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Gjøa Subsea Operations Manual

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1. INTRODUCTION

This document outlines the requirements of Neptune Energy as Operator of the Gjøa field for offshore operations typically involving subsea inspection, maintenance, or repair activities at or related to Gjøa field, Duva, and P1 subsea facilities.

This document sets out the basic operating requirements that apply to ROVs, AUVs, ROTVs, divers and subsea intervention vessels, including some conditions that apply to seismic surveys.

For the purposes of this document “subsea operations” is deemed to mean subsea interventions involving ROVs, AUVs, ROTVs, side scan towed fish, or divers working on or related to Gjøa, Duva, or P1 subsea assets, but not including drilling.

Due to the location of the Gjøa ESVs which are mounted directly on the top of the pipeline risers, and the barrier testing requirements for the topside removal or replacement of an ESV, these activities are also addressed in this document.

This document should be read in conjunction with Marine Operations Manual [Ref 5] which outlines the basic technical requirements for subsea intervention vessels at Gjøa. Hire of vessels for subsea operations shall be performed in close cooperation with Neptune Energy Deck and Marine Leaders. In the event of any conflicts on operational issues this document shall take primacy.

This document is aimed at subsea Contractor’s project managers, vessel offshore managers / superintendents, vessel Masters, marine crews, project / inspection engineers, as well as Neptune Energy Offshore Representatives, OIMs, subsea, marine and materials / logistics personnel.

2. PURPOSE

The purpose of this document is to outline the requirements of Neptune Energy for subsea IMR operations (not involving drilling or construction-installation), carried out in or related to the Gjøa field, Duva, and P1 subsea facilities. Vega and Nova facilities that are within the Gjøa field are also subject to these requirements.

3. SCOPE

The scope of this document is subsea IMR operations carried out from vessels in or related to the Gjøa field and Gjøa, Duva, and P1 subsea assets. This includes the infield subsea assets, part* of the export pipelines and the power cable between the Gjøa Semi and the landfall at Mongstad. Operations connected with new development work are not within the scope.

(* The entire oil export pipeline, and the gas export pipeline within the Gjøa Semi safety zone.)

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No activities involving divers are foreseen for Gjøa, Duva, or P1 subsea assets on the seabed, they are beyond the maximum normal operating depth of divers. However, the power cable close to Mongstad, the hull of the Gjøa Semi, the upper parts of the moorings and risers are within the reach of divers.

The Gjøa field main standby vessel is equipped with an observation class ROV. This ROV is intended for occasional use for simple observation and inspection tasks. ROV operations undertaken from this vessel shall also be carried out in accordance with this document.

Drilling operations and tree / template interventions such as work overs carried out from drill rigs or monohull drilling / intervention vessels are not covered by this document.

The normal operations of supply vessels and the field standby vessel are not covered by this document.

4. OWNERSHIP AND ADMINISTRATION

Ownership and maintenance of this document is the responsibility of the OIM on the Gjøa.

5. ABBREVIATIONS

The following abbreviations are used in this document:

AUV	Autonomous Underwater Vehicle
CMID	Common Marine Inspection Document
CPI	Company Provided Items
DFU	<i>Definerte fare- og ulykkessituasjoner (Defined hazard and accident situation)</i>
DP	Dynamic Positioning
ESV	Emergency Shutdown Valve
ETA	Estimated Time of Arrival
GERB	Gas Export Riser Base
GIRB	Gas Import Riser Base
GLRB	Gas Lift Riser Base
G-OMO	Guidelines for Offshore Marine Operations
HAZOP	Hazard and Operability Analysis – i.e. hazard identification and risk assessment process
IMO	International Maritime Organisation
Incident	An emergency or reportable accident or near miss
IMR	Inspection Maintenance and Repair subsea operations
Intrusive Activity	Subsea activity that involves breaking into subsea pipework or components that contain hydrocarbons or gas or fluids at high pressure
KP	Kilometre Post
MOB	Man Overboard Boat
Non-Intrusive Activity	Subsea activity that does not involve breaking into subsea pipework or components that contain hydrocarbons or gas or fluids at high pressure
NMD	Norwegian Maritime Directorate
OIM	Offshore Installation Manager (Onboard Gjøa Semi)
PLEM	Pipeline End Manifold
PPE	Personal Protective Equipment
OIRB	Oil Import Riser Base
ROTV	Remotely Operated Towed Vehicle
ROV	Remotely Operated Vehicle
SBL	Short Base Line
SIMOPS	Simultaneous Operations
SPS	Subsea Production System
SMS	Safety Management System
SSBL	Super Short Base Line



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SSIV	Subsea Isolation Valve
D&M M	Deck and Marine Manager (stationed on Gjøa Semi)
TMS	ROV Tether Management System
USBL	Ultra Short Base Line
VERB	Vega Export Riser Base

6. FIELD DESCRIPTION

This section contains a basic description of the Gjøa field. A field layout drawing is included in the Appendices.

6.1 General Field Description

Gjøa is located in blocks 35/9 and 36/7, approximately 45 km West of Sognefjorden, 80 km Northeast of Kvitebjørn and 70 km north of Troll. The water depth in the area is around 360-370m. Figure 1 provides a field representation showing the Gjøa “A” semi-submersible production facility (the Semi) and the subsea production structures.



Figure 1 - GJØA FIELD PRESENTATION (Duva & P1 NOT SHOWN)

Gjøa field is developed with four 4-slot templates (B, C, D and E) and one 1-slot template for production (satellite well F).

The Gjøa Semi has been installed to carry the equipment necessary for treatment of the well stream from the subsea templates, and to serve as starting point for the gas and oil export pipelines. In addition to the production from Gjøa, well stream Neptune Energy Duva, P1, and from Wintershall’s neighbouring Vega and Nova fields are routed to Gjøa for treatment and subsequently exported together with the Gjøa volumes.

Figure 2 provides a simple schematic layout for the Gjøa, Duva, and P1 field developments.

Figure 3 provides an overview of the Wintershall Nova development.

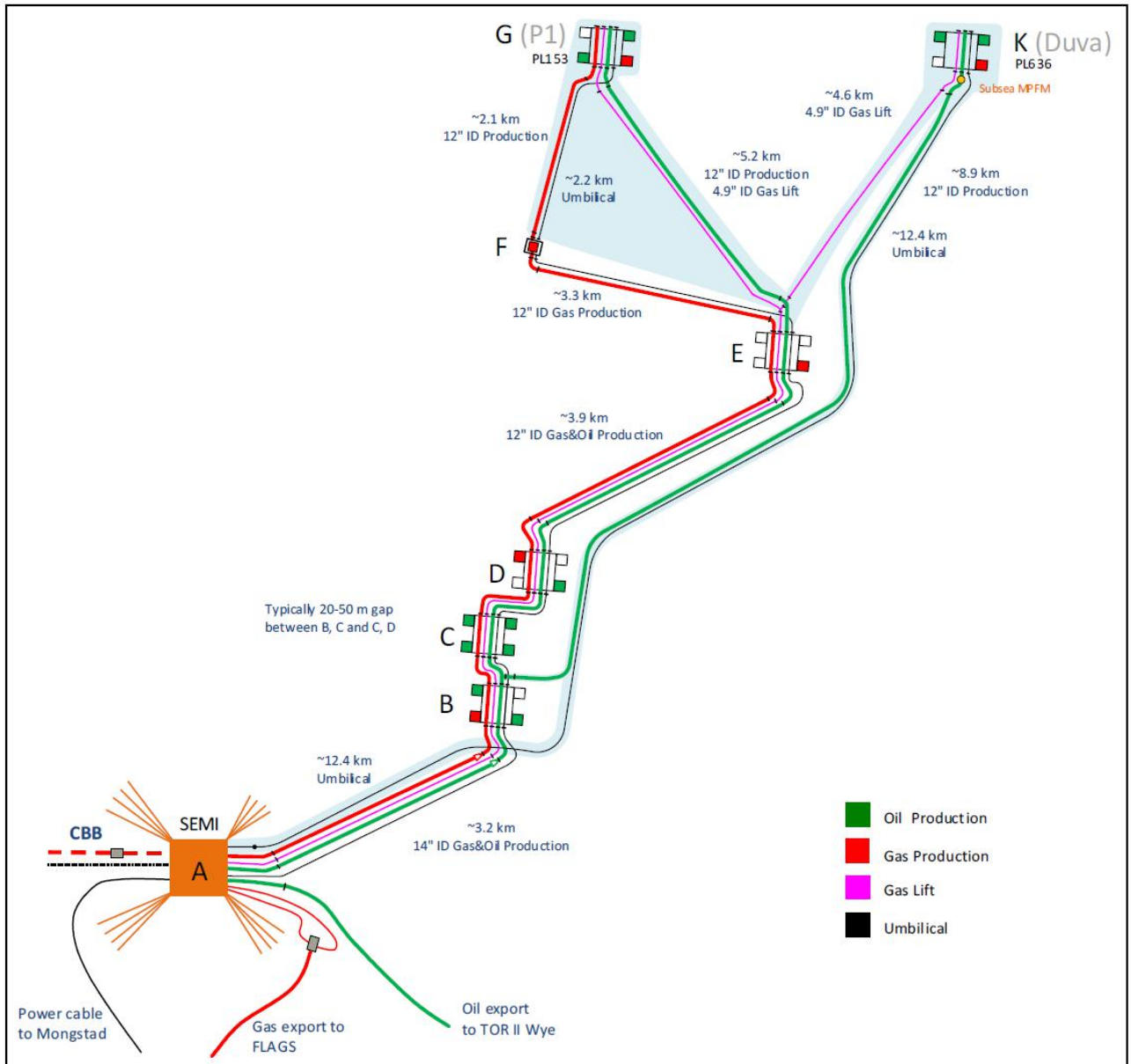


Figure 2 - FIELD SCHEMATIC Gjøa, Duva, & P1

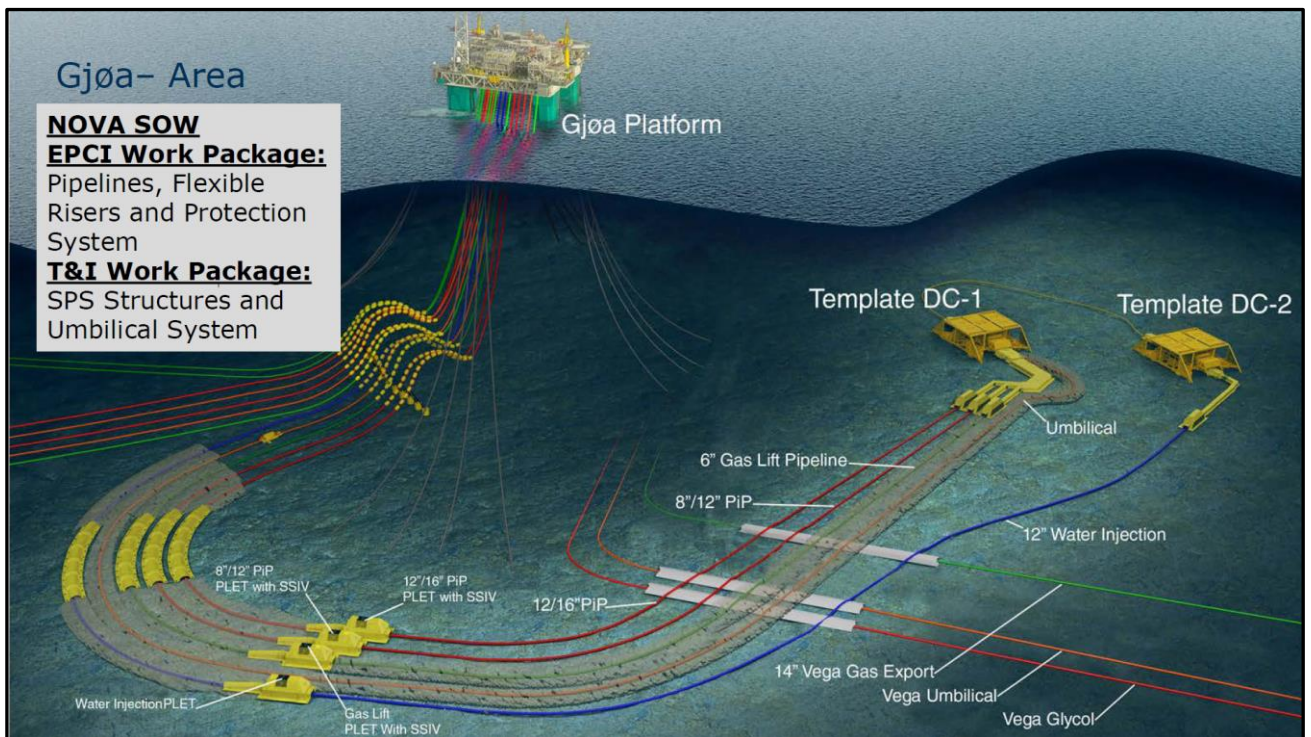


Figure 3 Wintershall 'Nova' PLET's and Risers at Gjøa

6.2 Gjøa Semi

The Gjøa Semi is a semi-submersible production unit. The location of the centre of the Gjøa Semi is given in Section 6.3 in UTM co-ordinates.

