East Limerick Substation Development

Hydrology and Hydrogeology Assessment

September 2026

Prepared for:

Harmony Solar East Limerick Limited

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This report describes work commissioned by Harmony Solar East Limerick Ltd, by an instruction dated 13/12/2024. The Client's representative for the contract was Fred Tottenham of Harmony Solar Ireland Ltd. Tara Saccardo of JBA Consulting carried out this work.

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Abbreviations

ADS	Arterial Drainage Scheme
BESS	Battery Energy Storage System
CEMP	Construction Environmental Management Plan
DoEHLG	Department of Environment, Heritage and Local Government
EPA	Environmental Protection Agency
EU	European Union
FRA	Flood Risk Assessment
GSI	Geological Survey of Ireland
GWS	Group Water Scheme
IPP	Independent Power Producer
NIS	Natura Impact Statement
OPW	Office of Public Works
pNHA	Proposed Natural Heritage Area
PWS	Public Water Supply
SAC	Special Area of Conservation
WFD	Water Framework Directive

1 Introduction

This report assesses and evaluates the potential for impacts on surface and groundwater as a result of the proposed East Limerick Substation Development (hereafter referred to as the "Proposed Substation Development"). The following legislation was consulted during the preparation of this report:

- The Water Framework Directive (WFD) (2000/60/EC);
- The European Communities Environmental Objective (Surface Water) Regulations 2009 as amended (S.I. No. 792 of 2009);
- European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 (S.I. No. 77 of 2019);
- European Communities (Quality of Salmonid Waters) Regulations (S.I. No. 293 of 1988);
- The European Communities (Water Policy) Regulations (S.I. No. 722 of 2003);
- The EU Floods Directive 2007/60 EC;
- Groundwater Directive (2006/118/EC); and
- The European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010).

1.1 Study Area

The site of the Proposed Substation Development is situated in the townlands of Gotoon, Coolscart and Kilfrush in County Limerick. The Overall Project further extends to the townlands of Ballyhaukish, Millfarm, Coolalough, Ballycahill, Newtown, and Knocklong.

The Proposed Substation Development comprises an area of 17.02 ha. The site is located south-west of the village of Hospital and north-west of Knocklong village.

1.2 Proposed Development

Harmony Solar East Limerick Limited is seeking planning permission for a substation development within the townlands of Gotoon, Coolscart and Kilfrush in County Limerick.

The Proposed Substation Development description, as contained on the statutory notices for the planning application, reads as follows:

A 10-year planning permission for the construction of a 220kV Loop In Loop Out (LILO) substation and associated works within a site of 17.02 hectares which will include the following:

- Transmission System Operator (TSO) compound with an area of approximately 14,158m², containing a two-storey 220kV GIS substation building with a footprint of approximately 1,844m², a total floor area of 3,550.8m², and a height of 20.7 m.

- Customer compound with an area of approximately 4,576m², containing a customer building with a footprint of approximately 346.2 m², a total floor area of 311.8m² and a height of 7.62m.
- 220kV customer transformer positioned within bunded enclosures, with a height of 9.5m above finished ground level.
- 220kV electrical infrastructure including transformers, switchgear, gantries, insulators, conductors, protection and control equipment, and all associated electrical plant and apparatus.
- A Battery Energy Storage System (BESS) located within a dedicated BESS compound and including:
    - 55 no. containerised battery storage modules, each measuring 6.06 m long, 2.44 m wide and 2.9 m high.
    - 28 no. containerised transformer and power conversion / conditioning units, each measuring 6.06 m long, 2.44 m wide and 2.9 m high.
    - Ancillary BESS infrastructure including inverters, transformers, switchgear, control equipment, thermal management systems, fire detection and suppression systems, acoustic screening and associated electrical plant.
- Removal of 1 no. existing 25m high steel lattice tower, and the installation of 2 no. steel lattice towers of 26.5m high, foundations and associated insulators, hardware and conductor.
- 4no. lightning protection masts, with a height of 18m.
- 1 no. telecommunications mast, with a height of 37.52m.
- 140m of underground electrical cable and associated ducting, including joint bays, cable sealing end compounds, marker posts and associated infrastructure.
- Internal access tracks.
- A new access point from the L1509 public road.
- Removal of derelict farm building.
- Landscaping and biodiversity enhancement measures.
- Security gates, boundary fencing and all associated ancillary development, site works and services.

A Natura Impact Statement will be submitted with the application.

The Proposed Substation Development forms part of a wider “Overall Project”. The Overall Project comprises the following components:

- A new 220kV substation development, Battery Energy Storage System (BESS) and associated grid infrastructure (hereafter referred to as the Proposed Substation Development), for which planning consent will be sought from An Coimisiún Pleanála (ACP) as a Strategic Infrastructure Development (SID) under Section 182A of the Planning and Development Act 2000 (as amended).
- A solar farm and associated cable route (the Proposed Solar Farm Development), for which planning consent is sought from Limerick City and

County Council under Section 34 of the Planning and Development Act 2000 (as amended).

The Red Line Boundary for the Proposed Substation Development overlaps with, and is located within, the Red Line Boundary for the Proposed Solar Farm Development and therefore forms part of the wider Overall Project lands. The Proposed Substation Development is required to facilitate the connection of the Proposed Solar Farm Development to the national electricity transmission network. However, separate consenting routes are required under the Planning and Development Act 2000, as amended. Notwithstanding these separate consent processes, the Overall Project has been considered in this Report, with the Proposed Solar Farm Development and Proposed Substation Development assessed cumulatively.

2 Methodology

2.1 Relevant Legislation and Guidance

2.1.1 Sources of Information

The following sources of information and references were consulted in the preparation of this report:

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022)
- Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (Institute of Geologists of Ireland, 2013)
- EPAMaps.ie
- OSI.ie – 6" & 25" maps
- Aerial Mapping
- Limerick City and County Development Plan 2022-2028
- Drainage Management Plan prepared by JBA Consulting
- Flood Risk Assessment prepared by JBA Consulting
- MyPlan.ie
- Floodinfo.ie

2.1.2 Relevant EU Directives and National Legislation

The following legislation was consulted during the preparation of this assessment, and the limits contained within them will be used for the purposes of monitoring during construction of the Proposed Substation Development.

- Water Framework Directive (2000/60/EC);
- Groundwater Directive (2006/118EC);
- European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No. 272 of 2009);
- European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 (S.I. No. 77 of 2019);
- European Communities (Quality of Salmonid Waters) Regulations (S.I. No. 293 of 1988);
- The European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010);
- Habitats Directive (92/43/EEC);
- European Communities Environmental Objectives (Groundwater) Regulations 2010 (S.I. No. 9 of 2010);
- European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016 (S.I. No. 366 of 2016);
- Local Government (Water Pollution) Act 1977;

- Local Government (Water Pollution) (Amendment) Act 1990.

2.2 Evaluation Criteria

2.2.1 Sensitivity of Receptors

The significance/sensitivity of receptors was described using criteria outlined in the EPA Guidelines. The possible rankings are high, medium, low and negligible (Figure 2-1). In this manner, the sensitivity of each target receptor is evaluated relative to the existing environment.

2.2.2 Assessment of Significance of Impacts

To determine the significance of an impact, the description of the effect is compared to the previously mentioned sensitivity of the receiving environment following the matrix shown in Figure 2-1. As before, the significance or sensitivity of each receptor will be ranked, as will the character of the predicted effect.

In accordance with Figure 2-1, for example, a high sensitivity value combined with a high character effect, would result in a "profound" effect; if both were low, the final result would be "slight" or "not significant".

