BRIGGS MARINE &
ENVIRONMENTAL SERVICES


# Robin Rigg Offshore Wind Farm Export Cable Repair

## EXAMPLE METHOD STATEMENT – INTER ARRAY CABLE REPLACEMENT / REPAIR

Prepared By:

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SEPTEMBER 2013

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DOCUMENT REFERENCE

| | |
|---|---|
| Customer | EC&R |
| Project Reference | Robin Rigg Offshore Wind Farm Inter Array Cable Repair |
| Document Number | |

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REVISION PAGE

| Issue | Date | Comments | Prepared By | Approved By |
|---|---|---|---|---|
| 1 | 21/08/13 | | FM | AK |
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GLOSSARY

| Abbreviation | Description |
|---|---|
| AHV | Anchor Handling Vessel |
| BMC | Briggs Marine Contractors Limited |
| CDM | Construction Design and Management Regulations 2007 |
| DPR | Daily Progress Report |
| DSV | Dive Support Vessel |
| EA | Environment Agency |
| ECC | Emergency Communications Card |
| EC&R | EOn Climate & Renewables |
| HAZOP | Hazard and Operability Study |
| HR | Human Resources |
| HSE | Health and Safety Executive |
| HSEQ | Health, Safety, Environment and Quality |
| MFE | Mass Flow Excavation |
| MLWM | Mean Low Water Mark |
| RIB | Rigid Inflatable Boat |
| SAP | Senior Authorising Person |

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## 1. SCOPE OF WORK

Briggs Marine Contractors (BMC) have been instructed to carry out a repair to the Robin Rigg Offshore Wind Farm 33kV inter array cable.

Figure 1-1 below shows the entire export cable route from shore end to wind farm.

Figure 1-2 shows the extents of the area covered within this Method Statement for a repair scenario on one of the inter array cables.

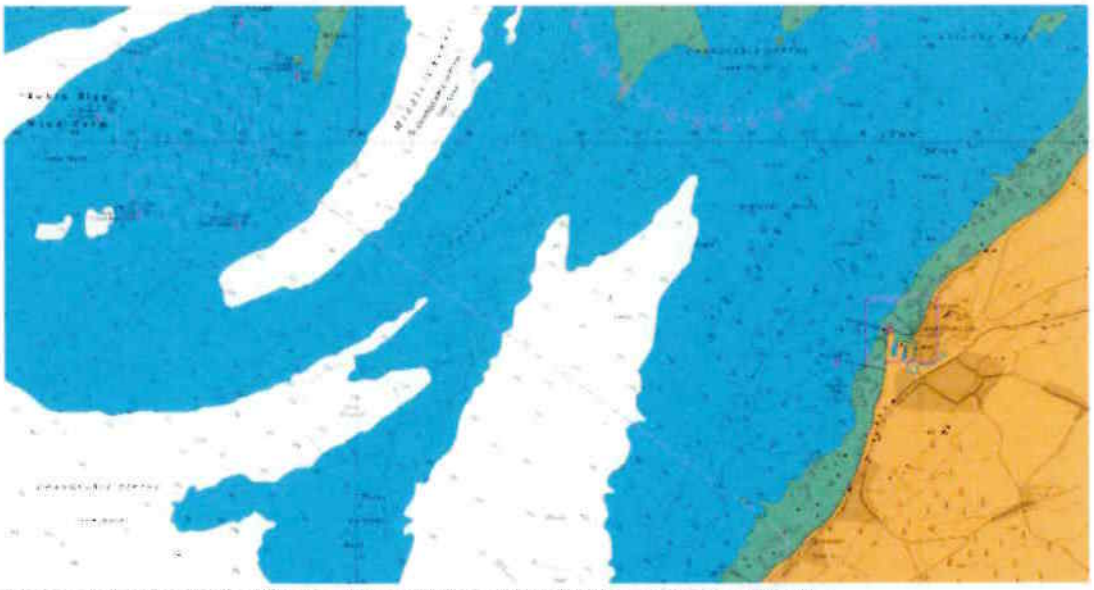


Figure 1-1 Overview of Robin Rigg Offshore Wind Farm and Export Cable

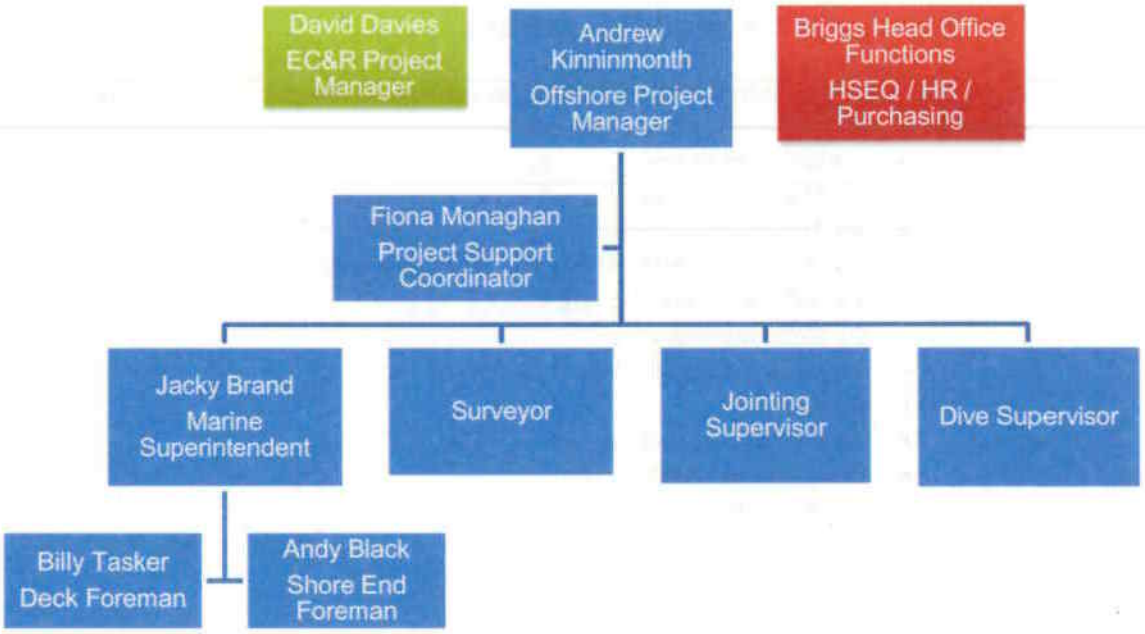

Figure 4-2 Area covered within the repair scenario, on one of the inter array cables.

The scope of the inter array cable repair works includes:

- Mobilisation and demobilisation of vessels and third party services;
- Cable load out / transfer from Prince of Wales Dock;
- Installation and commissioning of a 33kV submarine cable repair length;
- Where possible, recovery of the faulted length of 33kV cable.

To achieve this, BMC will utilise Forth Guardsman (Cable Lay Vessel), Forth Constructor (Anchor Handling Tug) and Forth Fighter (Dive Support Vessel). This spread will be supported by dive and jointing subcontractor services.

## 2. PROJECT TEAM



## 3. VESSELS AND EQUIPMENT

BMC vessels Forth Guardsman, Forth Constructor and Forth Fighter will be mobilised at Burntisland.

See Appendix 1 for full vessel specifications.

The Forth Guardsman will be mobilised at Burntisland with the following equipment:

- 1 x M9 Fassi Crane
- 4 x Mooring winches
- 2 x Thompson winches
- 2 x Hired in 100 kVA, 415V, 3ph, 50Hz generators
- 2 x 220m long mooring wires
- 2 x 220m mooring ropes
- 1 x Electrical switch room
- Drum stands
- 2 x 90° roller quadrants
- Cable engine diverter
- 1 x Disc cutter
- 1 x Rigging container
- 1 x Workshop container
- 1 x Mess room
- 1 x Toilet module
- 1 x Cable recovery / deployment skid
- 1 x 4 Wheel pair cable engine & electro / hydraulic power pack
- 8 x Radios and chargers
- 1 x Hand held GPS
- Cable cutter
- Oil spill equipment
- 3 x 10 Man life rafts with hydrostatic releases and cradles
- 6 x Perry buoys and holders
- Rigging equipment, ropes, blocks and beach anchors
- RUBB jointing enclosure
- MFE tool for deburial
- Carousel
- Survey equipment (Table 1)
- Equipment for turbine platform
    - Pulling winch
    - Sheave blocks
    - Chain slings

A general arrangement for the Forth Guardsman can be found in Appendix 5.

