LLŶR FLOATING OFFSHORE WIND PROJECT

Llŷr Floating Offshore Wind Farm

Environmental Statement

Volume 6: Appendix 10B - Onshore Water Environment Site Survey Report

August 2024

Prepared by: Llŷr Floating Wind Ltd

FLOVENTIS ENERGY

Document Status

Version	Authored by	Reviewed by	Approved by	Date
FINAL	AECOM	AECOM	AECOM	August 2024

Approval for Issue

Prepared by	AECOM
Prepared for	Llŷr Floating Wind Limited
Approved by	Jay Hilton-Miller

Acronyms and abbreviations

Acronym or abbreviation	Definition	Acronym or abbreviation	Definition
Loc_ID	Location ID	OnECC	Onshore Export Cable Corridor
MLWS	Mean Low Water Springs	OCT	Open Cut Trenching
MLT	Marine Licensing Team	TJB	Transition Joint Bays
NRW	Natural Resources Wales	WTG	Wind Turbine Generator

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 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.

Term	Definition
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.
Project	All aspects of the Llŷr development
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-B. ONSHORE WATER ENVIRONMENT SITE SURVEY REPORT

10.1 Proposed Project Background

1. Llŷr Floating Wind Limited (hereafter referred to as the Applicant) is proposing to develop the Llŷr 1 Floating Offshore Wind Farm (hereafter referred to as the Project), located approximately 35 km off the coast of Pembrokeshire in the Celtic Sea.
2. The proposed Project comprises both offshore and onshore components. This Site Survey Report relates to the onshore component, which is located wholly within the Onshore Development Area which comprises:
    - The Onshore Substation Compound: the area within which the Onshore Substation and associated infrastructure will be located. This is an area of 15,000 m^2, located 1.5 km from the grid connection location;
    - The Onshore Export Cable Corridor (OnECC): the area within which the onshore export cable circuits will be located. The onshore export cables are connected to the offshore export cables via Transition Joint Bays (TJBs) at the landfall at Freshwater West. The OnECC runs from Mean Low Water Springs (MLWS) to the grid connection location at Pembroke Dock power station.
3. The assessment has been undertaken by AECOM. Further details of the proposed Project Team's competency are provided in **Appendix 1A: Statement of Competence.**

10.2 Purpose of this report

4. This Onshore Water Environment Site Survey Report (hereby referred to as this 'report') has been produced to highlight the findings of a site walkover of the watercourses potentially proposed to be crossed by the proposed Onshore Export Cable, and supports the assessment of environmental effects in **Chapter 10: Water Environment.**
5. The reasonable worst case design scenario for the watercourse crossings for the Onshore Export Cable would be dry open cut trench methodology.
6. The 11 ordinary watercourses which could be crossed by the Onshore Export Cable are: WC05, T05a, WC06, WC07, T07c, T07b, WC14, WC12, T12a and two tributaries of Goldborough Pill West. These are shown on **Volume 5: Figure 10.3: Identified Ordinary Watercourses.**
7. The methodology for dry open cut trenching will be to use temporary flume pipes or damming and over pumping. Details of these methodologies can be found in **Chapter 04: Description of the Proposed Project.**

10.3 Consultation

8. Consultation has been undertaken with NRW to inform the approach to and scope of this survey. **Table 10B-1** summarises the scope of the survey as discussed with NRW during a virtual meeting on 28 March 2023 and in subsequent email correspondence.

Table 10B-1. Summary of the key issue raised by NRW in relation to this report, and how the issue was addressed

Consultee	Consultation type and date	Comment raised	How issue has been addressed and location of response in chapter
Scoping			
NRW	Email Correspondence 16/05/2023 (Email)	On the 5th May 2023, NRW suggested that the applicant should undertake a water feature survey, which was recommended to include the following:	On 12th May 2023, AECOM responded with a proposed assessment approach consisting of: Identification of water features through desk-based study, considering water features within a study area of 1km from the Onshore Development