The Gjøa Semi is secured by a system of 16 moorings. The locations of the anchors are detailed in Section 6.3 as UTM co-ordinates

The infield and export pipelines, control umbilicals, Vega riser base, and Nova pipelines are connected by flexible risers to the East face of the Gjøa Semi. *Note – the Vega riser base is located on the West side of Gjøa, its riser and the Vega Control Umbilical riser approach Gjøa East side by passing under the Semi from the West. The Gjøa power cable is connected by flexible riser to the West face of the Gjøa Semi. The locations of the riser bases are also detailed in Section 6.3.2 as UTM co-ordinates.

6.3 Location Data

The overview and the locations of Gjøa A Semi and Subsea Templates can be found in drawing C097-GJO-A-RF-0022 Gjøa – Overview [Ref 13]

UTM Position reference system - Datum ED50, Projection UTM Zone 31

6.3.1 Gjøa Semi Location

Semi centre	UTM co-ordinates	Northing 6 800 300	Easting 547 999
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*Note that the Gjøa Semi has a potential excursion radius of 70m.

6.3.2 Riser Base Locations

Fourteen flexible risers are located on the East face of Gjøa Semi connecting to seabed riser bases, PLETS, or Transition joints. The riser bases include the following:

OIRB	UTM co-ordinates	Northing 6 800 257.46	Easting 548 501.60
GIRB	UTM co-ordinates	Northing 6 800 334.69	Easting 548 501.73
GLRB	UTM co-ordinates	Northing 6 800 303.73	Easting 548 541.93
GERB	UTM co-ordinates	Northing 6 800 092.49	Easting 548 461.84
OERB	UTM co-ordinates	Northing 6 800 153.53	Easting 548 478.34
VERB	UTM co-ordinates	Northing 6 800 266.65	Easting 547 609.89

6.3.3 Gjøa Semi Anchor Locations

1	UTM co-ordinates	Northing 6 799 452	Easting 547 354
2	UTM co-ordinates	Northing 6 799 507	Easting 547 282
3	UTM co-ordinates	Northing 6 799 571	Easting 547 217
4	UTM co-ordinates	Northing 6 799 637	Easting 547 156
5	UTM co-ordinates	Northing 6 801 109	Easting 546 964
6	UTM co-ordinates	Northing 6 801 192	Easting 547 038
7	UTM co-ordinates	Northing 6 801 270	Easting 547 120
8	UTM co-ordinates	Northing 6 801 340	Easting 547 207
9	UTM co-ordinates	Northing 6 800 865	Easting 548 428
10	UTM co-ordinates	Northing 6 800 829	Easting 548 474
11	UTM co-ordinates	Northing 6 800 788	Easting 548 519
12	UTM co-ordinates	Northing 6 800 744	Easting 548 560
13	UTM co-ordinates	Northing 6 799 454	Easting 549 083
14	UTM co-ordinates	Northing 6 799 366	Easting 549 005
15	UTM co-ordinates	Northing 6 799 286	Easting 548 920
16	UTM co-ordinates	Northing 6 799 214	Easting 548 829

6.3.4 Template / Satellite Well F Locations

B	UTM co-ordinates	Northing 6 801 231.80	Easting 551 296.97
C	UTM co-ordinates	Northing 6 801 290.74	Easting 551 278.08
D	UTM co-ordinates	Northing 6 801 345.11	Easting 551 307.62
E	UTM co-ordinates	Northing 6 803 875.65	Easting 554 255.50
F	UTM co-ordinates	Northing 6 806 585.08	Easting 552 419.17

6.3.5 P1 Template

G	UTM co-ordinates	Northing 6 808 483.20	Easting 553 364.30
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6.3.6 Duva Template

K	UTM co-ordinates	Northing 6 807 999.70	Easting 556 999.50
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6.3.7 Nova PLET's

12"/16" Production PLET	UTM co-ordinates	Northing 6 800 658.53	Easting 548 842.8
8"/12" Production PLET	UTM co-ordinates	Northing 6 800 649.38	Easting 548 863.54
6" Gas Lift PLET	UTM co-ordinates	Northing 6 800 671.70	Easting 548 852.48
Umbilical UTJ	UTM co-ordinates	Northing 6 800 664.90	Easting 548 864.39
Water Injection PLET	UTM co-ordinates	Northing 6 800 653.07	Easting 548 888.29

6.3.8 Other Locations

Kvitebjorn Wye

UTM co-ordinates	Northing 6 746 565	Easting 557 600
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Power Cable

Crossing of Gjøa oil export pipeline	UTM co-ordinates	Northing 6 794 310	Easting 549 684
Mongstad landfall	UTM co-ordinates	Northing 6 743 453	Easting 611 066.9

Note that the dynamic part of the Power cable is strongly influenced by current.

7. ROLES AND RESPONSIBILITIES

7.1 Neptune Energy Subsea Group

The Neptune Energy Subsea engineer is responsible for ensuring all non-drilling and non-workover related subsea interventions carried out in the Gjøa field or associated with the Gjøa subsea assets are carried out safely, efficiently, in accordance with Neptune Energy governing documents and in accordance with Norwegian legislation [Ref 1, 2].

The Neptune Energy Subsea engineer based in the Technical Department, Neptune Energy AS, Forus, Stavanger shall arrange and oversee some of the subsea interventions in or related to the Gjøa field and subsea assets. Any subsea interventions initiated by other Neptune Energy groups or by other third parties must be planned in consultation with the Neptune Energy Subsea engineer, who will review /audit / inspect the subsea intervention HAZOP process, work procedures, equipment and vessels as deemed necessary by the Neptune Energy Subsea engineer.

7.2 Neptune Energy Offshore Representatives

Neptune Energy shall normally provide Offshore Representatives on all Contractors' vessels during any subsea interventions in the Gjøa field.

Neptune Energy expects Contractors to accommodate these Offshore Representatives as required on their vessels during subsea interventions in the Gjøa field.

The Neptune Energy Offshore Representatives shall be given access to all parts of the Contractor's vessel as they see fit, and will be kept fully informed on operational details and progress.

The Neptune Energy Offshore Representatives shall be given access to all parts of the Contractor's project video recordings and project data on site, without delays of any kind.

The Neptune Energy Offshore Representatives shall ensure that subsea operations are carried out safely and in accordance with Neptune Energy's HSE requirements. They shall be fully empowered by Neptune Energy to halt operations if they believe the work is not being carried out in a sufficiently safe or efficient manner.

The Neptune Energy Offshore Representatives shall also ensure that the subsea operations scope of work is carried out in accordance with Neptune Energy technical requirements. They can modify the sequence or the detail of the scope of work.

Where anomalies/defects are found in subsea equipment, these shall be reported to the Neptune Energy Offshore Representative on duty who shall ensure any severe defect, which presents an imminent threat to safety or the environment, is brought to the attention of the Gjøa OIM without delay.

The Neptune Energy Offshore Representatives shall act as a focal point for communications with Neptune Energy onshore and on Gjøa Semi. Normally issue and approval of Neptune Energy work permits, with or without associated isolations, and/or well handover certificates shall also be handled via the Neptune Energy Representatives.

For some short operations only one Neptune Energy Offshore Representative may be provided. As a general rule two representatives shall be provided to give 24 hour coverage. Some specialised operations may require more than two representatives. This could consist of one main representative, with overall responsibility for dealing with the Contractor and further specialised technical representatives per working shift.

7.3 Drilling/Intervention Rig OIM.

Any subsea interventions in the vicinity of drill rigs will require communication with and the co-operation of the drill rig.

The OIM on a drill rig in the Gjøa field shall be responsible for ensuring all activities carried out on or by the drill rig, or within the drill rig 500m zone are carried out safely, efficiently and in accordance with Neptune Energy governing documents and Norwegian legislation.

Subsea intervention activities that take place within the 500m zone of a drill rig in the Gjøa field, and that require a work permit, shall generally also require the work permit to be approved by the OIM on the drill rig. In this event a communications bridging document will describe the process to control operations.

Contractor's vessels are not permitted to commence operations within the 500m zone of a drill rig in the Gjøa field without the permission of the drill rig OIM.

8. PROJECT PLANNING AND EXECUTION

For operations which involve potential for environmental pollution within Gjøa field it is the responsibility of the operator conducting the work to inform themselves of, and make arrangements for, statutory requirements for prior notification of works to all governmental and interested organisations who may have right to such notification.

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9. INTERVENTION CONTRACTOR'S PROJECT PERSONNEL

Project crew are deemed to be those personnel employed temporarily for the purpose of the Neptune Energy subsea intervention. This latter category would typically include personnel such as project managers, project engineers, ROV, and inspection personnel.

All Contractors' project crew personnel are required to have emergency and survival training and medical fitness certificates that meet Norwegian Oil Industry Association (OLF) / G-OMO and Norwegian Oil and Gas Association requirements.

Supplementary to this, the Contractor is expected to operate a competency assessment / training system for his project crew. As with the marine crew, this may be in accordance with guidelines published by IMCA, or to a similar standard. Contractors shall also be required to confirm to Neptune Energy that all key project crew personnel are competent. As a general rule, Neptune Energy shall advise the minimum qualifications and experience of project crews in the relevant Neptune Energy governing documents or contract scopes of services that address the type of work to be carried out.

Before or during-vessel mobilisation, Neptune Energy shall check qualifications, emergency and survival training and medical certificates for Contractor's marine and project crews are all within date. Personnel without current documentation shall not be accepted by Neptune Energy.

10. IMR VESSEL REQUIREMENTS

Vessels conducting IMR work within the areas governed by this document shall comply with Neptune Energy document MSD-OANO-OD-05-00001 - Marine Operations Manual [Ref 5].

11. BRIDGING DOCUMENT

11.1 General

The following documents shall be prepared prior to mobilising a contractor vessel for IMR work on the Gjøa field:

- HSE Bridging Document – Contractor
- Operational Bridging Document – Neptune Energy
- Work Procedure/Operation Procedure Document – Contractor/Neptune Energy (as applicable)
- Project specific risk assessment with resulting HAZID register

11.2 Operational Bridging Document

This document is developed by Neptune Energy with the following objectives:

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- Reference key documents for the scope of work (in some cases this is covered in Subsea Operation Procedure Document)
- Define roles and responsibilities of key personnel
- Define operational limits
- Define communication lines
- Provide the 'Vessel Emergency Communications Flowchart'

11.3 Work Procedure/Operation Procedure Document

Work procedure with task plans shall be made for all operations. For routine operations it may be possible to use already existing procedures so long as these are reviewed and revised where necessary to ensure they remain fit for purpose. An Operation Procedure document is developed in special cases where more than 1 contractor is involved in operations. This document shall bridge between the different contractors procedures and be the overall governing document.

12. COMMUNICATIONS WITHIN GJØA FIELD

12.1 Contact details (Telephone)

Offshore Installation Manager	+47 52 03 20 00
Central Control Room (CCR)	+47 52 03 21 09 /10 / 11
Deck & Marine Manager	+47 52 03 20 20
Operation and Maintenance Manager	+47 52 03 20 10
Materials Co-ordinator	+47 52 03 22 83
Crane South	+47 52 03 23 86
Crane North	+47 52 03 23 94

12.2 Radio Channels

Field working channel (VHF)	15
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12.3 Email addresses

Offshore Installation Manager	gjoa.oim@neptuneenergy.com
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Central Control Room (CCR)	gjoa.prod@neptuneenergy.com
Deck & Marine Manager	gjoa.dm.leader@neptuneenergy.com
Operation and Maintenance Manager	gjoa.om.leader@neptuneenergy.com
Materials Co-ordinator	gjoa.material@neptuneenergy.com

12.4 Standby Boat - MV Ocean Alden

Call sign:	3YAG
Phone Number	+47 46 29 92 81 / +47 52 03 22 00
Email	Alden.Bridge@atlantic-vessel.com

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13. SUBSEA OPERATIONS AT GJØA

13.1 General

All operations involving Contractor's vessels in Gjøa field, or associated with Gjøa subsea assets shall be carried out using Neptune Energy approved procedures, which are in accordance with Neptune Energy governing documents, approved by and subject to a Neptune Energy approved HAZOP process.

All operations by Contractor's vessels in the Gjøa field or associated with Gjøa subsea assets shall be carried out in accordance with the weather limits of the vessel, vessel crane or lifting system, or other intervention systems, (such as ROV) whichever limits are reached first.

The Gjøa field standby vessel is equipped with an ROV. ROV operations undertaken from this vessel shall also be carried out in accordance with this document.

Seismic survey activities within 1 km of Gjøa Semi or Gjøa production structures or drill rigs will not normally be permitted. Seismic survey activities within 2km of Gjøa Semi or Gjøa producing structures or drill rigs require prior approval by Neptune Energy. This approval cannot be guaranteed.

