



NRW Band 2 Marine Licence Application

Suction Bucket Foundation Technical Note

Version 3.0 – Issued March 2023

1. Introduction

bp and Energie Baden-Württemberg AG (EnBW) have been awarded preferred bidder status for two offshore wind leases in the Irish Sea as part of The Crown Estate Offshore Wind Leasing Round 4, named Mona and Morgan. To inform the development of the projects, bp and EnBW intend to carry out trials of suction bucket foundations commencing in Summer 2023.

The works proposed within this Welsh Marine Licence Application consist of trialling suction buckets to validate the install viability within the Mona array area, which is predominantly within Welsh waters. Further information on the trial methodology is provided in Section 4. A Marine Licence for the same proposed works within English waters is also being sought from the Marine Management Organisation (MMO). MarineSpace is acting as the agent to obtain relevant consents for these proposed works.

This technical note sets out the proposed scope of the works, relevant legislative and policy context, associated potential impacts and mitigation measures to help inform the marine licensing decision-making process in Welsh waters.

2. Relevant Legislation and Policy

2.1. Marine and Coastal Access Act 2009

Under the Marine and Coastal Access Act 2009, a marine licence is required for carrying out a 'licensable marine activity', including construction works on the seabed, depositing of any object, certain removals from the seabed, dredging and aggregate extraction.

The Welsh Government is the licensing authority for the Welsh inshore and offshore region. The Marine Licensing Team (MLT) in Natural Resources Wales (NRW) administer marine licences on behalf of the Welsh Government.

Marine licensable activities, as defined under the Marine and Coastal Access Act 2009, can be summarised as:

- Deposit any substance or object, in the sea or on or under the seabed;
- Construct, alter or improve any works either in or over the sea or on or under the seabed;
- Use a vehicle, vessel, aircraft, marine structure or floating container to remove any substance or object from the seabed; and
- Carry out any form of dredging, whether or not involving the removal of any material from the sea or seabed.

The proposed foundation trials include the deposit of an object using a vessel and constitute a marine licensable activity under the Marine and Coastal Access Act 2009. Therefore, a marine licence application is required from NRW MLT for the works within Welsh waters.

2.2. Welsh National Marine Plan

The Welsh Government adopted the first Welsh National Marine Plan (WNMP) (Welsh Government, 2019) covering Welsh inshore and offshore waters in November 2019. The plan has been developed in accordance with the Marine and Coastal Access Act 2009, the UK Marine Policy Statement and the Marine Spatial Planning Directive.

Under the Marine and Coastal Access Act, all public authorities must consider relevant Marine Plans when making decisions regarding the marine area, in this case the WNMP. This ensures that marine resources are used in a sustainable way in line with high-level marine objectives.

A summary of the WNMP policies relevant to the proposed works is outlined in Table 2.1. A full WNMP assessment accompanies the marine licence application as a supporting document.

Table 2.1: Summary of the Welsh National Marine Plan policies relevant to the proposed works

Relevant Welsh National Marine Plan Policy	How the works adheres to the Policy
ELC_01: Low carbon energy (supporting) wind ELC_01 a: Proposals for offshore wind energy generation will be supported where they contribute to the objectives of this plan. Proposals should comply with the relevant general policies and sector safeguarding policies of this plan and any other relevant considerations. Proposals for wind >350MW will be considered by UK Government in accordance with relevant national policy. In determining an NSIP for a wind proposal, the decision maker will have regard to this plan. Any determination in relation to energy developments of any scale will be taken in accordance with this plan alongside any other relevant considerations. ELC_01 b: In order to understand future opportunities for offshore wind development, including floating technologies, this plan supports strategic planning for the sector. Relevant public authorities and the sector are encouraged, in liaison with other interested parties, to collaborate to understand opportunities for the sustainable use of wind energy resources including identification of: • natural resources that provide potential opportunity for future use; • evidence to de-risk consenting for the sector; and • opportunities to define and, once in place, further develop and refine Strategic Resource Areas for offshore wind energy resource safeguarding; in order to support the sustainable development of the sector through marine planning. Relevant public authorities should make appropriate	The suction bucket trials will inform the development of the two Round 4 offshore wind farm sites, Morgan and Mona, which will contribute up to 3 GW of renewable energy to Wales and the rest of the UK. Conducting comprehensive offshore development work and using the findings to inform the design of the projects can help ensure sustainable marine development, getting the right project in the right location and avoiding environmental and other sensitivities where possible.