Consultee	Consultation type and date	Comment raised	How issue has been addressed and location of response in chapter
		Identification of all water features both surface and groundwater (ponds, springs, ditches, culverts etc.) within a 300 metres radius of the site or either side of a linear development area, e.g., cabling route; Use made of any of these water features. This should include the construction details of wells and boreholes and details of the lithology into which they are installed; An indication of the flow regime in the spring or surface water feature, for example whether or not the water feature flows throughout the year or dries up during summer months; Accessibility to the spring/well; This information should be identified on a suitably scaled map (i.e. 1:10,000), tabulated and submitted to NRW. It would be useful for the applicant to photograph each of the identified water features during the survey. Based on the results of the survey the applicant must assess the likely impacts from the proposed Project on both quantity and quality of the surface water and groundwater. This should take into consideration both the preferred methods of construction and the assumed hydrogeology in	Area and further where there is hydrological connectivity to downstream receptors Determine potential for impact to water features through a source-pathway-receptor approach. Any features identified that could be impacted are given further consideration. Undertake targeted site work to all potentially impacted watercourses e.g. all that might be crossed by the cable route. All features will be photographed and hydromorphological condition recorded along with flow condition at the time of survey. Additional features such as springs would only be surveyed if a pathway is confirmed by the desk study (rather than visiting all features within 300 m of the cable route when they would not all be impacted). An Onshore Water Environment Site Survey Report was suggested to be produced as a technical appendix to the ES (including photographs). Water features will also be mapped on figures that accompany the ES. NRW confirmed on 16th May 2023 that they accept the proposed assessment approach. Subsequently, a combined water quality and hydromorphology walkover survey of watercourses within the grid connection route corridor that could be physically impacted was undertaken on 22 August 2023 and 23 August 2023 which focussed on all crossing points plus upstream and downstream character[1] of watercourses to determine hydromorphological baseline; The results of the walkover survey are outlined herein.

[1] Where land access allowed.

Consultee	Consultation type and date	Comment raised	How issue has been addressed and location of response in chapter
		the vicinity of the proposed Project.	

10.4 Methodology

9. Initially, a desk-based study was conducted and any watercourses within the Onshore Export Cable Route Corridor were identified and marked on a plan.

10. Following the desk study, a combined water quality and hydromorphology walkover survey of watercourses within the grid connection route corridor that could be physically impacted was undertaken on 22 August 2023 and 23 August 2023. This focussed on the potential crossing points at specific locations considered to be representative of the reach within the OnECC. It took account of the upstream and downstream character of the watercourses in order to inform the hydromorphological baseline.

11. The walkover survey was undertaken by a Consultant Water Scientist and a Graduate Geomorphologist. The preceding weather conditions during the week leading up to the survey were mostly dry, sunny and warm with highs of 19 °C and lows of 12 °C. During the surveys, the weather remained dry, sunny and warm with highs of 20 °C and lows of 17 °C, with a gentle breeze and variable cloud cover.

12. The results of the survey are outlined in **Section 10.5** below.

10.4.1. Hydrology within the Study Area

13. The local hydrology of the Study Area is variable. The area is coastal and watercourses within the vicinity of the OnECC are generally spring-fed and have multiple on-line ponds. There is no primary river basin catchment, rather the area is subdivided into several small surface water catchments which discharge directly to Milford Haven Waterway, Pembroke River / Estuary, Angle Bay and Freshwater West.

10.4.2. Limitations

14. The survey area was limited by land access permissions granted for the dates of the survey. Therefore, the full extent of the OnECC could not be surveyed, and not every single surface water feature within the OnECC was surveyed. However, the survey focussed on the potential crossing points at specific locations where land access was granted and we consider the survey extent to be representative of the surface water features within the wider OnECC.

15. The survey was undertaken during August 2023 which presented sub-optimal survey conditions due to limited visibility of water features in certain locations due to overgrown riparian vegetation. Best efforts were made to view the required survey locations without any intrusive works such as vegetation clearance.

16. Encounters with cattle were also a limitation to survey extent; Livestock plays a significant role in the agricultural landscape of Pembrokeshire, therefore during the survey (and due to the timing of the survey whereby cattle are usually out in the summer as opposed to indoors during winter) cattle and livestock were present onsite. On occasion, survey locations were adjusted or removed all together due to heath and safety risks associated with livestock.

10.5 Onshore Water Environment Site Survey Findings

17. The findings of the onshore water environment site survey are provided in **Table 10B-2**. Supporting photographs are also provided.

Table 10B-2. Onshore water environment site survey findings

Survey Location (Loc_ID) on **Volume 5: Figure 10B.1**	A
Location Description	Within the OnECC, approximately 100 m north of the B4320 (Angle Road), upstream of Broomhill Farm.
British National Grid Co-ordinates	SM 88686 01080
Watercourse Description	This watercourse is within the OnECC and might be crossed by Open-Cut Trenching (OCT) cabling. The watercourse features an artificially straightened channel with a water depth of approximately 1 cm with a slow and unapparent flow, indicating its likely ephemeral nature. The channel is situated between two agricultural fields used for livestock, which are likely sources of fine sediment and nutrient inputs. The channel exhibits steep banks covered in tall grasses and macrophytes. Even during extremely high flood events, it is improbable that the channel would overflow onto these fields, owing to the steep and deep configuration of the banks. The wetted width was approximately 0.4 m and the bank-full width was approximately 1 – 1.5 m.