There are seven generalised degrees of effect significance that are commonly used in the EPA guidelines, as it is depicted on the figure: Imperceptible, Not Significant, Slight, Moderate, Significant, Very Significant and Profound.

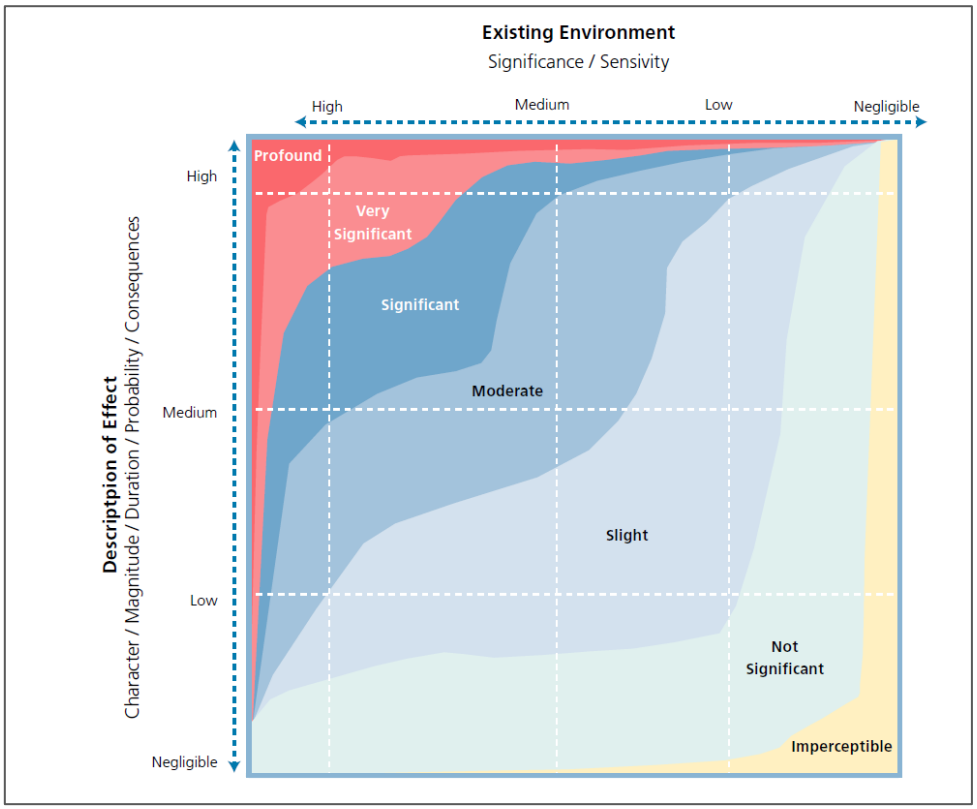


Figure 2-1: Assessment of significance of impacts (EPA, 2022)

3 Desk Study

3.1 Hydrologic Environment

The River Camogue and River Mahore are the main hydrological features in the wider area. Both rivers flow in a northwestern direction (Figure 3-1). The Proposed Substation Development is located within the catchment of the River Camogue.

A tributary of the River Camogue forms the southern boundary of the site. There are drainage ditches present within the site, which drain south towards the River Camogue.

The River Mahore rises in County Tipperary c. 10km east of the site and has a catchment area of 41.6km². The River Mahore is a tributary of the River Camogue, where it joins the larger river c. 4km northwest of the site. The River Mahore is located approximately 1.1km north of the site.

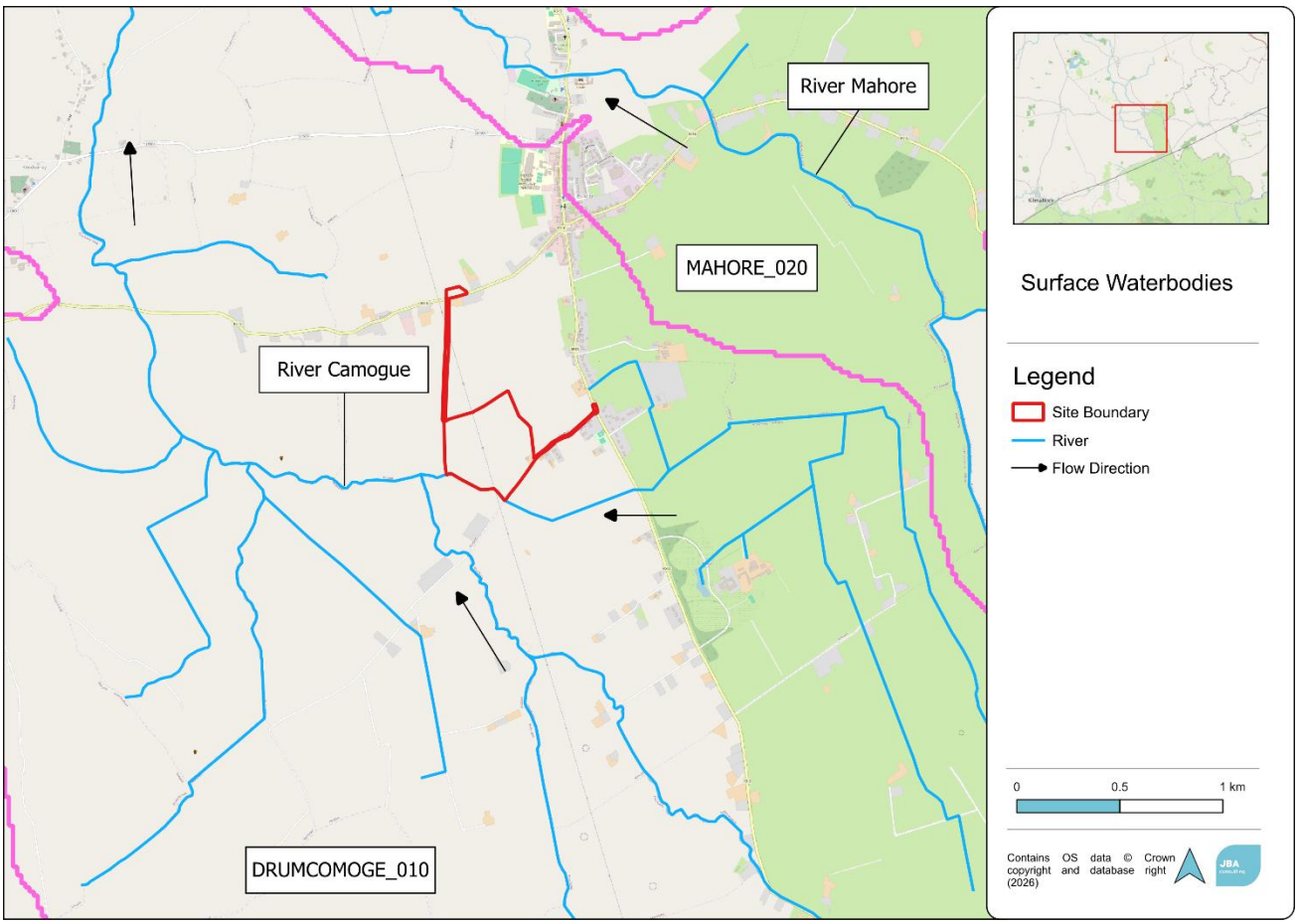


Figure 3-1: Surface waterbodies in vicinity of site

3.1.1 Water Framework Directive Status

The site is situated within the Shannon Estuary South Water Framework Directive (WFD) catchment (24). The size of the catchment is 2,033km^2 (EPA, 2023). The site is located DRUMCOMOGE_SC_010 WFD sub-catchment.