Relevant Welsh National Marine Plan Policy	How the works adheres to the Policy
evidence available to support planning and decision making in order to support the sustainable development of the sector through marine planning, where it is appropriate to do so.	
ENV_02: Marine Protected Areas Proposals should demonstrate how they: • avoid adverse impacts on individual Marine Protected Areas (MPAs) and the coherence of the network as a whole; • have regard to the measures to manage MPAs; and • avoid adverse impacts on designated sites that are not part of the MPA network.	The proposed works will not take place within any protected area (see Figure 3.1 which shows Marine Protected Areas in the wider vicinity of the trial areas) and will not have an adverse negative impact on protected areas.
SOC_05: Historic assets Proposals should demonstrate how potential impacts on historic assets and their settings have been taken into consideration and should, in order of preference: a. avoid adverse impacts on historic assets and their settings; and/or b. minimise impacts where they cannot be avoided; and/or c. mitigate impacts where they cannot be minimised. If significant adverse impacts cannot be avoided, minimised or mitigated, proposals must present a clear and convincing case for proceeding. Opportunities to enhance historic assets are encouraged.	The proposed works will not have a significant impact on marine historic assets. The positioning of the suction foundation locations will be informed by geophysical survey data as well as avoiding known archaeological feature locations and as such will be designed to avoid heritage assets.
GOV_02: Cross-border and plan compatibility Relevant public authorities, in making their decisions, should have regard to: • any applicable policy in a relevant marine plan; • any applicable policy in relevant terrestrial development plans or related documents; • the Natural Resources Policy; • any relevant local well-being plan(s) (including the local well-being assessment); and • evidence in any relevant Area Statement(s) produced by Natural Resources Wales (NRW).	The proposed works are located within Welsh and English waters. Relevant consents are being sought from the different authorities as required, including the Marine Management Organisation, and a Seabed Survey Licence from The Crown Estate.

