LLŶR FLOATING OFFSHORE WIND PROJECT

Llŷr Floating Offshore Wind Farm

Environmental Statement

Volume 6: Appendix 10A - Flood Consequence Assessment

August 2024

Prepared by: Llŷr Floating Wind Ltd

FLOVENTIS ENERGY

Document Status

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Acronyms and abbreviations

Acronym or Abbreviation	Definition	Acronym or Abbreviation	Definition
bgl	below ground level	LLFA	Lead Local Flood Authority
BGS	British Geological Survey	NRW	Natural Resources Wales
CEMP	Construction Environmental Management Plan	PCC	Pembrokeshire County Council
DAM	Development Advice Map	PFRR	Preliminary Flood Risk Report
DEFRA	Department for Environment, Food and Rural Affairs	PPW	Planning Policy Wales
ES	Environmental Statement	RBMP	River Basin Management Plan
FCA	Flood Consequence Assessment	SFCA	Strategic Flood Consequence Assessment
FCERM	Flood and Coastal Erosion Risk Management	SMP	Shoreline Management Plan
FRMS	Flood Risk Management Strategy	SUDS	Sustainable Drainage Systems
HDD	Horizontal Directional Drilling	TAN15	Technical Advice Note 15
LDP	Local Development Plan	WFD	Water Framework Directive
LFRMS	Local Flood Risk Management Strategy		

Glossary of project terms

Term	Definition
The Applicant	The developer of the Project, Llŷr Floating Wind Limited
Array	All wind turbine generators, inter array cables, mooring lines, floating sub-structures and supporting subsea infrastructure within the Array Area, as defined, when considered collectively, excluding the offshore export cable(s).
Array Area	The area within which the wind turbine generators, inter array cables, mooring lines, floating sub-structures and supporting subsea infrastructure will be located
Floventis Energy	A joint venture company between Cierco Ltd and SBM Offshore Ltd of which Llŷr Floating Wind Limited is a wholly owned subsidiary.
Landfall	The location where the offshore export cable(s) from the Array Area, as defined, are brought onshore and connected to the onshore export cables (as defined) via the transition joint bays (TJB).
Llŷr 1	The proposed Project, for which the Applicant is applying for Section 36 and Marine Licence consents. Including all offshore and onshore infrastructure and activities, and all project phases.
Marine Licence	A licence required under the Marine and Coastal Access Act 2009 for marine works which is administered by Natural Resources Wales (NRW) Marine Licensing Team (MLT) on behalf of the Welsh Ministers.
Offshore Development Area	The footprint of the offshore infrastructure and associated temporary works, comprised of the Array Area and the Offshore Export Cable

Term	Definition
	Corridor, as defined, that forms the offshore boundary for the S36 Consent and Marine Licence application
Offshore Export Cable	The cable(s) that transmit electricity produced by the WTGs to landfall.
Offshore Export Cable Corridor (OfECC)	The area within which the offshore export cable circuit(s) will be located, from the Array Area to the Landfall.
Onshore Development Area	The footprint of the onshore infrastructure and associated temporary works, comprised of the Onshore Export Cable Corridor and the Onshore Substation, as defined, and including new access routes and visibility splays, that forms the onshore boundary for the planning application.
Onshore Export Cable(s)	The cable(s) that transmit electricity from the landfall to the onshore substation
Onshore Export Cable Corridor (OnECC)	The area within which the onshore export cable circuit(s) will be located.
proposed Project	All aspects of the Llŷr 1 development (i.e. the onshore and offshore components).
Onshore Substation	Located within the Onshore Development Area, converts high voltage generated electricity into low voltage electricity that can be used for the grid and domestic consumption.
Section 36 consent	Consent to construct and operate an offshore generating station, under Section 36 (S.36) of the Electricity Act 1989. This includes deemed planning permission for onshore works.

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10. APPENDIX 10A FLOOD CONSEQUENCE ASSESSMENT

10.1 Introduction

10.1.1. Commission

1. AECOM Limited (AECOM) has been commissioned by Llŷr Floating Wind Ltd (hereafter referred to as the 'Applicant') to undertake a Flood Consequence Assessment (FCA) for an offshore wind development project in the Celtic Sea, known as Llŷr Floating Wind Farm. This FCA has been prepared to support and inform the Environmental Statement (ES) for this project and considers only the onshore elements. The onshore element is taken here to denote all aspects of the project extending to the extreme Low Water Mark.
2. To comply with national policy, this FCA has been prepared in accordance with Planning Policy Wales (Welsh Government (2024) (PPW) and the affiliated Technical Advice Note (TAN) 15: Development and Flood Risk (Welsh Government 2004).

10.1.2. The proposed Project

3. The proposed Project is a test and demonstration project, showcasing the use of floating offshore wind platform technologies, comprising up to 10 wind turbine generators (WTGs) and associated infrastructure. The proposed Project will be located offshore in the Bristol Channel approximately 35km from the Welsh coastline at its closest point. The proposed Project will consist of a 55 km offshore export cable to the Pembrokeshire coastline which will connect the offshore infrastructure, including wind turbine generators, floating platforms (along with associated anchors and mooring lines) and array cables, to the onshore infrastructure, including transition joint bays / risers, substation / control building, and cabling between the landfall site and the grid connection point. The landfall location will be at Freshwater West. A map detailing the onshore cable route and the surrounding area can be viewed in **Figure 10A-1**.

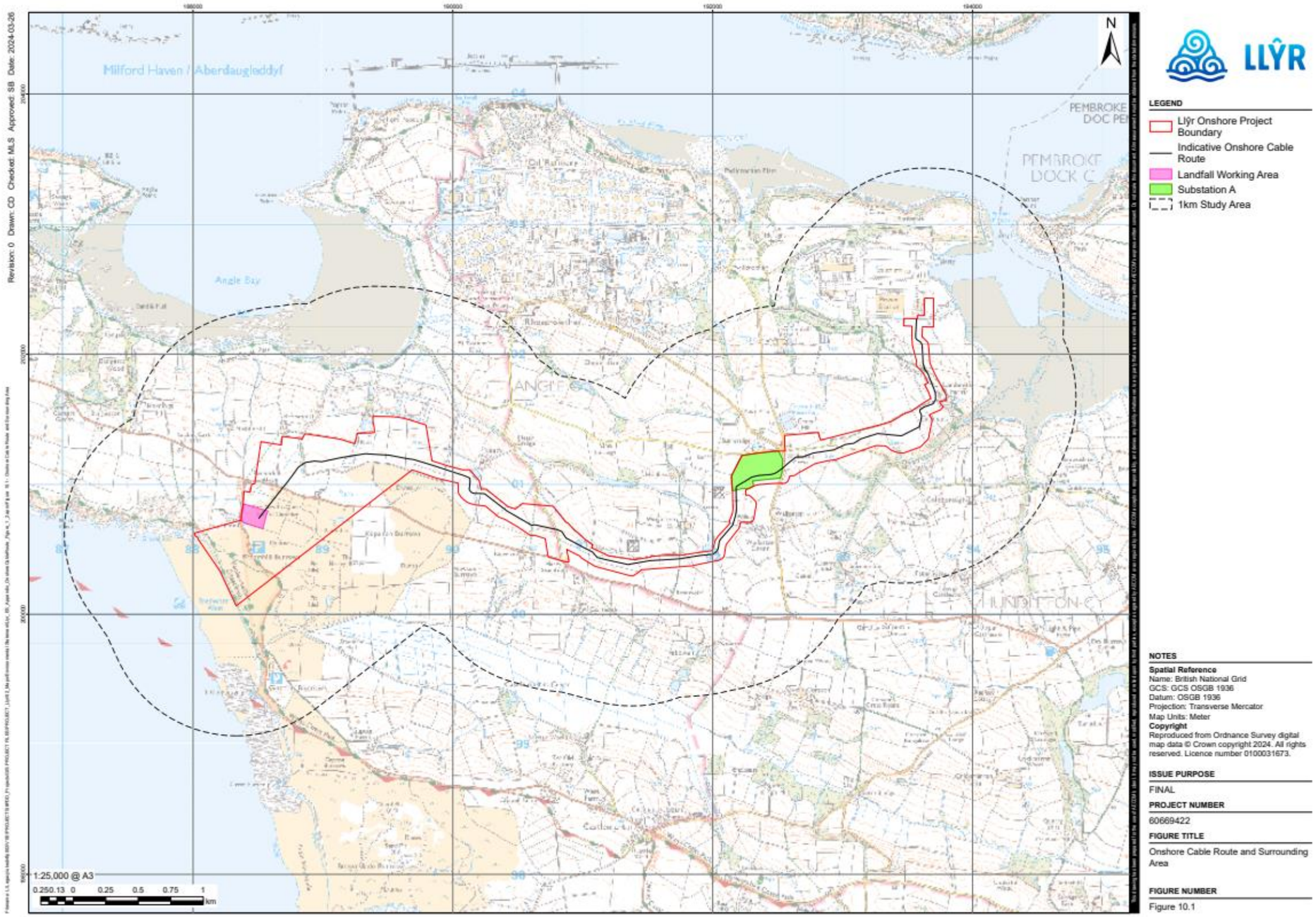

Figure 10A-1. Onshore cable route and surrounding area

10.1.3. Aims and Objectives

4. The aim of this FCA is to assess the flood risk posed to, and arising from, the proposed Project. To achieve this aim, the following objectives have to be satisfied:

- Collection and review of existing flood risk data, topographic data, the Natural Resources Wales (NRW) Product 4 data, and available planning policy documents;
- Assessment and interpretation of available information to identify potential sources of flood risk from fluvial, tidal, groundwater, surface water, sewer and artificial sources;
- Review the proposed Project design considering identified flood risks and propose flood risk mitigation measures, where applicable, to reduce any residual flood risk to acceptable levels;
- Provide comment on the management of surface water within the Study Area (this is taken to denote all areas within 1km of the onshore cable route, as significant hydrological impacts are considered unlikely to occur beyond this); and
- Produce an FCA report in full accordance with TAN 15 to inform the ES for the proposed Project.

