

Appendix B.2

Water Framework Directive Screening and Scoping Assessment





Water Framework Directive Screening and Scoping

Bodelwyddan Solar and Energy Storage

September 2025

Prepared for:
Bodelwyddan Solar and Energy Storage
Ltd

Prepared by:
Calibro Consultants

Project Number:
24-310



1 Background

1.1 Introduction

- 1.1.0 This report provides an assessment of the likely impacts of the proposed Bodelwyddan Solar & Energy Storage project (hereafter referred to as the 'Proposed Development') and if these meet the requirements of The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.
- 1.1.1 This report covers stage 1 (Screening) and stage 2 (Scoping) of the Water Framework Directive (WFD) assessment process only.
- 1.1.2 As explained below, this WFD Screening and Scoping Report is written in conjunction with Volume 1 of the Environmental Statement (ES).

1.2 Project Background

- 1.2.0 Bodelwyddan Solar & Energy Storage Limited (the 'Applicant') intend to submit a Development of National Significance (DNS) planning application for the construction, operation and maintenance of a proposed solar photovoltaic electricity generating system and battery energy storage system ('BESS'), associated solar arrays, inverters, transformers, cabling, substations, access tracks, landscaping, ecological enhancement areas and associated ancillary development (the 'Proposed Development') on land to the northwest and southeast of Bodelwyddan, North Wales.
- 1.2.1 As the Proposed Development exceeds the 10MW threshold for energy generating projects in Wales it constitutes a Development of National Significance ('DNS') under the Planning (Wales) Act 2015. The Planning (Wales) Act states that Welsh Ministers are to determine DNS projects and applications should be made directly to them. The framework for applying for a DNS is detailed within the Developments of National Significance (Procedure) (Wales) Order 2016, as amended. The DNS application process is managed by Planning and Environment Decisions Wales (PEDW) on behalf of the Welsh Ministers.

1.3 Proposed Development

- 1.3.0 The formal description of the Proposed Development is:

'The construction, operation and maintenance of a proposed solar photovoltaic electricity generating system and battery energy storage system ('BESS'), associated solar arrays, inverters, transformers, cabling, substations, access tracks, landscaping, ecological enhancement areas and associated ancillary development'.

- 1.3.1 The Proposed Development will have an operational lifespan of 40 years, after which it will be fully decommissioned, and this would be secured via a planning condition.
- 1.3.2 The Proposed Development will be brought forward through a full planning application and will include the following key elements of infrastructure:
- Solar photovoltaic ('PV') panels and mounting structures;
 - Solar inverters and transformers (or 'power conversion units' ('PCU'));
 - Switchroom building(s);
 - BESS units;
 - BESS inverters or PCU;



- Substation, transformer and ancillary buildings;
- Fencing, gates, CCTV and internal access tracks;
- Drainage and water storage tank;
- Access;
- Landscaping and biodiversity enhancements;
- Cables;
- Temporary construction compounds; and
- Associated ancillary development.

1.4 Site Context and Key Considerations

- 1.4.0 The Site comprises two separate parcels of land located to the northwest and southeast of Bodelwyddan, which are linked by a Cable Corridor. The grid connection point will be at Bodelwyddan Substation, directly adjacent to the eastern boundary of the Solar Site. The overall Site measures approximately 183.77 hectares ('ha') in total. The Site is defined by the red line boundary provided in the Site Location Plan (Ref. 01), which forms part of the planning drawing pack.

Solar Site

- 1.4.1 The larger parcel of land to the northwest of Bodelwyddan extends to approximately 168.95 ha, comprising land to the north and south of Rhuddlan Road (A547), and to the west of St Asaph Avenue, and hereinafter is referred to as the 'Solar Site'. Towyn and Kinmel Bay are located to the north of the Solar Site and Abergele to the west.
- 1.4.2 There is an existing 24MW operational solar farm, consented in 2015 (Conwy LPA ref. 0/40999), directly adjacent to the Solar Site. The consented scheme originally included a number of fields within the Solar Site (adjacent to the north and east of the operational solar farm) however these were not built out. Notwithstanding, the precedent for solar development in this specific area and within the Solar Site itself has already been established.

BESS Site

- 1.4.3 The smaller parcel of land to the south-east of Bodelwyddan is approximately 6.52 ha. It is broadly rectangular in shape and is positioned south of St Asaph Business Park, directly adjacent and to the west of Bodelwyddan substation. It is referred to as the 'BESS Site'. High voltage overhead lines transect the eastern part of the BESS Site and pylons are located to the east and south of the site. To the east, south and west of the BESS Site lies agricultural land. There are a number of offshore wind farm substations located further to the east.

Cable Corridor

- 1.4.4 The Cable Corridor is approximately 8km in length and 10m wide with a total area of 8.29 ha. It represents the area of land within which the underground electrical cables will be laid into trenches. These cables will link the various Solar Site fields together in addition to linking the Solar Site with the BESS Site and to the adjacent grid connection point at Bodelwyddan substation.



Study Area

- 1.4.5 The Site, in particular the Solar Site, occupies predominantly low-lying land which relies on a complex network of drainage systems including watercourses, culverts and pumping stations. The low-lying nature means flow rates to and from the Site are likely to be relatively slow and consequently mobilised sediment or similar would settle relatively quickly.
- 1.4.6 In accordance with relevant policy and guidance, impacts on flood risks to third parties needs to be negated and therefore managed within the redline boundary of the Site, delineated in the Site Location Plan (Ref.01) provided in the planning drawing pack.
- 1.4.7 For the above reasons, but to promote a catchment -based approach that reflects the nature of the local hydrology, the Study Area extends 500 m from the red line boundary.
- 1.4.8 This is consistent with the Environmental Statement(ES) Volume 1 **Chapter 6= Flood Risk and Water Resources**.