Table 1. Survey Equipment

| Number | Item |
|---|---|
| 1 | DGPS Primary (High Accuracy) including 2 Receivers |
| 1 | DGPS Secondary (Standard) including 2 Receivers |
| 1 | DGPS QC Software – Veripos Verify |
| 1 | Meridian Surveyor Gyrocompass including spare |
| 1 | Pitch / Roll Sensor MRU |
| 1 | CTD Probe Midas including spare |
| 1 | Online Positioning and Navigation System c/w software |
| 1 | Smart Remote Display three units and one spare |
| 1 | Reporting PC – Software: Acrobat, Video Grabber, MS Office |

N.B. All positioning operations will be conducted with and referenced to World Geodetic System 1984.

The Forth Constructor (AHV) will be mobilised at Burntisland with the following equipment:

- 4 x 3T high hold mooring anchors
- 2 x 2T high hold mooring anchors
- 6 x 100 gallon can buoys complete with flashing lights
- 6 x wire risers

The Forth Fighter (DSV) will be mobilised at Burntisland with the following equipment:

- Complete dive spread
- 60kVA generator
- Dinghy
- 4 x quads diving oxygen
- Hyperbaric chamber
- Dive control unit container
- Dive engine room

The dive spread and dive control unit will be supplied by the dive contractor and the decompression chamber supplied by BMC.

A cable engineering analysis was undertaken to determine the appropriate cable handling equipment to be used in relation to the cable specification (Table 2).

Table 2. Cable Engineering Analysis

| **Cable** | **Voltage and Type** | | |
|---|---|---|---|
| Robin Rigg Inter Array | 33kV SWA 150mm$^2$ | 33kV SWA 300mm$^2$ | |
| **Parameter** | **Criteria** | | **Comments** |
| Overall External Diameter (mm) | 100 | 115.5 | |
| Minimum Bending Radius (m) | 2.5 | 2.5 | |
| Minimum Coiling Diameter (m) | | | Cable handling quadrants and deployment skid to be above MBR |
| Outer Serving Type | Polypropylene yarn and bitumen | Polypropylene yarn and bitumen | MFE pressures to ensure no external cable damage |
| Maximum Pulling Tension (kN) | 195 | 250 | Tensiometer to be fitted in line with pulling wires |
| Weight of Cable in Air (kg/m) | 15.5 | 21.9 | |
| Weight of Cable in Water (kg/m) | 8.3 | 12.4 | |

All winches and hydraulic cranes will have been tested and certificates issued by an engineer from appointed testing company.

Test certificates for all equipment will be kept in the Project Folder on the bridge of Forth Guardsman.

The Method Statement and Risk Assessments will be kept in the Project Folder on the bridge of Forth Guardsman.

## 4. OPERATIONS

All work will be carried out in accordance with EON Climate and Renewables (EC&R) agreed working practice or techniques agreed in writing by the Senior Authorising Person (SAP) for the project. This will include all aspects of Health and Safety and fulfilling the requirements of CDM.

Risk assessments will be undertaken in advance of the operation and all parties made aware of the findings during Toolbox Talks and operational briefings.

As each new phase of the project commences further Risk Assessments and toolbox talks will be undertaken. If the required the Method Statement will be amended and agreed with EC&R.

BMC will supply an oil spill operative and response kit for Tier 1 emergencies.

At all times the Vessel Master, Offshore Project Manager and Marine Superintendent will carefully oversee and be vigilant for any anomalies in working practices and incidents. All team members are empowered to stop a task and carry out a 'Take Five' risk assessment should they consider the task unsafe or require any clarification.

BMC will supply Forth Guardsman, which will be fitted out in Burntisland with the required cable handling equipment and survey equipment.

BMC will provide Forth Constructor as the anchor handling vessel (AHV), which will be mobilised at Burntisland.

BMC will provide Forth Fighter as the dive support vessel (DSV), which will be mobilised at Burntisland.

BMC will conduct survey equipment operations in-house.

An EC&R pre-qualified diving contractor will conduct diving operations.

All operations for the duration of the contract will be under the control of the BMC Offshore Project Manager.

For the duration of the operations, the BMC Offshore Project Manager will provide daily operational reports to EC&R via email.

A Notice to Mariners will be issued prior to operations being undertaken. The Notice to Mariners acts to advise mariners of any operations with potential impacts on navigational safety.

A Permit to Work will be issued by EC&R.

All diving operations will be carried out from Forth Fighter. Only diving operations requested by the BMC Offshore Project Manager will be undertaken. Entry of divers into the water can only be undertaken once instruction is approved by the Master.

## 5. METHOD OF WORK

### 5.1. Mobilisation

The vessels will be mobilised in Burntisland with the equipment and materials described in Section 3 – Vessels & Equipment. Forth Constructor and Forth Fighter will transit to site on a 2 day passage.

Forth Guardsman will transit to Prince of Wales Dock on a 3 day passage to collect the spare cable section to be utilised for the repair. Following cable load out, Forth Guardsman will then transit to site on a 0.5 day passage.

### 5.2. Cable Load Out

The spare cable available in the event of an inter array cable failure is as follows:

- 1 x 1500m 300mm$^2$ section

This cable length is currently wound on a drum stored at:

Prince of Wales Dock
Northside
Workington
Cumbria
CA14 1BN

The spare cable length to be used for the repair will be collected by Forth Guardsman from Prince of Wales Dock and transported to site. For the load out, the spare cable drum will be lifted onto under rollers at Prince of Wales Dock using a 500T crane. The required repair length will be spooled directly onto Forth Guardsman for transport to the repair site.

EC&R will undertake a test on the cable after load out onto Forth Guardsman.

### 5.3. Transit to Workington

On completion of the mobilisation / cable load out, all equipment will be sea fastened and all vessels will transit to site. All personnel will travel to Workington.

Forth Guardsman will mobilise the installation skid using Forth Constructors crane whilst alongside in Workington.

Following transit, the dive team will setup the dive spread and hyperbaric chamber in Workington.

### 5.4. Cable Repair Operations – Repair Length Inserted Into Inter Array Cable

Depending upon the length of the faulted inter array cable, proximity of the fault to turbine and age of the cable at time of fault, a technical and economic decision would be made on the repair strategy.

### 5.4.1. Repair Operation

The fault location will be determined by EC&R testing.

Forth Guardsman will be positioned utilising a 4 point mooring, consisting of 4 x 2T high hold anchors. During site setup, locations for anchor spread will be finalised in conjunction with the Offshore Project Manager, Vessel Master and Surveyors. Anchor positions and wire lengths will be planned to avoid other cables, with lengths being set to ensure that anchors are not at risk of being dragged over them. A schematic of anchor positions can be found in Appendix 6. When anchors are being recovered, the winch wire will be followed towards the CLV by the AHT as the wire is being winched in to ensure the wire is not dragged along the seabed near any other cables. When the mooring wires are tensioned up with the CLV in the anchor pattern, wires will be subsurface but above the seabed and no risk to the buried cables. Subsurface buoys will be attached onto the mooring lines in line with the BWEA Guidelines (Guidelines for the Selection and Operation of Jack-Ups in the Marine Renewable Energy Industry). Note that to comply with these Guidelines for mooring line and vessel hull clearances, the exact methodology and timing of operations will have to be assessed in line with tidal ranges at that time.

Once Forth Guardsman is in position at the suspected fault location the first operation will be to debury and cut the cable.

When Forth Guardsman is in position above the suspected fault location the deburial system will be deployed to uncover the cable over a short length. The Mass Flow Excavation system will be deployed and Forth Guardsman moved within the anchor pattern to uncover approximately 20m of cable.

The cable will then be cut at the approximate fault location using a hydraulic cable cutter positioned around the cable by divers. Once cut, a riser wire will be attached to the first cable end to allow for recovery, the second cable end will be capped and buoyed off. The first cable end will be recovered to deck, stoppered off and tested by EC&R. The cable will be cut back until clear cable is found through testing. Once cable is clear of the fault, it will be capped and buoyed off. The second cable end will then be recovered to deck, stoppered off and tested by EC&R. The cable will be cut back until clear cable is found through testing.

When the cable is deemed good to joint to, the jointing works will commence, to piece in the new cable repair length. The first joint will be undertaken from the end of the repair length in the carousel, to the cable end stoppered off on deck.

The RUBB shelter will be constructed in place around the cable ends in preparation for jointing. Jointing operations will then commence as outlined in the Jointing Method Statement / Jointing Instruction.

Following the first jointing operation, the cable will be laid on the seabed towards the buoyed off cable end. Forth Guardsman will lay the cable whilst moving on anchors. The buoyed off cable end will be recovered to deck and stoppered off. The correct length of cable will be fed out of the carousel and the second joint will be undertaken between the repair length and the recovered cable end.

Upon completion of jointing operations, the joint box will be moved to the skid bow on Forth Guardsman using the Fassi crane. Cable installation ropes will be bonded to the cable on either sides of the joint box, and bend restrictors applied to the crown of the bight to protect

the minimum bending radius (MBR) during deployment operations. With the joint box in position, the crane will be released and joint boxes lowered under tension on ropes whilst Forth Guardsman moves on anchors, until the cable is on the seabed.