10.2 Site Description

10.2.1. Location

5. The Study Area for the onshore element of the proposed Project is in south-west Pembrokeshire on the Angle Peninsula as seen in **Figure 10A-1**. The proposed Project is located within Pembrokeshire County Council. The cable route is proposed to make landfall at Freshwater West and stretch eastwards to the substation located within Substation Search Area A approximately 1.5 km south west of Pembroke Substation, and then to the grid connection point at Pembroke Substation. The length of the onshore cable route is approximately 7.1 km. The Study Area is primarily occupied by arable and pastoral agriculture, with the village of Rhoscrowther being the only settlement near the proposed Project. The closest towns are Pembroke to the east and Milford Haven to the north. To the north of the Study Area, several heavy industry facilities are located, namely the Valero Oil Refinery and Pembroke Power Station.

10.2.2. Local Water Features

6. According to Water Watch Wales' Cycle 3 Rivers and Waterbodies Map (Water Watch Wales' Cycle 3 Rivers and Waterbodies Map), the Study Area crosses the Pembrokeshire South Water Framework Directive (WFD) coastal waterbody, and the Milford Haven Inner WFD transitional waterbody. The Pembrokeshire South WFD coastal waterbody extends from Whitedole Bay to Manorbier Bay, whilst the Milford Haven Inner WFD transitional waterbody extends from Pennar Mouth eastwards.

7. **Figure 10A-2** shows the main rivers and ordinary watercourses within the Study Area. Main rivers are watercourses that are managed by NRW for flood management, whereas ordinary watercourses simply refer to all other open watercourses in Wales that where flood management is overseen by the relevant Local Authorities; Pembrokeshire County Council manage the ordinary watercourses within the Study Area. There are two watercourses within the Study Area that are designated as Main Rivers, namely Castlemartin Corse and Pembroke River. However, the cable route itself does not cross either river.

8. There are numerous ordinary watercourses within the Study Area, the majority of which are unnamed. The most significant of these being Goldborough Pill (SM 92951 000330) which the cable route crosses and Lightapipe (SR 94563 99952), both of which drain into the Milford Haven Inner WFD transitional waterbody. In addition, the cable route crosses an unnamed ordinary watercourse (SM 90844 00755) approximately 1.5 km southeast of Rhoscrowther.

9. Water Watch Wales' Cycle 3 Rivers and Waterbodies Map shows that there are no WFD classified Lake Waterbodies in the general area of the onshore cable route, although according to 1:25,000 OS mapping, there are small reservoirs at Green Hill (SM 92572 01470, approximately 9,400 m^2 in area), just south of Pembroke Power Station (SM 92848 02088, approximately 3,000 m^2 in area), and near Broomhill (SM 89339 01488, approximately 3600 m^2 in area). Small ponds are also present across the Study Area, several of which are online to small watercourses, whilst others are associated with topographic depressions.

10.2.3. Topography

10. Topography across the cable route is depicted in **Figure 10A-2.** The cable route makes landfall at Freshwater West at an elevation of 4m AOD. The cable route travels 2 km north-west to an elevation of 30 m AOD. The cable route then runs roughly parallel to Angle Road (B4320) in an easterly direction, ranging between elevations of 30m and 63m AOD, for 3.5 km. The final 3 km of the cable route descends in a north-eastern direction towards the Pembroke Power Station, with the end of the cable route at 5 m AOD. Most of the cable route runs at altitudes above 30 m AOD within the Angle Peninsula, with the start and end of the route displaying the sharpest changes in gradient.

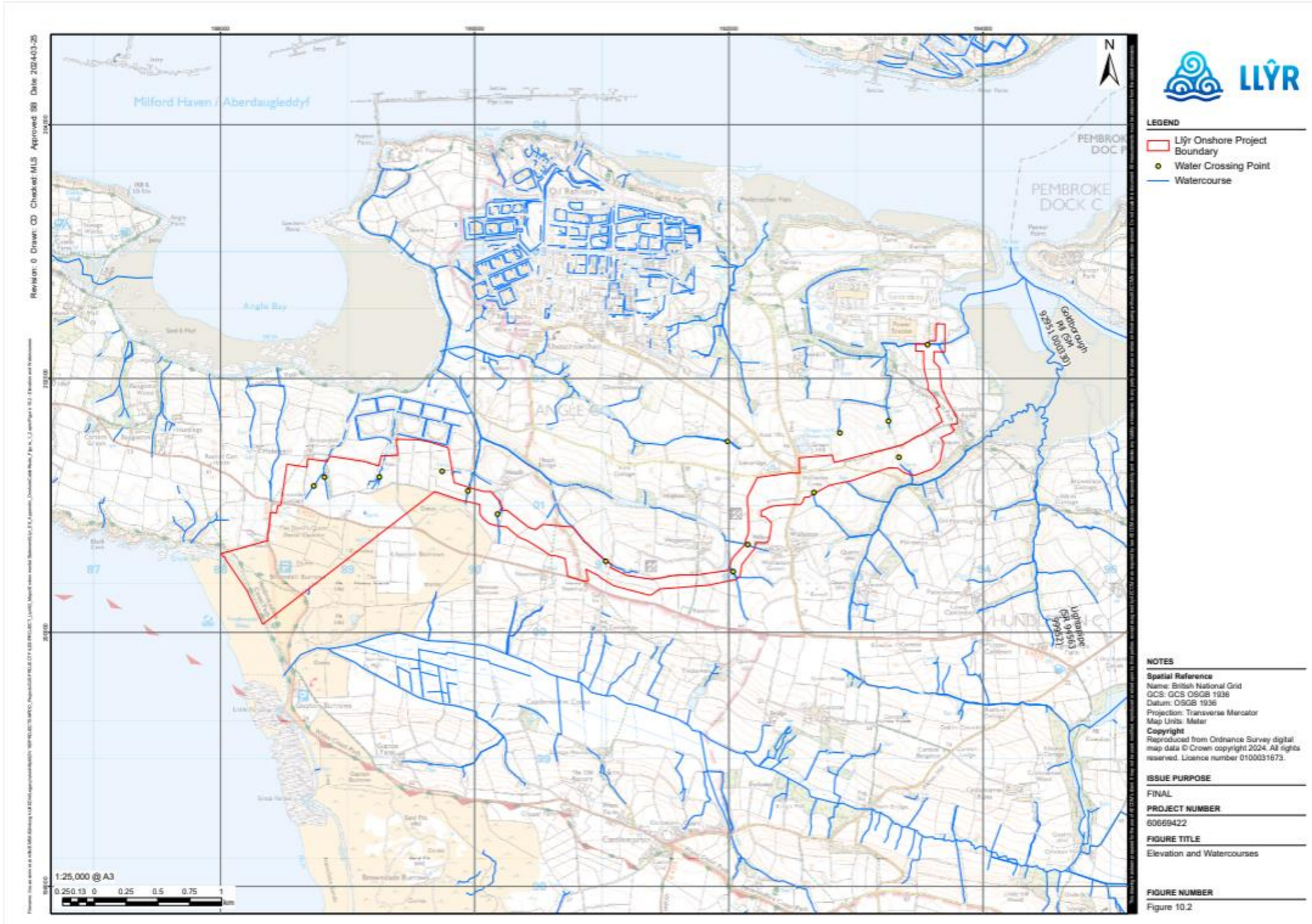

Figure 10A-2. Elevation and watercourses

10.2.4. Geology and Hydrogeology

11. The British Geological Survey (BGS) online 'Geology Viewer' (British Geological Survey (online) Geology Viewer) displays the bedrock and superficial geology underlying the cable route and is shown in **Figure 10A-3** and **Figure 10A-4** respectively. The bedrock geology underlying the majority of the onshore cable route is the Milford Haven Group, a Devonian age strata composed of argillaceous rocks and sandstone. However, there is variability in the bedrock geology along the onshore cable route, with this variability being sharpest close to the inception and termination points of the onshore cable route. At Freshwater West, the cable route passes through the Aber Mawr Shale Formation (mudstone) and the Ludlow Rocks (sandstone) before reaching the Milford Haven Group (Argillaceous rocks and sandstone). Before reaching the grid connection location, the cable route passes through the Ridgeway Conglomerate Formation, the Skrinkle Sandstone Formation, the Avon Group, and the Black Rock Sub Group and Gully Oolite Formation.

12. Most of the cable route is not underlain by superficial deposits. There is a small patch of Marine Beach Deposits at Freshwater West. Approximately 1 km of the cable route is intercepted by Blown Sand near to Freshwater West and Alluvium is present at the grid connection point.

13. DEFRA's Magic map (DEFRA Magic Map (online)) application indicates that the bedrock along the length of the cable route is largely classified as Secondary A aquifer. The only exceptions to this are a small section of bedrock designated as Principal aquifer near Pembroke Power Station. Principal aquifers are comprised of highly permeable layers that can hold significant quantities of water, whereas Secondary A aquifers are composed of permeable layers that can support local water supplies and may act as an important source of baseflow to rivers.

14. The Cranfield University Soilscapes (Cranfield Soil and Agrifood Institute (online)) website indicates that most of the onshore cable route is intercepted by freely draining slightly acid loamy soils. An exception to this includes a small section of the cable route at Freshwater West and north-east of Freshwater West that is intercepted by sand dune soils.