1.5 Study Area Context and Conditions

- 1.5.0 It is important to assess the Study Area holistically to demonstrate that impacts arising from the Proposed Development would not significantly impact the water environment in the Study Area. Therefore, this section describes the baseline condition of the Study Area, making reference to specific parts of the area where relevant (for example the Solar Site).
- 1.5.1 The Site is currently agricultural land, which is understood to be a mix of pasture and arable uses. The Cable Corridor follows field boundaries, existing tracks, existing roads and is predominantly along adopted highways, wherever possible.
- 1.5.2 Furthermore, the underground electrical cables would be a buried service. Therefore, subject to appropriate crossing of watercourses, it would not impact the flow or movement of water and has consequently been excluded from the scope of this assessment.
- 1.5.3 The majority of the Solar Site is on low-lying and flat ground, with levels being approximately 4 – 4.2 m above ordnance datum (AOD). Land starts to rise in a band along the southern boundaries of the Solar Site parcels located to the south of the A547, reaching between 5.5 m – 6.5 m AOD. The BESS Site is located at a much higher elevation, at approximately 48 m AOD.
- 1.5.4 The lower parts of the Solar Site are characterised by a network of watercourses, including NRW Main Rivers. It is understood this watercourse network assists with the drainage of agricultural fields and is managed by a system of sluices, pumps and diversion channels.
- 1.5.5 The principal Main Rivers that flow through the Study Area are the Afon Gele and associated Bodoryn Cut, the Glan Y Morfa Drain, Bodelwyddan Main Drain, St Georges Meadow Drain, Coed Y Drive Drain and Glan Y Gors Drain.
- 1.5.6 For the WFD classification, the Solar Site lies within the Western Wales River Basin District, Clwyd Management Catchment, Gele Operational Catchment and Gele waterbody area. The BESS Site lies in the same Management Catchment but within the Pont Robin Cut (Bodelwyddan) waterbody area, differing from the Solar Site.
- 1.5.7 The Gele water body is classed as being heavily modified due to its assistance with drainage of agricultural land. It has an overall Moderate status. Its ecological status is Moderate and chemical status High. The driving elements behind these classifications are dissolved oxygen and phosphorus which are classified as being Poor.
- 1.5.8 The Pont Robin Cut (Bodelwyddan) waterbody has an overall Poor status, with Poor ecological status and High chemical. The driving elements behind these classifications are invertebrates, which are classified as being Poor.



- 1.5.9 According to the WFD Cycle 3 data, diffuse sources from agriculture, beef/dairy fields and rural land management are reasons for not achieving good (RNAG) status. Other RNAG include the water industry, sewage discharges and domestic use.
- 1.5.10 In addition, the Site is located within an area with a Woodland Opportunity Map (WOM) 21 score of 4, indicating the WFD status of the water bodies are likely to be influenced by agricultural run-off.
- 1.5.11 Regarding groundwater, the Site (Solar and BESS Site) falls entirely within the Clwyd Permo-Triassic Sandstone groundwater area. This has an overall water body status of Good, with the groundwater quantity status also being Good.
- 1.5.12 Outside the above, the Site contains a network of watercourses to assist with the drainage of agricultural fields.
- 1.5.13 British Geological Survey data shows most of the Site, including the BESS Site, to be underlain by Warwickshire Group bedrock geology – a mudstone, siltstone and sandstone. The far northeastern parcels are underlain by Kinnerton Sandstone Formation. The Cable Corridor predominately runs through an area of Clwyd Group Limestone.
- 1.5.14 The low-lying parts of the Site, i.e. the vast majority of the Solar Site, are underlain by Tidal Flat superficial deposits, comprising clay, silt and sand. As the Site rises, it is underlain by Till, Devensian – Diamiction superficial deposits. This means only the southern edges of the Solar Site are underlain by Till but the entire BESS Site and Cable Corridor is underlain by such.
- 1.5.15 BGS data demonstrates that the aquifer designation matches the bedrock, with the areas of sandstone bedrock being classified as a 'Highly Productive Aquifer', with the mudstone, siltstone and sandstone as well as the limestone being a 'Moderately Productive Aquifer'.
- 1.5.16 Cranfield Soil and Agrifood 'Soilscapes' mapping shows soils at the Solar Site to have seasonally wet soils with impeded drainage or be naturally wet with high groundwater. The Cable Corridor and BESS Site are underlain by 'Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils' with impeded drainage.
- 1.5.17 According to the BGS Soil Parent Material Model mappingⁱ the Solar Site lies in an area of Quaternary Estuarine soils with a clay to silt texture, which are defined as 'heavy' and 'deep'. The 'deep' classification is the deepest of the groups, where soils are able to be dug to at least 1m. 'Heavy' is the heaviest of the groups, denoting heavy clay soils.
- 1.5.18 The Cable Corridor and the BESS Site fall within an area of Glacial Till, which is, according to the Soil Parent Material Model, loam to clayey loam, classified as 'deep' and 'medium to light (silty) to heavy'.
- 1.5.19 The Site is not located within a Source Protection Zone but does fall within a groundwater Nitrate Vulnerable Zone (NZV).