Once both joint boxes are on the seabed, a dive survey will be undertaken to confirm the position of the joint boxes and to cut rigging equipment from the cable. After the cable repair length has been installed, the MFE will be deployed to lower the cable down to the required burial depth. Forth Guardsman will move on anchors to rerun the cable lay route recorded by the survey systems, with the MFE positioned above the cable route. Forth Guardsman will then move out of moorings and return to Workington for demobilisation and transit.

Jointing operations will take place as outlined in the jointing subcontractors Jointing Instruction. The Method Statement and Jointing Instruction are held within the Project Folder on the bridge of Forth Guardsman.

### 5.5. Cable Repair Operations – Replacement of Entire Inter Array Cable

#### 5.5.1. Repair Operation

The replacement of an entire inter array cable would require the removal of the existing inter array cable from the J-tubes. It would have to be decided if the length buried on the seabed between the turbines would be left in situ or removed. Removal of the cable would make future repairs and installations easier.

Forth Guardsman will be positioned utilising a 4 point mooring, consisting of 4 x 2T high hold anchors. During site setup, locations for anchor spread will be finalised in conjunction with the Offshore Project Manager, Vessel Master and Surveyors. Anchor positions and wire lengths will be planned to avoid other cables, with lengths being set to ensure that anchors are not at risk of being dragged over them. A schematic of anchor positions can be found in Appendix 6. When anchors are being recovered, the winch wire will be followed towards the CLV by the AHT as the wire is being winched in to ensure the wire is not dragged along the seabed near any other cables. When the mooring wires are tensioned up with the CLV in the anchor pattern, wires will be subsurface but above the seabed and no risk to the buried cables. Subsurface buoys will be attached onto the mooring lines in line with the BWEA Guidelines (Guidelines for the Selection and Operation of Jack-Ups in the Marine Renewable Energy Industry). Note that to comply with these Guidelines for mooring line and vessel hull clearances, the exact methodology and timing of operations will have to be assessed in line with tidal ranges at that time.

The section of cable at the base of the turbine has to be deburied to facilitate the cutting of the cable. To increase the productivity of the operation the deburial device would be mobilised on the AHT and deployed with the AHT tied up alongside the moored CLV.

When Forth Guardsman is in position close to the J-tube location the deburial system will be deployed to uncover the cable over a short length at the base. The Mass Flow Excavation system will be deployed and Forth Guardsman moved within the anchor pattern with the AHT alongside to uncover approximately 10m of cable.

The cable will be cut using a hydraulic cable cutter positioned around the cable by divers. Once cut, a riser wire will be attached to the cable end exiting the turbine to allow for recovery with a pulling stocking attached to the cable end. The riser wire will be connected to a pulling winch positioned on deck of the CLV.

Equipment for the platform pulling works will be transferred from the vessel to the platform (pulling winch, sheave blocks, shackles and cable supports). Internal to the turbine, cable ends will be disconnected and a pulling stocking also attached to the second end. This will leave a short length of cable through the turbine to be pulled out of the system and pull in messenger wires in preparedness for the new cable installation. A 'pig' will be fitted between the messenger wire and the cable stocking to clean debris from the J-tube as the cable is withdrawn.

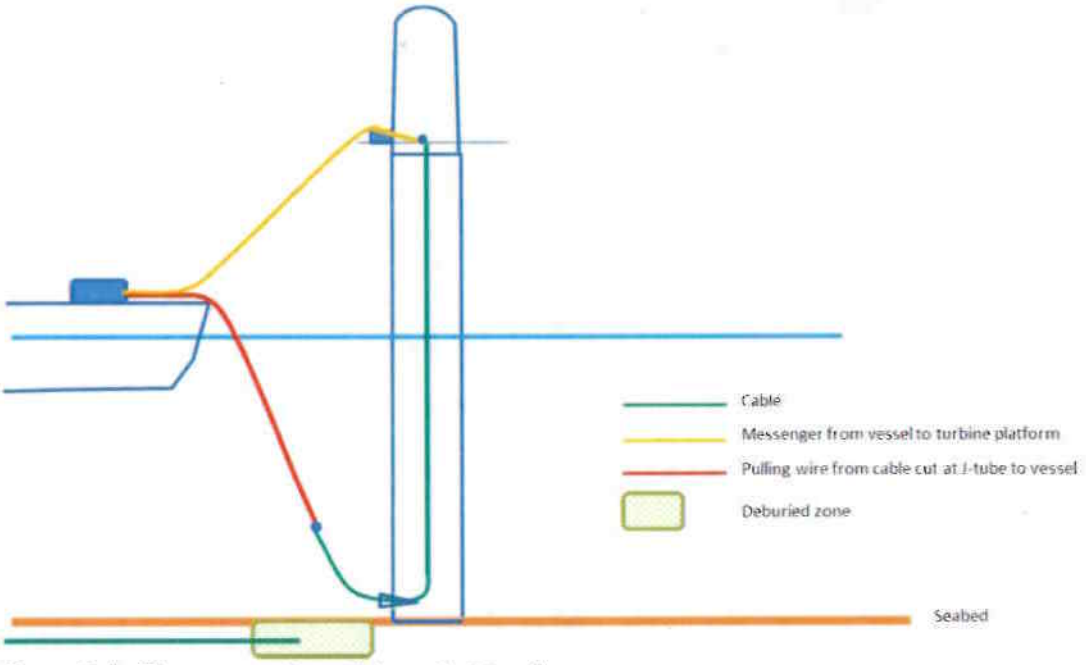



Figure 5-1. Messenger wire pull through: Step 1

The cable will be pulled down through the turbine by the wire attached to the pulling winch on the CLV. At the same time the messenger wire to the turbine platform will be paid out. This will leave the turbine clear of the old cable ready for the new pull in. The cable will be recovered to deck and cut into sections for disposal. The messenger wire through the system will be buoyed off.