13.2 Diving

No activities involving divers are foreseen for the Gjøa subsea assets on the seabed infield or on the oil export pipeline because they are beyond the normal maximum operating depth of divers. However, the landfall of the power cable at Mongstad, the hull of Gjøa Semi, the top of the moorings, and the top of the risers are all within normal diving range.

Due to the inherent risks involved in diving, Neptune Energy will always attempt to carry out subsea interventions with the assistance of ROVs rather than divers.

If any Gjøa subsea operations require the use of divers, they shall use surface demand techniques, SCUBA is not permitted. Neptune Energy preference is for Contractors to use Nitrox gas mixes for any diving operations that do not involve saturation diving.

Any operations involving divers working in close proximity to Gjøa Semi could be carried out by divers based either on Gjøa Semi or on a dive support vessel. Diving from a dive support vessel in such a location shall only be permitted in exceptional circumstances and after a thorough HAZOP and appropriate safety precautions have been approved by Neptune Energy.

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Any operations involving divers working on the shallow end of power cable close to Mongstad could be carried out by divers based on a dive support vessel, although those immediately adjacent to the landfall could also be carried out from a dive station based on land at the site of the landfall.

13.3 AUVs

Any AUV operations are expected to be non-intrusive and restricted to inspection / survey activities. Unless specified otherwise all ROV and ROV support vessel requirements should also apply to AUVs and AUV support vessels.

13.4 Vessel transit and set up at Gjøa

Pre-notification of vessel ETA should be advised to the following as per the schedule given in the Marine Operations manual [Ref5], sect. 12.1 Offshore Activity Notification.

- Gjøa CCR
- Gjøa OIM
- Deck and Marine Manager
- Operation and Maintenance Manager

For IMR work this shall normally be carried out by the Neptune Energy Offshore Representative, if one is provided on the vessel. If a Neptune Energy Offshore Representative is not provided on the vessel the vessel Master shall advise the Control Room.

When in transit to the Gjøa field, Contractor's marine crews shall not use the co-ordinates of the centre of Gjøa Semi or the template locations as a navigation target waypoint.

All Contractors' vessels shall advise the Gjøa Semi Control Room of the time they depart the Gjøa worksite at the completion of operations, their intended destination and ETA.

13.5 Operations at the Templates / Satellite Well F

The Neptune Energy representative on the intervention vessel must inform the Gjøa Semi OIM or CCR of the estimated time of arrival as per Offshore Activity Notification, and later inform of any changes. A signed version of the planned program must be made available to the Gjøa Semi OIM and CCR in due time.

Before physical contact is made with the subsea structure the Operator representative must initiate the following:

- As-found visual inspection of the subsea structure by ROV.
- Verify lines of communication between the rig / intervention vessel and the Gjøa Semi CCR.

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- Verify that Gjøa Semi CCR knows the level of shut down required and what actions to take in case of an emergency.

Operations that require disconnecting the well from the manifold will be fully detailed in the Neptune Energy operation Program and shall include:

- Leak test of the manifold isolation valves for that well.
- Pressure readout from Gjøa Semi CCR that verifies XMT integrity.

Operations that require work in the well must include:

- Handover of the well according to Transfer of well responsibility, Gjøa [Ref 6]

Contractor's vessels may not approach within 500m or commence work at the templates or satellite well F without permission from the Gjøa OIM or the Control Room evidenced by a valid and activated work permit as per the requirements of Neptune Energy Marine Operations manual.

Contractor's vessels shall inform the Gjøa Semi Control Room of the times they enter and depart from 500m of the templates and / or satellite well F.

Contractor's vessels shall inform the Gjøa Semi Control Room of the ROV launch and recovery times. This shall also be advised on VHF channel 15 monitored by standby vessel.

Vessels performing IMR services on behalf of Neptune Energy shall comply with requirements of the Neptune Energy Marine Operations Manual [Ref 5].

13.6 Operations within the vicinity of drill rigs

Contractor's vessels may not enter or commence work within 500m of any drill rigs without permission from the drill rig OIM or the Control Room.

Contractor's vessels shall inform the drill rig and Gjøa Semi Control Rooms of the times they enter and depart from 500m of any drill rigs.

Contractor's vessels shall inform the Drill Rig and the Semi Control Room of the ROV launch and recovery times. This shall also be advised on VHF channel 15 monitored by standby vessel.

Unless approved by the drill rig OIM, no operations shall be carried out that involve the Contractor's vessel positioned in a "blow-on" or "drift-on" situation within the safety zone of the drill rig.

Any Contractor's vessels that shall operate within 500m of drill rigs shall be IMO DP class 2 vessels with fully functioning DP systems, thrusters and main engines. [Ref 7]

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Prior to carrying out subsea operations within any drill rig mooring catenaries, the Contractor shall confirm and fix the position of adjacent moorings by plotting their positions using an ROV.

Vessels performing IMR services on behalf of Neptune Energy shall comply with requirements of Neptune Energy Marine Operations Manual [Ref 5].

14. ISOLATIONS REQUIREMENTS DURING NORMAL AND CONTINGENCY OPERATIONS

14.1 General

All intrusive operations shall be carried out in accordance with Neptune Energy approved procedures. The procedures shall detail the isolations to be put in place to isolate appropriate pipeline / pipework sections and the necessary depressurisation and / or bleeding of pipeline / pipework sections. Basic guidelines to be followed are given below:-

- All intrusive operations require a prior HAZOP process. A major subject to be covered in the HAZOP is the barrier and isolation requirements of the work.
- Any activity that has potential risk to personnel has a more stringent requirement for the isolations required to provide the isolations than those operations only involving ROVs.
- Topside ESV disconnections or replacements on the Gjøa Semi or riser replacements are currently the only subsea associated activities that can pose a risk to personnel. In these instances it should be noted that all potential isolations required on the outboard side of the ESVs and risers are located on the seabed.
- For the purpose of this document a “barrier” is taken to mean a closed and satisfactorily tested in-line valve.
- For the purpose of this document a “tested barrier” is taken to mean a valve that has been closed and monitoring of the pipeline / header / manifold / pipework primarily on the worksite side of the valve (as described in 14.3 below) has shown the valve to be leak tight.
- All activities that have potential risks to personnel require two satisfactorily tested isolations on both sides of the work location.
- All activities that have potential risks to ROVs or to the environment require at least one satisfactorily tested barrier on both sides of the work location.

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14.2 Selection of Isolations

Single or double tested wellbore or flowline isolations, as explained above, are required on both sides of an intrusive work location. This applies to all pipe sections that branch off the pipe containing the intrusive work location.

During the preparation for the intrusive intervention, the layout of the pipes and branches on both sides of the work location must be thoroughly determined. This is required to confirm the location of all functioning valves on all connected branches on both sides of the work location, and also confirm the location of the nearest connected pipe sections containing functioning pressure gauges.

A basic foundation for all intrusive subsea intervention procedures is the correct definition of the barrier requirements. As soon as the Contractor has determined the barrier requirements, they must prepare a brief report outlining these and issue this to Neptune Energy for checking and approval. This process will normally involve the OIM on Gjøa Semi and the subsea and process teams within the Technical Department, Neptune Energy, Forus, Stavanger.

14.3 Testing of Isolations

A barrier test involves the successful closure and the satisfactory sealing of the valve that is to be used as the barrier.

A barrier test is not valid unless leakage past the barrier can be measured.

The basic method for testing a barrier is to isolate the section of pipe containing the worksite and a functioning pressure gauge by closing the barrier, then decrease the pressure in the worksite section to ambient, whilst maintaining pressure on the other side of the barrier, and finally check for leakage past the barrier by monitoring the pressure in the worksite section of pipe.

In some cases the section of pipe containing the pressure gauge may be short, such as on a template. In other cases the section may be a complete pipeline length. This will have an effect on the speed at which changes in pressure become apparent.

If a valve has not been operated for a long period before the barrier test, it may require to be functioned more than once to obtain a good barrier test result.

14.4 Valve Operations during Testing of Wellbore/Flowline Isolations

During barrier testing the valves involved must not be operated with any significant pressure differential (≤ 10 bar) across the valves. This is to minimise any potential damage to the internal parts of the valves, such as seals.

This is particularly relevant after intrusive interventions when isolations need to be removed. In this situation some pipeline / pipework sections will be at ambient pressure, and should be re-pressurised to remove / minimise pressure differentials across the barrier valves before they are re-opened.

15. TRANSFER OF WELL RESPONSIBILITY

15.1 General

All transfer of well responsibility to be in compliance with document “Transfer of well responsibility,” [Ref 6]

The control of all the Gjøa wells and subsea valves is the responsibility of the Gjøa Semi Control Room.

In the event that an intrusive subsea intervention requires local control of a tree or one or more subsea operable valves, a formal handover of control process shall take place. Local control of the tree or the required subsea operable valves shall be handed from the Gjøa Semi Control Room to the intervention vessel at the start of the work. At the completion of the work the handover of control shall take place in the opposite direction.

The handover of control shall be accompanied by the transfer of a well / tree / valve handover certificate. All such certificates shall detail the position of all relevant valves at the time of handover.

Prior to commencing an intrusive intervention on a tree or subsea operable valve, the Contractor shall inspect the tree / valve and confirm as far as possible the valve details on the well / tree / valve handover certificate are correct. This inspection shall be recorded on video and witnessed by a Neptune Energy Offshore Representative.

Prior to handing control of a well / tree / valve back to the Gjøa Semi Control Room, the Contractor must carry out a further inspection to confirm the details of the new handover certificate are correct. This inspection shall be recorded on video and witnessed by a Neptune Energy Offshore Representative.

Note:- Extract from Transfer of well responsibility document “Inspections, repairs, change out of equipment on manifold or XT supervised by operations are not regarded as well intervention / well operation. Well responsibility shall not be transferred in such cases. Formalities between vessel and Gjøa during such operations shall be detailed in the operational procedure for the activity. Examples of such operations are change out of Choke Bridge (Flow Control Module, Choke Bridge), external tree cap, choke and Control Modules (SCM).”

16. LIFTING OPERATIONS

All lifting operations over open sea or sub sea should be in compliance with NORSOK R-003 as per Neptune Energy Marine Operations Manual [Ref 5].

Lifts carried out entirely onboard the vessel shall be controlled by the Contractor's safety management system, and where appropriate under a vessel permit to work. All such lifts shall be carried out outside the Gjøa Semi safety zone, more than 500m from any drill rigs, and at least 100m* distance horizontally from any Gjøa subsea assets.

The Contractor shall prepare and follow a lift plan in advance of all subsea lifts. This lift plan must be approved in advance of the lift by the on-shift Neptune Energy Offshore Representative.

Subsea lifts could typically include the raising or lowering of template choke bridge modules, or subsea tools requiring guide wire assistance, as well as opening or closing of panels or hatches in subsea structures.

The launching and recovery of ROVs does not require lift plans.

Lifts of most heavy items (e.g. choke bridge modules) to or from templates or satellite well F are expected to be carried out using a tower and multi guide wire system through the moonpool of the intervention vessel. Also when the item is on the vessel, it must be restrained in a heavy lift/module handling system. The overboarding or recovery onboard of such items with the load simply hung below a crane should be avoided and only undertaken after careful formal risk assessment has taken place.

Where an item must be lowered to the seabed; but the use of a tower and / or guide wires is not appropriate or not possible, the vessel shall initially lower the item to within approximately 20m above the seabed (or a safe height bearing in mind adjacent seabed structures) at a safe sideways distance (normally 100m)*, and down current from the nearest subsea asset. When the item is at this depth, the vessel and load can be moved to their final location. Recovery of such items to the surface shall be carried out in a similar manner, in reverse.

(*The safe distance of 100m has been arrived at assuming a water depth of 370m and a dropped object drifting sideways at an angle of 15 degrees as it falls to the seabed. However, common sense should always be applied in such situations, e.g. lifts between two pipelines may lead to an unnecessary large offset for the vessel and potentially impose a larger risk due to towing the load over a long distance). The on-shift Neptune Energy Offshore representative shall evaluate any requests to reduce the safe deployment offset distance.

Where an item is lowered to the seabed with the use of a tower and guide wires, the vessel shall offset 50m down current from the structure for the initial deployment phase of the lift, and with minimal

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tension in the guide wires, then as the load reaches 20m above the seabed, step into position in controlled increments while increasing tension in the guide wires for the final approach to landing. Retrieval of equipment should also be done this way but in the reverse order.

Neptune Energy will only permit certain vessel to vessel lifts offshore, and then only when local conditions permit.

Lifts involving items within DNV approved containers and baskets are permitted between the Gjøa Semi and Contractor's vessels and vice versa.

Lifts from monohull vessels to monohull vessels are not permitted in the Gjøa field: for example, between Contractor's monohull vessels, or between the Gjøa standby vessel and a Contractor's vessel, even with one vessel in the lee of the other. This is to prevent a lift between vessels that are both moving.