1.6 Policy Context, Legislation, Guidance and Standards

National Legislation

- 1.6.0 The primary legislation of relevance to this assessment is The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017ⁱⁱ
- 1.6.1 The overall aims of the WFD are to:
- Enhance the status and prevent further deterioration of surface water bodies, groundwater bodies and their ecosystems;
 - Ensure progressive reduction of groundwater pollution;



- Reduce pollution of water;
 - Contribute to mitigating the effects of floods and droughts;
 - Achieve at least good surface water status for all surface water bodies and good chemical status in groundwater bodies by 2021 [Ref. WFD-1] (or good ecological potential in the case of artificial or heavily modified water bodies); and
 - Promote sustainable water use.
- 1.6.2 The WFD requires a holistic approach to water management within defined River Basin Districts (RBDs), assessed, reported and monitored through River Basin Management Plans (RBMPs), which themselves are divided into Management Catchments, then Operational Catchments and finally Water Bodies.

National Policy

- 1.6.3 Planning Policy Wales (PPW)ⁱⁱⁱ is the national policy framework in Wales. It sets out the land use planning policies of the Welsh Government to ensure the planning system contributed to the delivery of sustainable development.
- 1.6.4 Section 6.6.6 of PPW states that '*Embracing integrated approaches should make a contribution toward achieving the requirements imposed by EU Water Framework Directive*'.

Guidance

- 1.6.5 With regard to guidance, NRW has provided guidance on how to carry out a WFD Assessment through Guidance Note 78^{iv}.
- 1.6.6 The WFD Advice recommends a staged assessment:
- Stage 1 – Screening: Identifies the receptors that could be impacted by the proposal and screen in or out activities that require further assessment.
 - Stage 2 – Scoping: Identify risks of the Proposed Development's activities to receptors based on the relevant water bodies and their water quality elements; and
 - Stage 3 – Impact Assessment: Detailed assessment of water bodies and their quality elements considered likely to be affected by the Proposed Development. Identify areas of non-compliance, consideration of mitigation measures, enhancements and contributions to the RBMP objectives.



2 Screening

- 2.1.0 The guidance recommends that screening identifies activities that do not require further consideration, for example activities that have been ongoing since before the water quality status was determined.
- 2.1.1 Other activities that are screened out would be categories listed as RNAG status other than agricultural and land management or beef and dairy farming practices, such as water industry, sewage discharge or domestic use. The Proposed Development would have no impact on these existing activities.
- 2.1.2 The only activity considered relevant to the Proposed Development to be screened out of the assessment is watercourse maintenance. This is understood to be undertaken by NRW or riparian owners, and primarily comprises routine vegetation cutback, weed removal, and maintenance of water level management assets such as sluice operation and pumping stations. It is envisaged that such works would continue post-development (by the site operator within the redline boundary and NRW or riparian owners outside the boundary) and therefore maintenance access has been a central design requirement.
- 2.1.3 Therefore, the maintenance activities mentioned above have been screened out of the assessment, but all other activities associated with the Proposed Development are screened in.
- 2.1.4 All the water bodies identified above have been screened into the assessment. The reason being that potential activities such as watercourse crossings could, without mitigation, potentially impact the watercourses. The scale of such impact, with or without mitigation, should be assessed as part of the scoping process.



3 Scoping

- 3.1.0 The scoping stage of the WFD assessment identifies the risks of the Proposed Development to the WFD receptors within the study area and the status of water bodies. It then concludes what, if any, likely effects may warrant a more detailed WFD impact assessment, when considering the mitigation embedded within the designs.
- 3.1.1 The NRW WFD guidance recommends that scoping follows a source-pathway-receptor model to identify activities that have the potential to cause deterioration, how they may do so and the elements of the water environment that may be impacted.
- 3.1.2 From a WFD perspective, the receptors are the various elements of the water environment as measured under the WFD classifications.

3.2 Receptors

- 3.2.0 The relevant surface water receptors, which will be the focus of this scoping assessment, are:
- Hydromorphology – includes the hydrology (i.e., flow) and ‘geomorphology’ (i.e., channel shape, size and structure);
 - Water quality – includes aspects such as temperature, clarity, salinity, oxygen levels and nutrients (phosphate, ammonia or dissolved inorganic nitrogen); and
 - Biology – includes fish, invertebrates, macrophytes and phytoplankton.
- 3.2.1 The WFD assessment also applies to the groundwater resource.
- 3.2.2 The WFD assessment also needs to consider potential impacts to protected areas that relate to that water body.
- 3.2.3 The current status of the above receptors is reported in Section 1.5 above.

3.3 Proposed Development activities

- 3.3.0 This section provides a description of the Proposed Development activities that could, without mitigation, impact the WFD receptors. The potential scale of the impact of these activities will be assessed later in this assessment, taking into account the embedded mitigation proposed.

Construction and decommissioning

- 3.3.1 During the construction and decommissioning phases of the Proposed Development, the predominant risk to the WFD receptors could occur in the form of localised compaction through vehicle movement, which could result in an increase in the rate of runoff to the watercourses, as well as increased migration of sediment to the watercourses.
- 3.3.2 Other activities could include piling the panel stanchions, groundworks associated with constructing the substations or hybrid inverters, or spillage of contaminants. Piling could create a preferential route (pathway) for water entry into the ground, which could encourage contaminants if they were to be used to migrate downwards. Spillage of hydrocarbons or chemicals on site could be a source of contaminants that could, subject to a suitable pathway existing, present a risk of contaminants entering the water bodies.
- 3.3.3 The majority of the containerised infrastructure would be raised on concrete pads or plinths below gravel bases. Concrete foundations may be required below the gravel bases. The two on-site substations will be placed on gravel bases. Inappropriate management of the arisings could release sediment to the watercourses, impacting hydromorphology, water quality, biology and fish receptors through sediment deposition and increased turbidity.



