWDTEs (with respect to water quantity).
- **Water balance:** This test is designed to identify groundwater bodies where groundwater abstraction exceeds the "available groundwater resource", defined as the rate of overall recharge to the groundwater body itself, as well as the rate of flow required to meet the ecological needs of associated surface water bodies and GWDTEs.

Chemical Status

Chemical status is defined by the concentrations of a range of key pollutants, by the quality of groundwater feeding into watercourses and water-dependent ecosystems and by the quality of groundwater available for drinking water purposes. This is assigned on a scale of Good or Poor, and on the basis of five classification elements or 'tests' as follows:

- **Saline or other intrusions:** This test is designed to identify groundwater bodies where the intrusion of poor-quality water, such as saline water or water of different chemical composition, as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.

- **Surface water:** This test is designed to identify groundwater bodies where groundwater abstraction is leading to a significant diminution of the chemical status of associated surface water bodies.
- **Groundwater Dependent Terrestrial Ecosystems (GWDTEs):** This test is designed to identify groundwater bodies where groundwater abstraction is leading to "significant damage" to associated GWDTE's (with respect to water quality).
- **Drinking Water Protected Areas (DrWPAs):** This test is designed to identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.
- **General quality assessment:** This test is designed to identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.

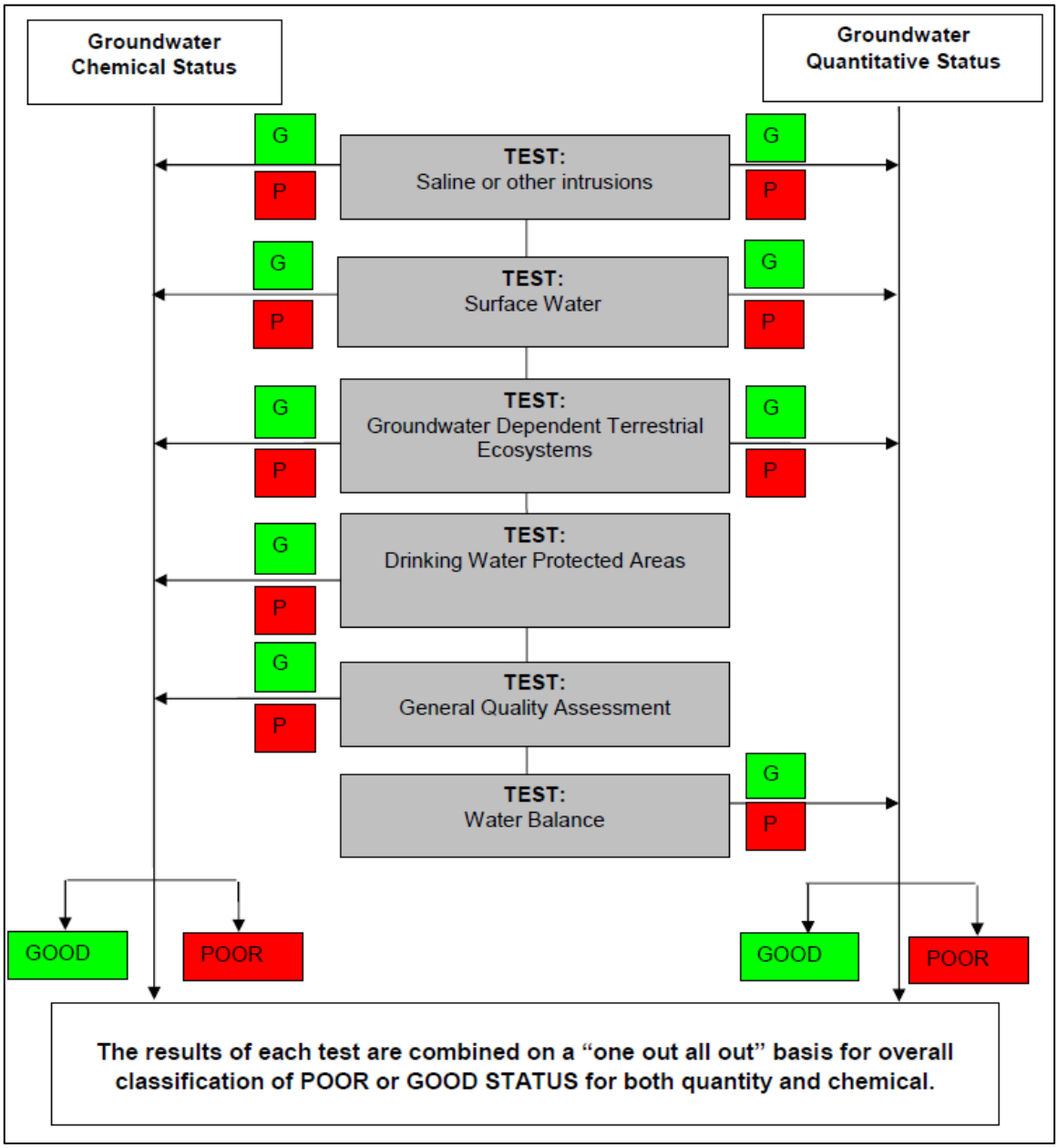

Figure 2 *WFD classification elements for groundwater body status (EPA, 2015)*

APPENDIX B

WATER FRAMEWORK DIRECTIVE ASSESSMENT MATRIX

Risk screening of potential to cause deterioration of current WFD status

	Surface Water	Scheme Elements	**Proposed Development**					Mitigation Measures	Overall Impact with mitgation measures
	Moyne_010 WFD Surface Waterbody (European Code: IE_WE_34M190890) Killala Bay Coastal Waterbody (European Code: IE_WE_420_0000)	Phase (Construction/ Operation)	Construction	Construction	Construction	Operation	Operation		
		Identified Quantitative/Qualitative Impacts	Increased run-off and sediment loading	Pollution due to accidental discharges or spillages during the construction phase	Scour during the construction phase	Increase in Hardstanding	Localised oil leaks from vehicles		
Biological Status	Macrophytes and phytobenthos - combined	Predicted change to status elements (green = none, amber = possibly, red = likely)	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	**Construction:** The project-specific CEMP will include robust mitigation measures to protect the hydrological environment. These include attenuation of surface water prior to discharge to the drainage ditch, containment of bulk oil tanks, management measures for concrete pouring and wash out to prevent alkaline discharge to run-off water, management of re-fuelling machinery and chemical handling, stockpile management and spill control measures. **Operation**: The proposed development has a low hazard loading due to the use of HVO for the 25 no. backup generators rather than bulk diesel. Bulk fuel (HVO) will be stored in bunded areas with hardstanding floors. The proposed development is designed to ensure the protection of the hydrological environment through the implementation of SuDS measures including attenuation to greenfield runoff rates and hydrocarbon/oil interceptors to control any washout following an oil leak from car parking areas and roads. The proposed foul drainage system will ultimately discharge into the licenced facility at Killala WWTP. A foul water holding tank will provide 24-hour storage and buffering capacity to ensure that there is no peak pressure on the Killala Wastewater treatment system. According to the Killala Waste Water Treatment Plant (WWTP) Annual Environmental Report (2021) there is capacity available and no mitigation is required.	No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Macroinvertebrates		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Fish		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
Physio-Chemical Status	Total Ammonia	Predicted change to status elements (green = none, amber = possibly, red = likely)	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Total Nitrogen		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Ortho-Phosphate		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