In the event that an item needs to be transferred in the field between such monohull vessels, it should firstly be lifted onboard the Gjøa Semi, and then lowered onboard the destination vessel.

Lifts involving items within Neptune Energy approved containers and baskets shall be permitted between Contractor's vessels if one vessel is a monohull and the other is a barge or multihull vessel larger and more stable than the monohull, and if the Offshore Neptune Energy Representatives and the Gjøa Semi OIM approve the lift.

Any vessel to vessel lifts that are necessary but cannot meet the above requirements must be carried out either in port or in sheltered water close inshore.

17. VESSEL MOBILISATIONS & DEMOBILISATIONS

The port of mobilisation for Contractor's vessels shall normally be a North Sea port. The port of demobilisation may be different to the port of mobilisation.

Some mobilisations may require the loading of Neptune Energy Provided Items (CPI). As a general rule these shall be stored at Neptune Energy Base in Florø. Mobilisations/demobilisations involving CPI will therefore normally occur at Neptune Energy Base in Florø. A plan view of the Base at Florø and the quay locations can be found in appendices.

The subsea industry has seen a high proportion of accidents and near misses during vessel mobilisations and demobilisations. These accidents and near misses have very often involved sub-contractor's personnel hired for the duration of the mobilisation / demobilisation who are not familiar with the vessel or the safety culture of the oil industry.

Contractors are therefore required to carry out a mobilisation / demobilisation HAZOP and prepare mobilisation / demobilisation plans in advance with emphasis on topics such a proper use of PPE and dealing with potential high risk activities such a lifting and welding / burning, and adequately briefing / preparing personnel from sub-contractors. Neptune Energy Offshore Representatives shall monitor Contractor's activities during mobilisation and demobilisation.

18. LOGISTICS

Gjøa is a relatively small field and the duration of Gjøa subsea IMR work scopes will generally not exceed two weeks. Therefore, unless approved in advance of mobilisation by Neptune Energy, Contractor vessels shall be bunkered with fuel and water and supplied with victuals sufficient for a period at sea of two weeks. Because of the short work scope durations and the field location only 63km offshore, and 66km from Neptune Energy base at Florø, resupply and bunkering of Contractor vessels in-field is not encouraged. It is expected that Contractor vessels shall resupply, bunker and carry out crew changes in port. Contractors shall also make best endeavours to make such port calls at intervals not less than two weeks.

It is understood that Contractors make commitments to their marine crews and project personnel with regard to crew change intervals. Contractors shall make best endeavours to make such crew changes take place in-field by helicopter or during normal re-supply port calls.

Contractors shall ensure continuity of project knowledge and key personnel on their vessels through crew changes. For example, Neptune Energy shall not normally permit Contractors to change 100% of the marine crew or the project crew in a single crew change.

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The provision of any helicopters for regular vessel crew changes shall be the responsibility of the Contractor. If the vessel has a properly certified and approved and operational helideck, Neptune Energy will assist with helicopter transport of Contractors personnel on Neptune Energy crew change flights if seats are available, but cannot guarantee numbers of seats or dates or times of flights.

When Contractor's vessels are working within the Gjøa Semi safety zone or within drill rig 500m zones, they may be required to maintain a minimum distance and / or position relative to the Gjøa Semi or drill rig when receiving helicopters, or during helicopter landings on the Gjøa Semi or drill rig.

If bunkering of Contractors vessels is required in the field, it shall be carried out outside the Gjøa Semi safety zone and at least 500m from any drill rigs and any subsea pipelines or umbilicals or structures.

Contractors shall plan as far as possible for all spare parts, mail or other items required on the vessel to be delivered to the vessel during port calls, or on Contractor's crew change flights. Neptune Energy will also assist with helicopter transport of such items on Neptune Energy crew change flights if space is available, and if the items are approved for helicopter transport, but cannot guarantee space will be available or dates or times of flights.

Transport of items to Contractor's vessels that are too large for helicopters or not helicopter transportable shall be sent offshore by supply boat, if approved by the Gjøa Semi OIM. Neptune Energy will assist with supply boat transport of Contractors equipment via the Gjøa Semi if space is available on supply boats or on the Gjøa Semi, but cannot guarantee such space or dates or times of supply boat sailings. Gjøa supply boat operations are controlled by Neptune Energy's base at Florø. Contractors are responsible for arranging onshore transport to and from Neptune Energy base at Florø.

Any lifting operations in the field required for resupply shall be carried out in accordance with Section 16 of this document.

Any lifts to be given to or received from the Gjøa Semi will be carried out on the Platform North or Platform South faces.

The entire Platform East face and the southern end of the Platform West face are to be avoided due to the presence of risers. Vessels may only approach the Platform East and West faces with prior approval of the OIM, after a thorough HAZOP, and only normally if required to carry out necessary subsea interventions affecting these risers.

Contact details for Neptune Energy at Florø are contained within Section 19.2 of this document.

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19. NEPTUNE ENERGY FLORØ

19.1 General

The Contractor's vessel may be required to mobilise or demobilise at Fjord Base Florø. This would normally be to allow loading or unloading of Neptune Energy provide items (CPI).

The ETA of a vessel at the Fjord Base, Florø must be advised to the Neptune Energy office in Florø at least 24 hours in advance. This shall be carried out by the Neptune Energy Offshore Representative, if one is provided on the vessel. If an Offshore Representative is not provided on the vessel the Master on the vessel shall advise the Neptune Energy office at the Fjord Base. In the event of any difficulties contacting the Neptune Energy office at Florø, the Control Room on the Gjøa Semi shall be informed instead.

Vessel contractors are responsible for arranging pilotage, customs clearance, harbour/quay booking, bunkering, support for mob/demob activities, seafastning waste removal.

19.2 Contacts at Neptune Energy Florø

Logistics and Base Manager

Oddvar Aarberg
 Office +47 52 03 13 00/ +47 41 51 66 05
 Email address oddvar.aarberg@neptuneenergy.com

Supply base operations

Duty phone +47 99 23 37 46 (24/7)
 Email address forsyning@neptuneenergy.com (08:00 - 16:00)

Subsea Tools

Reinhardt Dankertsen
 Office +47 52 03 13 19/ +47 48 24 09 07
 Email address reinhardt.dankertsen@neptuneenergy.com

19.3 Details of the Florø Fjordbase

Link to Fjord Base <http://www.fjordbase.no/>

Contact for vessels

Channel 9
 Office +47 57 75 18 36 (08:00 – 16:00) - Duty phone: +47 91 80 10 41 (all hours)
 Email address Kaikontor@incgruppen.no

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Saga Fjordbase

Phone +47 57 74 56 00

Fax +47 57 74 56 66

A plan view of the base at Florø is included in the Appendices

All berths have a minimum 10 metres water depth.

For details of the approaches to Florø see the local marine chart number: 479

20. HSEQ

All Contractors' activities shall be carried out in accordance with their SMS and their HSEQ policy.

Neptune Energy HSEQ requirements for Contractors subsea interventions shall be according to the Neptune Energy Marine Operations Manual [Ref.5]

21. ADVERSE WEATHER

The North Sea is an extreme environment, weather forecasts are of variable reliability and the weather can change at short notice.

All mobilisations of Contractor's vessels must be co-ordinated with Neptune Energy. This is partly to prevent work conflicts. It is also to avoid as far as possible vessels arriving in the field during unambiguous forecasts of bad weather.

The Master of any vessel in the Gjøa field is responsible for the safe operation of his vessel. This includes deciding when to stop work, or not commence work, not to transit to the field, or run for shelter because of adverse weather. Neptune Energy does not expect Contractor's vessels to transit to or from the field in severe weather, or ride out such weather in the field unnecessarily.

All Contractors' operating procedures shall specify weather limits at which operations should cease or not commence. The controlling weather limits may be swell or current or wind or a combination of all three.

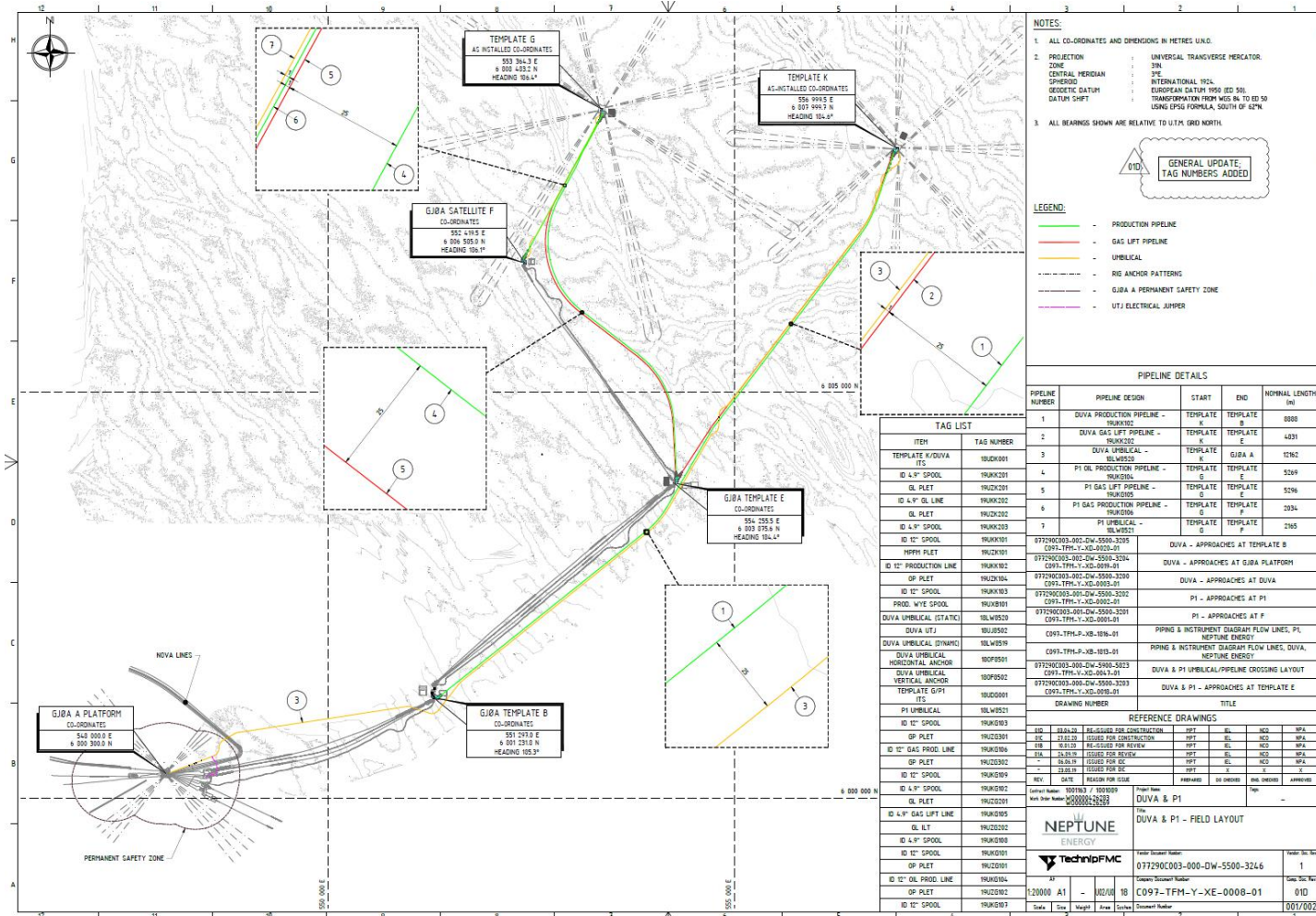
Contractors are also required to have contingency procedures in place in the event of sudden weather deterioration part way through operating procedures. An example could be to wet store a subsea lift on the seabed if weather suddenly deteriorates. Operating and contingency procedures also need to address "blow on" and "drift on" scenarios.

22. REFERENCES

1. Petroleum Safety Authority regulations
2. Norwegian Petroleum Directorate regulations
3. Norwegian Maritime Directorate regulations for anchor handling in Norwegian waters
4. Neptune Energy E&P Norge, Management System
5. MSD-OANO-OD-05-00001 - Neptune Energy Marine Operations Manual
6. MSD-DRIL-DB-05-00001 - Transfer of well responsibility
7. International Maritime Organisation Circular 645 – Guidelines for vessels with Dynamic Positioning Systems
8. IMCA M 204 – Vessel Assurance
9. IMCA M 103 - Guidelines for the Design and Operation of Dynamically Positioned Vessels
10. IMCA M 149 - Common Marine Inspection Document
11. <https://operasjonsmanual.norog.no/selskapsesifikke/neptune/>
12. C097-GJO-A-RF-0022 - Gjøa Field Layout Overview
13. C097-GJO-A-RF-0017 - Gjøa A Semi - Field Layout Detailed

APPENDIX – DRAWINGS

- Gjøa-P1 & Duva – Field Layout Overview (Drawing No. C097-TFM-Y-XE-0008-01)
- Gjøa A Semi - Field Layout Detailed (Drawing No. C097-GDF-A-RF-0017)
- Plan View of Gjøa Semi
- Riser Profiles
- ROV and TMS Positions Relative to Riser
- Plan View of the Base at Florø



NOTES:

- ALL CO-ORDINATES AND DIMENSIONS IN METRES U.N.O.
- PROJECTION : UNIVERSAL TRANSVERSE MERCATOR
 ZONE : 31N
 CENTRAL MERIDIAN : 5°E
 SPHEROID : INTERNATIONAL 1924
 GEODETIC DATUM : EUROPEAN DATUM 1956 (ED 50)
 DATUM SHIFT : TRANSPORTATION FROM WGS 84 TO ED 50 USING EPSG FORMULA, SOUTH OF 61°N
- ALL BEARINGS SHOWN ARE RELATIVE TO UTM GRID NORTH.