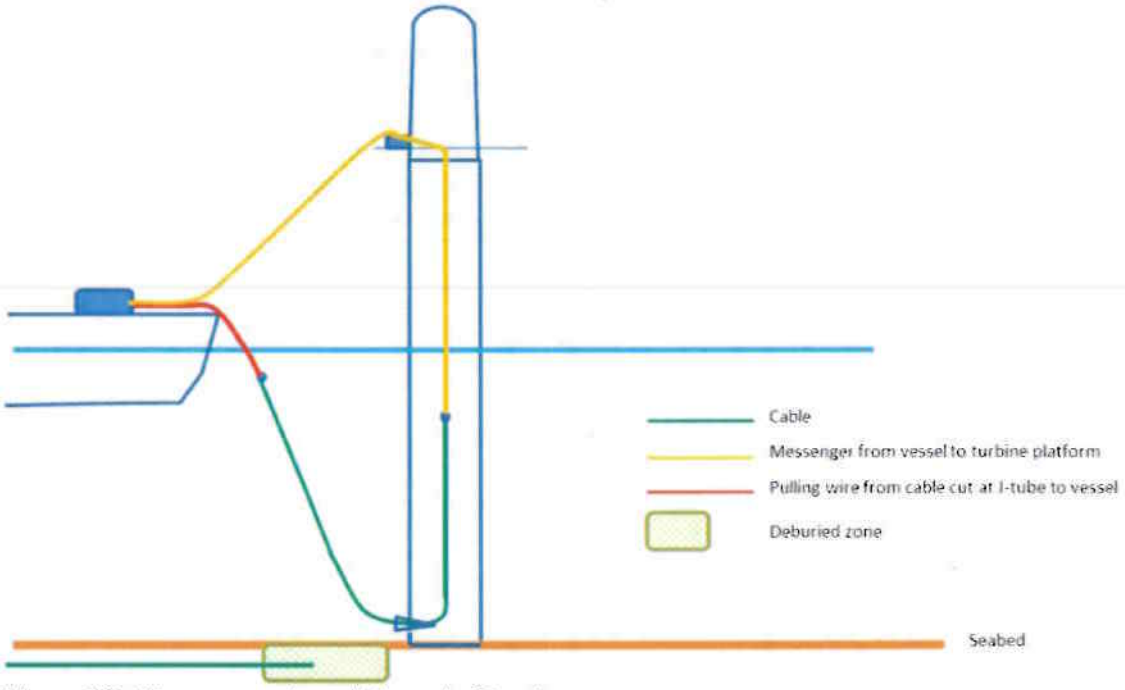



Figure 5-2. Messenger wire pull through: Step 2

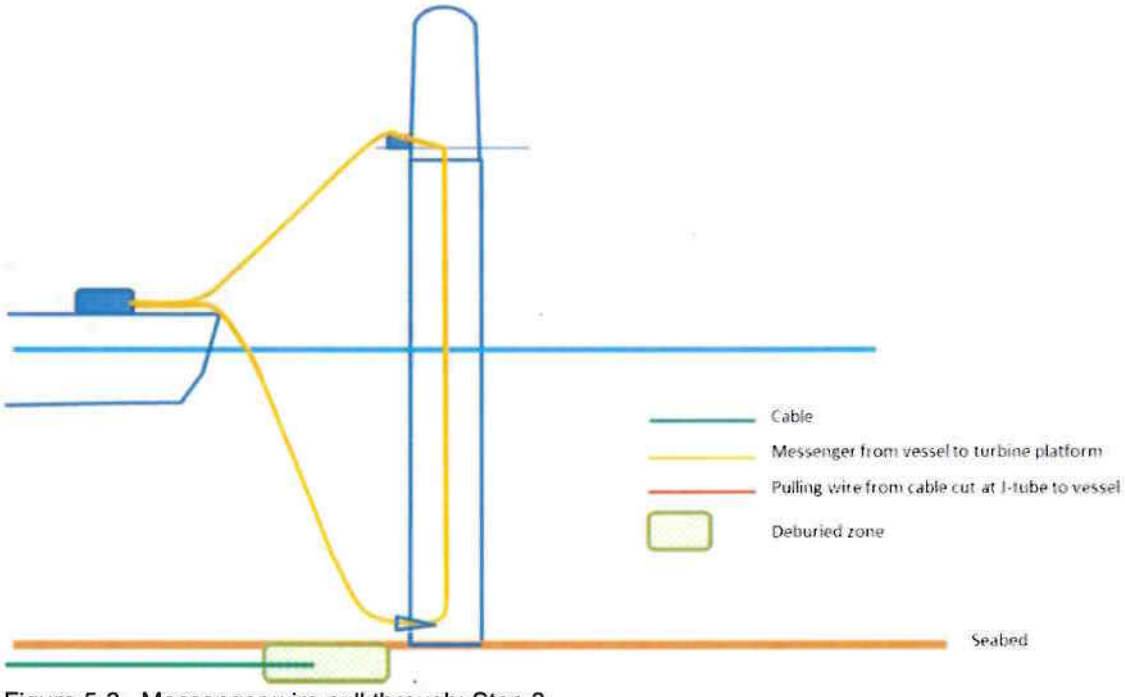



Figure 5-3. Messenger wire pull through: Step 3

This process will be repeated at the second turbine end.

At the next turbine end the messenger wire will not be buoyed off after it is pulled through the system. The messenger will be connected to the pulling head of the new cable. The cable will be paid out from the storage tank by the 4 pair cable engine as the messenger wire is pulled by a pulling winch positioned on the wind turbine generator.

When the cable is pulled through the J-tube and up the turbine the cable will be stoppered off at the hang off plate.

The CLV will slip moorings and begin to lay cable towards the final turbine. The CLV will enter the pre-laid mooring pattern and the second cable end will be turned over on the forward deck area.

The buoyed off messenger wire will be recovered to deck and connected to the pulling head of the cable end. Cable will be paid out by the powered quadrant as the WTG platform winch pulls the messenger wire in. When the cable reaches the hang off plate the cable will be stoppered off.

Jointers will then make off both cable ends in the turbine.

Divers will install seals at the J-tubes and survey the cable at the base of the turbines.

### 5.6. Transit to Burntisland

All vessels and personnel will await any further instruction from EC&R, prior to transiting to Workington.

Forth Constructor and Forth Fighter will leave Workington on completion of sea fastening and transit to Burntisland.

Following repair operations, the Forth Guardsman will return to Prince of Wales Dock to offload any unused cable. The unused cable length will be respooled onto the spare cable drum at Prince of Wales Dock. The spare cable drum will be lifted onto under rollers using a 500T crane with suitable spreader mats, and the unused cable spooled from the 1200T carousel on Forth Guardsman onto the drum.

Forth Guardsman will leave Prince of Wales Dock on completion of seafastening and transit to Burntisland.

### 5.7. Demobilisation

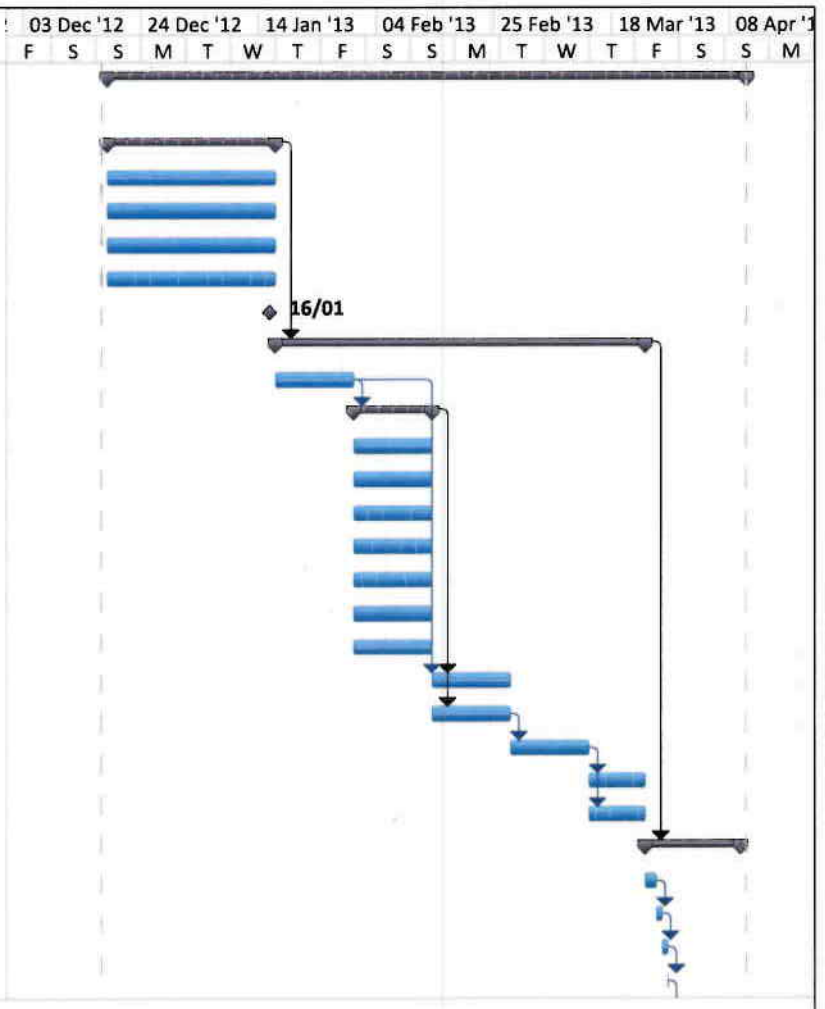
On arrival at Burntisland Forth Constructor and Forth Fighter will be demobilised and off hired.

Forth Guardsman will be de-fitted of all equipment and the wooden decking reinstated, and on completion an off hire survey will be carried out. All hired in equipment will be off hired and Briggs equipment returned to the designated storage area.

## 6. PROJECT SCHEDULES

An indicative project schedule for the repair is provided below.