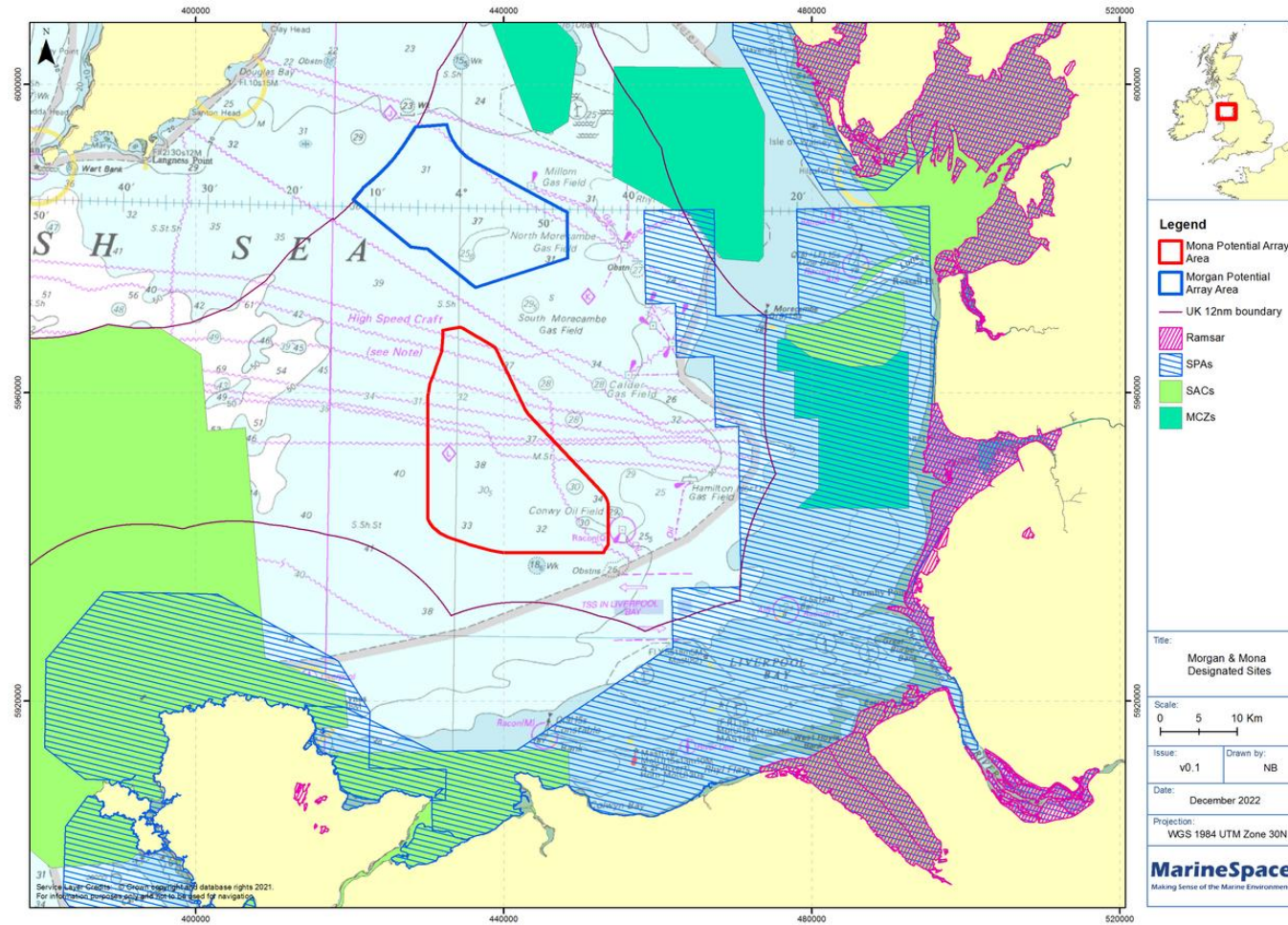
3. Suction Bucket Trial Locations

The works will be undertaken within the Morgan and Mona array areas, illustrated in Figure 3.1. The Morgan site is located in English offshore waters (approximately 35 km from the English coast at the nearest point), and the Mona site primarily within Welsh offshore waters with a small proportion

within English waters (approximately 30 km from the Welsh Coast at the nearest point). This application includes activities located within Welsh waters at the Mona site only. The specific suction bucket trial locations are not yet determined. However, they will be spread across the array areas so that the viability of the foundations can be assessed across the whole site. The determination of the locations will be based on the results of geophysical and geotechnical survey data acquired in 2021, 2022 and 2023 using Side Scan Sonar, Multibeam Echo Sounder and Magnetometer equipment. The locations of the suction buckets will likely be within 10 m of the site investigation locations from the 2022 geotechnical survey locations.

The range of water depths is approximately 33 m LAT to 46 m LAT in Mona (LAT = Lowest Astronomical Tide).

Figure 3.1: Morgan and Mona Deep Suction Bucket Trial Areas in relation to Designated Sites



Note: Array Areas shown are the areas in which the suction bucket trials will take place

4. Suction Bucket Trial Methods

To inform the development of the Morgan and Mona offshore wind farms bp and EnBW intend to carry out suction bucket foundation trials, commencing in Summer 2023.

The suction bucket trials will include:

- Trialling of suction buckets at 30 locations across the Mona array area

The methods for the above works are outlined in the sections below. In the event that the equipment described below is unavailable, alternative equipment with a similar specification and capability will be substituted.

4.1. Suction Bucket Foundations

Suction buckets are a foundation type that are installed into the seafloor by pumping out the water enclosed within them. Installation and removal causes limited disturbance to the seabed. No soil is removed and this method of installation is relatively silent. The foundations are removed by pumping water back into the bucket to push them out of the seafloor. Suction bucket trials are used to develop project specific design methods to validate their suitability and optimise their design. It is appropriate to conduct these trials in conjunction with the detailed geotechnical works, so that the findings of the trials inform and optimise foundation selection for the project helping to assure timely and reliable construction of the wind parks, and to minimise material use.