Above: Looking downstream from where T05a rises.

		Above: Looking across to T05a from Broomhill Farm drive.  ***Above: Channel bed conditions of T05a.***
Survey Location (Loc_ID) on **Volume 5: Figure 10B.1**	B	
Location Description	Immediately adjacent to the OnECC and within the Study Area, approximately 400 m north of the B4320 (Angle Road).	
British National Grid Co-ordinates	SM 90789 00836	
Watercourse Description	This watercourse is immediately adjacent to the OnECC. The watercourse is situated within a woodland that is bordered between two agricultural fields. The right bank exhibits a steep profile with depths of up to 2 m in certain areas, while the left bank is	

	approximately 10 cm in height. Water depths vary throughout the observed section, ranging from 2 to 7 cm. The bed material primarily consists of fine sediment, owing to the low-energy nature of the watercourse and its proximity to agricultural land. Small woody material is present along the watercourse. It is expected that significant runoff from the right bank will contribute to the influx of fines and nutrients. Both the banks and floodplain are characterised by the presence of herbaceous plants, scrubs, and trees.	***Above: T07a viewed from a wooded riparian area, looking downstream.***  ***Above: Looking upstream on T07a.***  ***Above: T07a within the wooded riparian area to the right.***

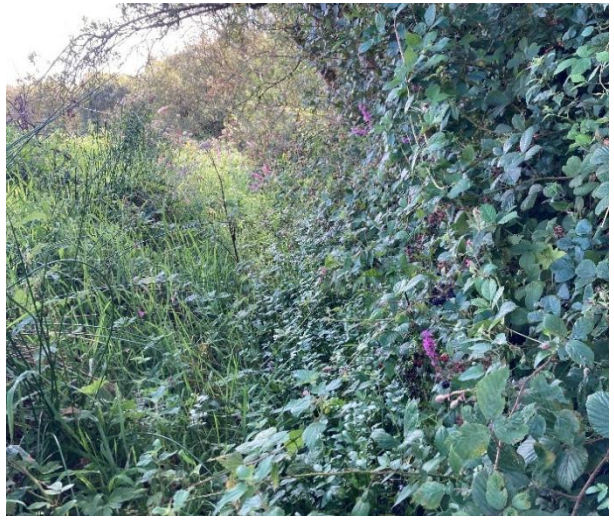
Survey Location (Loc_ID) on **Volume 5: Figure 10B.1**	C	 ***Above: Pond within the tall vegetation / scrub.***
Location Description	Watercourse surveyed immediately downstream of the OnECC and the online pond and within the Study Area, north of Kilpaison Burrows and approximately 500 m north of the B4320 (Angle Road)	
British National Grid Co-ordinates	SM 90139 01107	
Watercourse Description	The watercourse and pond at this survey location were difficult to view due to restricted access and overgrown riparian and vegetation. However, it is assumed the channel morphology would be similar to that found upstream, at survey location D.	
Survey Location (Loc_ID) on **Volume 5: Figure 10B.1**	D	
Location Description	Watercourse surveyed immediately downstream of the OnECC and upstream of the online pond within the Study Area, north of Kilpaison Burrows and approximately 400 m north of the B4320 (Angle Road)	
British National Grid Co-ordinates	SM 90223 00972	
Watercourse Description	This watercourse is within the OnECC and therefore is a potential crossing location. The watercourse was observed at a construction	

	works crossing, where silt traps and straw bales were present in the watercourse surroundings. The channel bed and banks at the construction crossing appeared to be altered downstream of the culverted crossing due to the removal of vegetation and regraded banks. Further upstream and downstream, natural characteristics prevailed, with dense grass, herbs, scrubs, and the occasional tree present on both banks. After the first silt trap, the watercourse becomes vegetated, forming a grassy channel. It was not possible to observe the flow or water depth within this part of the channel due to access restrictions.	***Above and below: Looking downstream on T07b from an existing temporary construction crossing*** 
Survey Location (Loc_ID) on **Volume 5: Figure 10B.1**	E	
Location Description	Approximately 200 m north of the OnECC, within the Study Area and downstream of T07b and T07c, north west of Neath Farm.	
British National Grid Co-ordinates	SM 90079 01405	
Watercourse Description	The watercourse at this survey location was difficult to view due to overgrown riparian and surrounding dense vegetation, however, observations included appearing to be a slightly wider and deeper	