WFD sub-catchments are subdivided into river sub-basins, which are the WFD management and reporting divisions. The Proposed Substation Development lies within the DRUMCOMOGE_010 river sub-basin. For the latest WFD reporting period (2019-2024):

- The DRUMCOMOGE_010 waterbody has a 'Poor' status and is 'At Risk' of failing to meet 2027 WFD objectives.
- The MAHORE_020 waterbody has a 'Moderate' status and is 'At Risk'.
- The MORNINGSTAR_040 waterbody has a 'Good' status and is currently 'Not at Risk'.

Pressures acting on these rivers include agriculture, hydromorphology and urban wastewater (EPA, 2023).

3.1.2 Arterial Drainage Channels

Arterial Drainage Scheme (ADS) channels are maintained under the Arterial Drainage Acts, as amended. The OPW has a statutory obligation to maintain these channels. These channels are either modified watercourses or constructed channels/drains to improve conveyance. On average, channels are maintained every four to six years. However, this varies with some channels requiring maintenance annually and others every twenty years.

ADS benefitted lands are those which experience drainage benefits as a result of ADS channels. Arterial Drainage Schemes were initially used to improve agricultural lands, with large areas of bog drained to facilitate peat extraction and farming.

The Camogue, Mahore and Morningstar Rivers are all ADS channels.

3.1.3 EPA Q Rating

The EPA's biological river water quality classification is based on macroinvertebrate biological sampling at water monitoring stations. The values and their interpretation are shown in Table 3-1.

Table 3-1: Q value ratings and interpretation

Q Rating	WFD Status	Pollution
Q5 or Q4-5	High	Unpolluted
Q4	Good	Unpolluted
Q3-4	Moderate	Slightly Polluted
Q3 or Q2-3	Poor	Moderately Polluted
Q2, Q1-2 or Q1	Bad	Seriously Polluted

There are three EPA monitoring stations, which have Q ratings in 1988, located downstream and in the vicinity of the Proposed Substation Development within the same river sub-basin. The water quality status recorded at the stations varies from 'Poor' to 'Moderate'. The locations of these stations are listed in Table 3-2 and are shown in Figure 3-2 below.

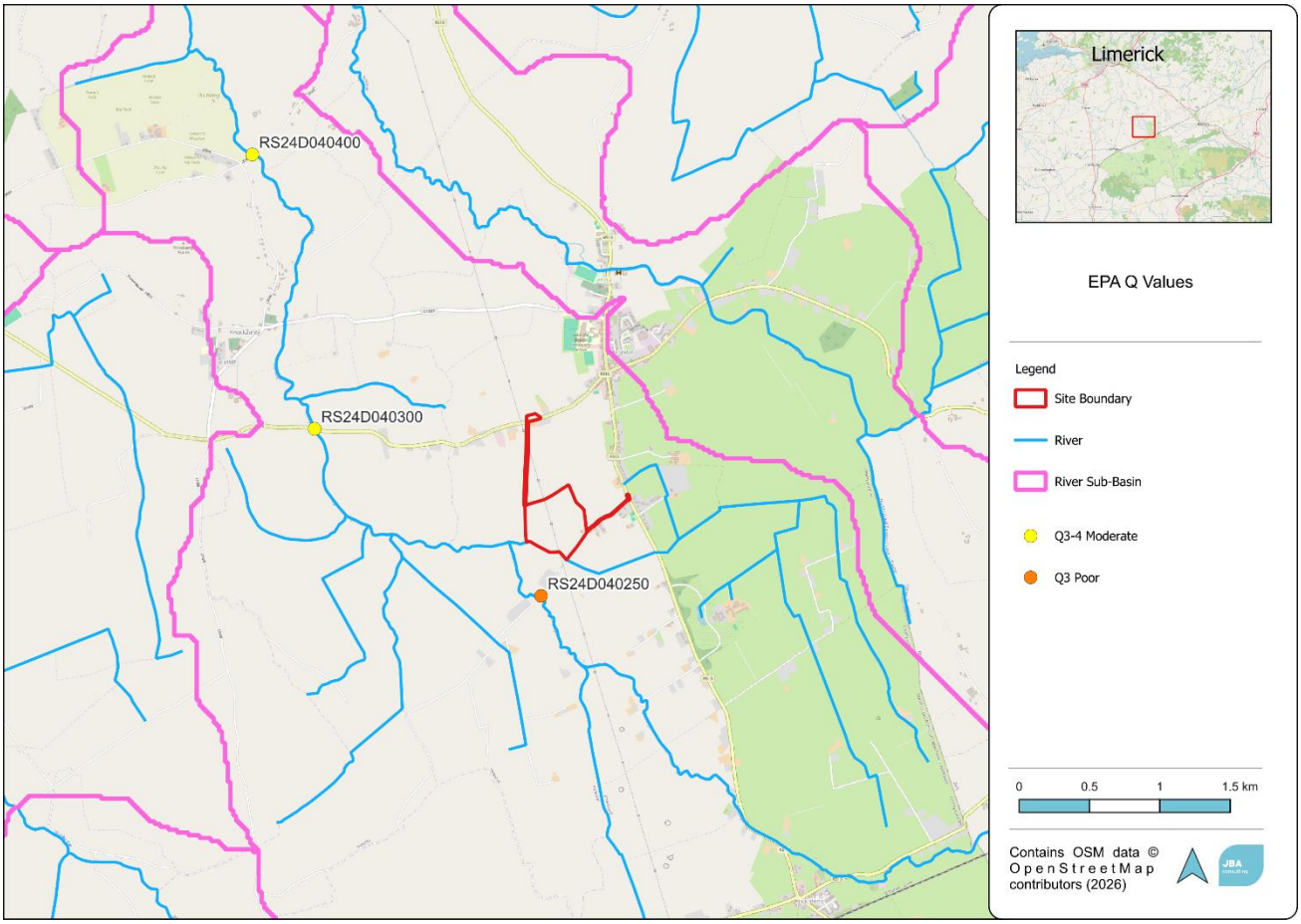


Figure 3-2: Q values

Table 3-2: Q values recorded at nearby stations

Station code	Location and hydrological distance	Year measured	Q rating	Status
DRUMCOMOGE_010 River Sub-Basin:				
RS24D040250	DRUMCOMOGE - Bridge N. of Ballycahill	1988	3	Poor
RS24D040300	DRUMCOMOGE - Bridge N.W. of Rathanny Ho	1988	3-4	Moderate
RS24D040400	DRUMCOMOGE - Gortacloona Bridge	1988	3-4	Moderate

3.1.4 Flood Risk

A Flood Risk Assessment (FRA) has been prepared by JBA Consulting for the Proposed Substation Development. The FRA was prepared in accordance with the Planning System and Flood Risk Management Guidelines for Planning Authorities (DoEHLG & OPW, 2009). The objectives of the FRA were to:

- Identify potential sources of flood risk,
- Confirm the level of flood risk and identify key hydraulic features,

- Assess the impact that the Proposed Substation Development has on flood risk,
- Develop appropriate flood risk mitigation and management measures which will allow for the long-term development of the site.

The FRA concludes that the proposed substation, BESS and access tracks are located in Flood Zone C and outside the mapped future flood extents. Low-lying land along the southern site boundary remains partly within Flood Zones A and B. The proposed infrastructure is located outside these areas and is not expected to result in a material loss of floodplain storage or obstruction of flood flows. The FRA recommends that the 220kV substation and other critical infrastructure be raised at least 100 mm above the surrounding ground level, subject to detailed design confirmation.