LEGEND:

- PRODUCTION PIPELINE
- GAS LIFT PIPELINE
- UMBILICAL
- RIG ANCHOR PATTERNING
- GJBA A PERMANENT SAFETY ZONE
- UTL ELECTRICAL ARMPIR

GENERAL UPDATE, TAG NUMBERS ADDED

PIPELINE DETAILS

PIPELINE NUMBER	PIPELINE DESIGN	START	END	NORMAL LENGTH (m)
1	DUVA PRODUCTION PIPELINE - RIG-202	TEMPLATE K	TEMPLATE B	8880
2	DUVA GAS LIFT PIPELINE - RIG-202	TEMPLATE K	TEMPLATE E	4381
3	DUVA UMBILICAL - RIG-202	TEMPLATE K	GJBA A	1262
4	P1 OIL PRODUCTION PIPELINE - RIG-202	TEMPLATE G	TEMPLATE E	5269
5	P1 GAS LIFT PIPELINE - RIG-202	TEMPLATE G	TEMPLATE E	5266
6	P1 GAS PRODUCTION PIPELINE - RIG-202	TEMPLATE G	TEMPLATE F	2034
7	P1 UMBILICAL - RIG-202	TEMPLATE G	TEMPLATE F	2165

TAG LIST

ITEM	TAG NUMBER
TEMPLATE K/DUVA ITS	19UK001
ID 4" SPOL	19UK201
GL PLET	19UK201
ID 4" OIL LINE	19UK202
GL PLET	19UK202
ID 4" SPOL	19UK203
ID 12" SPOL	19UK001
NPPM PLET	19UK001
ID 12" PRODUCTION LINE	19UK002
OP PLET	19UK004
ID 12" SPOL	19UK003
PROD. WYE SPOOL	19UK001
DUVA UMBILICAL (STATK)	19UK003
DUVA UTL	19UK002
DUVA UMBILICAL (DYNMG)	19UK003
DUVA UMBILICAL HORIZONTAL ANCHOR	19UK001
DUVA UMBILICAL VERTICAL ANCHOR	19UK002
TEMPLATE G/P1 ITS	19UK001
P1 UMBILICAL	19UK001
ID 12" SPOL	19UK003
OP PLET	19UK001
ID 12" GAS PROD. LINE	19UK004
OP PLET	19UK002
ID 12" SPOL	19UK004
ID 4" SPOL	19UK002
GL PLET	19UK001
ID 4" GAS LIFT LINE	19UK005
GL LT	19UK002
ID 4" SPOL	19UK008
ID 12" SPOL	19UK001
OP PLET	19UK001
ID 12" OIL PROD. LINE	19UK004
OP PLET	19UK002
ID 12" SPOL	19UK007

REFERENCE DRAWINGS

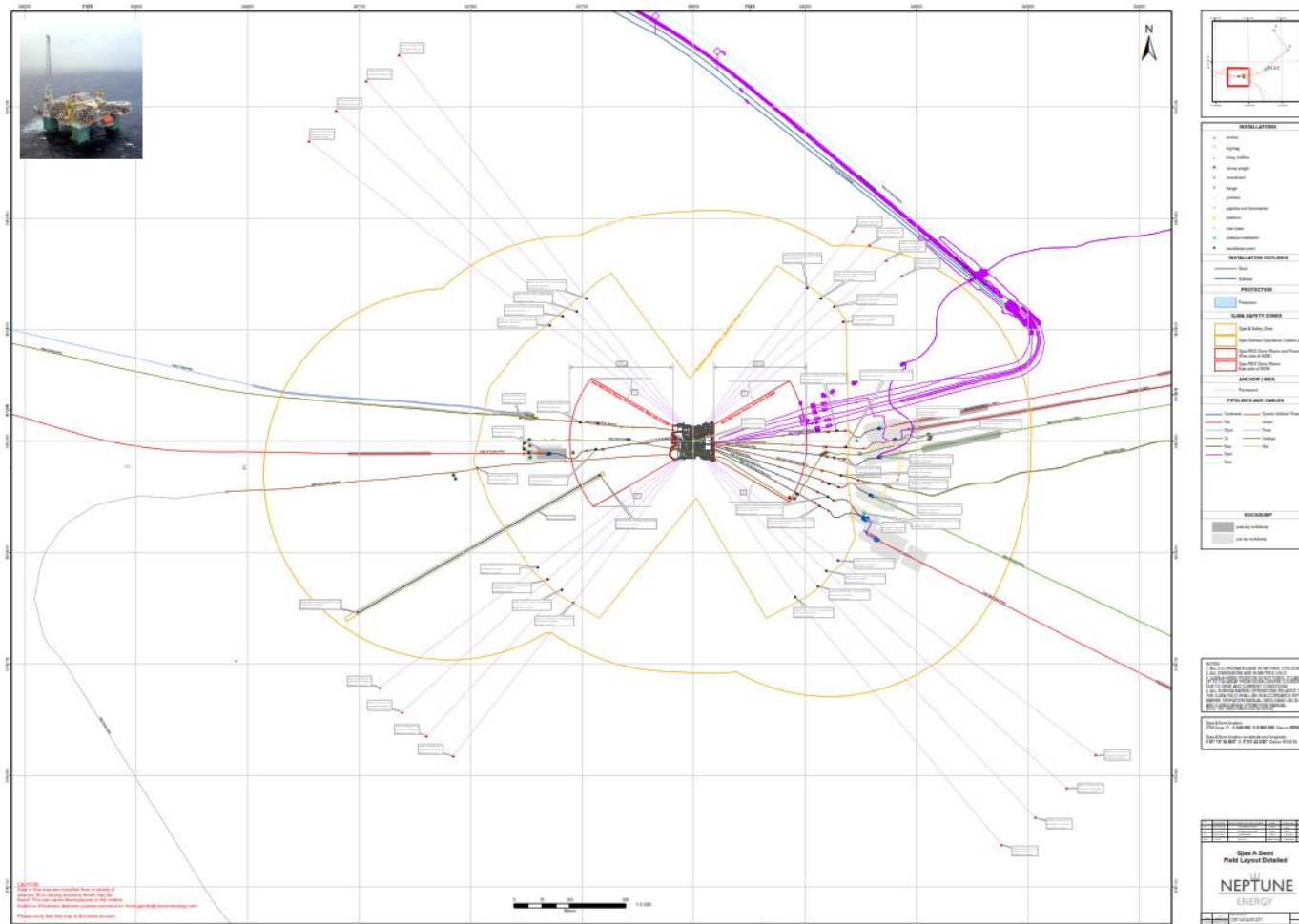
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012	18/02/20	ISSUED FOR CONSTRUCTION	ISSUED FOR REVIEW	ISSUED FOR DE	ISSUED FOR DE	ISSUED FOR DE
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NEPTUNE ENERGY

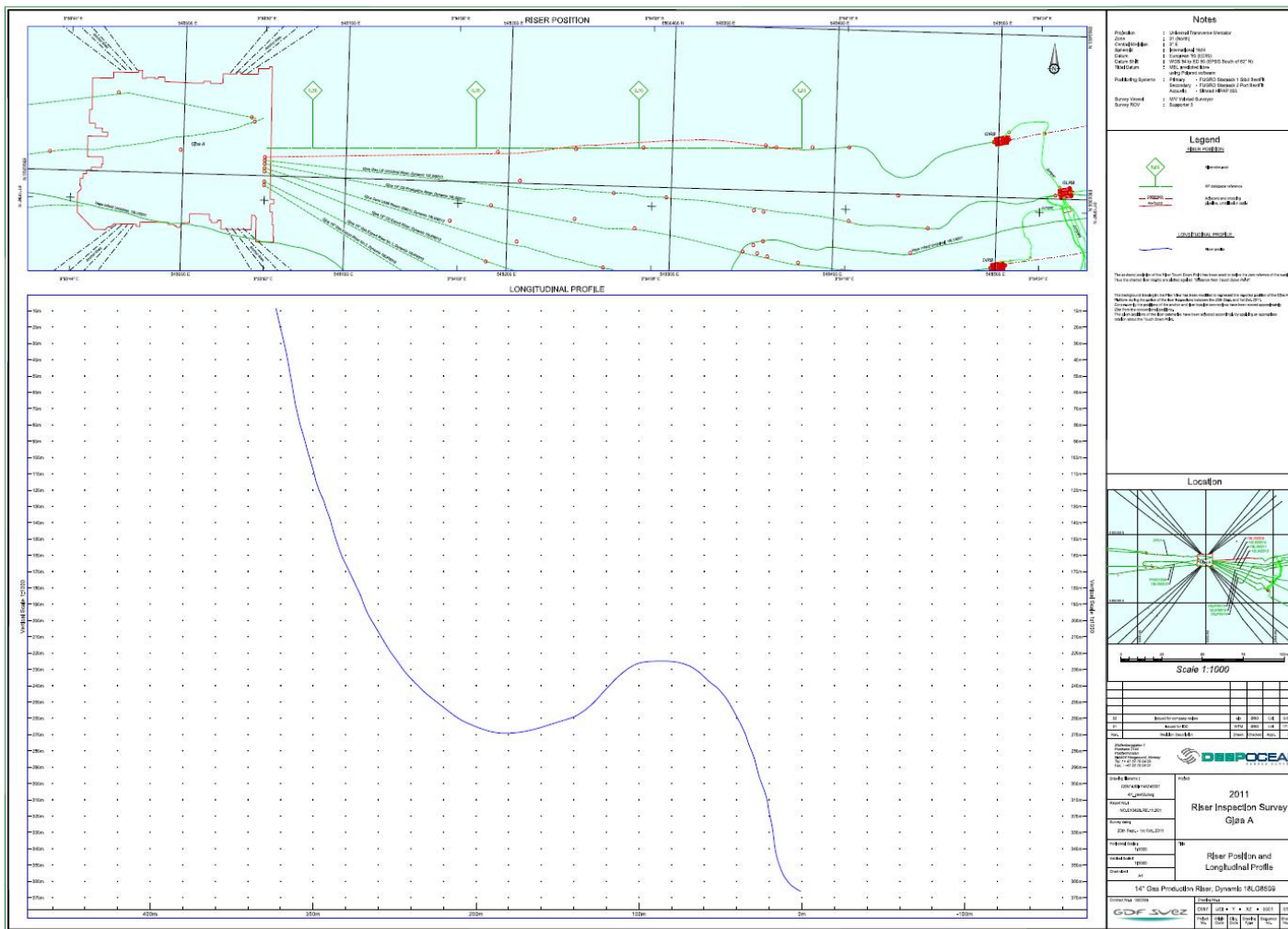
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 Scale: 1:1000
 Date: 18/02/20
 Author: [Name]
 Checked: [Name]
 Approved: [Name]