Table 4.1: Suction Bucket Quantities and Dimensions

	Number of trial locations	Diameter (m)	Maximum depth (m)	Wall thickness
Mona bidding area	30	6 - 12 m	5 – 20 (dependant on soils)	~0.045 m

Figure 4.1: Suction bucket foundation



To conduct the suction bucket foundation trials a test bucket will be loaded onto the vessel at port, and transited to the trial location. Once onsite, a reference frame consisting of a temporary package of scientific instruments is lowered to the seabed. The suction bucket is lowered to the seabed and water is pumped out, installing it into the seafloor. Once installation is complete, suction may be applied continuously to verify seafloor contact. After the installation and associated tests are complete, water is pumped back into the bucket to extract it from the seafloor.

If required, the installation will be repeated up to 3 times to validate findings. Once all activities at a site are complete, the bucket is recovered to the vessel and the vessel transits to the next location. It is expected that the tests will last no longer than 36 hours at each location.

4.2. Works Programme

The suction bucket foundation trials are planned to be undertaken between June and November 2023. It is anticipated that within this window the suction bucket foundation trials will take approximately 45 days to complete, depending on weather. Please note that this time frame includes aspects of the trials in both Welsh and English waters. However, a licence is requested from 01 June 2023 extending until 31 May 2024 to allow contingency in the programme should the works be delayed, for example, due to weather downtime.

5. Potential Environmental Impacts

This section outlines environmental receptors that could potentially be affected by the proposed works.

Table 5.1 Potential for Environmental Impacts

Environmental Receptor	Potential Activity Impact
Physical Processes	Some localised suspended sediment and resettlement may occur due to interaction of equipment with the seabed. The maximum total footprint per foundation trial (including the use of a jack up barge) is 213.04 m ² . However, these impacts will be localised and small in scale. Any depressions or marks left in the seafloor following the proposed works will naturally backfill. It is anticipated given the scale of activities and the mobile nature of the marine environment there will be no long-term impact on physical processes.
Benthic Ecology	Impacts on benthic ecology are expected to be limited and temporary within the footprint of the trials (max footprint of 213.04 m ² per foundation trial). Direct damage via crushing is likely to occur within the equipment and jack up barge footprint. Smothering as a result of sediment settlement following potential increases in suspended sediment concentration (SSC) is possible. However, this impact is likely to be highly localised, limited to only the area immediately under the footprint of the works. The significance of these impacts will depend on the sensitivity of the benthic species to disturbance, however as the impacts are limited in scale, recolonisation from the surrounding seabed is likely to be rapid. The specific locations of the trials will further be informed by the 2021 and 2022 geophysical and geotechnical survey data. Data will be used to avoid sensitive habitats, and therefore any impact of the proposed works on benthic ecology will be negligible.
Fish and Shellfish	Potential impacts on fish and shellfish may arise through presence of the vessel, noise from the trial and increased suspended sediments. Direct damage via crushing is likely to occur within the equipment footprint (max footprint of 213.04 m² per foundation trial), which may impact shellfish, or benthic fish species that may have limited mobility. Smothering as a result of sediment settlement following potential increases in SSC is possible. However, this impact is likely to be localised and small in scale. These species will likely recover rapidly following the proposed works via recolonisation from the surrounding seabed. Mobile species are unlikely to be affected, with short term avoidance behaviour likely to mitigate potential injury or mortality. Any impact from installation activities on fish and shellfish will be negligible given the general high mobility of the species in the area, the short duration of the trials and the small footprint of the proposed works.
Ornithology	Potential impacts of the foundation trials on marine and coastal birds are limited given their wide ranges, the limited duration of the works and the use of either a one vessel or one jack up barge for the licensable activities. Impact pathways including lighting, noise and disturbance have the potential to occur during the survey. It is unlikely that foraging activities will be impacted for ornithological receptors given their high mobility and therefore potential to relocate for the limited period of time during which the survey is undertaken. Additionally, given