The proposed diversion of the existing field drain will discharge directly to the adjacent field drain, west of the access tracks, avoiding the need for two additional culvert crossings. This arrangement will maintain the existing drainage regime while reducing flow velocities and improving surface water attenuation.

A detailed Flood Risk Assessment report is provided within the wider planning application.

3.2 Hydrogeology

3.2.1 Groundwater Bodies

The Proposed Substation Development lies on the groundwater body Hospital (IE_SH_G_107). According to the last WFD reporting period (2019-2024), the Hospital groundwater body has a 'Good' status and is 'Not at Risk'.

The bedrock underlying the site is comprised of dark muddy limestone and shale. Subsoils are composed of alluvial sediments in the southern extent and limestone till (Carboniferous) in the northern extent of the site.

3.2.2 Groundwater Vulnerability

Groundwater vulnerability, a measure of the likelihood of groundwater contamination occurring within the site as classified by the Geological Survey of Ireland (GSI, 2020), varies across the site from 'Moderate' in the southern extent to 'High' in the northern extent (Figure 3-3). This classification is a function of the underlying bedrock and subsoils at the site.

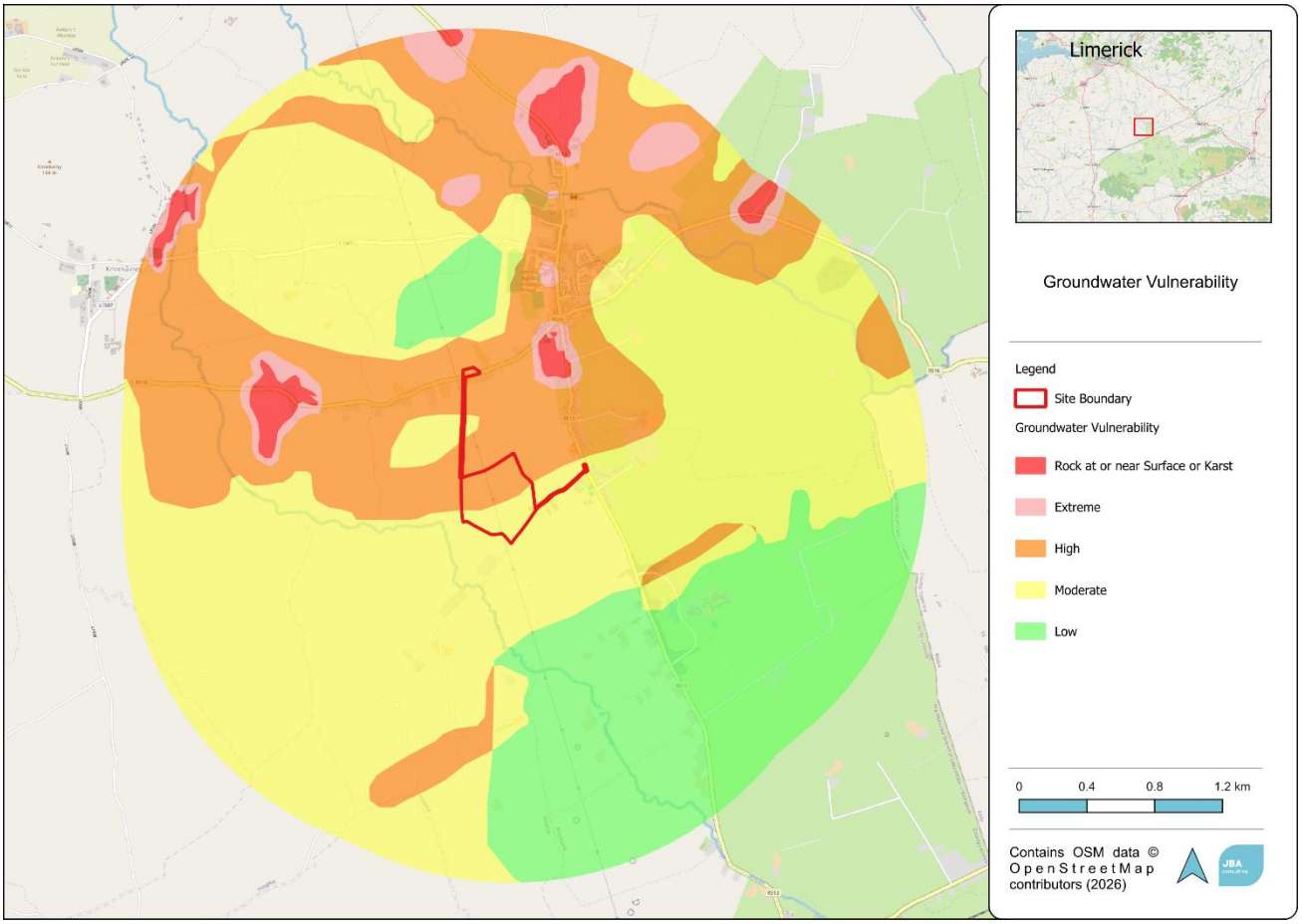


Figure 3-3: Groundwater vulnerability within 2km of the site

3.2.3 Karst

The GSI map viewer was consulted for groundwater karst data. One karst feature, a borehole, was identified within 750m north of the Proposed Substation Development (Figure 3-4).