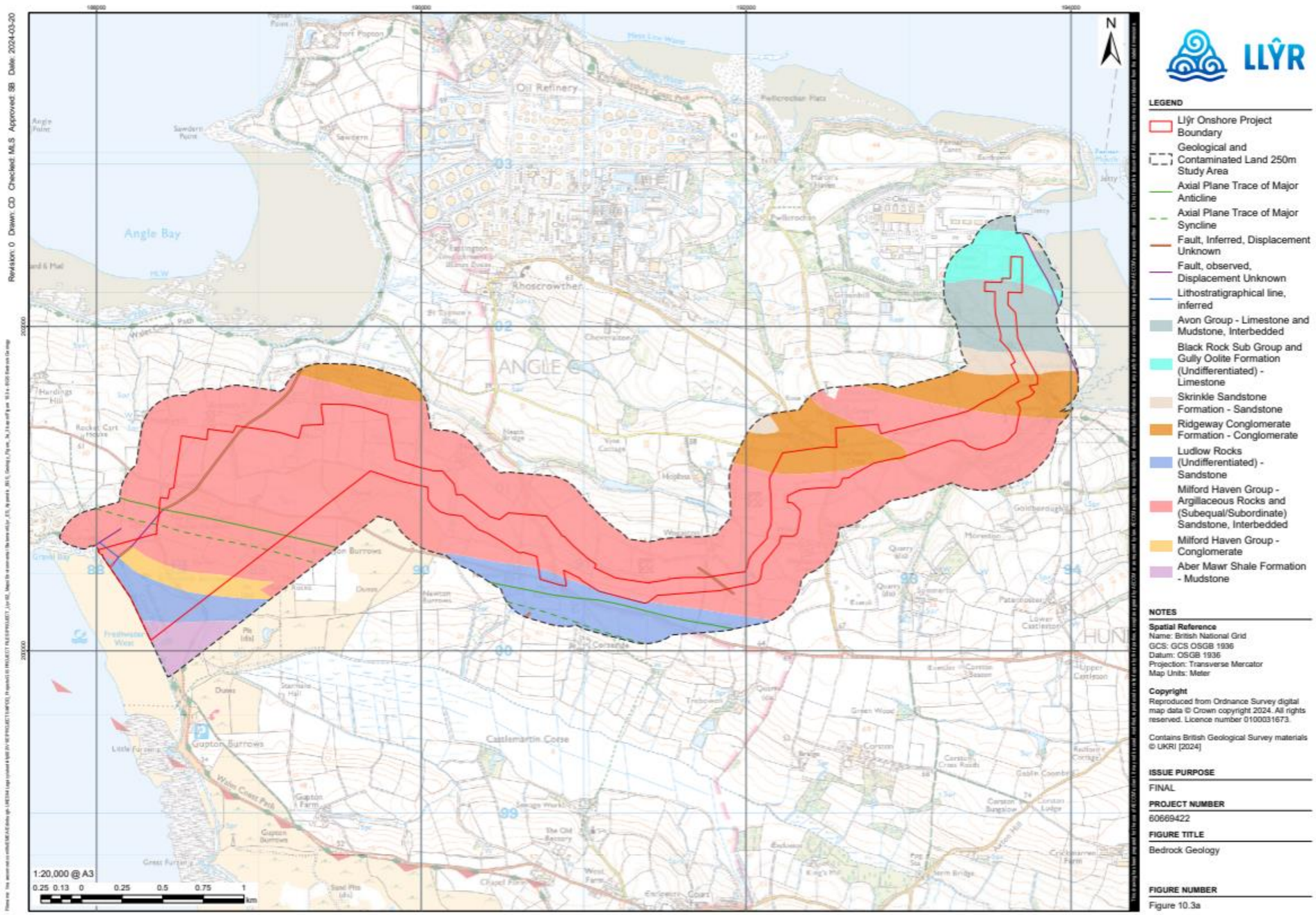

Figure 10A-3. Bedrock geology

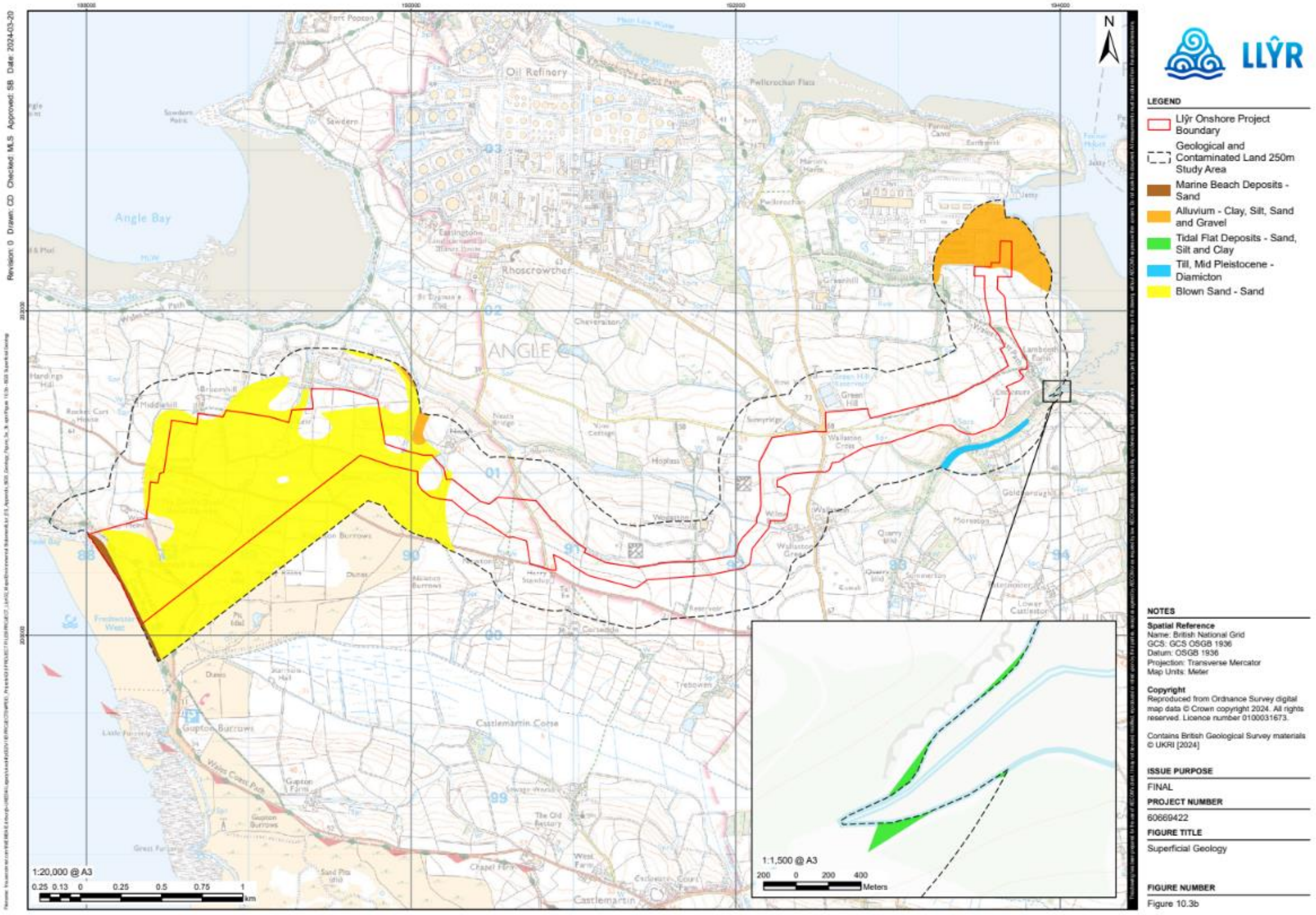

Figure 10A-4. Superficial geology

10.3 Planning Policy and Guidance

10.3.1. National Policy

Future Wales – National Plan 2040

15. The Future Wales – National Plan 2040 (Welsh Government 2021) published in February 2021 acts as the national development framework for Wales, by establishing the direction for development in the country up to the year 2040. It includes a policy relevant to flood risk:

Policy 8 – Flooding

"Flood risk management that enables and supports sustainable strategic growth and regeneration in National and Regional Growth Areas will be supported. The Welsh Government will work with Flood Risk Management Authorities and developers to plan and invest in new and improved infrastructure, promoting nature-based solutions as a priority. Opportunities for multiple social, economic and environmental benefits must be maximised when investing in flood risk management infrastructure. It must be ensured that projects do not have adverse impacts on international and national statutory designated sites for nature conservation and the features for which they have been designated."

10.3.2. National Strategy for Flood and Coastal Erosion Risk Management (FCERM)

16. The National Strategy for FCERM in Wales (Welsh Government (2020)) was published in October 2020 and establishes how risks from flooding and coastal erosion will be managed over the strategy's 10 year lifespan. The document lists the strategy's overarching objectives which are as follows:

- Improving our understanding and communication of risk;
- Preparedness and building resilience;
- Prioritising investment to the most at risk communities;
- Preventing more people becoming exposed to risk; and
- Providing an effective and sustained response to events.

Planning Policy Wales

17. Planning Policy Wales (PPW) (Welsh Government 2024) sets out the Welsh's Government's land use planning policies and is supplemented by a series of Technical Advice Notes (TANs). Section 6.6 of PPW provides the current guidance for planning with respect to flood risk. PPW advocates that planning authorities should take a strategic approach to flood risk and consider the catchment by providing preliminary representation of flood risks. It is stated that development should reduce, and must not increase, flood risk arising from fluvial and/or tidal flooding on and off the development site itself. The priority should be to protect the undeveloped or unobstructed floodplain from development and to prevent the cumulative effects of incremental development.

Technical Advice Note 15

18. Technical Advice Note (TAN) 15 (Welsh Government 2004) provides guidance which supplements the policy set out in PPW in relation to development and flooding. A precautionary framework is set out which advises caution in respect of new development in areas at high risk of flooding and this is used as a guide for planning decisions. The overall aim

of the precautionary framework is to direct new development away from those that have a high risk of flooding and development will only be justified in these areas if it meets the criteria and tests specified in this guidance.

19. The operation of the precautionary framework is governed by Development Advice Map (DAM) zones (**Table 10A-1**) which are used to trigger the appropriate planning test and definitions of vulnerable developments. The DAM zones are based on the best available information to determine when flood risk needs to be taken into consideration with future development.

Table 10A-1: DAM zone designations, their associated flood risk definition and use within the precautionary framework (Source: TAN 15)

Description of Zone	Zone name	Use within the precautionary framework
Considered to be at little or no risk of fluvial and tidal/coastal flooding	A	Justification test not applicable and no need for further consideration of flood risk.
Areas known to have been flooded in the past as determined from sedimentary deposits	B	Site levels should be checked against extreme (0.1%) flood level. No need for further consideration of flood risk if site levels exceed the flood levels used to define adjacent extreme flood outline.
Land with an annual probability of flooding (river, tidal, or coastal) equal to or greater than 0.1%	C	Flood risks should be considered an integral part of the decision making through the application of the justification test including the assessment of consequences.
Areas of the floodplain which are developed and served by significant flood defence infrastructure	C1	Development can take place subject to the application of a justification test, including the acceptability of consequences.
Areas of the floodplain without significant flood defence infrastructure	C2	Only less vulnerable development should be considered subject to the application of the justification test, including the acceptability of consequences. Highly vulnerable development and emergency services should not be considered

20. The precautionary framework identifies the vulnerability of different land uses to flooding and classifies proposed uses accordingly as detailed in **Table 10A-2**. This is because certain flooding consequences may not be acceptable for particular development types.