	channel than that observed at survey location D, although no flow was able to be identified.	***Above: T07c not visible due to overgrown riparian vegetation.***  ***Above: T07c not visible due to overgrown riparian vegetation.***
Survey Location (Loc_ID) on **Volume 5: Figure 10B.1**	F	
Location Description	Watercourse surveyed approximately 200 m upstream of the OnECC, south of Wallaston Green.	
British National Grid Co-ordinates	SM 92275 00416	
Watercourse Description	This agricultural ditch is within the OnECC and might be crossed by OCT cabling. The agricultural ditch possesses an artificially straight channel with a width of approximately 0.5 m. It was predominantly dry but featured certain areas with a water depth ranging from 1 to	

	2 cm, indicative of its ephemeral nature. No visible flow was observed in the sections containing water. This channel is situated between two agricultural fields used for livestock, which likely contributes to the ingress of fine sediment and nutrients. The left bank was characterised by grasses and herbs, while the right bank was densely covered with scrub and occasional trees.	***Above: Looking downstream from near to the source of WC14; WC14 flows within hedgerow / wooded riparian buffer.***  ***Above: Looking downstream on WC14. Channel dominated by vegetation.***  ***Above: Overview of WC14, looking downstream.***

Survey Location (Loc_ID) on **Volume 5: Figure 10B.1**	G	 ***Above: Looking downstream on WC07.***  ***Above: Channel conditions on WC07***
Location Description	On WC07, watercourse surveyed within the OnECC, north west of Wallaston Green.	
British National Grid Co-ordinates	SM 92166 00683	
Watercourse Description	This watercourse is within the 1 km Study Area but not the Onshore Development Area, therefore it will not directly interact with the Project. The agricultural ditch features an artificially straightened channel with an approximate width of 0.5 m and a water depth ranging from approximately 2 to 3 cm, indicating its likely ephemeral nature. Situated between two agricultural fields used for livestock, the ditch is likely subject to the ingress of fine sediment and nutrients. The bed substrate appeared to be silty in nature. The channel's banks were characterised by steep inclines and were vegetated with scrub, occasionally featuring trees on the left bank. Even during high flood events, it is improbable that the channel would overflow onto these fields, owing to the steep and deep configuration of the banks.	

Survey Location (Loc_ID) on **Volume 5: Figure 10B.1**	H	
Location Description	Tributary of Goldborough Pill West surveyed where it rises within the OnECC, located south east of Wallaston Cross.	***Above: Spring of a tributary of Goldborough Pill West, looking downstream***
British National Grid Co-ordinates	SM 92694 01124	
Watercourse Description	This watercourse is within the OnECC and might be crossed by OCT cabling. The agricultural ditch possesses an artificially straight channel. It was predominantly dry but featured certain areas with a water depth ranging from 1 to 2 cm, indicative of its ephemeral nature. No visible flow was observed in the sections containing water. This channel is situated between two agricultural fields used for livestock, which likely contributes to the ingress of fine sediment and nutrients. An electric fence was present to stop livestock poaching. The left bank was characterised by grasses and scrub, while the right bank was densely covered with scrub and trees. The channel's banks were characterised by steep inclines and is approximately 1 m deep. Even during extremely high flood events, it is improbable that the channel would overflow onto these fields, owing to the steep and deep configuration of the banks.	

		Above: In channel conditions of tributary of Goldborough Pill West, looking downstream  ***Above: Looking upstream***
Survey Location (Loc_ID) on **Volume 5: Figure 10B.1**		
Location Description	Goldborough Pill West surveyed south of The Stables and Lambeeth farm, before it flows into the Goldborough Pill at the Pennar Mouth.	
British National Grid Co-ordinates	SM 93853 01415 SM 93898 01434	
Watercourse Description	This watercourse is within the 1 km Study Area but not the OnECC, therefore it will not directly interact with by the Project. Goldborough Pill West was observed at a public footpath crossing.	