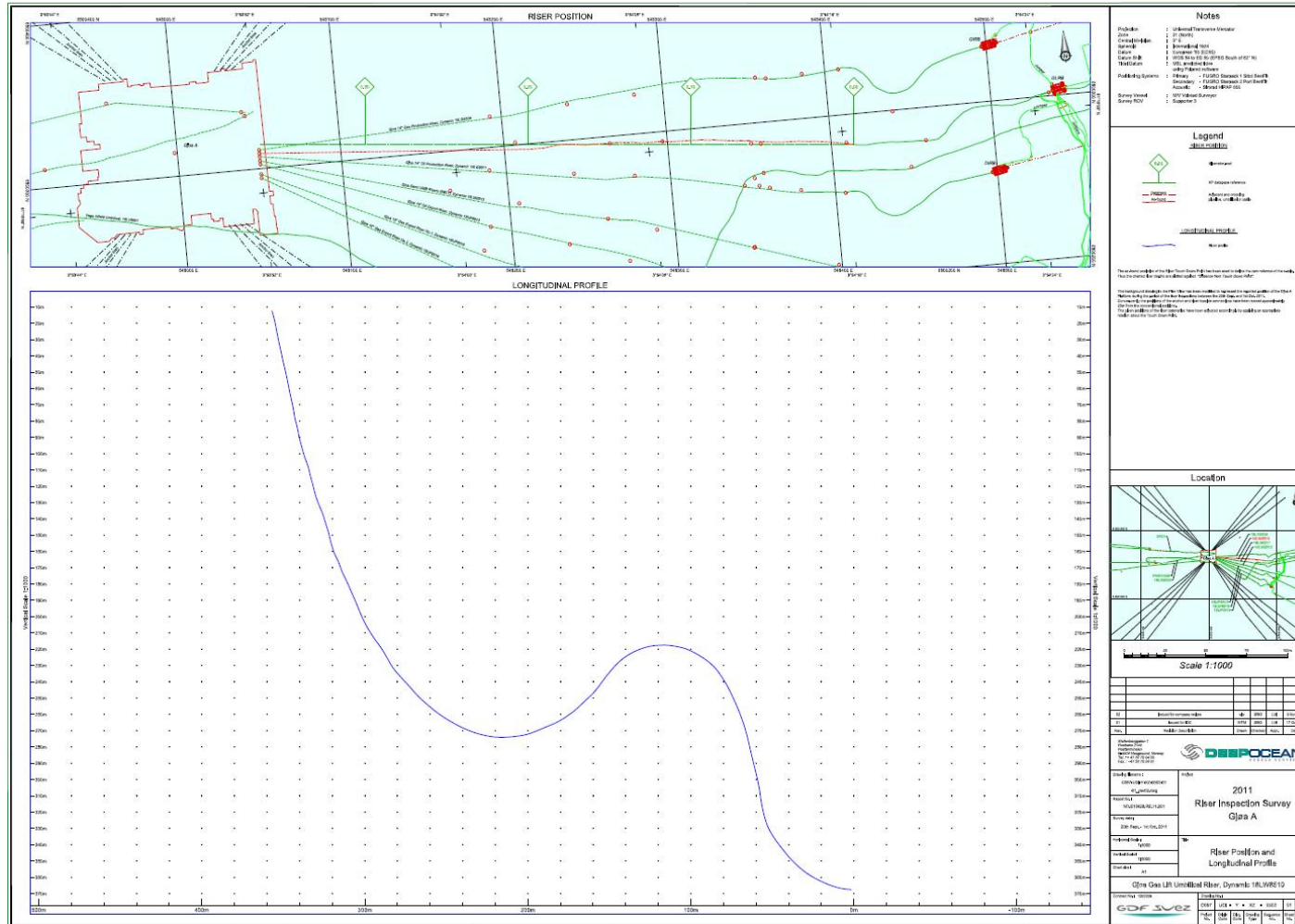
Field Layout-Overview (Drawing No. C097-TFM-Y-XE-0008)



Gjøa A Semi Field Layout with Gjøa safety zone, Gjøa Subsea Operation caution Zone and Gjøa Red Zone (Drawing No. C097-GDF-A-RF-0017)



Riser Profile – Gjøa 14" Gas Production Riser



Riser Profile – Gjøa Gas Lift Umbilical Riser

PROCEDURE



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Riser Profile – Gjøa 14" Oil Production Riser

PROCEDURE

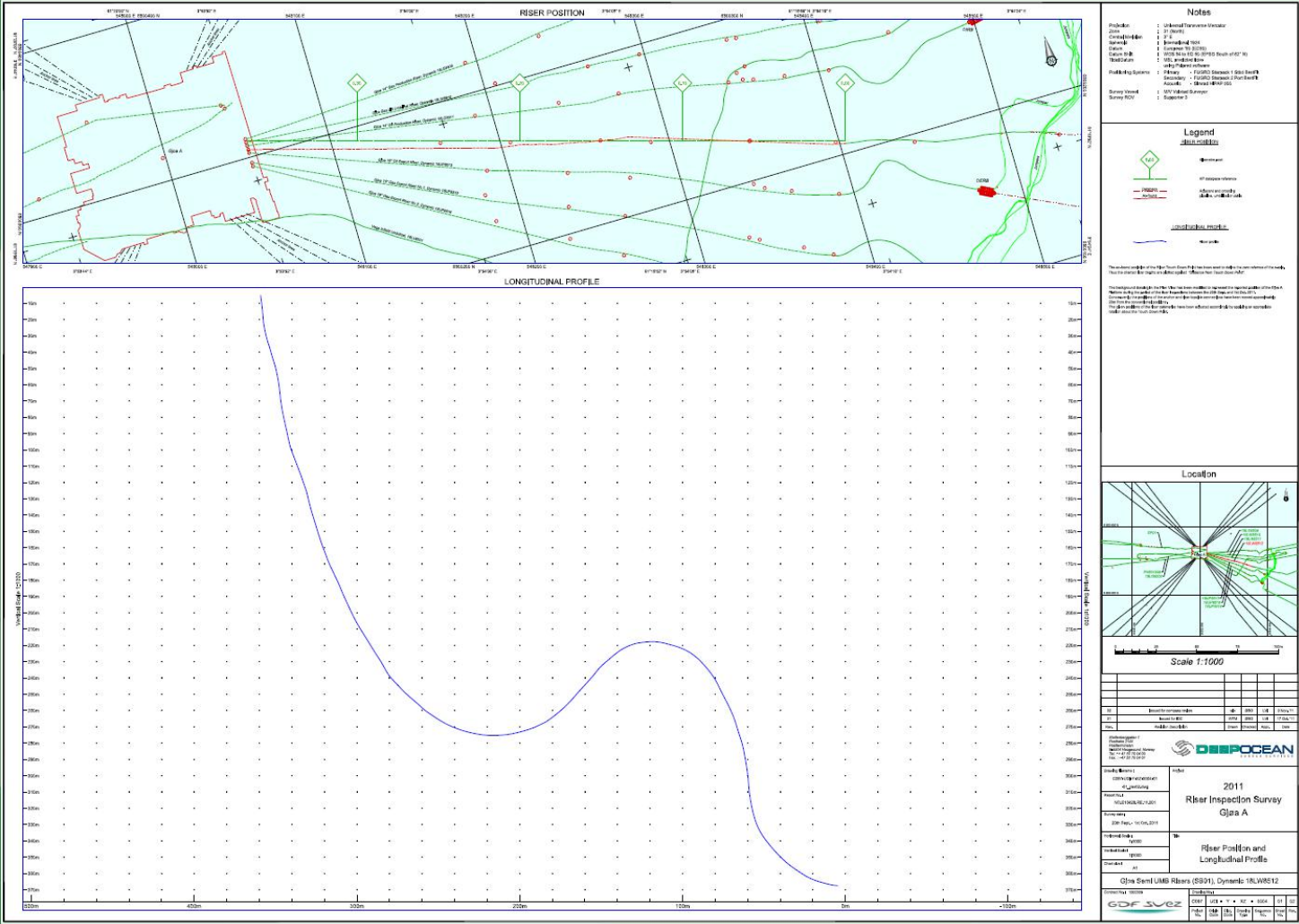


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Riser Profile – Gjøa Ctrl Umbilical Riser

PROCEDURE

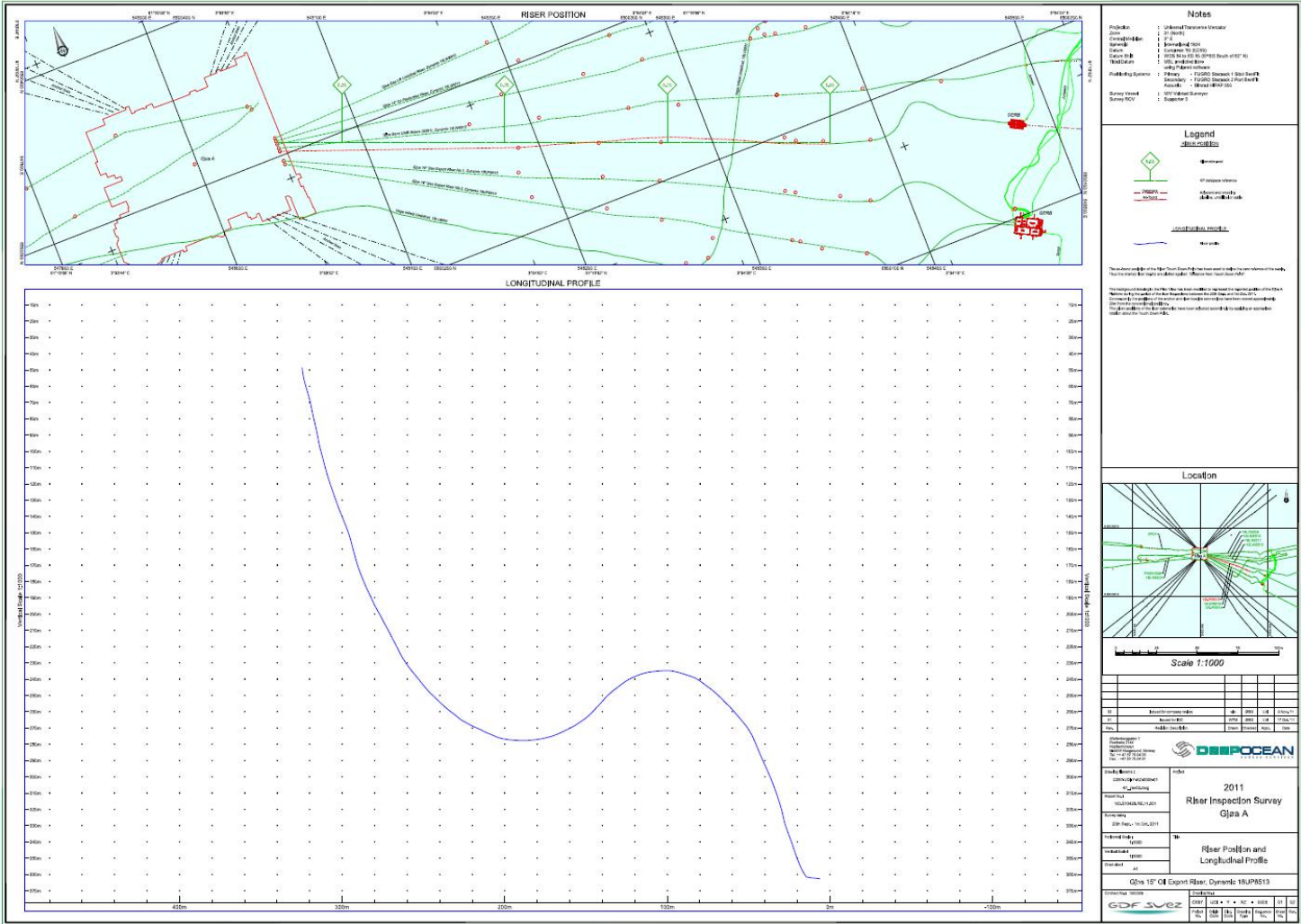


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Riser Profile – Gjøa 15" Oil Export Riser

PROCEDURE

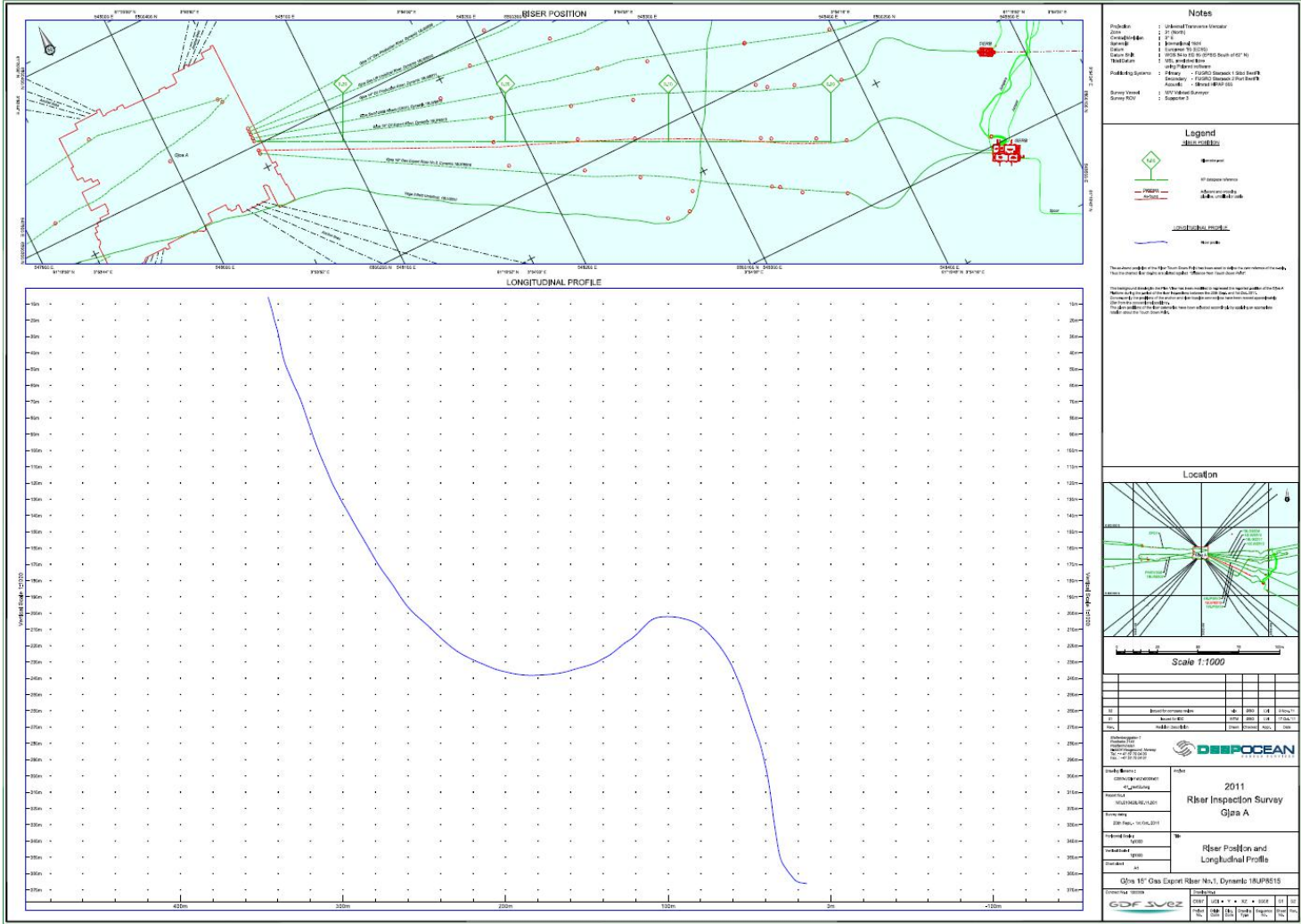


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Riser Profile – Gjøa 16" Gas Export Riser No.1