Table 10A-2: Development categories (Source: TAN 15)

Development category	Types
Emergency services	Hospitals, ambulance stations, fire stations, police stations, coastguard stations, command centres, emergency depots and buildings used to provide emergency shelter in time of flood
Highly vulnerable development	All residential premises (including hotels and caravan parks), public buildings, especially vulnerable industrial development (power stations, incinerators, chemical plants), and waste disposal sites
Less vulnerable development	General industrial, employment, commercial and retail development, transport and utilities infrastructure, car parks, mineral extraction sites and associated processing facilities

21. According to TAN 15, new development should be directed away from DAM Zone C and towards more suitable land in DAM Zone A, otherwise to DAM Zone B, where fluvial or tidal flooding will be less of an issue. The onshore cable route part of the proposed Project is classified as 'less vulnerable' as it is utilities infrastructure. The substation part of the proposed Project is classified as 'highly vulnerable' as it is a power station.

22. TAN 15 is planned to be updated and will be supported by the NRW Flood Map for Planning (Natural Resources Wales Flood Map for Planning). NRW states that the Flood Map for Planning represents the best available information on flood risk, therefore the Flood Map for Planning has been used to assess flood risk in this FCA.

10.3.3. Local Policy

Pembrokeshire County Council Local Development Plan

23. Pembrokeshire County Council (PCC) prepared a Local Development Plan (LDP) which was adopted in 2013 with an end date of 2021 (Pembrokeshire County Council Local Development Plan 2013). The Plan provides guidance relating to development and use of land in Pembrokeshire. The policies relating to flood risk are:

SP 1 Sustainable Development

"All development proposals must demonstrate how positive economic, social and environmental impacts will be achieved and adverse impacts minimised."

GN.1 General Development Policy

"Development will be permitted where it would not cause or result in unacceptable harm to health and safety."

GN.2 Sustainable Design

"Development will be permitted where it incorporates a resource efficient and climate responsive design through location, orientation, design, layout, land use, materials, water conservation and the use of sustainable drainage systems and waste management solutions."

24. A review of the LDP commenced in 2017 and is ongoing. The date for the revised LDP to be adopted is currently unknown.

10.3.4. Pembrokeshire Coast National Park Local Development Plan

25. Pembrokeshire Coast National Park Authority published a LDP in 2020 with an end date of 2031 (Pembrokeshire Coast National Park Local Development Plan 2020). The Plan includes the long term vision for the Pembrokeshire Coast National Park and sets out the objectives and land use policies needed to deliver that vision. The policies relating to flood risk are:

Policy 34 Flooding and Coastal Inundation

"In planning for the future development of the National Park:

a) Development will be directed away from those areas which are at risk from flooding now or as predicted for the future by TAN15 Development Advice Maps or Shoreline Management Plan 2 unless there are sound social or economic justifications in accordance with the advice set out in Technical Advice Note 15.
b) Sustainable defence of the coast will permitted where it can be demonstrated that the works are consistent with the management approach for the frontage presented in the relevant Shoreline Management Plan and there will no unacceptable adverse effects on the environment."

Policy 32 Surface Water Drainage

"Development will be required to incorporate sustainable drainage systems for the disposal of surface water on site. "

Pembrokeshire County Council Local Flood Risk Management Strategy

26. PCC produced a Local Flood Risk Management Strategy (LFRMS) in 2015 which addresses flood risk arising from surface water, groundwater and ordinary watercourses. There are five local objectives stated in the LFRMS:

- Reducing the consequences for individuals, communities, businesses and the environment from flooding and coastal erosion;
- Raising awareness of and engaging people in the response to flood and coastal erosion risk;
- Providing effective and sustained response to flood and coastal erosion events;
- Prioritising investment in the most at risk communities; and
- Establishing effective routine maintenance regimes.

Lavernock Point to St. Ann's Head Shoreline Management Plan

27. The Lavernock Point to St Ann's Head Shoreline Management Plan (SMP) (2012) provides a large-scale assessment of risks associated with coastal erosion and flooding. The proposed Project falls within two Policy Scenario Areas.

28. Policy Scenario Area 18: St Govan's Head to Thorn Island states that West Angle Bay is the only defended frontage in the area, with a short length of seawall reducing the risk of coastal erosion and flooding to a small number of assets. It is considered that unlikely that public funding would be made available to maintain existing defences at West Angle Bay due to the limited socio-economic value of the assets at risk. Therefore a policy of no active intervention is recommended which will allow existing defences to fail.

29. Policy Scenario Area 19: Thorn Island to Cleddau Bridge states that the recommended policy for the southern shoreline of Milford Haven and Angle Bay is to allow the coastline to naturally evolve through a policy of no active intervention, although the SMP conceded that intervention would be authorised to prevent contamination of coastal waters from the industrial facilities (oil refinery and power station) if necessary.

South West Wales Stage 1 Strategic Flood Consequence Assessment

30. The Stage 1 Strategic Flood Consequence Assessment (SFCA) was published in 2022 and commissioned by a group of six Local planning Authorities, including PCC and Pembrokeshire Coast National Park Authority. The SFCA states that in Pembrokeshire, fluvial flood extents are fairly refined, generally remaining within close proximity to watercourses. Surface water flooding is predicted to predominantly follow topographic flow paths of existing watercourses or dry valleys in rural parts of Wales. In the south of Pembrokeshire, (south of Hill Mountain), groundwater is predominantly between 0.025 m and 5 m below ground level.

Pembrokeshire County Council Preliminary Flood Risk Report

31. PCC is the designated Lead Local Flood Authority (LLFA) and produced a Preliminary Flood Risk Report (PFRR) in 2011 which provides an assessment of past and future flood risks. The PFRR was reviewed in 2017 and agreed with NRW with no changes to the PFRR. The key points extracted from this PFRR are:

- The Study Area is not recorded as having any historic surface water flooding incidents;
- The Study Area has one historic sewer flooding incident recorded; however this was not located along the onshore cable route or at the Substation Search Areas; and
- The proposed Project is not listed within an area experiencing significant harmful consequences from a flood event where 10 or more residential properties or 3 or more commercial properties flooded.

10.3.5. Climate Change

Context

32. TAN 15 stipulates that it is necessary to account for the potential impacts of climate change on flood risk over the lifetime of a development. The most recent guidance on the application of climate change is the Welsh Government's "Flood Consequences Assessments: Climate change allowances" document (Welsh Government 2021).

33. The guidance document provides allowances for peak river flows in areas impacted by fluvial flooding, and for peak rainfall intensity in smaller catchments. Revised sea level rise projections based on UK Climate Projections (UKCP18) are also provided for locations at risk of coastal flooding.

Peak River Flow

34. Peak river flow allowances are provided for the three river basin districts in Wales. The allowances are based on percentage increases relative to the 1961-1990 baseline and are provided for the 10th (lower end estimate), 50th (central estimate), and 90th (upper end estimate) percentiles. The peak river flow allowances for the West Wales river basin district where the Study Area is located are outlined in **Table 10A-3**.

Table 10A-3: Peak river flow allowances in West Wales river basin district using the 1961-1990 baseline

West Wales	Total potential change anticipated by the 2020s	Total potential change anticipated by the 2050s	Total potential change anticipated by the 2080s
Upper End Estimate	25%	40%	75%
Central Estimate	15%	25%	30%
Lower End Estimate	5%	10%	15%

35. It is recommended that the central estimate for the 2050s should be employed within this FCA to assess the impacts of climate change on peak river flows, given the project's anticipated lifespan of 25 years. In addition, an assessment of risk should be made using the upper end estimate and information derived from this should be used to inform mitigation measures to help ensure the long-term resilience of the development.

Sea Level Rise

36. **Table 10A-4** sets out the estimates of cumulative sea level rise for the Pembrokeshire local authority area to 2100 and 2120. The guidance document indicates that development proposals should be assessed against the 70th percentile as a minimum to inform design levels, whilst the 95th percentile should be utilised to inform the design of mitigation measures, access and egress routes and emergency evacuation plans. Given that the proposed Project has a projected lifespan of 30 years, the 70th and 95th percentile sea level rise estimates to 2100 will be employed in this FCA to assess the impact of climate change on the risk of coastal flooding.

Table 10A-4: Estimated mean sea level rise (in metres) for Pembrokeshire local authority area by 2100 and 2120. Allowances are based on RCP8.5 70th and 95th percentiles.

Local Authority Area	Allowance (percentile)	Mean sea level rise (metres) by 2100 (UKCP18 baseline 1981-2000)	Mean sea level rise (metres) by 2120 (UKCP18 baseline 1981-2000)
Pembrokeshire	70th	0.83	0.99
	95th	1.10	1.31

10.4 Flood Risk – To Development

10.4.1. Overview

37. TAN 15 requires that all potential flood sources that could affect the proposed Project be considered as part of an FCA. This chapter includes consideration of flooding from fluvial and tidal sources, directly from rainfall on the ground surface, rising groundwater, overwhelmed sewers, and drainage systems. Flooding from reservoirs, canals, lakes, and other artificial sources are also considered. The assessment has been undertaken considering the flood risk to the cable route and also to the Substation Search Area A. The FCA should also demonstrate how flood sources should be managed, whilst accounting for climate change, so that the development remains safe throughout its lifetime.

10.4.2. Flood Risk to the Cable Route – Construction and Decommissioning

38. This section will consider potential flood risks during the project construction and decommissioning phases to the cable route. The two are included together given that the decommissioning phase will largely follow the same steps as the construction phase, but in reverse order. A greater number of flood risk sensitive receptors will need to be examined for the construction and decommissioning phases of the project relative to the operation phase. These will include site personnel, construction compounds, construction vehicles, operational construction sites, material stockpiles, and potential pollutants.

Tidal

39. Tidal flood sources include the sea and estuaries. Most of the cable route is not located in an area of tidal flood risk according to NRW's Flood Map for Planning with the only exceptions to this being at the landfall location and the grid connection point at Pembroke Power Station, which are sited within areas of tidal Flood Zone 3 (see **Figure 10A-5**. Tidal Flood Zone 3 means areas with more than 0.5% chance of flooding from the sea in a given year, including the effects of climate change. Tidal flood risk during construction and decommissioning to the cable route is 'medium' and mitigation measures will be required which is discussed further in **Section 10A.6**.