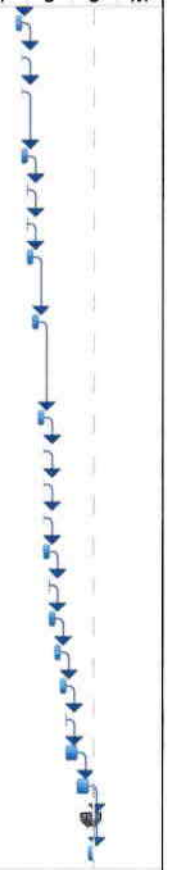
| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 1 | **Inter Array Repair Plan - Repair Length Inserted Into Inter Array Cable** | **114.54 days** | **Mon 17/12/12** | **Wed 10/04/13** |
| 2 | **Pre-Planning** | **30 days** | **Mon 17/12/12** | **Wed 16/01/13** |
| 3 | Procurement of spares | 30 days | Mon 17/12/12 | Wed 16/01/13 |
| 4 | Jointing materials | 30 days | Mon 17/12/12 | Wed 16/01/13 |
| 5 | Spare cable | 30 days | Mon 17/12/12 | Wed 16/01/13 |
| 6 | Consent consultation | 30 days | Mon 17/12/12 | Wed 16/01/13 |
| 7 | Incident | 0 days | Wed 16/01/13 | Wed 16/01/13 |
| 8 | **Repair Planning** | **66 days** | **Wed 16/01/13** | **Sat 23/03/13** |
| 9 | Fault location testing | 14 days | Wed 16/01/13 | Wed 30/01/13 |
| 10 | **Contract placement** | **14 days** | **Wed 30/01/13** | **Wed 13/02/13** |
| 11 | Main contractor | 14 days | Wed 30/01/13 | Wed 13/02/13 |
| 12 | Subcontractors | 14 days | Wed 30/01/13 | Wed 13/02/13 |
| 13 | Pre-repair survey | 14 days | Wed 30/01/13 | Wed 13/02/13 |
| 14 | Local plant and machinery | 14 days | Wed 30/01/13 | Wed 13/02/13 |
| 15 | Specialist equipment | 14 days | Wed 30/01/13 | Wed 13/02/13 |
| 16 | Divers | 14 days | Wed 30/01/13 | Wed 13/02/13 |
| 17 | Jointers | 14 days | Wed 30/01/13 | Wed 13/02/13 |
| 18 | Repair planning following fault location | 14 days | Wed 13/02/13 | Wed 27/02/13 |
| 19 | HAZOP/HAZID | 14 days | Wed 13/02/13 | Wed 27/02/13 |
| 20 | Method Statement/Risk Assessment | 14 days | Wed 27/02/13 | Wed 13/03/13 |
| 21 | Survey | 10 days | Wed 13/03/13 | Sat 23/03/13 |
| 22 | Vessel mobilisation | 10 days | Wed 13/03/13 | Sat 23/03/13 |
| 23 | **Repair** | **17.54 days** | **Sat 23/03/13** | **Tue 09/04/13** |
| 24 | Vessel transit to site | 2.5 days | Sat 23/03/13 | Mon 25/03/13 |
| 25 | Final survey to determine safe mooring positions | 1 day | Mon 25/03/13 | Tue 26/03/13 |
| 26 | AHT lays mooring spread | 8 hrs | Tue 26/03/13 | Wed 27/03/13 |
| 27 | AHT moves CRV into position above fault location | 2 hrs | Wed 27/03/13 | Wed 27/03/13 |




Project: Complete Process Repair
Date: Fri 01/11/13

| | | | | | |
|---|---|---|---|---|---|
| Task | | External Milestone | | Manual Summary Rollup | |
| Split | | Inactive Task | | Manual Summary | |
| Milestone | | Inactive Milestone | | Start-only | |
| Summary | | Inactive Summary | | Finish-only | |
| Project Summary | | Manual Task | | Deadline | |
| External Tasks | | Duration-only | | Progress | |

| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 28 | Deburial of fault section | 1 day | Wed 27/03/13 | Thu 28/03/13 |
| 29 | Divers attach rigging gear to cable | 0.5 days | Thu 28/03/13 | Thu 28/03/13 |
| 30 | If possible, recover bight to seabed and cut on board. Retain both ends for testing | 6 hrs | Thu 28/03/13 | Fri 29/03/13 |
| 31 | If not enough slack, cut cable on seabed and recover | 8 hrs | Fri 29/03/13 | Fri 29/03/13 |
| 32 | Test cable to check fault location | 3 hrs | Fri 29/03/13 | Fri 29/03/13 |
| 33 | Cap good end and return to seabed | 4 hrs | Fri 29/03/13 | Fri 29/03/13 |
| 34 | Cut cable back until good cable is found in both directions, deburying further as required | 0.5 days | Fri 29/03/13 | Sat 30/03/13 |
| 35 | Depending on CRV, deburial tool may have to be returned to port to make deck space for jointing operation | 1 day | Sat 30/03/13 | Sun 31/03/13 |
| 36 | First joint repair | 24 hrs | Sun 31/03/13 | Mon 01/04/13 |
| 37 | Test first joint | 6 hrs | Mon 01/04/13 | Mon 01/04/13 |
| 38 | Cable laid off in direction of capped cable end | 4 hrs | Mon 01/04/13 | Mon 01/04/13 |
| 39 | Cable end recovered to deck | 4 hrs | Mon 01/04/13 | Mon 01/04/13 |
| 40 | Second joint repair | 24 hrs | Mon 01/04/13 | Tue 02/04/13 |
| 41 | Cable repair bight deployed to seabed | 4 hrs | Tue 02/04/13 | Tue 02/04/13 |
| 42 | Cable tested | 6 hrs | Tue 02/04/13 | Wed 03/04/13 |
| 43 | If required, burial tool mobilised onto CRV | 1 day | Wed 03/04/13 | Thu 04/04/13 |
| 44 | Repair bight jetted onto seabed | 1 day | Thu 04/04/13 | Fri 05/04/13 |
| 45 | Test cable installation | 6 hrs | Fri 05/04/13 | Fri 05/04/13 |
| 46 | Vessel transit to Burntisland | 2.5 days | Fri 05/04/13 | Sun 07/04/13 |
| 47 | Demobilisation | 2 days | Sun 07/04/13 | Tue 09/04/13 |
| 48 | **Reporting** | **1 day** | **Tue 09/04/13** | **Wed 10/04/13** |
| 49 | As laid route record | 1 day | Tue 09/04/13 | Wed 10/04/13 |




Project: Complete Process Repair
Date: Fri 01/11/13

| | | | |
|---|---|---|---|
| Task | External Milestone | Manual Summary Rollup | |
| Split | Inactive Task | Manual Summary | |
| Milestone | Inactive Milestone | Start-only | |
| Summary | Inactive Summary | Finish-only | |
| Project Summary | Manual Task | Deadline | |
| External Tasks | Duration-only | Progress | |

| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 1 | **Inter Array Repair Plan - Replacement of Entire Inter Array Cable** | **120.96 days** | **Mon 17/12/12** | **Wed 17/04/13** |
| 2 | **Pre-Planning** | **30 days** | **Mon 17/12/12** | **Wed 16/01/13** |
| 3 | Procurement of spares | 30 days | Mon 17/12/12 | Wed 16/01/13 |
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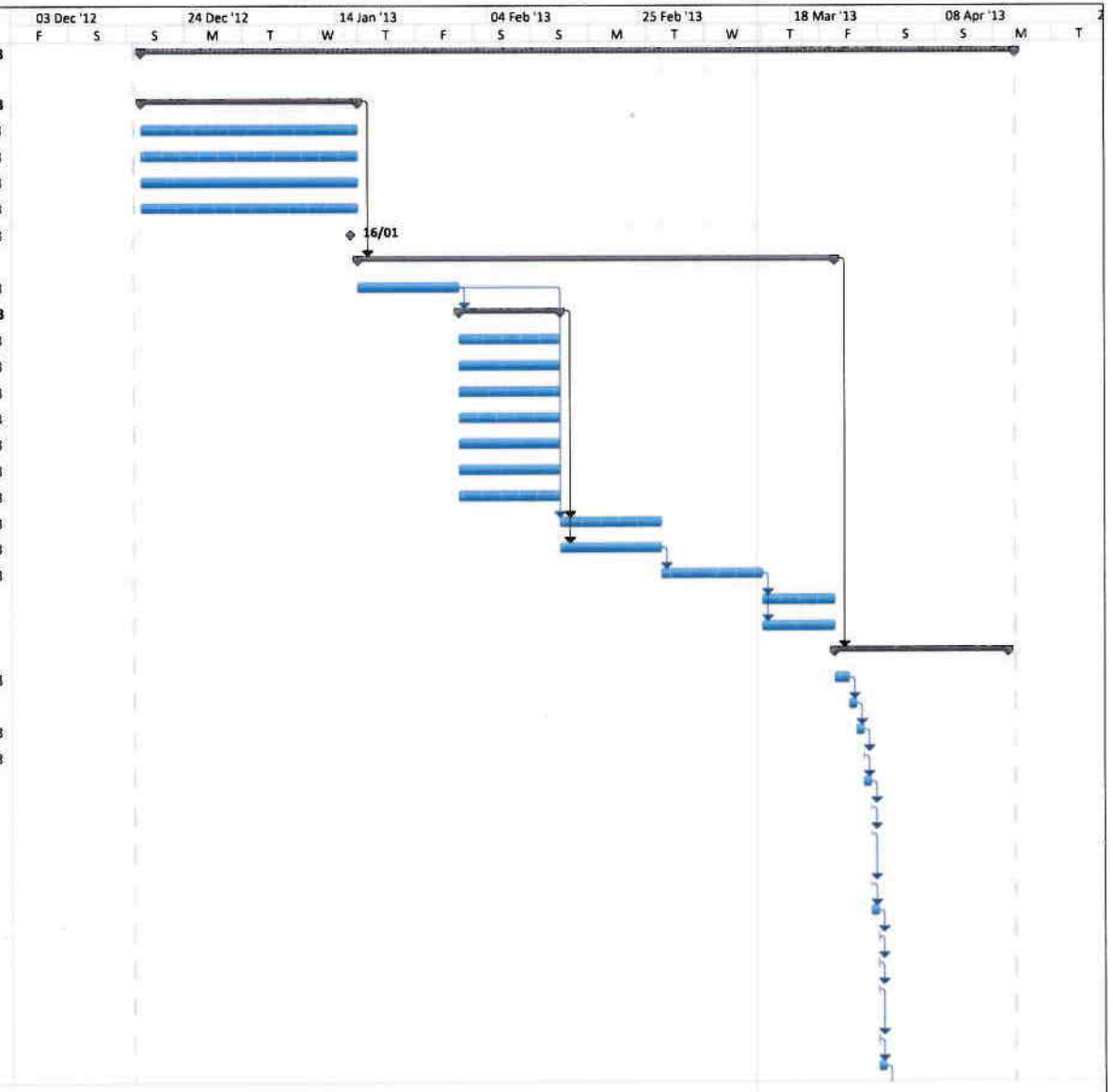
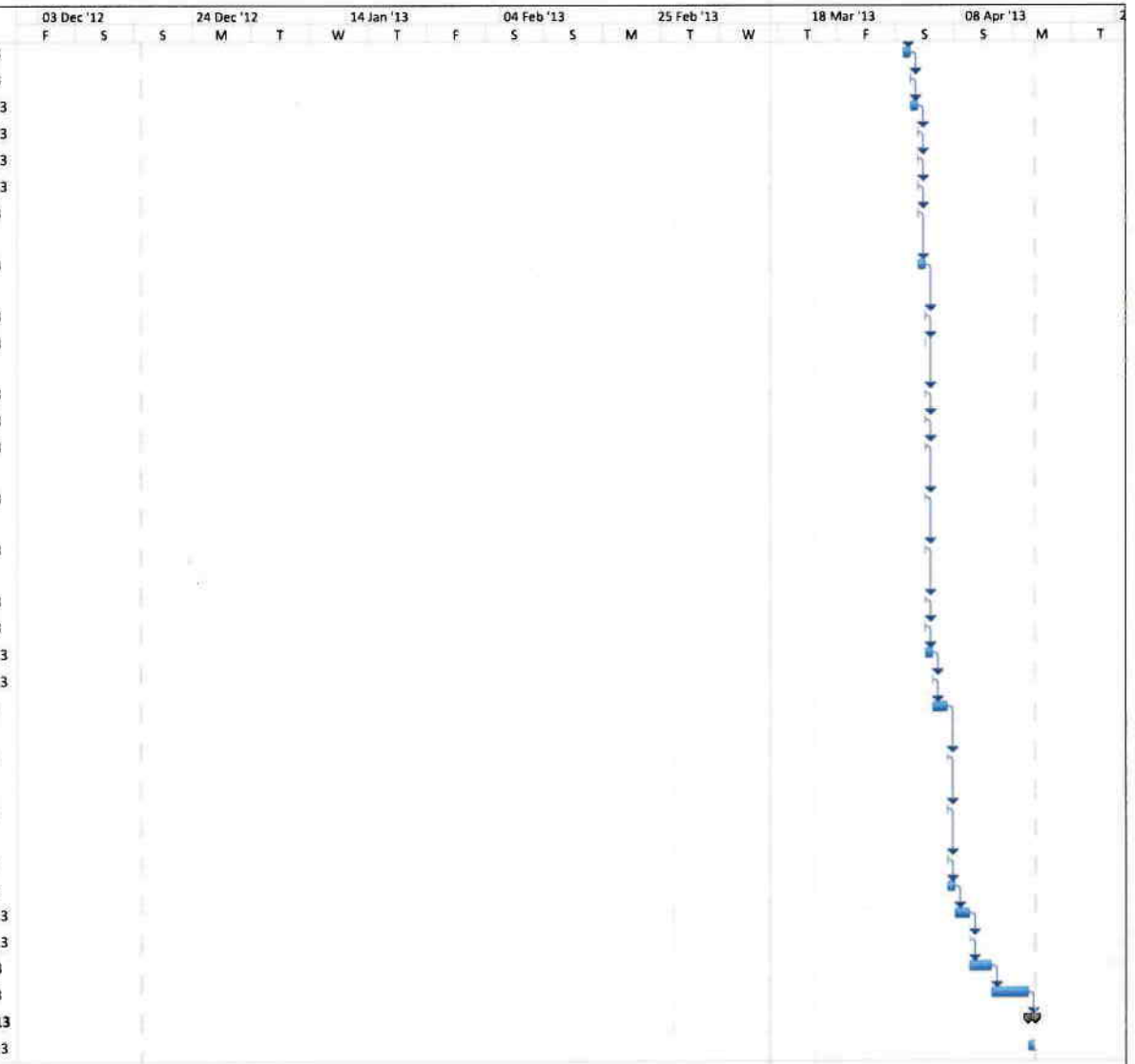
| 10 | **Contract placement** | **14 days** | **Wed 30/01/13** | **Wed 13/02/13** |
| 11 | Main contractor | 14 days | Wed 30/01/13 | Wed 13/02/13 |
| 12 | Subcontractors | 14 days | Wed 30/01/13 | Wed 13/02/13 |
| 13 | Pre-repair survey | 14 days | Wed 30/01/13 | Wed 13/02/13 |
| 14 | Local plant and machinery | 14 days | Wed 30/01/13 | Wed 13/02/13 |
| 15 | Specialist equipment | 14 days | Wed 30/01/13 | Wed 13/02/13 |
| 16 | Divers | 14 days | Wed 30/01/13 | Wed 13/02/13 |
| 17 | Jointers | 14 days | Wed 30/01/13 | Wed 13/02/13 |
| 18 | Repair planning following fault location | 14 days | Wed 13/02/13 | Wed 27/02/13 |
| 19 | HAZOP/HAZID | 14 days | Wed 13/02/13 | Wed 27/02/13 |
| 20 | Method Statement/Risk Assessment | 14 days | Wed 27/02/13 | Wed 13/03/13 |
| 21 | Survey | 10 days | Wed 13/03/13 | Sat 23/03/13 |
| 22 | Vessel mobilisation | 10 days | Wed 13/03/13 | Sat 23/03/13 |
| 23 | **Repair** | **23.96 days** | **Sat 23/03/13** | **Tue 16/04/13** |
| 24 | Vessel transit to site | 2.5 days | Sat 23/03/13 | Mon 25/03/13 |
| 25 | Final survey to determine safe mooring positions | 1 day | Mon 25/03/13 | Tue 26/03/13 |
| 26 | AHT lays mooring spread | 8 hrs | Tue 26/03/13 | Wed 27/03/13 |
| 27 | AHT moves CRV into position at first turbine | 2 hrs | Wed 27/03/13 | Wed 27/03/13 |
| 28 | Deburial of section around exit of J-Tube | 1 day | Wed 27/03/13 | Thu 28/03/13 |
| 29 | Cut exposed cable end | 6 hrs | Thu 28/03/13 | Thu 28/03/13 |
| 30 | Divers attach rigging gear to cable end exiting J-tube. Pulling line attached back to winch on vessel | 6 hrs | Thu 28/03/13 | Thu 28/03/13 |
| 31 | Pulling line transeferred from vessel to platform | 4 hrs | Thu 28/03/13 | Thu 28/03/13 |
| 32 | Cable ends disconnected from switchgear and pulling s | 4 hrs | Thu 28/03/13 | Fri 29/03/13 |
| 33 | Pulling line from vessel attached to cable end on platfo | 2 hrs | Fri 29/03/13 | Fri 29/03/13 |
| 34 | Cable pulled from vessel down through J Tube. | 6 hrs | Fri 29/03/13 | Fri 29/03/13 |
| 35 | Messenger wire down through J-tube recovered to deck and buoyed off | 2 hrs | Fri 29/03/13 | Fri 29/03/13 |
| 36 | Move to second turbine location | 6 hrs | Fri 29/03/13 | Fri 29/03/13 |
| 37 | Final survey to determine safe mooring positions | 1 day | Fri 29/03/13 | Sat 30/03/13 |