PROCEDURE

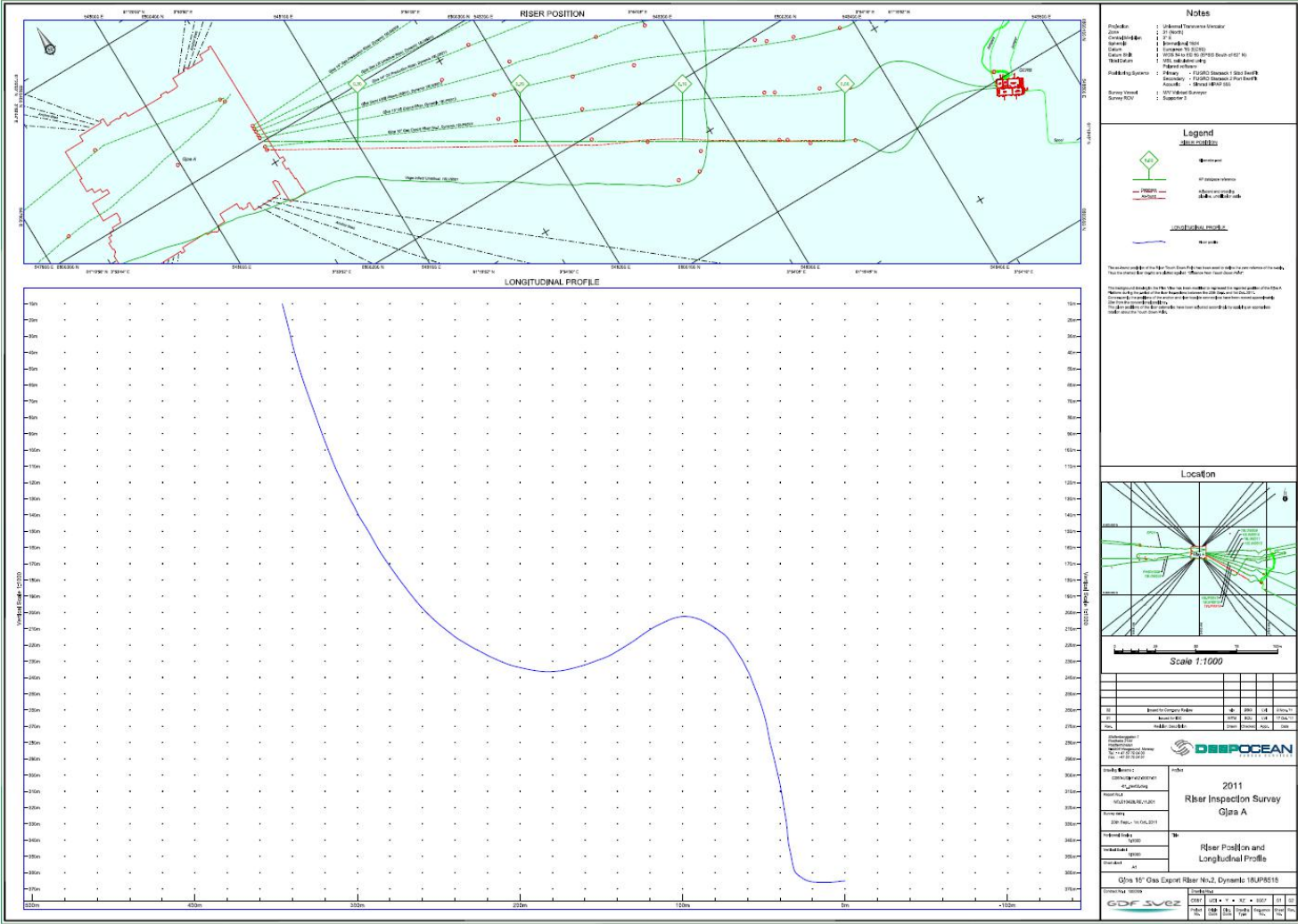


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Classification
Internal



Riser Profile – Gjøa 16" Gas Export Riser No.2

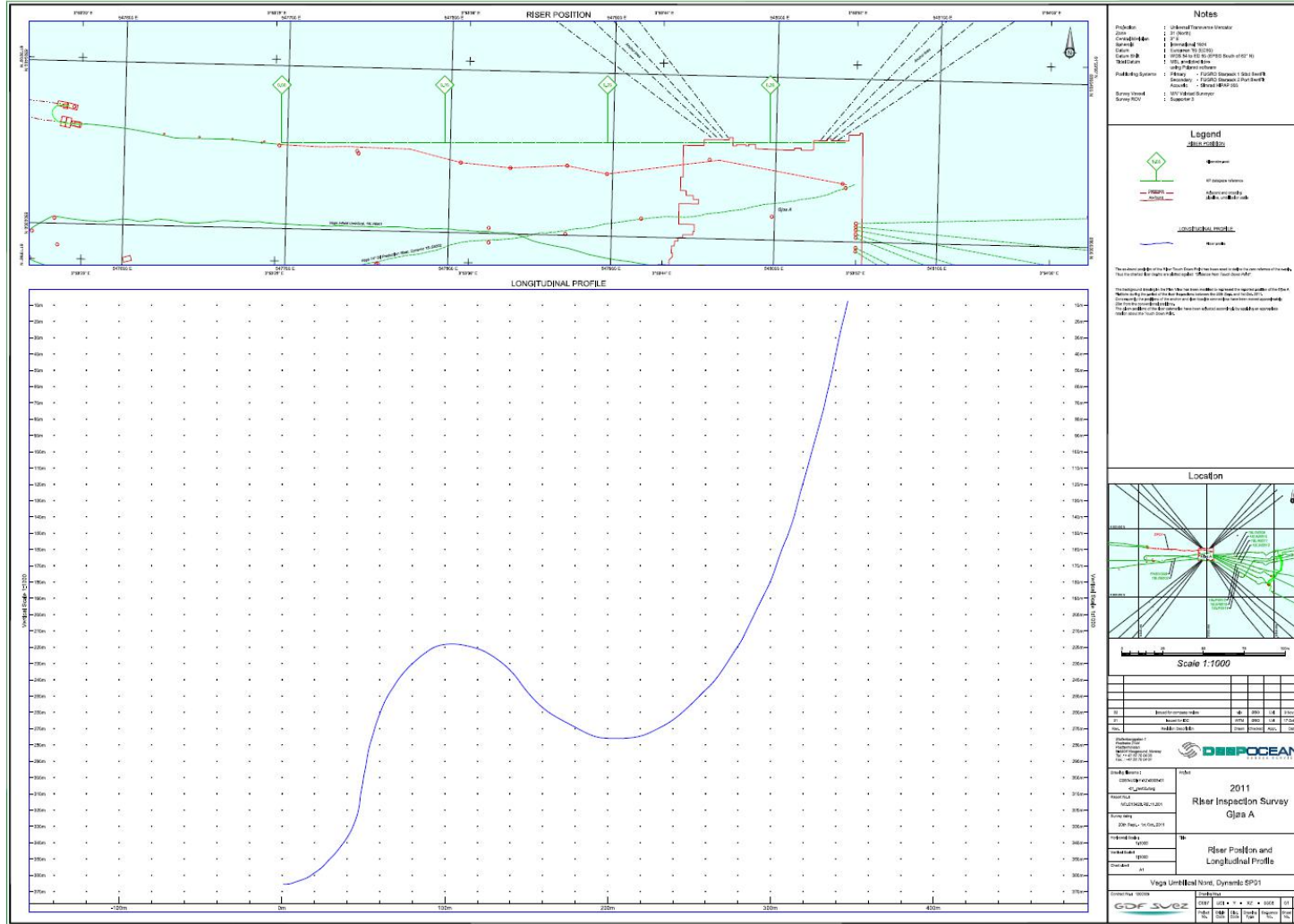
PROCEDURE

Document code
MSD-OANO-OD-05-00002

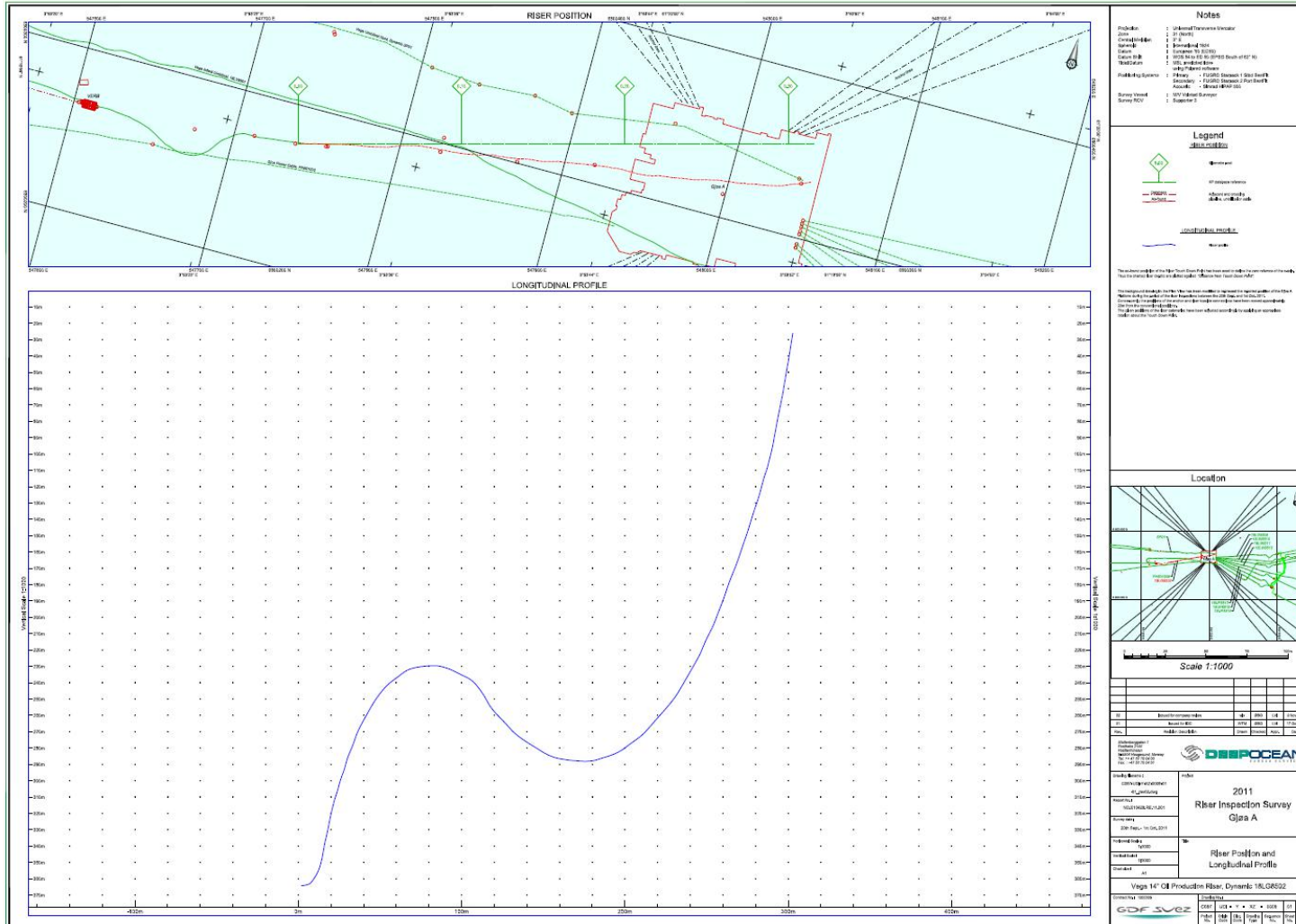
Document title
Gjøa Subsea Operations Manual