Fluvial

40. Fluvial flooding generally occurs when a river exceeds its capacity following sustained or intensive rainfall. According to NRW's Flood Map for Planning, the entirety of the onshore cable corridor does not fall within an area associated with fluvial flood risk (see **Figure 10A-6**. However, 11 ordinary watercourses will be required to be crossed to install the cable route, and therefore, it is considered that fluvial sources pose a 'medium' risk and mitigation measures will be required.

Surface Water

41. Overland flow occurs when infiltration capacity of the ground surface is exceeded and surface water runoff is generated. This is exacerbated where low permeability soils and/or geology are experienced or where there are large areas of impermeable surfaces.

42. According to NRW's Flood Map for Planning, there are several isolated areas along the proposed onshore cable route that are at risk of surface water flooding and flooding from small watercourses (see **Figure 10A-7**. The areas within the cable route at risk of surface water

flooding are positioned approximately at grid reference SM 88484 00289 and SM 91977 00544 as displayed on **Figure 10A-7**. It is considered that overall, the flood risk from surface water is 'low', as the cable route crosses some isolated areas of surface water flood risk, mitigation measures will be required which is discussed further in **Section 10A.6**.

Sewer

43. Sewer flooding can occur because of infrastructure failure, for example blocked sewers or failed pumping stations. It can also occur when the system surcharges due to the volume or intensity of rainfall exceeding the capacity of the sewer, or if the system becomes blocked by debris or sediment.

44. As the cable route is in a rural area and according to the Project Erebus FCA (Blue Gem Wind 2021), the cable route between Freshwater West and the grid connection point is not serviced by a sewer network, it is considered that sewer flooding poses a 'low' risk.

Groundwater

45. Groundwater flooding occurs when water levels in the ground rise above the ground surface. The geology has a major influence on where this type of flooding takes place; it is most likely to occur in low-lying areas underlain by permeable rocks (aquifers).

46. Ground investigations were undertaken for Project Erebus along its onshore cable route extending from West Angle Bay to the grid connection point near Pembroke Power Station, of which the proposed Project shares the same cable route from Freshwater West to the grid connection point. According to the Project Erebus FCA (Blue Gem Wind 2021) ground investigations along the onshore cable route corridor have identified the presence of groundwater in 9 of the 45 exploratory logs at depths between 0.5m below ground level (bgl) to 5.3 m bgl. As there is limited presence of groundwater along the cable route, the risk from groundwater flooding is 'low', subject to further ground investigations, however where groundwater has been encountered, mitigation measures will be required.

Artificial Sources

47. Artificial flood sources include raised channels such as canals or storage features such as ponds and reservoirs.

48. According to NRW's Map for Planning, the majority of cable route is not located within an area at risk of flooding from reservoirs (see **Figure 10A-8**. The landfall location at Freshwater West is shown to be in an area at risk of flooding from reservoirs, however, NRW note that reservoir flooding is extremely unlikely to occur. Therefore, flood risk from artificial sources is therefore considered to be 'low'.

