INNOGY

Gwynt y Môr Offshore Wind Farm

MARINE PROCEDURE.

TITLE:-	**MAIN COMPONENT REPLACEMENT USING A JACK UP BARGE**
L.P.No:-	**GYM\LP\MAR\003**
VERSION No:-	2
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Approved by:-	Name:	Signed:	Date:
Environmental Manager	A Bendall		

Keywords associated with this procedure.
Jackup
Repair
Marine

Formal documentation referenced in this procedure.

Gwynt y Môr Offshore Wind Farm
Port of Mostyn,
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RECORDS of REVISIONS and REVIEWS

Version No.	Revised by	Reviewed by	Date	Description of Changes
1	Giles Sims Williams	A Bendall	01/06/2015	Original, for review
2	Giles Sims Williams	n/a	15/09/2015	Improved details of signalling requirements

1. INTRODUCTION.

Gwynt y Môr Offshore Wind Farm Limited is a joint venture between RWE Innogy UK, Stadtwerke München (SWM - Munich Municipal Utility) and Siemens to develop the wind farm site 13km offshore from the North Wales coast.

The wind farm consists of 160 wind turbine generators (WTG) with a gross output of 576MW. The Project is located between 15km to 20km off the coast of North Wales in the Liverpool Bay area of the Irish Sea. It is adjacent to RWE Innogy's North Hoyle and Rhyl Flats offshore wind farms. The consented site covers an area of 124km2. The water depth ranges from 12m to 28m LAT with a tidal range of 10m.