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Classification
Internal



Riser Profile – Vega Umbilical Riser



Riser Profile – Vega 14" Production Riser

PROCEDURE

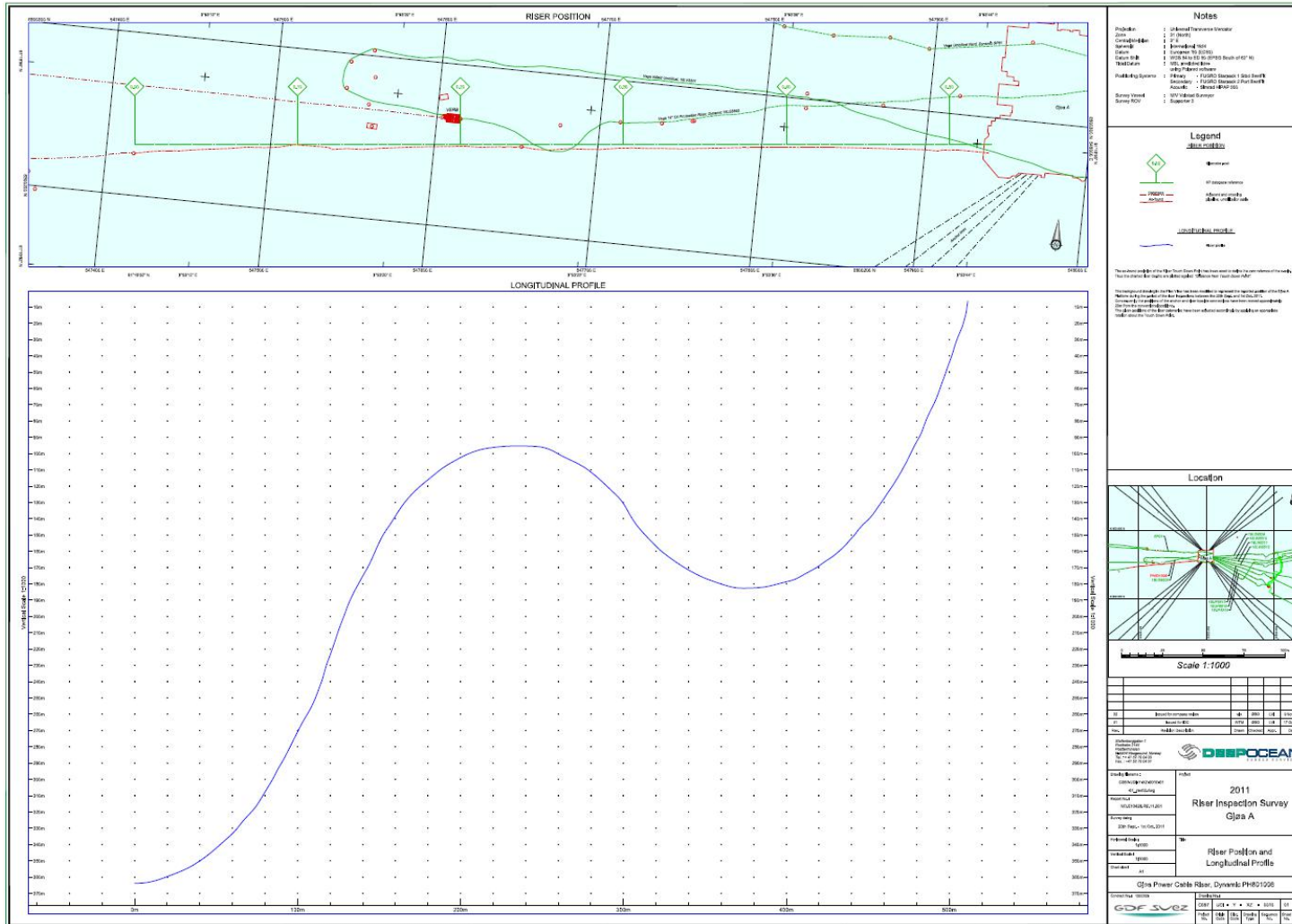


Document code
MSD-OANO-OD-05-
00002

Document title
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Classification
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Riser Profile – Gjøa Power Cable Riser

PROCEDURE

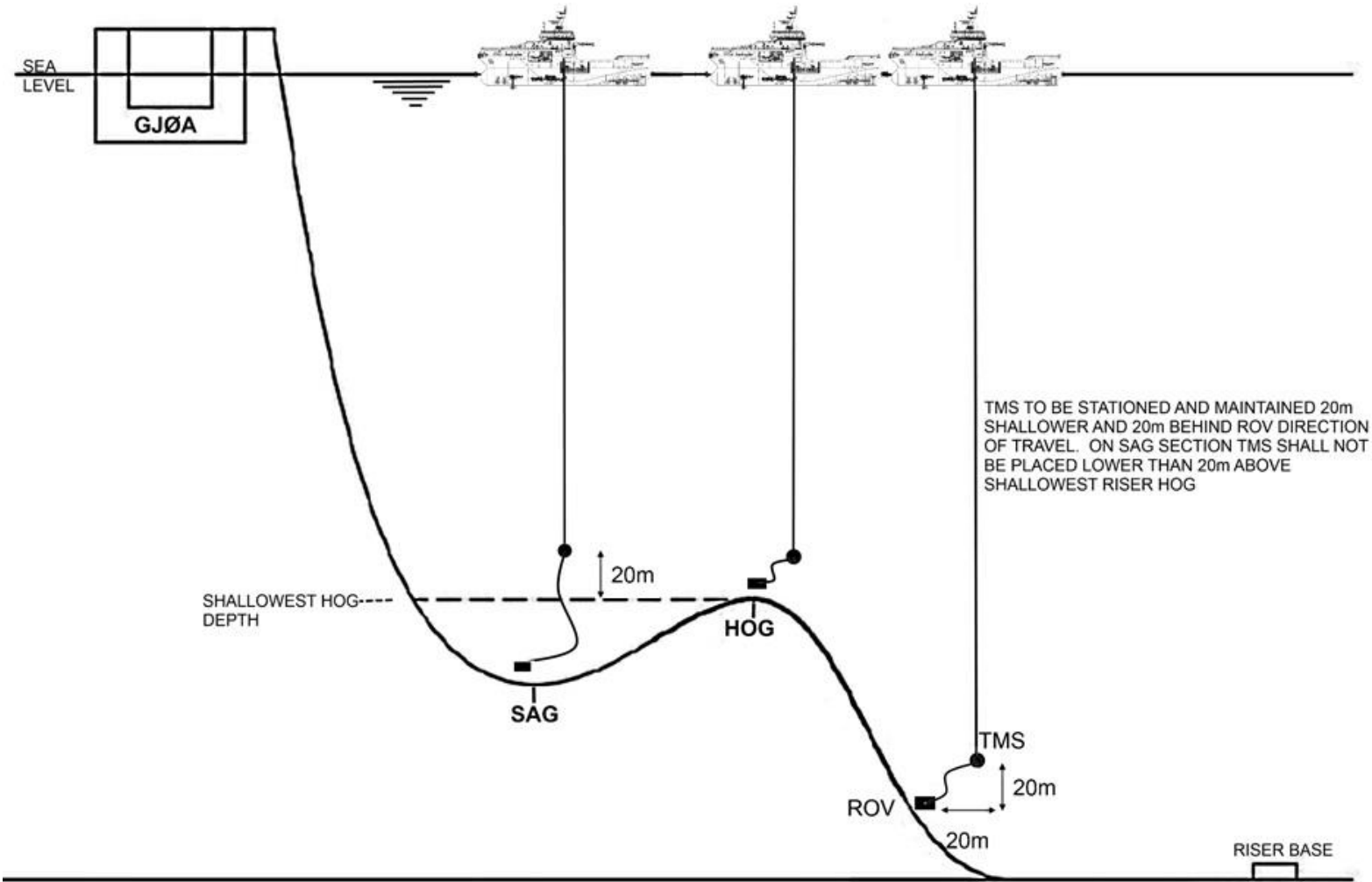


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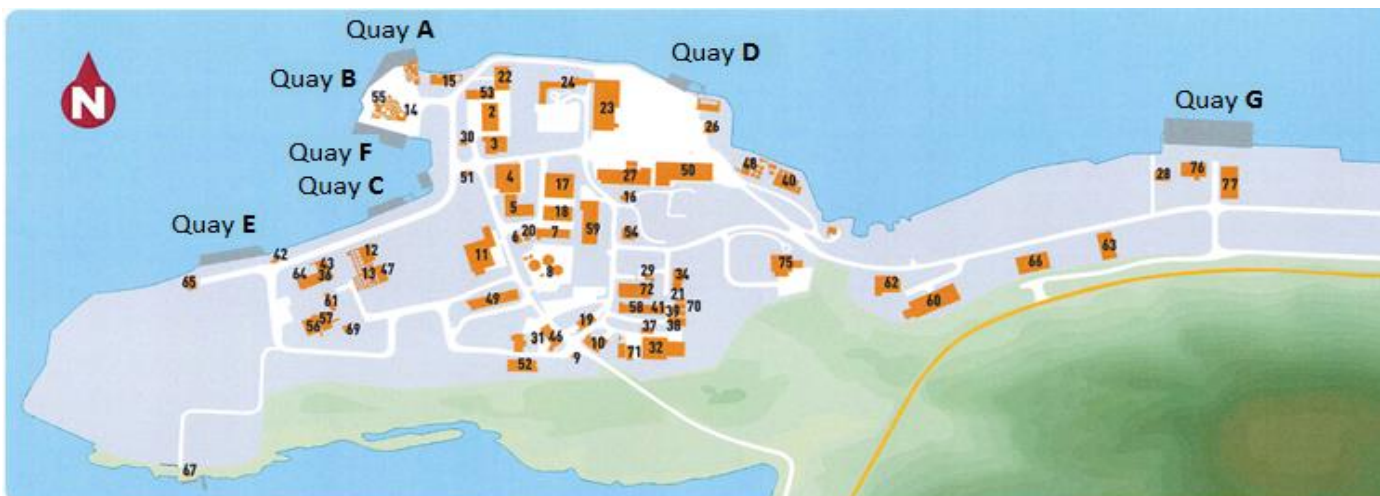
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Classification
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ROV and TMS Positions Relative to Riser



Building No. / User

2	Saga Fjordbase, Safari Engros, Halliburton	19	Certex Offshore Services	39	Luna Trading	59	Engie
3	Safari Engros	20	Global Maritime	40	Havlandet Marin Yngel	60	Engie
4	IOS Tubular Management, Weatherford Norge, Schlumberger, Petroleum Services	21	Norsk Contracting Partner	41	Saga Fjordbase	61	Ramco Norway
5	INC vedlikehold, Norsk Contracting Partner, Saga Fjordbase	22	Kystverket, Halliburton	42	Tuboscope Norge	62	GDF Suez E&P Norge
6	Global Maritime	23	Statoil	43	SAR	63	Engie
7	Halliburton, Petroleum Services, Havlandet Marin Yngel, Saga Fjordbase, Fjord Base	24	Saga Fjordbase, Statoil, Fjord Base, INC Engineering, INC Invest	44	Swire Oilfield Services	64	Tuboscope Norge
8	Statoil	25	SAR	45	Halliburton	65	Saga Fjordbase
9	Bring Logistics	26	Statoil	46	Havlandet Marin Yngel	66	Statoil
10	Tess	27	Swire Oilfield Services	47	Dunlop Hiflex,	69	Ramco Norway
11	Statoil	28	NBN Elektro, Norsk Contracting Partner	48	Saga Fjordbase	70	WIS VVS Miljø
12	Petroleum Services, Saga Fjordbase	29	Saga Fjordbase	49	Statoil, Saga Fjordbase	71	Luna Trading
13	Halliburton	30	Swire Oilfield Services	50	Statoil	72	Statoil, BB Transport,
14	Schlumberger, Norcem	31	Statoil, West Industri Service, WIS VVS Miljø, NCC Constructions, Luna Trading	51	Statoil, Swire Oilfield Services	75	A/S Norske Shell
15	Halliburton, SAR	32	Norsk Contracting Partner	52	Halliburton	76	Saga Fjordbase
16	Fjord Base	33	Oceaneering Asset Integrity	53	Schlumberger	77	Saga Fjordbase
17	Statoil, Schlumberger	34	Tuboscope Norge	54	Ramco Norway		
18	Saga Fjordbase, Statoil, IOS Tubular Management	35	Certex Offshore Services	55	Certex Offshore Services		
		36	Certex Offshore Services	56	Certex Offshore Services		
		37		57			
		38		58			

Plan View of the Base at Florø