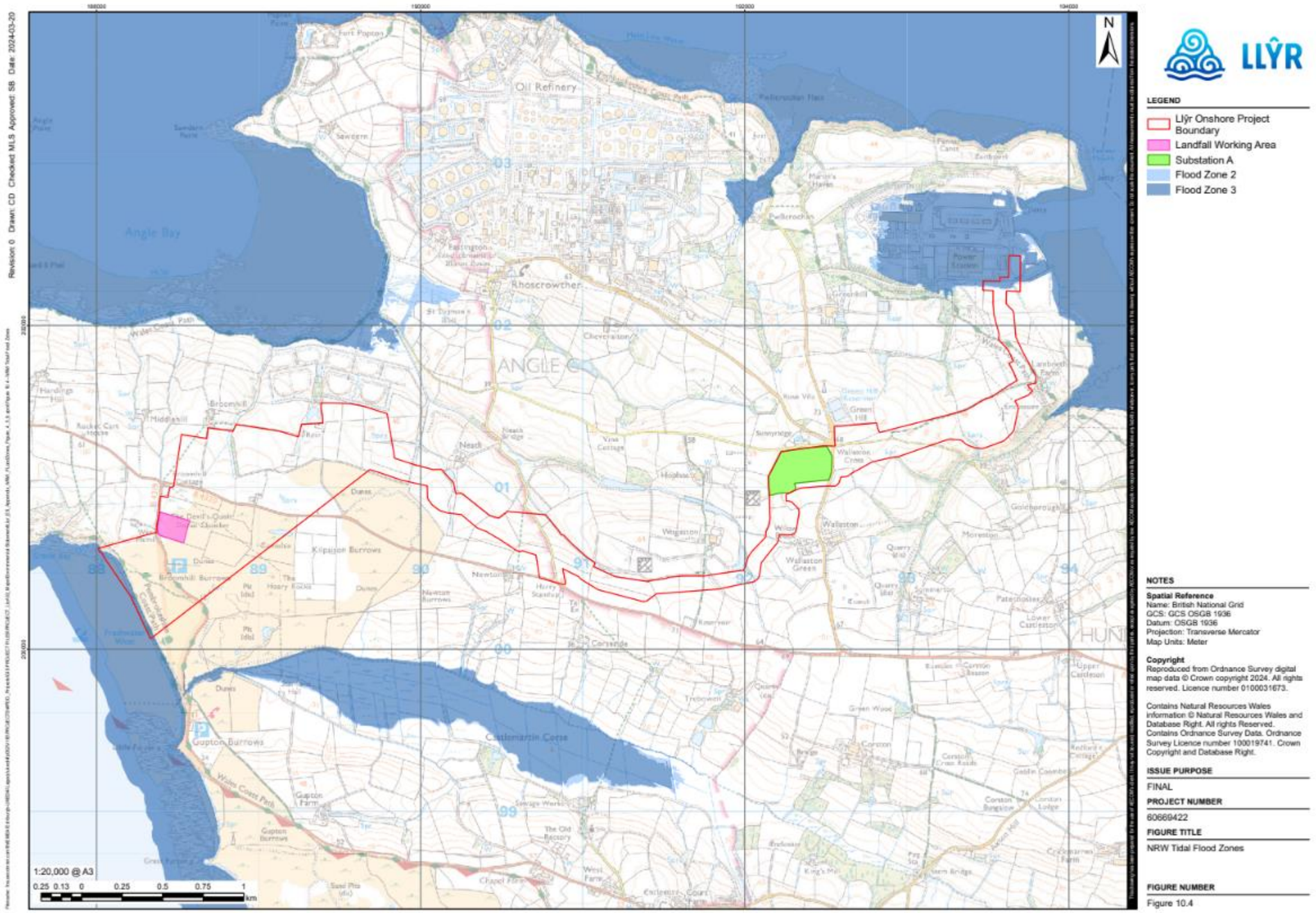

Figure 10A-5. NRW tidal flood zones

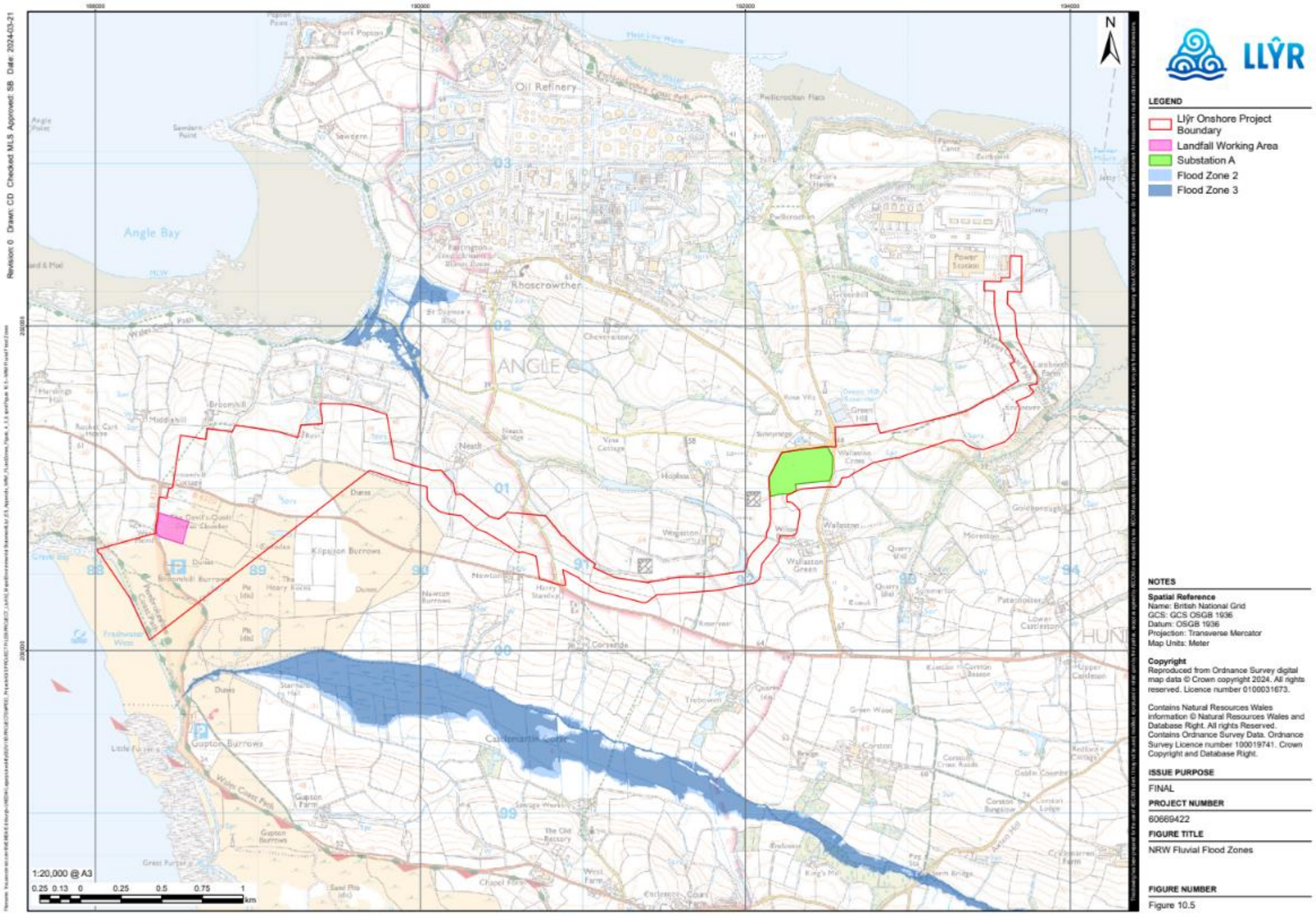

Figure 10A-6. NRW fluvial flood zones

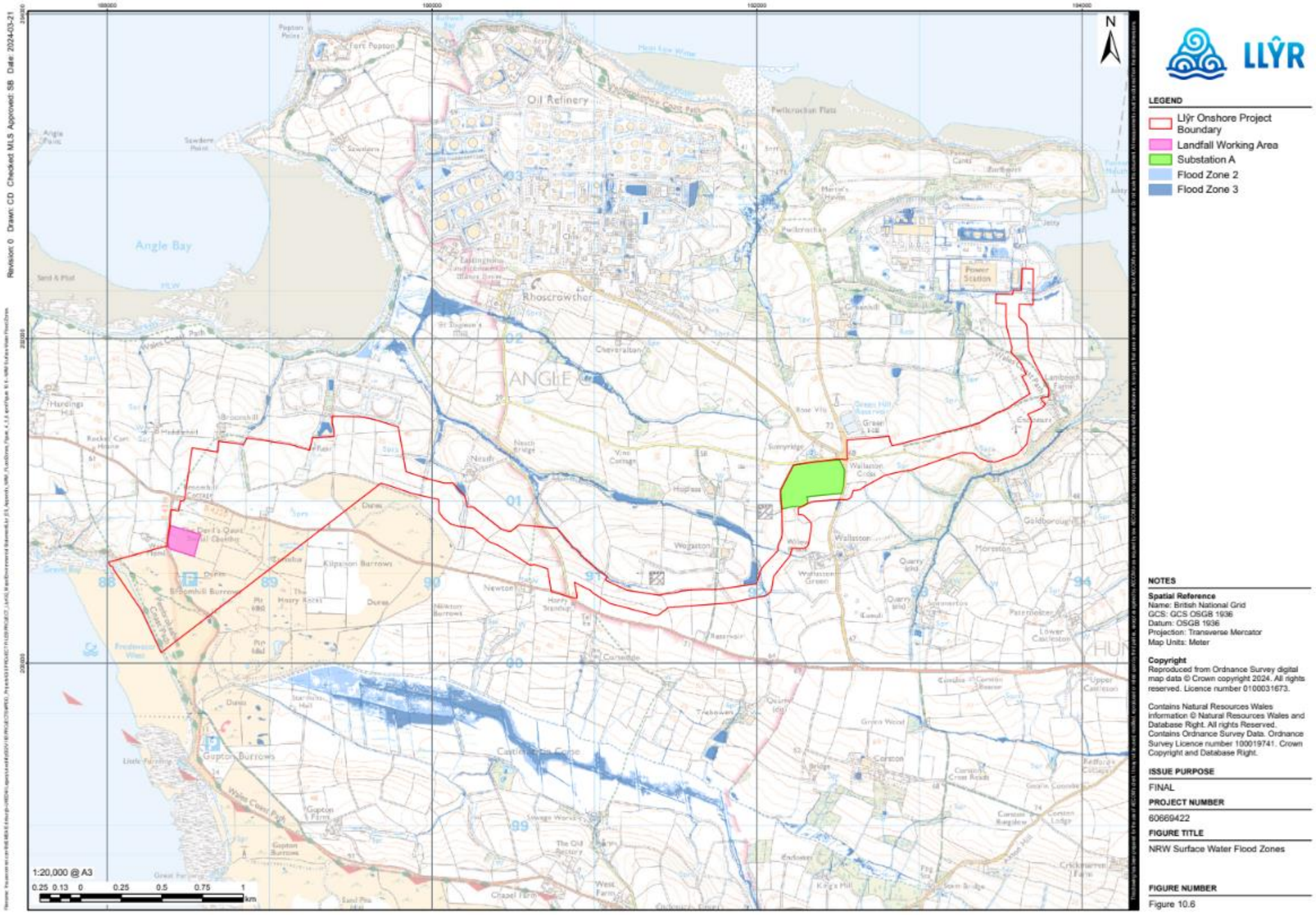

Figure 10A-7. NRW surface water flood zones

Figure 10A-8. NRW flood risk from reservoirs

10.4.3. Flood Risk to the Substation – Construction and Decommissioning

49. This section will consider potential flood risks during the project construction and decommissioning phases to the substation.

Tidal

50. The Substation Search Areas are not located within an area of tidal flood risk according to NRW's Flood Map for Planning (see **Figure 10A-5**. Therefore, the risk from tidal flooding is 'negligible'.

Fluvial

51. The Substation Search areas are not located within an area of fluvial flood risk according to NRW's Flood Map for Planning (see **Figure 10A-6**. Therefore, the flood risk from fluvial flooding is 'low'.

Surface Water

52. The closest ordinary watercourse is located to the south of Substation Search Area A. The ordinary watercourse is generally considered as a field boundary ditch assumed to assist with the draining of the existing agricultural fields. Substation Search Area A is not located within an area of surface water and small watercourse flood risk according to NRW's Flood Map for Planning (see **Figure 10A-7**). Therefore, the flood risk from surface water flooding is 'low'.

Sewer

53. Substation Search Area A is in a rural area and according to the Project Erebus FCA (Blue Gem Wind 2021), the cable route between Freshwater West and the grid connection point is not serviced by a sewer network. Substation Search Area A is also located on high ground so if a sewer network was in close proximity, it would likely drain away from the substation. Therefore, it is considered that sewer flooding poses a 'low' risk.

Groundwater

54. According to the Project Erebus FCA (Blue Gem Wind 2021), a borehole located to the eastern boundary of Substation Search Area A struck water between 2 and 3 m below ground level (bgl). Based on this information, the risk from groundwater flooding is considered to be 'low' however, this will be subject to further investigation.

Artificial Sources

55. The Substation Search Areas are not located within an area at risk of flooding from reservoirs according to NRW's Flood Map for Planning (see **Figure 10A-8**). Therefore, flood risk from artificial sources is 'low'.

10.4.4. Flood Risk to the Cable Route – Operation

56. This section will only appraise the flood risk from all sources to the cable route once the project has become operational. Based on the TAN 15 development categories listed in **Table 10A.2**, the onshore cable is classified as 'less vulnerable' development, and the grid connection point is classified as 'highly vulnerable' development. The cable route is mainly located within DAM Zone A, however, also crosses areas of DAM Zone C2 at the landfall location and at the grid connection point as shown in **Figure 10A-9**.

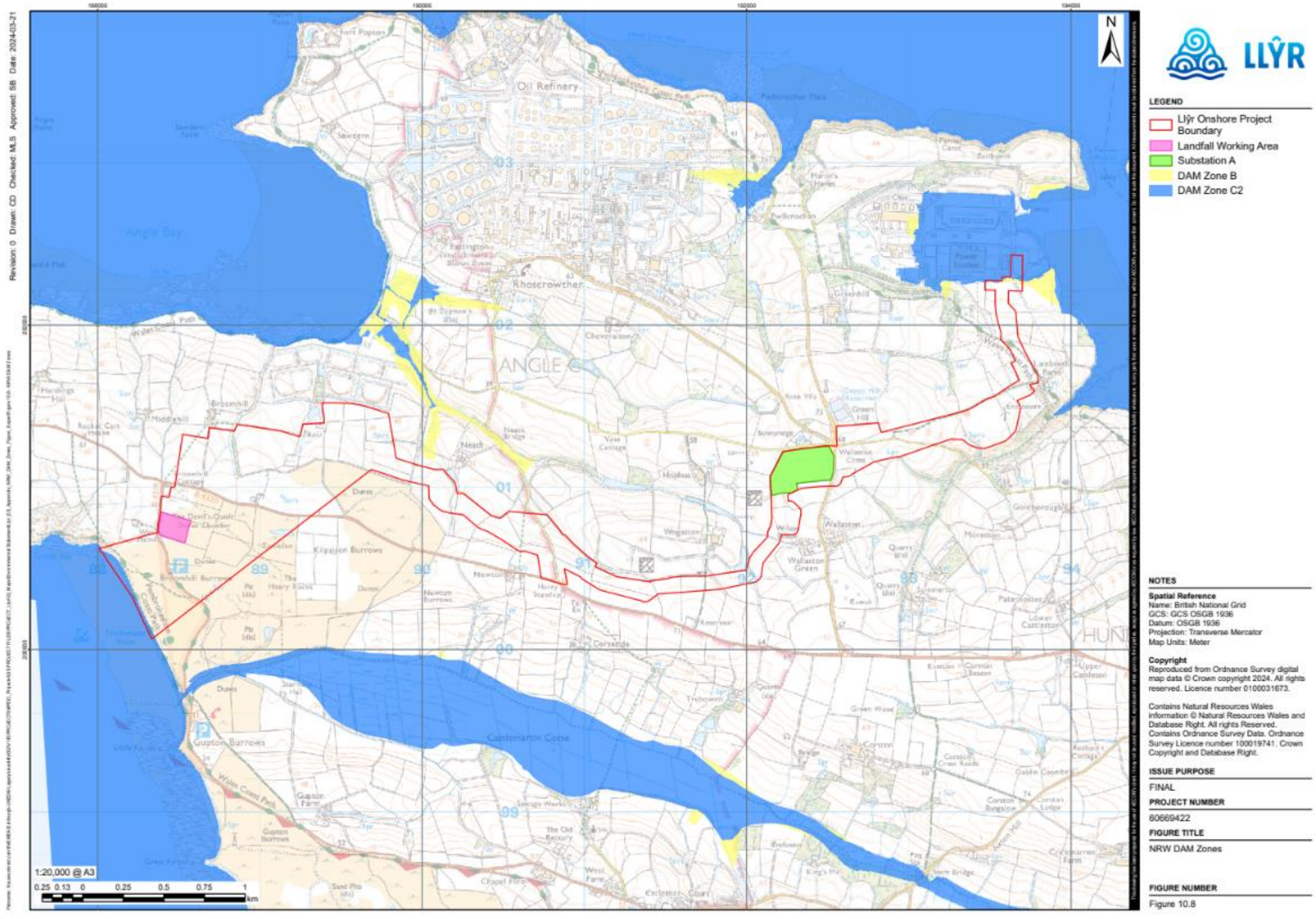

Figure 10A-9. NRW DAM zones

Tidal

57. According to NRW's Flood Map for Planning (see **Figure 10A-5**, the cable route is generally not located within areas at risk of tidal flooding. The only exceptions to this are short sections at the landfall location and the grid connection point near Pembroke Power Station where there are areas tidal Flood Zone 3. Overall, it is considered that there is a 'low' risk of tidal flooding, where the cable route crosses areas of risk, mitigation measures will be required which is discussed further in **Section 10A.6**.