- 3.3.4 The Cable Corridor will be a buried service and will need to cross a number of watercourses. Depending on the method used, without mitigation this has the potential to impact the hydromorphology, water quality, biology and fish receptors through the release of sediment or contaminants.
- 3.3.5 Similarly, if constructing new vehicular watercourses crossings is required, without mitigation this has the potential to impact the hydromorphology, water quality, biology and fish receptors through the release of sediment or contaminants.
- 3.3.6 As explained in the ES Volume 1 **Chapter 11 – Landscape and Visual Impact**, there are a number of dry ditches across the Solar Site that could be enhanced so they become permanently wet, subject to consultation with NRW and relevant consents. To do so would require excavation of the ditches to make them deeper and wider. Although well-intentioned due to the clear biodiversity benefits that would arise, without mitigation, such excavation could result in release of sediment or erosion of the excavated channel. In addition, the widening of channels would result in a new top of bank alignment, meaning infrastructure could then be located within the easement.
- 3.3.7 Without mitigation, decommissioning has the potential to reverse the minor benefits arising from the transition to a solar PV development, which are described in paragraph below. Although not confirmed at this stage (due to the unknown regulatory landscape at the time of decommissioning), the requirement and scope of any mitigation is subject to details in terms of best practice available at the time.

Operation

- 3.3.8 The operational life of the Proposed Development is expected to be 40 years, before being decommissioned.
- 3.3.9 The Site would be remotely operated, not needing day-to-day physical interaction. During the operational (including maintenance) phase of the Proposed Development, on-site activities would be limited to maintenance activities and grazing (if livestock are proposed to be used). Maintenance activities are likely to include:
- Regular visual inspection of all infrastructure;
 - Regular scheduled inspections and testing of equipment;
 - Replacement of consumable items (e.g., inverter filters);
 - Cleaning of solar PV modules, if required;
 - Repair or replacement of solar modules or other components, if damaged;
 - Delivery of spare parts, replacement equipment items and consumables;
 - Water management (e.g., clearing of drainage ditches); and
 - Vegetation management (e.g., cut back of grass, hedges, trees).
- 3.3.10 The Proposed Development would include a centralised Battery Energy Storage System (BESS).
- 3.3.11 The specific BESS unit design, installation and therefore composition and safety mechanisms is dependent on the system procured but the general principles of battery safety is considered in this assessment.
- 3.3.12 Without mitigation, batteries have the potential to ignite (although evidence presented in this scoping assessment demonstrates likelihood of this is extremely low), typically due to thermal runaway. Once alight, again without mitigation, they have the potential to discharge



contaminants. It is understood that hydrogen fluoride gas could be released but other contaminants could include metals such as cobalt, nickel, lithium and others but this would depend on the composition of the procured units. The design, construction and maintenance of the batteries will be the subject of the specific Outline Battery Safety Management Plan (**Appendix I.3**, ES Volume 2) submitted in support of the application.

- 3.3.13 The Fire and Rescue Services consider that attempts to extinguish BESS fires directly with water is not effective. It is difficult to direct water on the fire source as it is often buried deep in the unit, and the BESS are Ingress Protection (IP) rated.
- 3.3.14 Consequently, a typical response from the fire service to a fire would be to either keep adjacent units cool or manage the resulting smoke plume. Where the plume is dense, the response could be to use suppression spraying to encourage the plume to ground. A less dense plume is unlikely to warrant spraying.
- 3.3.15 BESS units often include internal fire suppression, the choice of which is dependent on the preferred BESS design but typically uses an aerosol or an inert gaseous asphyxiant but can include both.
- 3.3.16 The fire or plume suppression water would have the effect of diluting contaminants present in the plume (if any are present, which is unlikely as described below) but could also potentially assist their mobilisation. In addition, when in contact with water, hydrogen fluoride becomes hydrofluoric acid. Hydrofluoric acid is known to be a particularly strong acid but would be diluted by the suppression water. For example, Edinburgh University guidance^v states that '*If [the] spill is of dilute hydrofluoric acid, ...neutralise with lime..*'. It is acknowledged this guidance relates to use of hydrofluoric acid in the laboratory; it is also concerned with the management of relatively large quantities of pure or concentrated hydrofluoric acid, as opposed to dilute acid that would be present if fire suppression water were used.
- 3.3.17 To support the above, Honeywell, who handle, and transport, concentrated hydrofluoric acid, have produced a factsheet^{vi} that provides a number of materials that are known to neutralise the acid. It specifically refers to the Calcium Carbonate present within limestone as a relevant material.
- 3.3.18 It should be noted that as of April 2025, there are approximately 132 operational BESS sites across the UK.
- 3.3.19 Since 2006, UK BESS installations have accumulated approximately 800 years of operation, with only two reported failures due to fire at Carnegie Road in Liverpool (2020) and East Tilbury (2025). This relates to a failure per hour (fph) rate of approximately 1×10^{-7} fph (0.0000014fph), which is extremely low. This prompted a thorough scientific review and significant improvements in BESS technology including new safety measures and guidance.
- 3.3.20 Within the Health and Safety Executive (HSE) Reducing Risks, Protecting People guidance^{vii}, a 1×10^{-6} fph (0.000001fph) rate is proposed as a '*socially acceptable*' safety rate for the public. This rate is therefore a factor of 10 higher than the fph rate of BESS operations in the UK. Consequently, the risk of ignition would not be deemed to be 'unacceptable'.
- 3.3.21 To date, there have been no recorded damage to third parties or the environment as a result of a BESS fire.
- 3.3.22 For example, the Merseyside Fire and Rescue Service Significant Incident Response^{vii} reported that during the Carnegie Road incident runoff was regularly tested and did not record acidic conditions.
- 3.3.23 In addition, of the few BESS fires worldwide, the clearest evidence relating to monitoring of contaminants in a smoke plume is the Moss Landing Vistra Battery Fire in California, USA^{viii}, which did not record elevated levels of contaminants.