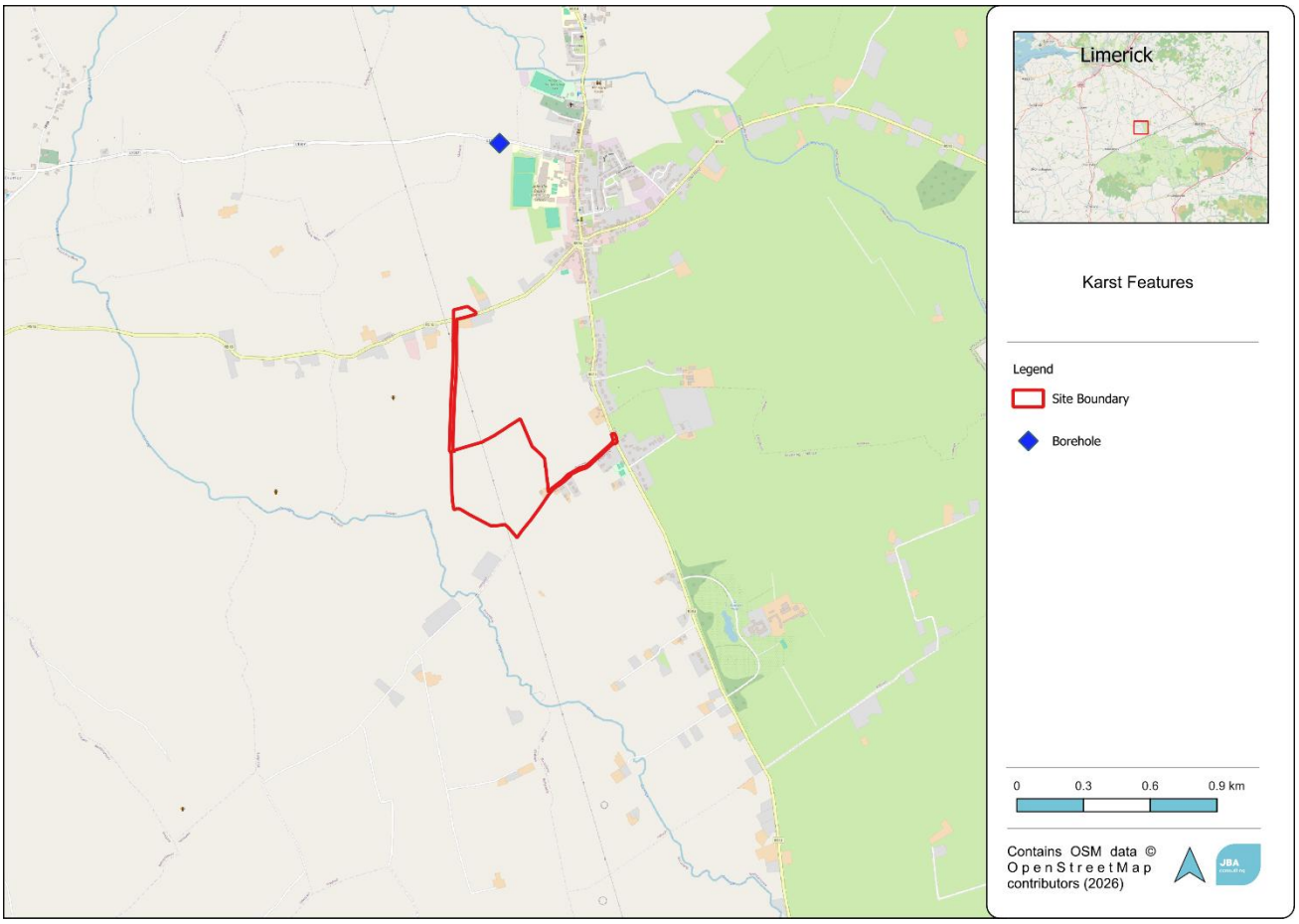


Figure 3-4: Karst features within 2km of the site

3.2.4 Groundwater Wells and Springs

The GSI map viewer was consulted to determine the presence of any groundwater wells and springs. There are 26 wells and springs located within 2km of the Proposed Substation Development. These are shown in Figure 3-5.

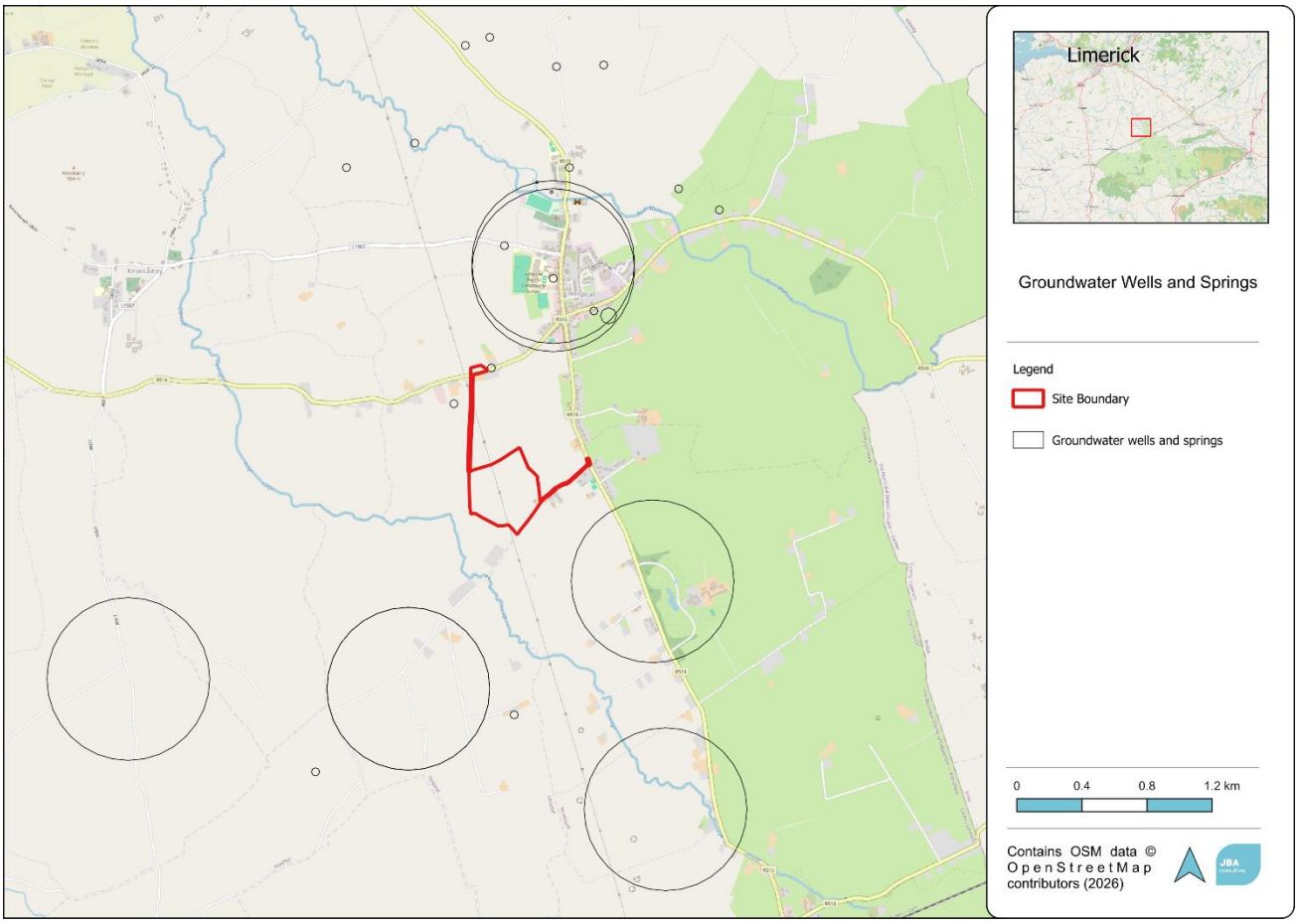


Figure 3-5: GSI Groundwater Wells and Springs within 2km of the Proposed Substation Development

The Proposed Substation Development is not located within any drinking water sources. Other water sources in the area include the Hospital Public Water Supply (PWS), the Knocklong PWS, and Baggotstown GWS (Figure 3-6).