Fluvial

58. The cable route is not located within any areas of fluvial flood risk according to NRW's Flood Map for Planning (see **Figure 10A-6**). Nine ordinary watercourses cross the onshore cable route. With respect to the cable route, the onshore export cables will be buried in trenches at least 1.7 m below the clean hard bed of the watercourse, minimising their exposure to fluvial flood sources. Therefore, it is considered that there is a 'low' risk from fluvial sources.

Surface Water

59. Most of the cable route is positioned outside of areas of flood risk from surface water and small watercourses according to NRW's Flood Map for Planning (see **Figure 10A-7**). The only exceptions to this are several isolated spots in areas of Flood Zones 2 and 3 for surface water and small watercourses that are dispersed across the onshore cable route. Flood Zone 2 means areas with 0.1% to 1% chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change. Flood Zone 3 means areas with more than 1% chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change. As the onshore export cables will be buried in trenches, this will minimise their exposure to surface water and small watercourses flood sources, therefore the risk from surface water flooding to the cable route is 'low'.

Sewer

60. As the cable route is in a rural area and according to the Project Erebus FCA (Blue Gem Wind 2021), the cable route between Freshwater West and the grid connection point is not serviced by a sewer network, it is considered that sewer flooding poses a 'low' risk.

Groundwater

61. According to the Project Erebus FCA (Blue Gem Wind 2021) ground investigations along the onshore cable route corridor have identified the presence of groundwater in 9 of the 45 exploratory logs at depths between 0.5 m bgl to 5.3 m bgl. The cable and cable ducting will be designed to prevent water ingress, therefore, once the proposed Project is operational, it is considered that the risk from groundwater flooding is 'low'.

Artificial Sources

62. According to NRW's Flood Map for Planning (see **Figure 10A-8**, the majority of cable route is not located within an area at risk of flooding from reservoirs. The landfall location at Freshwater West is shown to be in an area at risk of flooding from reservoirs, however, reservoir flooding is extremely unlikely to occur. Therefore, flood risk from artificial sources is therefore considered to be 'low'.

10.4.5. Flood Risk to the Substation – Operation

63. This section will appraise the flood risk from all sources to the substation once the project has become operational. Based on the TAN 15 development categories listed in **Table 10A.2**, the substation is classified as 'highly vulnerable' development.

Tidal

64. Substation Search Area A is not located within an area at risk of tidal flooding according to NRW's Flood Map for Planning (Ref 10-9) (see **Figure 10A-5**). Further evidence of there being negligible tidal flood risk at the Substation Search Area is provided by the Environment Agency's Coastal Design Sea Levels (2018) dataset. This data indicates that the peak coastal flood level for the 100-year and 1000-year events would be 4.76 m AOD and 5.04 m AOD respectively, LiDAR data indicates that the lowest ground level in Substation Search Area A is approximately 55 m AOD The addition of the year 2100 70th and 95th percentile estimates (see **Table 10A.4**) would raise the peak coastal flood levels for the 1000-year event to 5.87 m AOD and 6.14 m AOD, which would still be insufficient to reach the elevation of the Substation Search Area A. Therefore, the flood risk from tidal flooding is 'low'.

Fluvial

65. Substation Search Area A is not located within an area at risk of fluvial flooding according to NRW's Flood Map for Planning (see **Figure 10A-6**). Therefore, the flood risk from fluvial flooding is 'low'.

Surface Water

66. The closest ordinary watercourse is located to the south of the site area. The ordinary watercourse is generally considered as a field boundary ditch assumed to assist with the draining of the existing agricultural fields. Therefore, Substation Search Area A is not located within an area of surface water and small watercourse flood risk according to NRW's Flood Map for Planning (see **Figure 10A-7**). Therefore, the flood risk from surface water flooding is 'low'.

Sewer

67. As Substation Search Area A is in a rural area and according to the Project Erebus FCA (Blue Gem Wind 2021), the cable route between Freshwater West and the grid connection point is not serviced by a sewer network, it is considered that sewer flooding poses a 'low' risk.

Groundwater

68. According to the Project Erebus FCA (Blue Gem Wind 2021), a borehole located to the eastern boundary of Substation Search Area A struck water between 2 and 3m, below ground level (bgl). Based on this information, the risk from groundwater flooding is 'low' however, this will be subject to further investigation.

Artificial Sources

69. Substation Search Area A is not located within an area at risk of flooding from reservoirs according to NRW's Flood Map for Planning (see **Figure 10A-8**). Therefore, flood risk from artificial sources is therefore considered to be 'low'.

10.4.6. Summary

70. **Table 10A-5** and **Table 10A-6** provide a summary of the assessment of flood risk from all sources during the construction and decommissioning phases, and during the operational phase respectively.

Table 10A-5: Summary of flood risk during construction and decommissioning phases

Flood Source	Assessment of flood risk for cable route	Assessment of flood risk for substation	Requiring mitigation measures?
Fluvial	Medium	Low	Yes (for cable route)
Tidal	Medium	Negligible	Yes (for cable route)
Surface Water	Low	Low	Yes (for cable route)
Sewer	Low	Low	No
Groundwater	Low	Low	Yes (for cable route)
Artificial Sources	Low	Low	No

Table 10A-6: Summary of flood risk during the operational phase

Flood Source	Assessment of flood risk for cable route	Assessment of flood risk for substation	Requiring mitigation measures?
Fluvial	Low	Low	No
Tidal	Low	Low	Yes (for cable route)
Surface Water	Low	Low	No (Drainage Strategy has been prepared to manage surface water from the substation)
Sewer	Low	Low	No
Groundwater	Low	Low	No
Artificial Sources	Low	Low	No

10.5 Flood Risk – From Development

10.5.1. Overview

71. TAN 15 highlights how built development often increases the area of impermeable surfaces thereby promoting rapid runoff to surface water sewers or watercourses rather than infiltration into the ground. This has the effect of increasing both the total and peak water flows, potentially increasing the risk of flooding at other locations downstream.

10.5.2. Construction and Decommissioning

72. Construction activities such as the excavation of trenches in which to bury the onshore cable, as well as the creation of site compounds and storage facilities, if undertaken on the floodplain, could alter the dynamics of overland flow and disrupt the continuity of flow within the watercourses.

73. The proposed onshore cable route crosses 11 ordinary watercourses. Therefore, measures will be required to ensure that the employed cable burial methods do not impede the continuity of flow within these watercourses. Sections of the cable route cross areas of surface water flood risk. Therefore, mitigation measures to manage the impact on overland flow routes by construction activities are required. Proposed mitigation measures are discussed in **Section 10.6**.

10.5.3. Operation

74. The cable route once completed, will be buried and the land will be returned to existing conditions. Therefore, there is not considered to be any impact on flood risk from the cable route. Increased areas of impermeable land at the location of the proposed substation and control building could increase surface water runoff, therefore a surface water drainage strategy would be required (**Annex A**). The proposed management of surface water from the proposed substation is discussed in **Section 10A.6**.

10.6 Flood Risk Management Measures

10.6.1. Overview

75. As shown in **Table 10A-5** and **Table 10A-6**, the following sources of flood risk to the development will be considered further in this section:

- Tidal;
- Fluvial;
- Surface water; and
- Groundwater.

76. In terms of the flood risk resulting from development, it was outlined in **Section 10.5** that the construction activities and the operation of the substation could increase flood risk from overland flows and disrupt the continuity of ordinary watercourses that span the proposed onshore cable route. A Drainage Strategy has been prepared to ensure that flood risk is not increased to the substation or to third parties (**Annex A**).

77. This section will identify the flood risk management measures required to mitigate the flood risk to and from the proposed Project.

10.6.2. Cable Route Flood Risk Management Measures – Construction and Decommissioning

Tidal

78. Construction activities at the landfall and grid connection locations will occur in areas of tidal flood risk according to NRW's Flood Map for Planning.

79. At the landfall location, a horizontal directional drilling (HDD) installation method is proposed to reduce the environmental impacts on shallow sub-tidal and intertidal marine habitats. HDD compounds will be located as far away from identified tidal flood risk areas as practicable, and all mobile equipment will need to be stored outside of identified tidal flood risk areas when not required. Open-cut trenching will be used from the Transition Joint Bay across to the substation, but will not be used from onshore to offshore.

80. At the grid connection point (Pembroke Power Station), a site-specific Flood Emergency Plan will be developed in partnership with the appointed contractor, which will include guidance on what actions to take during a flood event, the roles and responsibilities of those on site in the event of a flood, as well information regarding safe access and egress routes.

81. Following the implementation of the above mitigation measures, the flood risk to the cable route Project during the construction from tidal sources is considered to be 'low'.

Fluvial

82. Although the proposed onshore cable route does not cross any areas of fluvial flood risk according to NRW's Flood Map for Planning (Ref 10-9), the route crosses a total of 11 ordinary watercourses, and therefore there is a considered to be a level of fluvial flood risk associated with construction within or close to these watercourses. The watercourses are narrow, shallow channels with small catchments, and largely spring fed, or drainage channels for local fields and roads.

83. A number of mitigation measures are proposed within the Construction Environmental Management Plan (CEMP) to minimise the risk of flooding impacts during construction at the watercourse crossing locations.