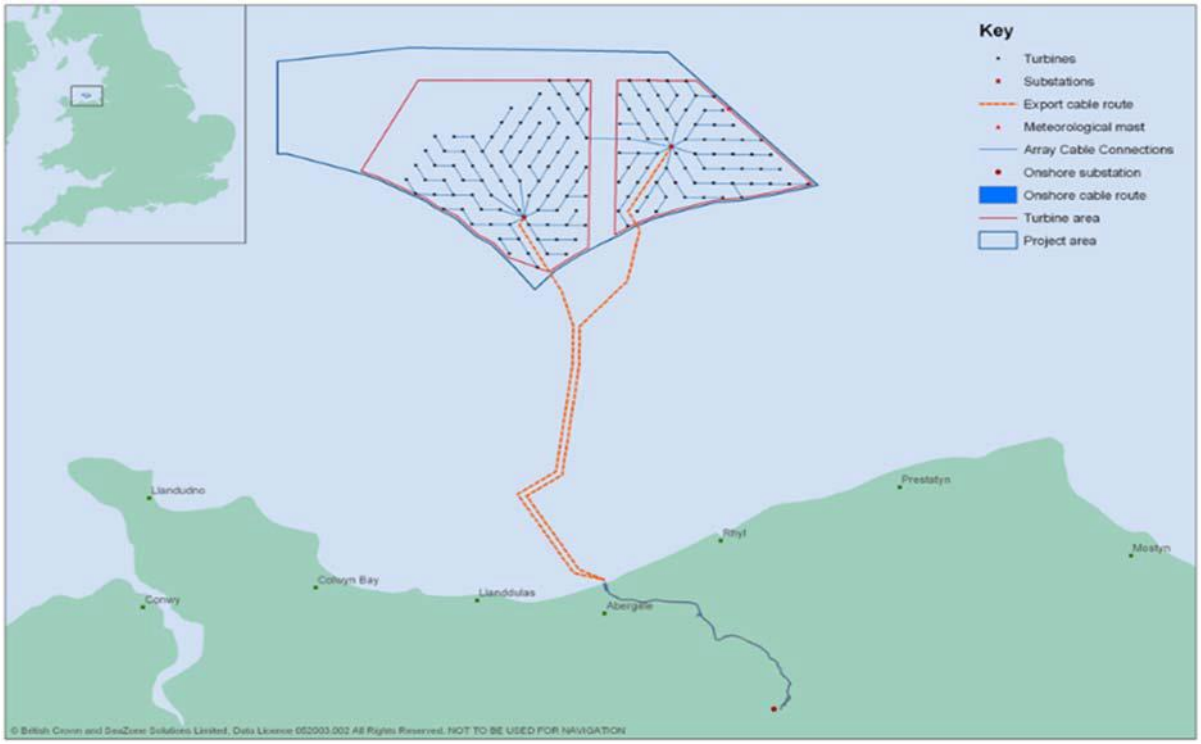


Figure 1 Location of Gwynt y Môr site

The Project comprises an array of WTGs, supported on monopile foundations, and connected to offshore substation platforms by subsea array cables.
The offshore substation platforms are connected via a 20km offshore export cable route to landfall and a further 12km onshore export cable route to an onshore substation at St Asaph in North Wales where the Project is connected to the National Grid at 400kV.

The Project comprises 160 x Siemens WTGs, 2 x 288MW 33/132kV offshore substation platforms, 33kV inter-array subsea cables, 132kV export subsea cables, 132kV export onshore cables, a 132kV GIS onshore substation, 2 x 132/400kV transformers and a 400kV GIS onshore substation (by National Grid). As part of the works to install the 33kV inter-array subsea cables, rock pinning and protection has been used in certain areas to secure the cables for the operational life.

2. SCOPE.

A jack up barge (JUB) is defined as any non-propelled or self-propelled marine vessel that is fitted with legs and a jacking system that provides the vessel with the capability to elevate the hull above the surface of the sea.
Other industry terms used to identify jack-ups are Mobile Offshore Units (MOUs), Self elevating Platforms (SEPs) and Lift Boats.

This document covers the use of JUB equipped with cranes for the replacement of major components on offshore wind turbines at Gwynt y Môr.

This document supplements REN\WP\PROD\78 "Management of jackup barges" and RUK13-h_s "Guidelines for the Selection and Operation of Jack-ups in the Marine Renewable Energy Industry"

This document covers the interactions required whilst the vessel is in the Gwynt y Môr area but excludes the procurement and commercial arrangements.

3. Preparation

RWE will provide the vessel supplier with documentation such as:

- Met-ocean reports
- Bore hole data
- Historical JUB position data
- Debris survey (if less than 6 months only)
- Bathymetry report
- Magnetometer survey report (UXO survey)
- These will contain information on exclusion zones, hazards, available areas for footprints, etc.

Clearance distances will be agreed for cables, pipelines, seabed objects, structures, etc.

The vessel supplier will conduct a site specific assessment and will submit to RWE a proposed transit/approach route, the planned jackup footprint locations and a risk based mitigation plan covering key environmental scenarios.

Responsibilities for the following will be allocated (depending on the contractual arrangement):

- Marine spread (tugs etc)
- Cranes
- Maritime supervision
- H&S supervision
- Lift plans
- Emergency procedures
- CDM co-ordination (if required)

RWE will notify Natural Resource Wales of their intention to bring a JUB into the wind farm area.

RWE will notify the port owners of their intention to bring a jackup barge into the port for loading/unloading.

RWE will notify the Maritime and Coastguard Agency (MCA) and will ensure that a Notice To Mariners is produced and circulated.