Project: Complete Process Repair
Date: Fri 01/11/13

Task
Split
Milestone
Summary
Project Summary
External Tasks
External Milestone
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
Deadline
Progress

| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 38 | AHT lays mooring spread | 8 hrs | Sat 30/03/13 | Sun 31/03/13 |
| 39 | AHT moves CRV into position at second turbine | 2 hrs | Sun 31/03/13 | Sun 31/03/13 |
| 40 | Deburial of section around exit of J-Tube | 1 day | Sun 31/03/13 | Mon 01/04/13 |
| 41 | Cut exposed cable end | 6 hrs | Mon 01/04/13 | Mon 01/04/13 |
| 42 | Divers attach rigging gear to cable end exiting J-tube. F | 6 hrs | Mon 01/04/13 | Mon 01/04/13 |
| 43 | Pulling line transferred from vessel to platform | 4 hrs | Mon 01/04/13 | Mon 01/04/13 |
| 44 | Cable ends disconnected from switchgear and pulling stocking attached | 4 hrs | Mon 01/04/13 | Tue 02/04/13 |
| 45 | Pulling line from vessel attached to cable end on platform | 2 hrs | Tue 02/04/13 | Tue 02/04/13 |
| 46 | Cable pulled from vessel down through J Tube. | 6 hrs | Tue 02/04/13 | Tue 02/04/13 |
| 47 | Pulling line recovered to deck pulling cable through J-tube | 6 hrs | Tue 02/04/13 | Tue 02/04/13 |
| 48 | Bouy off messenger wire | 2 hrs | Tue 02/04/13 | Tue 02/04/13 |
| 49 | Connect cable pulling head to messenger wire. | 1 hr | Tue 02/04/13 | Tue 02/04/13 |
| 50 | Connect messenger wire to pulling winch on turnbine platform | 2 hrs | Tue 02/04/13 | Tue 02/04/13 |
| 51 | Pay cable out through cable engine and pull messenger on winch | 4 hrs | Tue 02/04/13 | Tue 02/04/13 |
| 52 | When cable fully through J-tube, stopper off in turbine | 2 hrs | Tue 02/04/13 | Tue 02/04/13 |
| 53 | Slip moorings | 2 hrs | Tue 02/04/13 | Tue 02/04/13 |
| 54 | Lay cable from Turbine 2 off to the side of turbine 1 | 2 hrs | Tue 02/04/13 | Tue 02/04/13 |
| 55 | CRV enter mooring pattern at second end. | 2 hrs | Tue 02/04/13 | Wed 03/04/13 |
| 56 | Second end turned over on deck | 4 hrs | Wed 03/04/13 | Wed 03/04/13 |
| 57 | Messenger wire recovered and connected to pulling head | 2 days | Wed 03/04/13 | Fri 05/04/13 |
| 58 | Cable deployed through powered quadrant as messenger wire pulled by winch | 2 hrs | Fri 05/04/13 | Fri 05/04/13 |
| 59 | Cable pulled up the termination point and stoppered off | 2 hrs | Fri 05/04/13 | Fri 05/04/13 |
| 60 | Anchors recovered. | 4 hrs | Fri 05/04/13 | Fri 05/04/13 |
| 61 | If required, burial tool mobilised onto CRV | 1 day | Fri 05/04/13 | Sat 06/04/13 |
| 62 | Cable buried at exit of turbine | 2 days | Sat 06/04/13 | Mon 08/04/13 |
| 63 | Test cable installation | 6 hrs | Mon 08/04/13 | Mon 08/04/13 |
| 64 | Vessel transit to Burntisland | 2.5 days | Mon 08/04/13 | Thu 11/04/13 |
| 65 | Demobilisation | 5 days | Thu 11/04/13 | Tue 16/04/13 |
| 66 | **Reporting** | **1 day** | **Tue 16/04/13** | **Wed 17/04/13** |
| 67 | As laid route record | 1 day | Tue 16/04/13 | Wed 17/04/13 |




Project: Complete Process Repair
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Task
Split
Milestone
Summary
Project Summary
External Tasks
External Milestone
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
Deadline
Progress

## 7. ENVIRONMENT

Waste management procedures will be in place for the operations and no waste will be disposed of over the side of the vessel.

Produced waste will be stored on board. Oil and fuel will be sited on a safe and level platform and will conform to regulations regarding oil storage.

Appropriate safety precautions will be followed during refuelling activities to minimise the risk of an oil spill. BMC will carry a Tier 1 Environmental Operative on board during operations.

All waste products and rubbish will be removed from the vessel and disposed of by a registered waste disposal company.

Copies of Environment Agency (EA) Pollution Prevention Guidelines are incorporated into this Method Statement and can be found in Appendix 2.

## 8. ROLES AND RESPONSIBILITIES

Safe working practices are a priority throughout all operations. Particular attention will be paid to briefing and operational training of the local contractors who will be supervised at all times by Briggs personnel.

All diving will be carried out to the requirements of the Offshore Project Manager and under the restrictions imposed by the HSE.

Prior to all operations, Toolbox Talks will be given by the BMC Marine Superintendent to all personnel on board.

Offshore Project Manager will have overall responsibility and control on site at all times:

- Ensuring all quality and safety requirements are identified and fully communicated, where necessary, to all relevant project personnel.
- Identification of the engineering support required in establishing the project specifications and project control procedures and communication of these requirements including, the control and co-ordination of engineering staff.
- Responding to all technical queries ensuring communication of formal responses to all interested parties.
- Preparation of the project control procedures and communication of requirements, including liaison with the other departments to undertake any engineering analysis required.
- Control and monitoring of sub-contract engineering activities.
- Monitoring the construction and installation activities and advising the relevant personnel of technical matters.
- Reporting and maintaining records in accordance with project requirements.
- Produce all necessary project control procedures, drawings and design criteria, in conjunction with other relevant parties, in order to meet the requirements of the project.
- Monitoring all engineering and design control activities.
- Interfacing and communicating with all parties undertaking the preparation and development of engineering analysis and preparation of installation procedures including sub-contractors design activities.
- Liaise with clients regularly concerning all planned work activities, personnel and equipment movements.
- Issuing of DPRs.

Vessel Master is ultimately responsible for, but not limited to, the following:

- The safety of the barge and all personnel on board.
- Ensuring that the company standards are maintained in all aspects of the operation.
- Ensuring that all project personnel are familiarised with the barge and its normal operating practices.
- Coordinating the liaison and logistics between vessels within the field, although the request to call for a vessel move may be under the control of the Offshore Manager
- Control all marine activities related to vessels required for the activities covered in this procedure.

The Marine Superintendent has control of safe deck, shore end, cable handling and rigging operational tasks:

- Ensuring the safe and adequate performance and effectiveness of personnel and equipment involved in the various functions of the deck and shore end operations and associated tasks.
- Ensure that the Company HSEQ Management System is applied, where applicable, for all aspects of the operations.
- Participation in HAZOP/Risk Assessment studies performed against project procedures.
- Ensuring that all operations are assessed for potential risk and that critical operations are reviewed and task risk assessments are performed.
- Managing the operations in a safe and efficient manner and report incidents in a timely manner to the Offshore Project Manager, Client Representative and where appropriate, to the relevant authorities.
- Fully investigating, and documenting all incidents to ensure the root cause is determined and in liaison with the Project Manager and relevant authority.
- Worksite establishment including mobilisation and vessel set up prior to diving.
- Ensure all personnel wear the appropriate PPE and safety equipment in performance of their duties.
- Ensure that company health, safety, drugs and alcohol policies are adhered to.
- Supervising subcontracted labour (e.g. excavator operators etc.)
- Supervise all winch manoeuvres, excavating and rigging.
- Demobilisation of equipment spreads.

## 9. COMMUNICATION LIST

An Emergency Communications Card can be found in Appendix 3, detailing:

- A list of telephone numbers for important EC&R, BMC and sub-contractor personnel;
- A list of local emergency telephone numbers covering the location of operations, e.g. medical assistance, local hospital and coast guard.

## 10. REPORTING

A Daily Progress Report (DPR) will be sent to EC&R via email. A template DPR can be found in Appendix 4.

## APPENDIX 1. VESSEL SPECIFICATION

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Briggs Marine & Environmental Services
Seaforth House, Seaforth Place, Burntisland, Fife, KY3 9AX
Tel: +44 (0)1592 872939
Email: marketing@briggsmarine.com
www.briggsmarine.com

# Forth Guardsman

| General information |
|---|
| **Built:** Japan 1983 |
| **Length:** 50.0m |
| **Length between perpendiculars:** 48.8m |
| **Breadth moulded:** 14.6m |
| **Depth moulded:** 3.1m |
| **Draft Min operation:** 0.9m |
| **Max operation:** 2.1m |
| **Registered tonnage Gross:** 722 |
| **Net:** 412 |
| **Fuel oil day tank:** 3.5m3 |
| **Fresh water:** 480m3 |
| **Sludge tank:** 20.0m3 |
| **Fuel oil storage:** 1.0m3 |
| **Water ballast:** 72.9m3 |
| **Deck loading:** 8.0T/m2 |
| **Dead weight:** 772 tonnes |
| UK MCA Loadline Exemption Certificate |
| **Pollution Recovery Capability:** Fully certified as a tanker recovery vessel with a capacity of 750 tonnes for recovered oil |
| **Full speed:** 8.5knots @ 3.7 tonnes/day |

| Main Equipment |
|---|
| **Main Engines:** 2 Cummins VTA - 1710M diesels each 500 BHP; each propelling hydraulic retractable drives |
| 2 Cummins N-855-G diesels each driving Leroy Somer AZ2510M6 alternators; total output 250kw, 460v, 3 phase, 60Hz |
| 2 x 0.9 tonne anchors |
| 2 fuel oil cargo pumps, capacity 833.3 litres/min at 50m head |
| 1 fresh water cargo pump capacity 833.3 litres/min at 50m head |
| 1 Gorman Rupp fire and general service pump |
| 1 bilge pump |
| 1 fresh water pump |
| 1 emergency bilge pump |
| 1 five-person lifeboat |
| 2 life rafts capable of accommodating 12 people |
| Life buoys |
| Life jackets |
| Survival suits |
| **Accommodation:** 3 single berths, 2 double berths |
| **Crew:** Six persons |