84. Open-cut trench methods will likely be employed to perform the majority of the watercourse crossings. Watercourses will be split into sections using barriers which span the width of the channel and water extracted and diverted downstream using over pumping. The water from the excavation will be treated to remove silt prior to being discharged downstream. Where open cut trench methods are not appropriate, a HDD method will be employed. Where this method is used, the depth of the HDD's will be such that the riverbed is undisturbed. The HDD compound areas will be located as far from flood risk areas as reasonably possible within the requirements of the HDD method to reduce the potential for impacts if flooding occurs.

85. As there is a low presence of fluvial flood risk across the Study Area, it is unlikely that any HDD compounds will be located within any fluvial floodplain areas. However, if the floodplain cannot be avoided, the following measures will be implemented to reduce the impacts on natural drainage:

- Access tracks will be at ground level; where this is not possible, drainage methods will be employed to allow natural drainage;
- Soil stored alongside the cable trenches will incorporate gaps of 3-4 m at regular intervals; and

- Pre-construction drainage measures will be implemented within the working corridor to reduce disruption to natural drainage pathways.

86. Where possible the crossing of watercourses will take place during periods of normal to low flow.

87. Mobile equipment when not required will be stored outside of any areas of identified fluvial flood risk.

88. Where access tracks result in the requirement for temporary watercourse crossing, these will be designed to maintain the existing flood flow conveyance and sediment transfer conditions. Any temporary culverts or bridges will be removed within 1 year following construction of the onshore infrastructure.

89. Following implementation of the described mitigation measures, flood risk to the cable route from fluvial sources during the construction and decommissioning phases is considered to be 'low'.

Surface Water

90. A limited number of surface water flood risk areas along the proposed onshore cable route have been highlighted in **Section 10A.2**. The following mitigation measures are proposed within the CEMP to reduce the level of flood risk from surface water flooding in these areas:

- Where possible, work will be planned to be completed during months with lower rainfall levels;
- Mobile equipment when not required will be stored outside of areas of identified surface water flood risk;
- Cleaning of existing field drains and culverts will be completed prior to construction to reduce drainage blockages or restrictions; and
- Mitigation measures to maintain existing surface water flow should be implemented to prevent direct impacts on the hydrology of surface flow paths. Standard settlement management methods should be used, if appropriate. For further information on mitigation measures, please refer to **Chapter 10: Water Environment of the Environmental Statement.**

Groundwater

91. Groundwater could be encountered during construction of the onshore cable route. As set out in the CEMP, to mitigate the risk of groundwater flooding during construction, temporary cut-off drains will be installed parallel to the proposed trenches to prevent soil and groundwater entering the trenches. Dewatering of the excavations may be required to provide safe working conditions.

Additional Mitigation Measures

92. Weather warnings will be monitored during the construction works and appropriate action taken in the event of adverse weather conditions.

93. Small parts of the onshore cable route (at Freshwater West and at the grid connection location) are located within the Pembrokeshire Coast Flood Alert Area therefore designated persons will be registered to receive flood warnings, flood alerts, and weather warnings for the local area.

10.6.3. Substation Flood Risk Management Measures – Construction and Decommissioning

Surface Water

94. The Drainage Strategy (**Annex A**) ensures surface water is managed appropriately during the construction and decommissioning of the substation including the use of SuDS.

10.6.4. Cable Route Flood Risk Management Measures - Operation

Tidal

95. As discussed in **Section 10A.3**, sections of the proposed onshore cable route at the landfall location and the grid connection point at Pembroke Power Station are located within areas of DAM Zone C2.

96. The TAN 15 document states that new development should be directed away from DAM Zone C and towards suitable land in DAM Zone A, otherwise to DAM Zone B. Highly vulnerable development and Emergency Services in DAM Zone C2 should not be permitted. All other new development should only be permitted within DAM Zones C1 and C2 if determined by the planning authority to be justified in that location. Development will be only justified if it can be demonstrated that:

i. Its location in zone C is necessary to assist, or be part of, a local authority regeneration initiative or a local authority strategy required to sustain an existing settlement; ***or,***

ii. Its location in zone C is necessary to contribute to key employment objectives supported by the local authority, and other key partners, to sustain an existing settlement or region; ***and,***

iii. It concurs with the aims of PPW and meets the definition of previously developed land, ***and****;*

iv. The potential consequences of a flooding event for the particular type of development have been considered, and in terms of the criteria contained in TAN 15 are found to be acceptable.

97. The development of renewable energy as a means of enhancing local energy security and mitigating the impacts of climate change is flagged as an important priority within the PCC LDP. The installation of cable interconnections in the intertidal zone is necessary to connect offshore windfarms onshore, justifying the requirement for construction within DAM Zone C2 at the landfall site. The grid connection point is an essential component of the proposed Project, and as the existing power station is sited within DAM Zone C2, it is not possible to avoid this section of the cable route encroaching into an area of DAM Zone C2.

98. TAN 15 states the following in relation to the acceptability of development in areas of high flood risk:

Where development is justified the assessment can be used to establish whether suitable mitigation measures can be incorporated within the design to ensure that development is as safe as possible and there is:

- Minimal risk to life;
- Minimal disruption to people living and working in the area;
- Minimal potential damage to property;

- Minimal impact of the proposed project on flood risk generally; and
- Minimal disruption to natural heritage.

99. During the operational phase, the proposed Project will comprise only a subterranean cable within the intertidal zone, which is classified as 'less vulnerable'. The proposed Project, once operational, will pose no risk to life, people, or infrastructure. Following construction, the land will be returned to pre-development conditions and will not impact upon existing flood mechanisms.

10.6.5. Substation Flood Risk Management Measures - Operation

Surface Water

100. The substation will increase the impermeable area through the construction of hard standing land at the proposed substation site. Without suitable mitigation measures this is likely to increase surface water runoff rates and volumes. The management of surface water will comply with planning policy to ensure no increase in flood risk to the proposed Project or to third parties. Runoff rates will be attenuated to not exceed the existing natural runoff into the local watercourses. The details of how surface water will be managed are detailed within a Drainage Strategy (**Annex A**) and are summarised as follows:

a. A surface water management strategy has been proposed which demonstrates that surface water runoff from the impermeable areas of the substation will be managed via a piped network, discharging to the proposed attenuation basin for all storm events up to and including the 1 in 100 years plus 40% allowance for climate change. The flows will be restricted to 1 in 1 year return period; and

b. The surface water management design presented at this stage demonstrates that adequate SuDS space provision is afforded within the concept design and is considered feasible and compliant to appropriate best practice and regulatory requirements. Notwithstanding, the final drainage/SuDS arrangements and layout will be confirmed at the next development stages.

10.7 Conclusion

10.7.1. Overview

101. Within the development vulnerability framework set out in TAN 15, the onshore export cable is classified as 'less vulnerable' development, whereas the substation is classified as 'highly vulnerable' development. Under TAN 15, 'highly vulnerable' development is not permitted to be located within DAM Zone C2, whilst 'less vulnerable' development is only permitted within DAM Zones C1 and C2 if the planning authority considers it to be justified in the proposed location.

102. This FCA has considered the risk from all sources of flooding both to and from the cable route and Substation Search Area A. The FCA has also recommended several flood mitigation measures where applicable.

10.7.2. Flood Risk to the Cable Route

103. Most of the onshore cable route is located within DAM Zone A. The only exceptions to this are sections of the cable route at the landfall location and grid connection point near Pembroke Power Station which are in DAM Zone C2.

104. This report has outlined that the construction and decommissioning phases of the cable route will be vulnerable to surface water, fluvial, tidal and groundwater flooding. The fluvial flood risk is associated with the 11 ordinary watercourse crossing points on the cable route, the NRW Flood Map for Planning identifies a limited number of sections of the cable route that are in areas of surface water flood risk. Just as in the operational phase, the sections of the cable route at the beginning of the route at Freshwater West and at the grid connection point near Pembroke Power Station are positioned areas of tidal flood risk.

105. The onshore export cables once completed, will be buried, and as a result are not considered at risk of flooding from surface water or fluvial sources. The positioning of the landfall and grid connection points within areas of DAM Zone C2 meet the requirements of the justification criteria set out in Sections 5 and 7 of TAN 15 and therefore is considered acceptable.

10.7.3. Flood Risk to the Substation

106. Substation Search Area A is located entirely within DAM Zone A and all sources of flooding are considered to pose a 'low' risk to the substation.

10.7.4. Flood Risk from the Cable Route

107. The cable route once completed, will be buried and the land will be returned to existing conditions. Therefore, there is not considered to be any impact on flood risk from the cable route.

10.7.5. Flood Risk from the Substation

108. Substation Search Area A is currently greenfield land, and therefore the construction of the substation will lead to an increase in the impermeable area, increasing surface water runoff. Surface water runoff management measures will be implemented at the substation site to ensure no increase in flood risk to the substation or to third parties. This is detailed within the Drainage Strategy (**Annex A**).

10.7.6. Mitigation Measures

109. The following mitigation measures listed below have been considered (see Section 6 for further details):

- Placement of construction compounds and stockpile facilities outside of areas of fluvial, tidal, and surface water flood risk;
- Storage of mobile equipment outside of areas of tidal, fluvial, and surface water flood risk, when they are not required for scheduled works;
- Development of a Flood Emergency Plan in collaboration with the appointed contractors at the grid connection, which will include information about the safe access and egress routes;
- Maintenance of flow continuity at watercourse crossing points through the implementation of damming and over pumping;
- Where possible, work will be planned to be completed during months of lower rainfall levels;
- The crossing of watercourses will take place during periods of normal to low flow;
- Access tracks will not be elevated so that they do not interrupt natural drainage pathways;

- Storage of excavated material adjacent to the cable trenches will not be continuous;
- Pre-construction drainage measures will be implemented within the working corridor to reduce disruption to natural drainage pathways;
- Existing field ditches and culverts will be cleaned prior to the commencement of construction activities;
- Temporary cut-off drains will be installed parallel to the proposed trenches to prevent soil and groundwater entering the trenches;
- Designation of individuals to register for flood warnings, flood alerts, and weather warnings for the local area. Appropriate actions will be taken in the event of adverse weather conditions; and
- Management of surface water runoff at the proposed substation site which is detailed within the Drainage Strategy.

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