- 3.3.24 The BESS Site drainage strategy proposes a system that can be shutoff and sealed in the event of fire breakout, as described in Section 3.4.

3.4 Mitigation

- 3.4.0 Before understanding if the Proposed Development activities would have an impact on the WFD receptors, it is first important to understand the mitigation that would be utilised by the Proposed Development.

Construction and decommissioning phases

- 3.4.1 A Construction Environmental Management Plan (CEMP) and Soil Management Plan (SMP) would be implemented during the construction phase of the Proposed Development, with measures such as:
- The use of permeable materials for construction or lay-down areas;
 - Constructing and using access tracks early in the programme;
 - Planting riparian vegetation early in the programme, where reasonably practicable;
 - Appropriate storage of hydrocarbons and other pollutants to reduce the chance for accidental spillage or reduce the chance for entry to water bodies;
 - Appropriate pollution prevention such as storage of chemicals on bunded impermeable surfaces, provision of spill kits for rapid clean up;
 - Use of low-pressure tyres to limit compaction;
 - Use of tillage, or similar, to break up compacted soils; and
 - Recording of damaged land drains to allow them to be restored if required.
- 3.4.2 During construction, there is a risk that land drains may be damaged by piled panel stanchions. This would have the potential to impact land drainage by slowing the rate at which water drains from the land to the watercourses. As described in the operational impacts below, the slowing of runoff is a minor benefit of the transition of part of the Solar Site from arable to solar PV development with shade tolerant grass mixes proposed in and around the panels.
- 3.4.3 However, damage of land drains could present a pathway for sediment to enter the receiving watercourse of the damaged drain.
- 3.4.4 Therefore, damaged land drains would be recorded and reinstated during construction, if required.
- 3.4.5 Regarding vehicular watercourse crossings, existing crossings are to be utilised wherever possible. The current site proposals Proposed Solar Site Layout (Ref.02) and Proposed BESS Site Layout (Ref.03), both submitted in the planning drawing pack) show this to be the case.
- 3.4.6 The number of crossings is relatively few and therefore cover a negligible length of the total reach of the watercourses. Therefore, use, or improvement, of existing crossings would have a negligible impact on the hydromorphology of the watercourses or movement of fish, invertebrates or other biological receptors.
- 3.4.7 The preference is to utilise or upgrade existing crossings wherever possible. The specific location, type and formation of proposed crossings is unknown at present as this is subject to a detailed inspection of existing crossings. Regardless, improved proposed crossings would require relevant consenting from the appropriate authority before installation. Such consenting



would include a case-by-case assessment on the likely local impacts on channel hydromorphology and therefore crossing design and any mitigation required.

- 3.4.8 Where the Cable Corridor needs to cross watercourses, either trellising (attaching the cable to a crossing) or horizontal directional drilling (HDD) is proposed to minimise impacts on the watercourses. Furthermore, relevant surveys such as water vole and otter surveys would be completed in advance of drilling and mitigation provided to minimise impacts. Measures within the to manage the risk of bentonite breakout should include the following:
- Reflect known ground conditions to select a specific route and depth through the most homogeneous geological conditions possible;
 - Casing of weaker un-cohesive layers to reduce bentonite breakout;
 - Use as low a concentration of bentonite as possible;
 - Operatives to monitor the drilling for evidence of breakout and cease drilling and seal fissures or voids if applicable, as required;
 - Monitoring of drilling fluid returns and volumes to help identify losses;
 - Retain a stock of sandbags and pumps on site to contain breakout and dispose accordingly.
- 3.4.9 As with watercourse vehicular crossings, the specific location, depth, length and methodology of cable crossings is currently unknown as it is subject to detailed investigation and survey of existing crossings. Similarly, the programme for installing the crossing cannot be known until a contractor is appointed.
- 3.4.10 It is possible that localised dewatering is required. This would very much depend on the time of year the cabling is installed and the specific geological conditions of buried (non-trellised) crossing location, which will only be confirmed following detailed surveys and on receipt of the contractor's programme.
- 3.4.11 In order to inform this assessment, it is presumed that groundwater dewatering would be non-consumptive and localised.
- 3.4.12 The excavation of dry ditches to enhance them would be undertaken during dry periods or summer months, when the ditches are likely to remain dry for the excavation period. The excavation would be from the centre of the ditch outwards, leaving the end as 'plugs' preventing ingress of water from adjoining ditches to the enhanced ditch. The 'plugs' would be carefully removed once vegetation in the enhanced ditch has established. Once vegetation is established, the 'plugs' would then be carefully removed so as to limit the velocity of water flowing into the ditch. This would mitigate potential for erosion. Material removed from the ditch would be treated appropriately, for example, spread across the Solar Site given it would likely be fertile.
- 3.4.13 An Outline Decommissioning Environmental Management Plan (oDEMP) is submitted with the application (**Appendix A.6**, ES Volume 2) and a detailed DEMP would be required to be submitted as part of a planning condition. The oDEMP should includes measures to mitigate the risk of increased runoff during the decommissioning phase of the Proposed Development such as:
- The use of permeable materials for compounds or lay-down areas;
 - Access tracks would remain until late in the programme, or possibly remain in situ (subject to landowner agreement), and other mitigation (low-pressure tyres, tillage and storage of chemicals) would also be used;



- Retain damaged land drains if possible. Reinstatement may be required depending on the proposed land use and subject to assessment;
- Retain planted watercourse easements and buffers wherever possible to also retain benefits in terms of sedimentation and runoff; and
- Retain cables or their ducting in situ where possible to remove the need for full excavation or disturbance.