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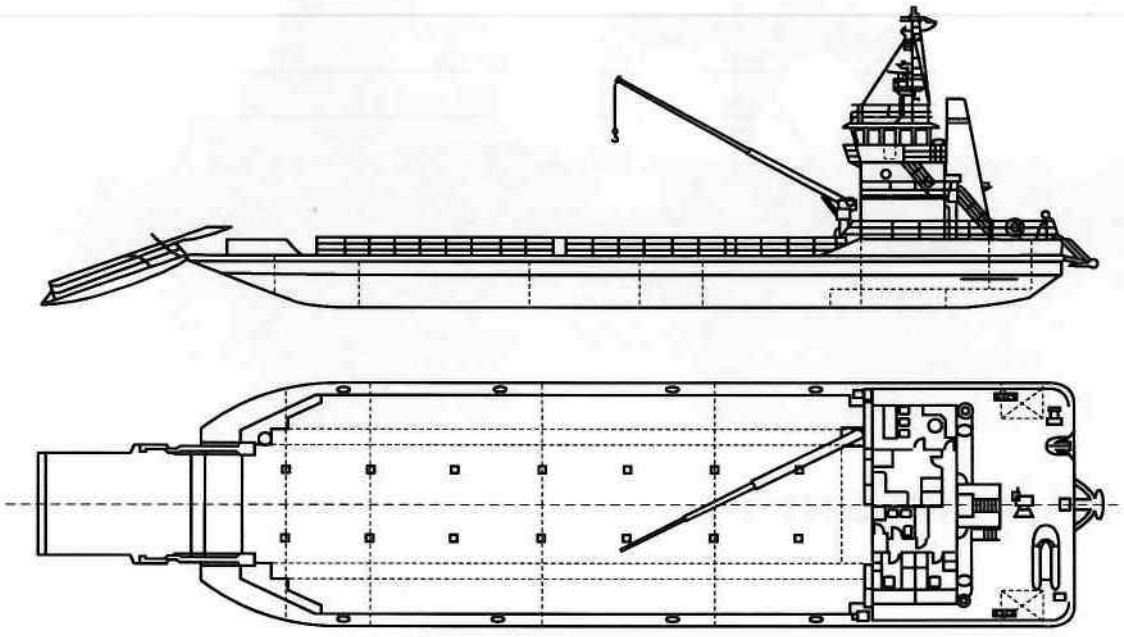

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# Forth Constructor

| General information |
|---|
| **Built:** 1994 |
| **Length:** o/a 28.50m |
| **Breadth:** 9.45m |
| **Moulded depth:** 4.27m |
| **Max draught:** 2.85m |
| **Min draught:** 2.30m |
| **Shell plating:** all welded 9.5mm thick |
| **Deck plating:** 12.5mm |
| 600mm diameter bow roller for anchor handling |
| Twin push bows |
| Towing bitts and quick release tow hook on aft deck |
| Anchor and capstan winch |
| Towing winch type ACE c/w 500 metres, 36mm wire |

| Main Equipment |
|---|
| Twin Doosan main engines |
| V180TIH series 600HP @ 2000RPM |
| Two Ulstien 360° propulsion units type US105 |
| Two Doosan generator engines GEC 220 volt DC x 70 KVA |
| Russell Newbury auxiliary genset x 20 KVA pumps -fire pump, bilge pump, oil transfer pump |
| 120 tonne metre EFFER marine crane c / w |
| 19.45 metre jib, 360° continuous slewing |
| 17T Bollard Pull |
| **Accommodation:** Two twin bunk cabins, galley / mess room, toilet & shower |
| Navigation Equipment, Lifesaving Equipment, All equipment approved by MSA |
| Deck cargo: 250 tonnes sheltered waters, 150 tonnes coastal waters. Potable water capacity 200 tonnes. Fuel in vessel tanks 54 tonnes |
| Hydraulic oil, lube oil and fuel oil can be supplied to deck through a meter for fuelling other vessels etc |
| International Loadline Certification |

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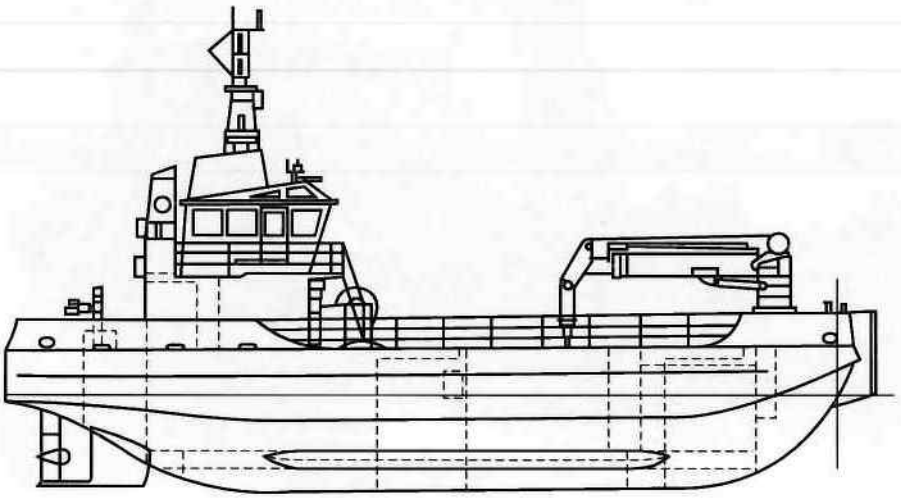

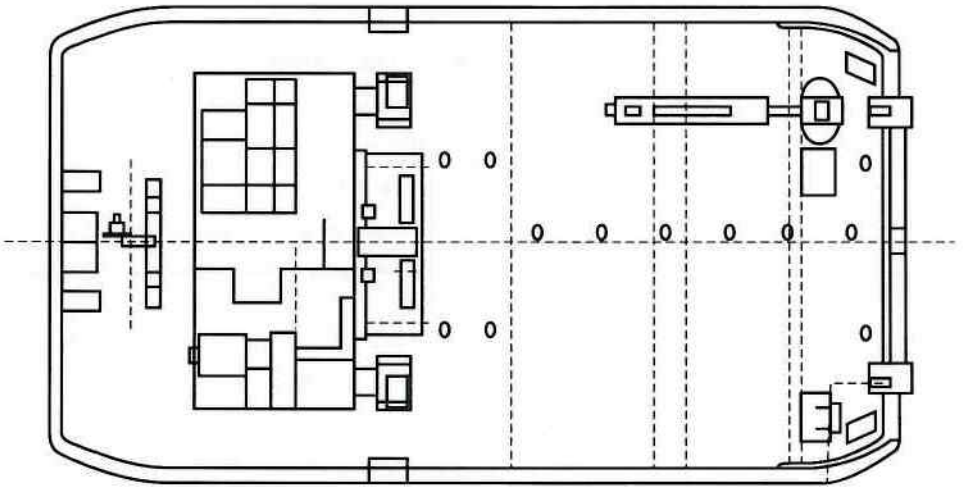

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# Forth Fighter

| General information |
|---|
| **Built:** 1985 |
| **Rebuilt:** 2001 |
| **Length:** 23.50m |
| **Beam:** 7.50m |
| **Draft:** 1.50m |
| Fixed Kort Nozzles |
| 4 Blade Propellers |
| Reg Tonnage 55.13 |
| UK MCA Workboat Code Cat 2 |

| Main Equipment |
|---|
| **Engines:** 2 x Man 320 hp each |
| Hydraulic 65T m teleboom Effer crane |
| Damen deck winch 15 tonne pull |
| 12.5mm deck plate |
| Push bows |
| Bollard pull 8 tonnes |
| Freshwater and fuel transfer facility |
| Autopilot |
| VHF x 2 |
| GMDSS x 1 |
| Radar / plotter / echo sounder integrated systems x 2 |
| Sat DGPS x 2 |
| Magnetic compass |
| Navtex |
| Mobile phone |
| **Accommodation and Mess** 2 Crew |

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# Forth Fighter