Environmental Receptor	Potential Activity Impact
	the existing marine traffic in the Irish Sea, ornithological receptors will likely be habituated to vessel movements. It is therefore determined that any impacts on birds will be negligible.
Marine Mammals	Potential impacts on marine mammals may arise through presence of the vessel and noise generation from the trials. Installing a suction bucket foundation is a relatively silent operation, involving only the pumping of water out from / into the foundation. Therefore, it is considered that there is no potential for injury, and any possible temporary disturbance would likely result from vessel presence rather than borehole activities. There is the potential for foraging activities to be disrupted within a limited region as a result of suspended sediment and noise. However, this impact is likely to be both localised and temporary. Further, marine mammal receptors are highly mobile, and will likely relocate for the duration of the survey. Given the short-term nature of the survey activities, there is unlikely to be a significant impact on marine mammals either in terms of collision or entanglement with equipment. In addition, marine mammals present in the installation area will be familiarised to vessel movements and noise given the level of existing activity. It is therefore determined that any impacts on marine mammals will be negligible.
Protected Sites	Potential impacts on protected sites, including Sites of Special Scientific Interest (SSSI), Special Protected Areas (SPAs) and Special Areas of Conservation (SACs) are considered further in Section 5.1 to 5.3 below.
Shipping and Navigation	A notice to mariners will be provided while the vessel is operational and conducting trials. The vessel will display the appropriate navigational signals. As such no impact to shipping and navigation is predicted.
Commercial Fisheries	The vessel will be in operation for only a short period, notice to mariners and kingfisher notifications will be provided and the vessel will display the appropriate navigational signals. As such no impacts to commercial fisheries are predicted.
Marine Archaeology and Cultural Heritage	The proposed works will not have a significant impact on marine historic assets. The positioning of the trial locations will be informed by geophysical and geotechnical survey data as well as known archaeological features and as such will be designed to avoid heritage assets.
Marine Infrastructure	The proposed works will not have a significant impact on other existing marine infrastructure. The positioning of the trial locations will be informed by geophysical and geotechnical survey data as well as known infrastructure locations and as such will be designed to avoid interactions with existing infrastructure.

5.1. Habitats Regulations Assessment Screening

No sites within the UK National Sites Network (including Natura 2000 sites) or Ramsar sites are located within the offshore array areas. Table 5.2 presents the sites that are within the wider vicinity of the survey and the potential for interaction with the survey.

Table 5.2: Habitats Regulation Assessment Stage 1 Screening: Special Protection Areas (SPA) and Special Areas of Conservation (SAC) within the vicinity of the survey

SAC/SPA	Reason for Designation	Distance to array Area	Potential for Interaction
Liverpool Bay SPA	Classified for the protection of red-throated diver (<i>Gavia stellata</i>), common scoter (<i>Melanitta nigra</i>), and little gull (<i>Hydrocoloeus minutus</i>) in the non-breeding season; common tern (<i>Sterna hirundo</i>) and little tern (<i>Sterna albifrons</i>) in the breeding season, and an internationally important waterbird assemblage.	10 km	The proposed works may cause temporary acoustic disturbance to birds during activities or visual disturbance due to vessel presence. However, the level of noise associated with the presence of the vessel will be low and is unlikely to be discernible above that associated with background vessel activity. Of the classified populations listed for this site, red-throated diver is considered the most sensitive to disturbance or displacement from vessel presence. SNCB advice ¹ currently states that disturbance to this species may occur within a range of 10 km. As such, it is considered there is minimal risk of visual disturbance/displacement from activities as the survey will be undertaken at least 10km from Liverpool Bay SPA. In view of these points, it is determined that there is no potential for adverse effects on the classified bird populations of Liverpool Bay SPA.
Anglesey Tern / Morwenoliaid Ynys Môn SPA	Breeding Season - Roseate tern <i>Sterna dougallii</i> - Common tern <i>Sterna hirundo</i> - Arctic tern <i>Sterna paradisaea</i> Sandwich tern <i>Sterna sandvicensis</i>	21.2 km	The proposed works may cause acoustic disturbance during survey activities or visual disturbance due to vessel presence. However, the level of noise associated with the survey will be low and is unlikely to be discernible above that associated with background vessel activity. Tern are not considered sensitive to disturbance due to the presence of vessels. Statutory Nature Conservation Bodies (SNCB) advice² currently states that disturbance may occur within a range of 10 km. As such,

¹ <https://data.jncc.gov.uk/data/9aecb87c-80c5-4cfb-9102-39f0228dcc9a/Joint-SNCB-Interim-Displacement-AdviceNote-2017-web.pdf>.