Operation

- 3.4.14 The Proposed Development will have measures that would minimise potential adverse impacts on, as well as deliver benefits to, the water environment.
- 3.4.15 The development of the Proposed Development design has been informed by technical water management, drainage and flood risk advice provided as part of this assessment as well as ES Volume 1, **Chapter 6** and the Flood Consequences Assessment (FCA) (**Appendix B.1**, ES Volume 2).
- 3.4.16 Most infrastructure would not be located within 8m of fluvial Main Rivers or NRW defence easements and 5m from Ordinary Watercourses, wherever reasonably practicable. In the event infrastructure would need to be located in this easement, it would be subject to consent from the relevant authority.
- 3.4.17 The limiting of in-channel and riparian works would negate impacts on the morphology of the water bodies and subsequently have negligible impact on the WFD hydromorphological, fish or biological receptors. Maintenance activities, such as vegetation cutbacks, would continue. These would likely have a far greater impact on the WFD receptors than the Proposed Development activities would.
- 3.4.18 Riparian grass establishment would be located within the easements to act as a buffer to the watercourses. This would maximise the benefits arising from the Proposed Development by reducing the rate of runoff entering the watercourses, therefore also reducing the chance for pollutants or sediment to enter the watercourses. It is not envisaged such grass establishment would interfere with watercourse maintenance activities. Therefore, despite this grass being encouraged or seeded in the watercourse easements, it is likely to be consented, if such approvals are required.
- 3.4.19 Mitigation would also manage the risk of increased runoff from hardstanding or containerised infrastructure (which would be limited to the dispersed infrastructure). The Proposed Development, and in particular the transition from arable farmed land to year-round grass cover or reduction in grazing densities, would result in improved percolation of rainwater and reduction in runoff and soil erosion (explained below) and consequently have minor benefit in terms of runoff, soil erosion and use of chemicals (herbicides or pesticides). In addition, the FCA [Appendix B.1, ES Volume 2]) describes the drainage strategy for the Proposed Development. This document recommends measures to mitigate the risk of increased runoff from hardstanding or containerised infrastructure.
- 3.4.20 Dispersed hardstanding or containerised infrastructure such as the inverters would direct rainfall to the ground locally. This would closely mimic the existing situation whereby rainfall falls to the surface to absorb into the ground.
- 3.4.21 As a result, rain falling on the inverter units would be directed to their gravel bases they would be sited on. Water would then percolate to the ground when conditions allow, mimicking the existing Site and negating increases in runoff arising from the hardstanding. The gravel bases would be sized to accommodate a design rainfall event.
- 3.4.22 The auxiliary transformers would utilise a similar approach, using a gravel surround to receive and percolate rainwater, which would also provide sufficient cleansing.



- 3.4.23 The substation would be sited on permeable gravel allowing rainwater to drain to ground locally.
- 3.4.24 Rain falling on the switchroom cabin and BESS containers and their underlying gravel bases would be directed to the gravel bases surrounding them, which would be wrapped in an impermeable membrane effectively creating a sealed system. The discharge from this sealed system would be controlled by a flow control device (such as a Hydrobrake) before flowing into a nearby watercourse.
- 3.4.25 The runoff pollutant load is expected to be very low and consequently the gravel bases sufficient to cleanse water before discharge to the ground, thus having a negligible impact on groundwater receptor. This is evidenced by comparing the likely pollutant hazard indices from Table 26.2 of the SuDS Manual^{ix} with the SuDS mitigation indices for discharges to surface waters in Table 26.3 and groundwater in 26.4 of the SuDS Manual.
- 3.4.26 The proposed hardstanding on the Site would be equivalent to 'residential roofs', which has a very low pollution hazard level. The nearest equivalent SuDS mitigation to the drainage strategy would be an infiltration trench, which would provide more than sufficient cleansing of suspended solids, metals and hydrocarbons likely to be generated.
- 3.4.27 The Site access tracks would be formed from permeable materials. They would allow rainwater to percolate into the underlying ground at the location where the rain would fall to the ground. This would closely mimic the existing situation by allowing water to drain to ground. Tracks would be used infrequently due to the remotely operated nature of the Site. The use of permeable granular material is effective at filtering the low level of contaminants likely to be present in runoff.
- 3.4.28 The Cable Corridor would be a buried service and consequently would have negligible impact on the routing of water overland, post-construction. Where the cable route needs to cross watercourses, HDD or trellising is proposed to minimise impacts on the watercourses. Trellising involves attaching the cables to a crossing to negate the impacts on flow, morphology or the movement of wildlife. Furthermore, relevant surveys such as water vole and otter surveys would be completed in advance of drilling and mitigation provided to minimise impacts.
- 3.4.29 Regarding batteries, as reported above, the chances for ignition are incredibly low and below HSE acceptable standards. Nonetheless, the design, installation and operation of BESS units follows the Health and Safety Executive's hierarchy of controls – elimination; substitution; engineering controls; administrative controls; and personal protective equipment. This would result in mitigation of fire risk being embedded at multiple levels within the battery design and installation.
- 3.4.30 The most notable mitigation at the Site would be to use watertight containers fabricated in accordance with Ingress Protection standards, subject to the procurement process. This would mean that in the event of a fire, it is highly likely that contaminants discharged would settle locally within the battery unit and not be released externally.
- 3.4.31 Furthermore, the drainage system for the BESS compounds, described earlier in this section, would be fitted with downstream penstock chambers that would create a sealed system in the event that fire suppression water is used. The water could then be tested for contaminants, with and pumped out if contaminants are identified. The contaminated water would then be disposed of via a licenced waste processing facility. When no contaminants are recorded, the penstock can be opened. The storage system (provided in the gravel base) would have sufficient capacity for at least six hours of suppression spraying at a discharge/pump rate of zero.
- 3.4.32 This limits the release the mechanism to be airborne via the smoke plume. The Moss Landing Vistra Battery fire has the clearest evidence relating to monitoring of contaminants in a smoke plume. The US Environmental Protection Agency (EPA) reported^{viii} that:



- EPA's monitoring showed concentrations of particulate matter to be consistent with the air quality index throughout the Monterey Bay and San Francisco Bay regions, with no measurements exceeding the moderate air quality level; and
 - Hydrogen fluoride gas was measured at one second intervals and there were no exceedances of California's human health standards.
- 3.4.33 If a dense smoke plume emanates from the fire, the fire service response would be to bring the plume to ground using suppression spraying. This would likely mean that pollutants (if present) would likely be captured by the sealed gravel base system.
- 3.4.34 Temperature and humidity within the batteries is controlled to avoid excessive heat that could cause breakdowns. This is managed through application of an air or liquid cooling system.
- 3.4.35 Batteries are fitted with a Battery Management System (BMS). The BMS is a multi-layered system that is able to shut down at cell, module or rack level if temperatures rise in the units.
- 3.4.36 An automated fire suppression system would exist with the units. A clean (i.e., non-toxic, Per- and Polyfluorinated Substances (PFAS)-free substances), non-water based, suppression system is preferred as this eliminates the need for internal storage, and use of, of significant volumes of water. The use of such suppression systems is validated by the decision to propose disperse batteries rather than a centralised system.
- 3.4.37 The gravel base would be specified to be limestone-based, given the calcium carbonate content of limestone is understood to be effective at diluting hydrofluoric acid, as recommended above in paragraph 3.4.13.
- 3.4.38 If the fire and rescue service is required to attend the Site in the unlikely event of fire, information boxes will be included at Site entrances. This will contain important information relating to the suppression of fire.
- 3.4.39 The mitigation would restrict the chance of ignition occurring, particularly through the control of thermal runaway. Therefore, the chance of a unit igniting (i.e. the source) is very low, reflected by the extremely low number of fires reported globally compared to operating hours of BESS units.
- 3.4.40 Evidence from previous BESS fires demonstrates that no contaminants were recorded, or that they were within safe or background limits.
- 3.4.41 Furthermore, the gravel base, membrane and sand layer would remove the pathway for release of pollutants and therefore provide sufficient mitigation to minimise potential impacts on the groundwater and surface water body receptors.
- 3.4.42 In summary, BESS fires have a negligible chance of occurring and the evidence demonstrates there is no significant source of contaminants. The pathway to the receptors is limited by low permeability or deep soils as well as embedded mitigation. Finally, the receptors are not assessed as being sensitive.

3.5 Impacts of the Proposed Development – Scoping Summary

- 3.5.0 This section of the WFD scoping assessment summarises the above impact assessment and identifies if any additional mitigation measures would be required to negate the chance for deterioration of the receptor or if a Stage 3 WFD Assessment is required. **Table 3.1** covers the construction and decommissioning phases while **Table 3.2** covers the operation (including maintenance) phase.



Table 3.1: Scoping Summary Table – Construction/Decommissioning

Potential Impact	Receptor	Pathway	Mitigation	Securing mechanism	Residual impact	Scoped into Assessment?
Compaction resulting in increased sedimentation/ turbidity caused by soil erosion/turbid water	Hydromorphology	Increased overland flows and soil erosion/ sediment – Low due to slope of Site	Construct access roads early (construction) and utilise until late (decommissioning). Construction Environmental Management Plan and Decommissioning Environmental Management Plan. Watercourse easements. Tillage. Seeding.	Outline CEMP Outline DEMP Outline Soil Management	Negligible	No
	Water Quality					
	Biology & Fish					
Damage to watercourses and release of sediment due to cable crossing construction	Hydromorphology	Release of sediment/ alteration of channel shape	HDD, where required, will be undertaken at sufficient depth below the channel beds. HDD breakout plans. Pre-commencement ecological surveys. Cables, or their ducting to remain in situ after decommissioning	Design Parameters Outline CEMP Outline DEMP	Minor	No
	Water quality					
	Biology & fish					
Damage to watercourses and release of sediment due to dry ditch excavation	Hydromorphology	Release of sediment/erosion of enhanced ditch	Excavated ditches in dry periods or summer months. Excavate from the centre of the ditch outwards, leaving 'plugs' at either end to prevent water ingress. Allow vegetation to establish before carefully removing the plugs Construction Environmental Management Plan	Design Parameters Outline CEMP Outline DEMP	Minor	No
	Water quality					
	Biology & fish					
Damage to watercourse and release of sediment due to vehicle crossing construction	Hydromorphology	Release of sediment/ alteration of channel shape	Utilise existing crossings Construction Environmental Management Plan and Decommissioning Environmental Management Plan.	Outline CEMP Outline DEMP	Negligible	No
	Water quality					