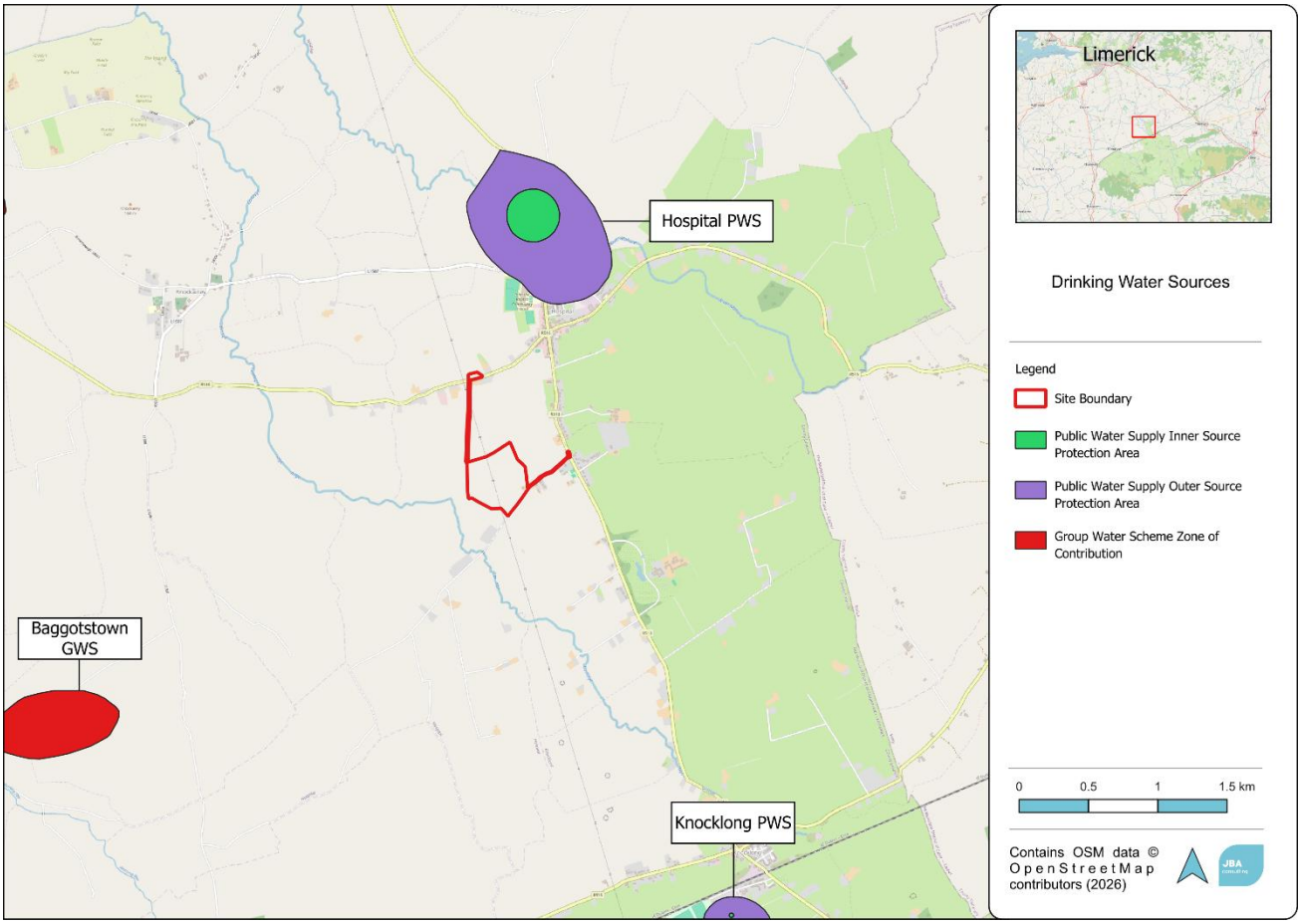


Figure 3-6: Drinking water sources within the vicinity of the Proposed Substation Development

3.3 Protected Ecological Environment

A Natura Impact Statement (NIS) has been prepared and submitted as part of this planning application in relation to significant impacts on Natura 2000 sites. The NIS concluded that provided that standard construction practices and mitigation measures to prevent water pollution are adhered to, the Proposed Development will not adversely affect the integrity of the Lower River Shannon SAC.

Glen Bog Special Area of Conservation (SAC) is located approximately 3.8km from the Proposed Substation Development at the nearest point and shares the same groundwater body. However, there is no surface water pathway between the Proposed Substation Development and Glen Bog SAC. The Proposed Substation Development will not result in water abstractions or changes to surface water or groundwater flows, and the NIS concluded that Glen Bog SAC cannot be impacted by the Proposed Substation Development. The Proposed Substation Development is hydrologically connected via downstream watercourses to the Lower River Shannon SAC. A hydrological connection

also exists to the River Shannon and River Fergus Estuaries SPA; however, the NIS concluded that the approximately 42km hydrological connection does not provide a viable pathway due to the size, scale, location and distance of the Proposed Substation Development from the SPA.

4 Potential Impacts

Potential impacts during construction and operation of the Proposed Substation Development, and under a 'Do Nothing' scenario which presents an outline of the evolution of the baseline in the absence of the Proposed Substation Development, are discussed below. This report focused on likely significant effects.

4.1 'Do Nothing' Scenario

If the Proposed Substation Development does not go ahead, the existing land use would remain unchanged and there would be no immediate impacts to the site's hydrology and hydrogeology, allowing natural succession to continue. Existing drainage pathways on site would remain in use, and would potentially change over time. As vegetation grows, overland flow pathways could naturally alter, with increased water retention due to the expanding vegetation and trees.

With climate change, the frequency and intensity of rainfall are expected to increase. This could exceed the capacity of existing drainage pathways, leading to a higher risk of pluvial flooding. Additionally, the existing farming activities on the site, could potentially cause adverse impacts on the water, hydrology and hydrogeology environments.

The 'Do Nothing' scenario is considered to be **not significant, long-term, neutral**, regarding water, hydrology and hydrogeology.

4.2 Construction Methodology

The Proposed Substation Development will comprise the following:

- Set up of construction compound;
- Site clearance and removal of existing structures, where required;
- Excavation and earthworks associated with foundations, drainage infrastructure, hardstanding areas and access tracks;
- Construction of the proposed 220 kV GIS substation, associated gantry compounds and BESS infrastructure;
- Installation of underground earthing cable; and
- Erection of the proposed overhead line infrastructure, including masts and gantries.

Further details of the proposed construction methodology are provided in the Outline Construction Methodology (OCM) submitted as part of the wider planning application.

Construction of the Proposed Substation Development will require localised vegetation clearance and excavations associated with the construction of the substation, foundations, hardstanding and access tracks. Existing vegetation, including hedgerows and trees, will be retained where practicable, with clearance limited to that required to facilitate the proposed works.

4.3 Potential Impacts During Construction

Construction activities pose a risk to watercourses and hydrology, particularly from contaminated surface water runoff entering the Camogue River or others further downstream, or changes to watercourse morphology and flow patterns.

The sections below outline the potential effects during construction on water and hydrology without any mitigation. Mitigation measures are discussed in Section 5. The key civil engineering works which will have potential effects on the surface water environment during construction are summarised below:

- During construction, vehicle movements, the placement of access tracks, and areas of hardstanding for electrical skids and foundation for the substation will alter ground conditions. A slight increase in surface runoff is likely as a result.
- Placement of the underground electrical cable connection, which could result in surface water runoff or groundwater contamination.
- Operations and storage of material in the contractor's compound.
- Other construction activities will include limited site storage of concrete materials (for electrical skid hardstanding), oils, and fuels. The quantity of any of these materials on site will be low, and they will be on site temporarily.
- Stockpiles of excavated material could result in sediment entering nearby watercourses.

The key works which may have potential effects (described above) in relation to surface water have been assessed in the following sections.

4.3.1 Water Quality

During the construction phase of the development, there is potential for effects on surface water quality due to suspended sediment, spills or leaks from the construction compound or vehicles. Runoff from construction areas can result in an increase in sediment loading or the suspension of solids, as well as the mobilisation and deposition of contaminants. Potential water pollutants are as follows:

- Silt and suspended solids. Sources include activities requiring excavation and limited ground clearance, construction of the substation, access tracks or hard standing areas which require the use of aggregate, construction plant movement across disturbed soils, or temporary surface water pooling in excavations.
- Chemicals. Sources include runoff of hydrocarbons or lubricants due to accidental spillage, refuelling, inappropriate storage, or gradual leakage from plant vehicles or at the construction compound, wastewater effluent from construction welfare facilities, and cement-based products in use during construction.

The proposed construction activities have a high potential to alter surface water quality temporarily in the nearby tributary of the River Camogue. This would result in a **moderate, short-term, negative** effect.

There is also potential for the release of pollutants or sedimentation to impact groundwater. This is most likely during construction of the substation development, as this will require excavation for building and equipment foundations. As excavations will be limited to where required, this would have a **slight, temporary, negative** effect.