	Vegetation was dense, limiting access and visibility of the watercourse. Both banks were characterised by trees and shrubs. From the visible portion of the watercourse, it is assumed to have a pool-riffle typology with a combination of run and riffle flows. The bed consisted of small gravels and fine sediment.	***Above: In channel conditions***  ***Above: In channel conditions***

		 ***Above: Looking downstream towards Pennar Mouth.***
Survey Location (Loc_ID) on **Volume 5: Figure 10B.1**	J	 ***Above and below: In channel conditions before WC11 enters the pond.***
Location Description	WC11 surveyed from Public Right of Way, upstream of the pond, south of Pembroke Power Station.	
British National Grid Co-ordinates	SM 93233 02159	
Watercourse Description	This watercourse is within the 1 km Study Area but not the Onshore Development Area, therefore it will not directly interact with by the Project. The watercourse downstream of Greenlink construction site is situated within a wet woodland. There is a small leaky dam upstream of a culvert for the watercourse. The watercourse	

	demonstrates riffles and pools, and the channel bed consists of gravels, pebbles, boulders. Shortly after the culvert, the watercourse enters large deep pond. The channel had the presence of woody debris and leaf litter.	  ***Above: WC11 as it enters the pond***

		 ***Above: Pond downstream on WC11, south of Pembroke Power Station***
Survey Location (Loc_ID) on **Volume 5: Figure 10B.1**	K	
Location Description	Goldborough Pill West observed at the Goldborough Road Crossing.	
British National Grid Co-ordinates	SM 93392 01144	
Watercourse Description	This watercourse is within the 1 km Study Area but not the Onshore Development Area, therefore it will not directly interact with the proposed Project. Goldborough Pill West was observed at the Goldborough Road crossing (NGR SM 93382 01154). Vegetation was highly dense, limiting access and visibility of the watercourse. Both	

	banks were characterised by trees and shrubs. From the visible portion of the watercourse, it is assumed to have a pool-riffle typology with a combination of run and riffle flows. The bed consisted of small gravels and fine sediment. At the road crossing, road runoff was present and likely contributes to a significant influx of fines and nutrients from both traffic and surrounding agricultural fields.	***Above: Goldborough Pill West flowing east, away from Goldborough Road***  ***Above: Goldborough Pill West behind the fence***  ***Above: Goldborough Pill West upstream of Goldborough Road***

		 ***Above: Goldborough Pill West downstream of Goldborough Road***
Survey Location (Loc_ID) on **Volume 5: Figure 10B.1**	L	 ***Above: Looking downstream.***
Location Description	Castlemartin Corse, in between an arable and a livestock field, just downstream of where WC16 (tributary of Castlemartin Corse) enters the watercourse.	
British National Grid Co-ordinates	SR 91334 99398	
Watercourse Description	Castlemartin Cose is within the 1 km Study Area but not the Onshore Development Area, therefore it will not directly interact with the proposed Project. Castlemartin Corse was observed at a public	

	footpath crossing (SR 91217 99442) where the watercourse exhibited characteristics of a passive meandering typology. The bed material was not visible due to extensive vegetation cover, but it is assumed to primarily consist of finer sediment, given the low-energy nature of the watercourse and the adjacent agricultural land use. Both the channel and banks were overgrown with tall herbaceous plants, grasses, and shrub.	 ***Above: In channel conditions***  ***Above: Looking upstream on Castlemartin Corse***
Survey Location (Loc_ID) on **Volume 5: Figure 10B.1**	M	

Location Description	Castlemartin Corse	 ***Above: Looking upstream on Castlemartin Corse prior to outfall at Freshwater West***  ***Above: Looking upstream on Castlemartin Corse prior to outfall at Freshwater West***
British National Grid Co-ordinates	SR 88559 99744	
Watercourse Description	At this point Castlemartin Corse flows adjacent to the sand dunes that back on to the Freshwater West beach prior to discharging via the beach to the sea. It is around 3 m in width and the watercourse is artificially straight and heavily modified at this point and flows beneath a road bridge (B4319) where is laterally constrained. Tall emergent macrophytes grow out of the watercourse through the dunes, before the channel has a more open nature close to the coast where the bed substrate includes pebbles and cobbles, but also some fine sediment. At this point floating macrophyte vegetation is also present within the channel.	

Above: Looking upstream on Castlemartin Corse prior to outfall at Freshwater West

Above: Castlemartin Corse at road crossing bridge prior to outfall at Freshwater West

		 ***Above: Castlemartin Corse prior to outfall at Freshwater West***  ***Above: Castlemartin Corse where it flows into Freshwater West***

10.6 Conclusion

18. This Onshore Water Environment Site Survey Report has been produced to highlight the presence of watercourses which are proposed to be crossed by the Onshore Export Cable. It provides relevant information on the nature of the watercourses along the OnECC and within the Study Area.