Potential Impact	Receptor	Pathway	Mitigation	Securing mechanism	Residual impact	Scoped into Assessment?
	Biology & fish					
Groundworks resulting in increased sedimentation/ turbidity	Hydromorphology	Increased overland flows and soil erosion/ sediment – Low due to slope of Site	Construction Environmental Management Plan, Decommissioning Environmental Management Plan and good site management practices. Use of geomembranes and waterproof coverings of stockpiles. Locate arisings away from watercourses	Outline CEMP	Negligible	No
	Water quality					
	Biology & fish					
Piling of panel stanchions creating flow path to ground	Groundwater quality	Sub-surface flow of contaminants to groundwater. Low due to depth to WFD waterbody	Push piled solution rather than foundations to minimise potential for contaminant release.	Outline CEMP	Negligible	No



Table 3.2: Scoping Summary Table – Operation (including maintenance)

Potential Impact	Receptor	Pathway	Mitigation	Securing mechanism	Residual impact	Scoped into Assessment?
Reduced soil erosion and runoff due to transition from arable farmed land to year-round grass cover	Water Quality	Reduced overland flows	Easements and planted buffer would augment the natural benefit.	Design Parameters	Minor beneficial	No
	Biology & Fish			Outline CEMP		
Change to cross sectional area due to cable crossing	Hydromorphology	Altered flow regime	Trellising or HDD drilling at sufficient depth below the channel beds.	Design Parameters Outline CEMP	Negligible	No
Change to cross sectional area due to cable crossing	Hydromorphology	Altered flow regime	Utilise existing crossings.	Design Parameters Outline CEMP	Negligible	No
Change to channel morphology due to loading of structures	Hydromorphology	Altered channel shape impacting flow regime	Locate infrastructure outside watercourse easements. Riparian planting.	Design Parameters Outline CEMP	Negligible	No
Release of contaminants from battery fire due to thermal runaway	Hydromorphology	Limited release of contaminants– for example due to fire suppression water	Utilise watertight containers (subject to procurement) to settle contaminants within the unit.	Design Parameters Outline CEMP	Negligible	No
	Water quality		Follow HSE hierarchy of controls. Disperse batteries across the Site to reduce chance for fires to spread or overheating due to proximity.			
	Biology & fish		Internal battery management systems.			



Potential Impact	Receptor	Pathway	Mitigation	Securing mechanism	Residual impact	Scoped into Assessment?
	Groundwater quality		Utilise an automatic clean agent fire suppression system rather than a water-based system. Use sealed drainage system to prevent escape of contaminated water Limestone gravel bases with membrane and sand layer to neutralise acids and absorb pollutants.			
Entry of sediments to the watercourses	Hydromorphology	Release of sediment/alteration of channel shape. Low pathway due to Site gradient	Watercourse easements with riparian grass planting to absorb sediments. Use of gravel bases to accommodate and cleanse roof runoff from hybrid inverters.	Design Parameters Outline CEMP	Negligible	No
	Water quality					
	Biology & fish					
Increased runoff from hardstanding	Hydromorphology	Increased overland flows Low due to slope of Site	Direct runoff to gravel bases. Size gravel bases to accommodate a design rainfall event. Use of permeable access tracks or including drainage mitigation (trenches or filter strips).	Design Parameters Outline CEMP	Negligible	No
	Water quality					



4 Conclusion

- 4.1.0 The assessment demonstrates that there are a number of Proposed Development activities that could impact the local WFD receptors. However, the mitigation proposed would minimise the chance for such impacts.
- 4.1.1 The construction impact with the highest potential for harm to the WFD receptors is the crossing of cables over the watercourses. Significant mitigation is proposed to minimise the chance for such harm to materialise.
- 4.1.2 The majority of the operational development would result in minor benefit to the WFD receptors local to the Site.
- 4.1.3 During operation, significant mitigation is proposed to manage the risk of release of contaminants in the unlikely event of battery fire breakout. This would minimise the risk to the WFD receptors from the impact with highest potential for harm.
- 4.1.4 Although the Proposed Development benefits are assessed to be unlikely to change the WFD status of the watercourses, they would assist the water bodies in meeting their Objectives.
- 4.1.5 For the above reasons and in accordance with the relevant guidance, there are no identified impacts of the Proposed Development that would warrant a more detailed WFD assessment. Therefore, this can be scoped out.

5 References

- ⁱ British Geological Survey 2025. Soil Parent Material Model. Available via https://osdatahub.os.uk/downloads/open/Soil_Parent_Material_Model_1km
- ⁱⁱ The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. Available online: <https://www.legislation.gov.uk/ukxi/2017/407/contents/made>
- ⁱⁱⁱ Welsh Government 2024. Planning Policy Wales. Available online <https://www.gov.wales/sites/default/files/publications/2024-07/planning-policy-wales-edition-12.pdf>
- ^{iv} Welsh Government 2024. Complying with the WFD Regulations 2017: Guidance Note 78
- ^v Edinburgh University 2024. Hydrofluoric Acid. Available online: <https://www.ed.ac.uk/health-safety/guidance/hazardous-substances/hydrofluoric-acid>
- ^{vi} Honeywell 2014. Typical Alkaline Materials (Bases) for Neutralization of HF. Available online <https://prod-edam.honeywell.com/content/dam/honeywell-edam/pmt/oneam/en-us/hydrofluoric-acid/honeywell-bases-for-neutralization-of-HF-v2.pdf>
- ^{vii} Merseyside Fire and Rescue Service 2020. Significant Incident Report. Available online <https://hawkchurchactiongroup.com/wp-content/uploads/2022/04/BESS-Fire-Significant-Incident-Report.pdf>
- ^{viii} United States Environmental Protection Agency 2025. EPA Completes Air Monitoring Near Moss Landing Vistra Battery Fire. Available online <https://www.epa.gov/newsreleases/epa-completes-air-monitoring-near-moss-landing-vistra-battery-fire>