4.3.2 Hydrological Impact

The Proposed Substation Development will require localised ground disturbance associated with the construction of the substation, BESS, foundations, access tracks and underground services. Site levelling works, including cut and fill activities, will be undertaken where required to facilitate the Proposed Substation Development. These works will result in localised changes to existing ground levels, gradients and surface water flow pathways during the construction phase. Access tracks will require the removal of overlying vegetation, with potential for localised impacts on drainage.

Construction may require changes to existing ground levels to facilitate the development. Such changes have the potential to alter existing surface water runoff and flow pathways and may result in localised changes to drainage patterns.

The Proposed Substation Development also includes the infilling and diversion of an existing drainage ditch within the site. Construction of the diversion could result in temporary disruption or alteration of existing drainage flows during the works.

Construction of access tracks, construction traffic movements, and the construction of the proposed substation and the interconnection route could lead to the following:

- Changes to runoff and flow pathways;
- Temporary ponding;
- Increases in runoff and drainage flows; and
- Temporary disruption to existing drainage patterns during construction.

The proposed construction activities have the potential to temporarily alter the hydrological regime in the study area. This would be a **moderate, short-term, adverse** effect.

4.4 Operational Phase

The potential impacts on the water environment during the operation phase refer to both the static ongoing operation of the proposed substation and to any specified maintenance requirements.

4.4.1 Hydrological Impacts

The proposed operational stage drainage for the Proposed Substation Development will be managed through the proposed site drainage network., Outside the formal hardstanding drainage catchment, shallow interception trenches, trackside drains, check dams, cross-underdrains and diffusers will maintain the continuity of existing overland flow pathways and prevent the concentration of runoff. Within the formal drainage catchment, runoff from

buildings and hardstanding areas will be collected via surface grading, gullies and vegetated swales and conveyed to a proposed attenuation pond prior to controlled discharge to the receiving drainage network.

The Proposed Substation Development includes the permanent diversion of an existing drainage ditch within the site. The existing drainage ditch will be infilled and replaced by a new section of drainage channel along the proposed alignment and will be diverted to the adjacent drainage ditch to the west of the proposed access tracks. This will result in a permanent alteration to the existing drainage network and the local surface water flow pathway. The proposed drainage ditch diversion will reduce flow velocities and improve surface water attenuation compared with the existing drainage ditch. As a result, the existing drainage function will be maintained, with a localised improvement in the management of surface water flows.

The proposed attenuation pond will provide temporary storage of surface water runoff and attenuate discharge rates to achieve greenfield runoff rates. This will ensure that the proposed development does not result in an increase in peak surface water runoff compared with the existing condition.

The expected impact on site hydrology once operational is **not significant, long-term, neutral**.

4.4.2 Maintenance

On occasion, personnel will visit the site in order to investigate any problems or to carry out routine maintenance of the substation, BESS and associated electrical infrastructure. Maintenance activities may involve the use of oils, lubricants or other materials, with the potential for accidental spills or leaks to affect surface water or groundwater quality if not appropriately managed. This could lead to **slight, long-term, adverse** effects on water quality if materials are not properly managed.

5 Mitigation Measures

5.1 Construction Phase

Mitigation measures during the construction phase are discussed below. These mitigation measures have been developed with the source-pathway-receptor links above in mind and are designed to break this link either by removing the source or disrupting the pathway for pollution.

5.1.1 Best Practice Construction Methods

A preliminary Construction Environmental Management Plan (CEMP) has been prepared for the Proposed Substation Development and will be put in place by the appointed Contractor. The CEMP will be used by the Contractor to prevent and minimise environmental effects during construction. It includes the below to mitigate impacts on water.

5.1.2 Surface Water Runoff

A surface water management plan will be put in place by the appointed contractor during construction. This will involve two methods of surface water management. The first involves keeping clean water clean by preserving the natural drainage on site, minimising works around drainage features, and diverting clean water around excavations and construction areas. The existing drainage regime will be maintained where possible, allowing surface water to percolate through the groundwater and towards the River Camogue. The second method involves separation and treatment of dirty water. The use of interceptor drains upstream of works areas will convey clean water away from works areas while dirty water is diverted to settlement ponds and filter drains. Treated water will then be released over vegetated areas. There will be no direct discharge to watercourses. This mimics the natural drainage regime.

During construction, silt traps will be installed along all watercourses including drainage ditches to treat any suspended solids resulting from temporary disturbance of soils. Silt fences will also be erected downslope of works areas and along the trackside.

Temporary storage of soil will be carefully managed to prevent any potential negative effects on the receiving hydrological environment. The material will be stored away from any existing drains within the site. Movement of material will be minimised to reduce degradation of soil structure and generation of dust. Excavations will remain open for as little time as possible before the placement of fill. This will help to minimise potential for water ingress into excavations, and efforts will be made to prevent surface water run-off from entering excavations.

Weather conditions will be monitored when planning construction activities, to minimise risk of runoff from the site and the suitable distance of topsoil piles from drainage ditches will be

maintained. In the event of an extended period of dry weather, stockpiles will be dampened using a water spray.

5.1.3 Chemical Pollution

Mitigation measures for the protection of water quality from chemical pollution involve environmental operating plans, chemical storage, and Emergency Response Procedures. At construction stage, the following mitigation measures will be implemented:

- The contractor will construct a site compound at a location at least 10m removed from any water bodies or drains. The compound may be moved or altered dependent on construction needs over the course of the project.
- Any pollutant chemicals, fuels of any kind, concrete additives etc. stored on site throughout the project will be stored in labelled waterproof and secured protective containers to mitigate the risk of pollution of the watercourses. At no point should there be storage of material or vehicles/machinery within 10m of watercourses;
- Spill kits will be stored in each temporary site compound and there will be easy access for delivery to site in the case of an emergency. A minimum stock of spill kits will be maintained at all times and site vehicles will carry spill kits at all times. Spill kits must include suitable spill control materials to deal with the type of spillage that may occur and where it may occur. Typical contents of an onsite spill kit will include the following as a minimum;
  - Absorbent granules;
  - Absorbent mats/cushions;
  - Absorbent booms;
  - Gloves to handle contaminated materials and sealable disposal sacks; and
  - Track mats, drain covers and geotextile material.
- Spill materials will be disposed of correctly if used and replaced with new kits immediately. Disposal records for used spill kits will be retained by the Site Manager.
- All materials taken off-site will be clearly labelled and stored in sealable containers.
- Oil and fuel storage tanks shall be stored in designated areas, and these areas will, as a minimum, be bunded to a volume not less than the following;
  - 110% of the capacity of the largest tank or drum within the bunded area (plus an allowance of 30 mm for rainwater ingress), or
  - 25% of the total volume of substances which could be stored within the bunded area.
- The diesel fuel tank will be adequately bunded (110%), and the filling nozzle will be stored within the bunded area. The Site Manager will, as part of their daily site walkaround, check the integrity of the fuel tank(s). The condition of the tanks will be recorded by the Site Manager.

- Re-fuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles, will take place in a designated area which will be away from any existing surface water drains which could also provide pathways to the underlying geology.
- The contractor will ensure that no hazardous or noxious materials enter a watercourse or drain. Should this situation arise emergency procedures will be activated.
- During all works the weather forecast will be monitored and a contingency plan developed to prevent damage or pollution during extreme weather. Machinery and equipment will not be left on-site during such events and will either be removed from site beforehand or stored within the site compounds.
- The contractor is to clean equipment prior to delivery to the site. The contractor is to avoid using any equipment which leaks fuel, hydraulic oil or lubricant. The contractor is to maintain equipment to ensure efficiency and to minimise emission.