² <https://data.jncc.gov.uk/data/9aecb87c-80c5-4cfb-9102-39f0228dcc9a/Joint-SNCB-Interim-Displacement-AdviceNote-2017-web.pdf>.

SAC/SPA	Reason for Designation	Distance to array Area	Potential for Interaction
			it is considered there is minimal risk of visual disturbance/displacement from survey activities. In view of these points, it is determined that there is no potential for adverse effects on the classified populations Anglesey Tern/ Morwenoliaid Ynys Môn SPA.
North Anglesey Marine / Gogledd Môn Forol SAC	Annex II species that are a primary reason for selection of this site: Harbour porpoise <i>Phocoena phocoena</i>	22.6 km	The proposed works area is located within the Celtic and Irish Seas harbour porpoise Marine Mammal Management Unit (MMMU), and the closest SAC is North Anglesey Marine/Gogledd Môn Forol SAC at a distance of 22.6 km. The proposed works involve installing suction bucket foundations into the seabed. This is a relatively silent method of installation that does not require drilling or piling. As such, disturbance effects are limited to the presence of the vessel. Given the existing traffic within the Irish Sea, it is not expected that the works will be discernible above background levels. Therefore, no likely significant effect is anticipated from the survey on the classified population of the North Anglesey Marine/ Gogledd Môn Forol SAC.

5.2. Marine Conservation Zone Screening Stage Assessment

No Marine Conservation Zones (MCZ) are located within the trial areas. The nearest MCZ, West of Copeland, designated for subtidal coarse sediment, subtidal sand and subtidal mixed sediments, is located over 20 km to the north of the Mona bidding array.

Given the distance to the nearest MCZ, the reasons for designation and the small spatial extent and nature of the proposed survey, no interactions are anticipated with these sites.

5.3. Sites of Special Scientific Interest

The trial areas are located over 30 km offshore, at the closest point of the Mona array area.

Therefore, there are no anticipated interactions between the survey and any SSSIs.

5.4. Water Framework Directive Compliance Assessment

Although the trials will be located beyond 12 nautical miles from the shore, in line with NRW Marine Licensing Team guidance, a separate WFD compliance assessment has been undertaken. The WFD Screening Assessment concluded that the survey works do not present any potential implications to WFD objectives.

6. Best Practice and Proposed Mitigation Measures

The following mitigation measures and environmental best practice will be adhered to throughout the survey work to minimise risk to the marine environment:

- The locations of the trials will be informed by geophysical, geotechnical data and environmental benthic data collected during 2021 and 2022 surveys of the area and will also be screened by geophysical survey techniques prior to execution of the foundation trials. Therefore, trial locations will be sited to avoid sensitive habitats (such as potential Annex I habitat), potential archaeological features and other potential hazards such as UXOs;
- Notice to mariners and kingfisher notifications will be provided and the vessel will display the appropriate navigational signals at all times;
- All equipment associated with the works will be removed on completion of the works.
- Bunding, storage facilities and spill kits will be employed to contain and prevent the release of fuel, oils and chemicals associated with the equipment into the marine environment.
- Coatings and treatments will be suitable for use in the marine environment and are used in accordance with best environmental practice;
- All equipment, materials, machinery and PPE used will be in a clean condition prior to their arrival on site, and upon removal from site, to minimise risk of introducing non-native species into the marine environment.

7. Summary

Bp and EnBW have been awarded preferred bidder status for two sites in the Irish Sea, named Morgan and Mona. To inform the development of the projects, bp and EnBW anticipate undertaking suction bucket foundation trials within the Mona and Morgan array areas. The trials include installing suction bucket foundations into the seabed to determine their viability. The data acquired during these trials will inform foundation design and placement of the wind turbines within the bidding areas.

This document provides an overview of the proposed activities as well as potential interactions with the environment and sensitive features. Key mitigation measures have also been listed. This document has been concluded that no significant impacts will result from the surveys on any of the receptors outlined in Table 5.1.

8. References

Welsh National Marine Plan 2019: <https://gov.wales/welsh-national-marine-plan-document>.