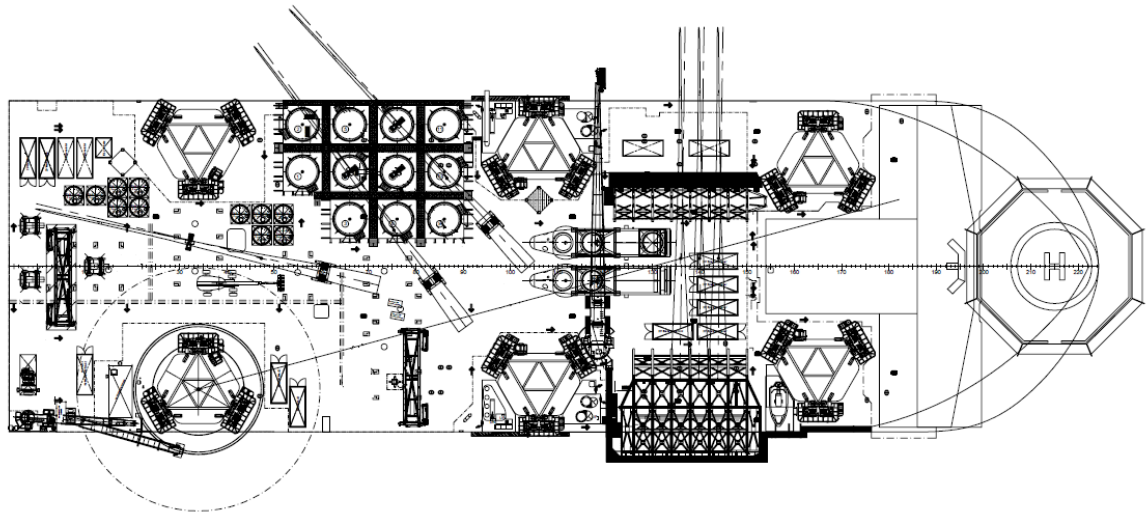
RWE will attend the JUB at the loading port and will conduct a safety audit. This will include checks on leg and draft markings, navigational aids, positioning and communication equipment.

RWE will ensure that a nominated representative is aboard the JUB until the vessel departs the wind farm. This person will monitor and audit the works, ensuring that appropriate procedures are being followed.

4. Indicative Methodology.

JUB operations typically occur 24hours per day. Sufficient lighting exists on the JUB to illuminate all operations.

Prior to arrival of the JUB, maintenance technicians will access the turbine via crew transfer vessel. The turbine will be placed in a 'rotor lock' and 'yaw lock' position (if required), to prevent contact between the JUB and the turbine blades. The technicians will also drain off any fluids from the component to be lifted (i.e. gearbox oil)



Typical JUB deck layout, including blades, gearboxes, nacelles and main bearings laid on deck

The JUB will not approach the turbine until a period of slack water. This will ensure that if the propulsion systems (or towing systems) fail, the JUB will not collide with the structure.

Depending on its type, the JUB will use anchors, dynamic positioning (DP), tugs, or thrusters for positioning.

Once located correctly, the JUB will deploy its legs in the predefined positions and extend an access bridge to the turbine transition piece.

From this point onwards, access to the JUB will be via the turbine transition piece ladder via the access bridge.

When jacked up, the vessel will exhibit signals in accordance with the UK Standard Marking Schedule for Offshore Installations

The weather forecast will be constantly monitored and compared to the pre-agreed limits for lifting, working outside, and remaining jacked up in the working position. The JUB will be elevated to 'storm' position in advance if required.

The possibility of scour developing around the jackup 'spudcans' should be reviewed depending on the weather forecast, as detailed in the site specific jacking plan.

To commence lifting operations, a 72hour window of adequate wave height is

typically required.

JUB in position for lifting operations

The JUB will commence with some functional checks of its lifting apparatus, followed by component lifts as detailed in the lift plan.

Typical components to be replaced include:

- Gearbox
- Generator
- Transformer
- Main Bearing and shaft
- Blade
- Nacelle

On completion of the lifting operation, the vessel will retract the access bridge and jack down. Jacking down will only commence during slack water or when the tide would move the vessel away from the turbine.

The vessel will then follow the approved transit path towards the next turbine and repeat until departing the field.

Maintenance technicians will return to the turbine via CTV to complete the repair process, remove the rotor and yaw locks, and return the turbine to service.

5. IMPACT ON ENVIRONMENTAL OR SAFETY ISSUES.

Failure to comply with this procedure could have serious impacts to the sea bed and surrounding Environment as well as risk to personnel.