5.1.4 Silt and Suspended Solids

Mitigation measures for the protection of water quality from silt and suspended solids on site involve silt control, particularly at any drains or open excavations. During construction, the following mitigation measures will be implemented:

- The contractor will construct site compounds at locations remote from any watercourses or drains.
- All soil stockpiles will be covered (vegetated or with tarpaulins/similar material) to minimise the risk of rain runoff / wind erosion. Vegetation will be established as soon as possible on all exposed soils.
- During extended dry periods, soil stockpiles will be dampened periodically to minimise the risk of airborne particles entering watercourses.
- Any temporary storage of spoil, hardcore, or similar material will be stored as far as possible from any surface water drains and stored in receptacles where possible minimising the risk of contamination.
- Should mobilisation of soil particles/pollution be noted during weekly monitoring by the Site Manager, works will stop temporarily, and the Site Manager will initiate the interception and treatment of pollution/silt run-off.
- Silt fencing and silt bags shall be put in place downstream of exposed soils or soil stockpiles to contain surface water runoff from the site.

5.2 Operational Phase

During the operational phase, visual inspection of silt traps or hydrocarbon interceptors will be carried out to ensure they are operating correctly. All tracks on the site will be constructed withcrushed rock on a geotextile, and trackside drainage will be installed where required.

The following measures will be put in place by the operator of the facility during maintenance or repairs:

- Spill protection equipment such as absorbent mats, socks and sand will be available to be used in the event of an accidental release. These will be disposed of correctly if used and replaced with new ones immediately. Disposal records for used adsorbent will be retained by the Site Manager;
- All materials taken on-site will be clearly labelled and stored in sealable containers;
- Re-fuelling of maintenance vehicles and the addition of hydraulic oils or lubricants will take place off-site;
- The operator will ensure that no hazardous or noxious materials enter a watercourse or drain. Should this situation arise, emergency procedures will be activated.

6 Residual Effects

The residual effects are those which will remain after mitigation measures have been implemented.

6.1 Construction Phase

With the implementation of the mitigation measures outlined above, the Proposed Substation Development will have no significant negative effects on waterbodies during construction. The WFD status of surface and ground waterbodies in the area will not deteriorate, nor will the Proposed Substation Development jeopardise future improvements in WFD status. Following the implementation of the mitigation measures, the residual effects during the construction phase will be **short-term, neutral**, and **not significant**.

6.2 Operational Phase

Once operational, the Proposed Substation Development will not lead to a deterioration of surface or ground water status, nor will it jeopardise future improvements of surface water status. Overall, the long-term effects of the Proposed Substation Development will be **neutral** and **not significant**.

7 Conclusions

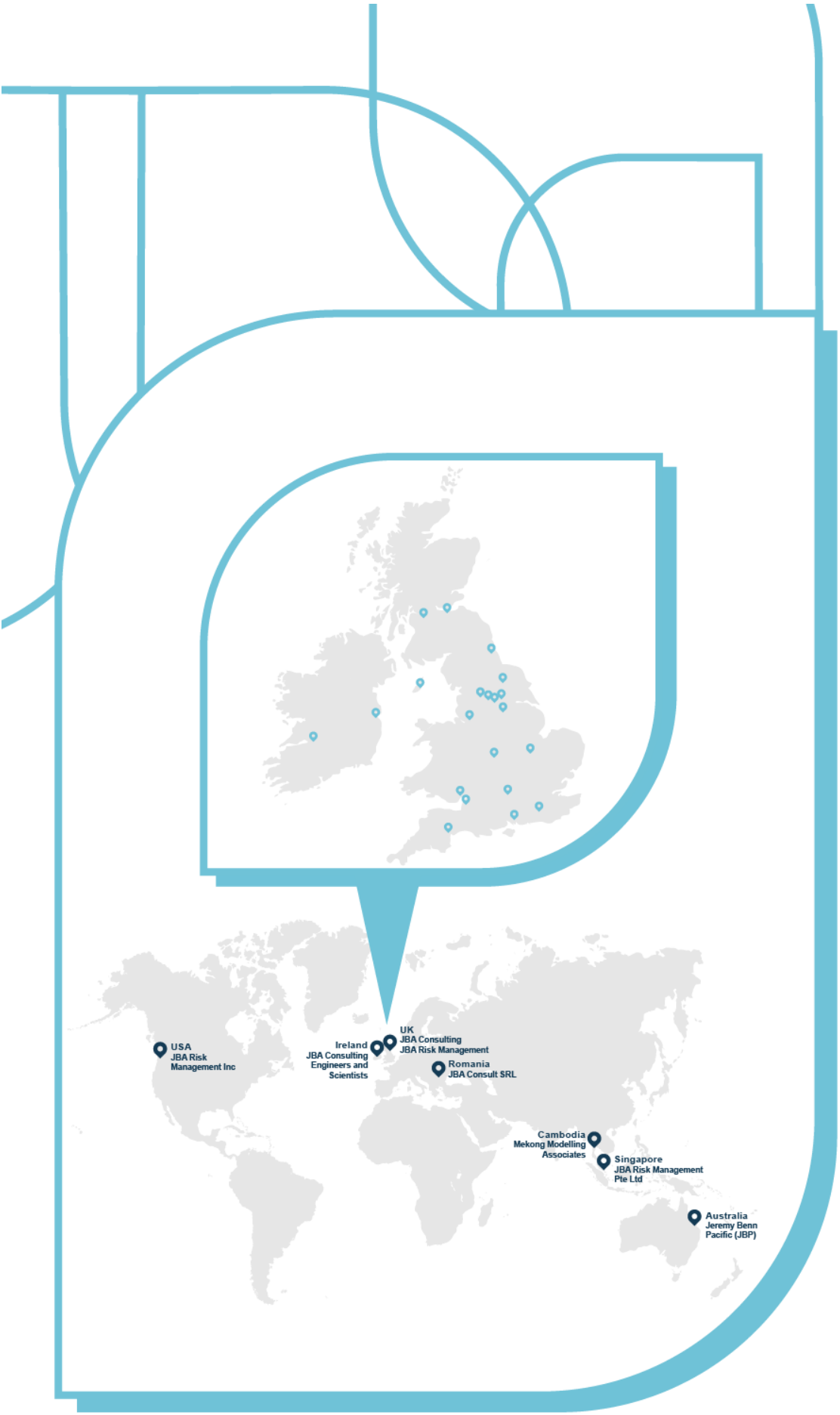
The Proposed Substation Development has the potential to lead to impacts on the hydrological environment without mitigation measures in place. The construction phase has the greatest potential for impacts, and so mitigation measures have been devised to effectively manage the risk of impacts. These mitigation measures, if properly implemented by the appointed contractor, will ensure that any potential impacts on water are minimised to slight or imperceptible.

Once operational, the Proposed Substation Development is not likely to have a significant impact on water. The Proposed Substation Development will result in localised changes to ground levels and surface water drainage patterns, including the permanent diversion of an existing drainage ditch and the introduction of impermeable surfaces associated with the hardstanding infrastructure. The proposed drainage system, including the diverted drainage channel and attenuation pond, will maintain drainage connectivity and manage surface water runoff to achieve greenfield runoff rates. It is likely that routine maintenance will be carried out on the proposed substation and BESS once operational. Operational mitigation measures for these activities have been devised which will ensure that the risks during operation are not significant.

The Site-Specific Flood Risk Assessment concludes that the proposed development is at low risk of fluvial flooding and that flood risk can be appropriately managed through the implementation of the measures identified in the FRA.

The residual impacts of the Proposed Substation Development on the water environment are expected to be not significant in both the construction and operation phases of the development.

No significant cumulative effects on the water environment are anticipated in relation to the Overall Project.



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