Hydromorphological Elements	Quantity and dynamics of river flow	Predicted change to status elements (green = none, amber = possibly, red = likely)	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Connection to Groundwater		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	River continuity		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	River depth and width variation bed		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Structure and substrate of river bed		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Structure of riparian zone		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status

Risk screening of potential to cause deterioration of current WFD status

	Groundwater	Scheme Elements	**Proposed Development**				Mitigation Measures	Overall Impact
	Bellacorrick-Killala Groundwater Body (European Code: IE_WE_G_0041).	Phase (Construction/ Operation)	Construction	Construction	Operation	Operation		
		Identified Potential Quantitative/Qualitative Impacts	Increased run-off and sediment loading	Pollution due to accidental discharges or spillages during the construction phase	Increase in Hardstanding	localised oil leaks form cars		
Quantitative Elements	**Saline or other intrusions.** To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Predicted change to status elements (green = none, amber = possibly, red = likely)	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	**Construction**: The project-specific CEMP will include robust mitigation measures to protect the underlying hydrogeological environment. The CEMP will be a live document and it will go through a number of iterations before works commence and during the works. It will set out requirements and standards which must be met during the construction stage and will include the relevant mitigation measures and any subsequent conditions relevant to the proposed development. These include collection of run-off and attenuation prior to discharge to the drainage ditch on the sites southern boundary, containment of bulk oil tanks, management and measures for concrete pouring and wash out to prevent alkaline discharge to ground, management of soils, re-fuelling machinery and chemical handling, control of water during the construction phase and spill control measures. Minor localised dewatering may occur during excavations which could impact on quantitative status. However, due to the discrete nature of fracturing and lengthy pathway of flow allowing time for attenuation and dispersion, there is no potential for change in water quality or levels as a result of local changes in the groundwater regime at the site. **Operation:** The proposed development has a low hazard loading due to the use of HVO for the 25 no. backup generators rather than bulk diesel. The proposed development is designed to ensure the protection of the underlying hydrogeological environment such as use of oil interceptors on the stormwater system prior to discharge from the site and the use of SuDS techniques. In order to limit the surface water discharge from the site to pre-development, greenfield rates, and to ensure improvement in the overall surface water quality before ultimate discharge the principles of Sustainable Drainage Systems, (SuDS) are to be implemented. No groundwater abstraction is required which could impact on quantitative status of Bellacorick-Killala GWB.	No anticipated impacts to the hydrogeological environment with no deterioration to the WFD Status
	Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Groundwater Dependent Terrestrial Ecosystems (GWDTE's) To assess the impact of groundwater abstractions on the condition of GWDTE'S.		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrogeological environment with no deterioration to the WFD Status
	Water balance To identify groundwater bodies where abstractions exceed the available resource.		Not Applicable (no dewatering anticipated)					No anticipated impacts to the hydrogeological environment with no deterioration to the WFD Status
Chemical Elements	**Saline or other intrusions.** To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Predicted change to status elements (green = none, amber = possibly, red = likely)	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrogeological environment with no deterioration to the WFD Status
	Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrogeological environment with no deterioration to the WFD Status
	Groundwater Dependent Terrestrial Ecosystems (GWDTE's) To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTE's.		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrogeological environment with no deterioration to the WFD Status
	Drinking Water Protected Areas (DrWPAs) To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrogeological environment with no deterioration to the WFD Status
	General quality assessment To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrogeological environment with no deterioration to the WFD Status