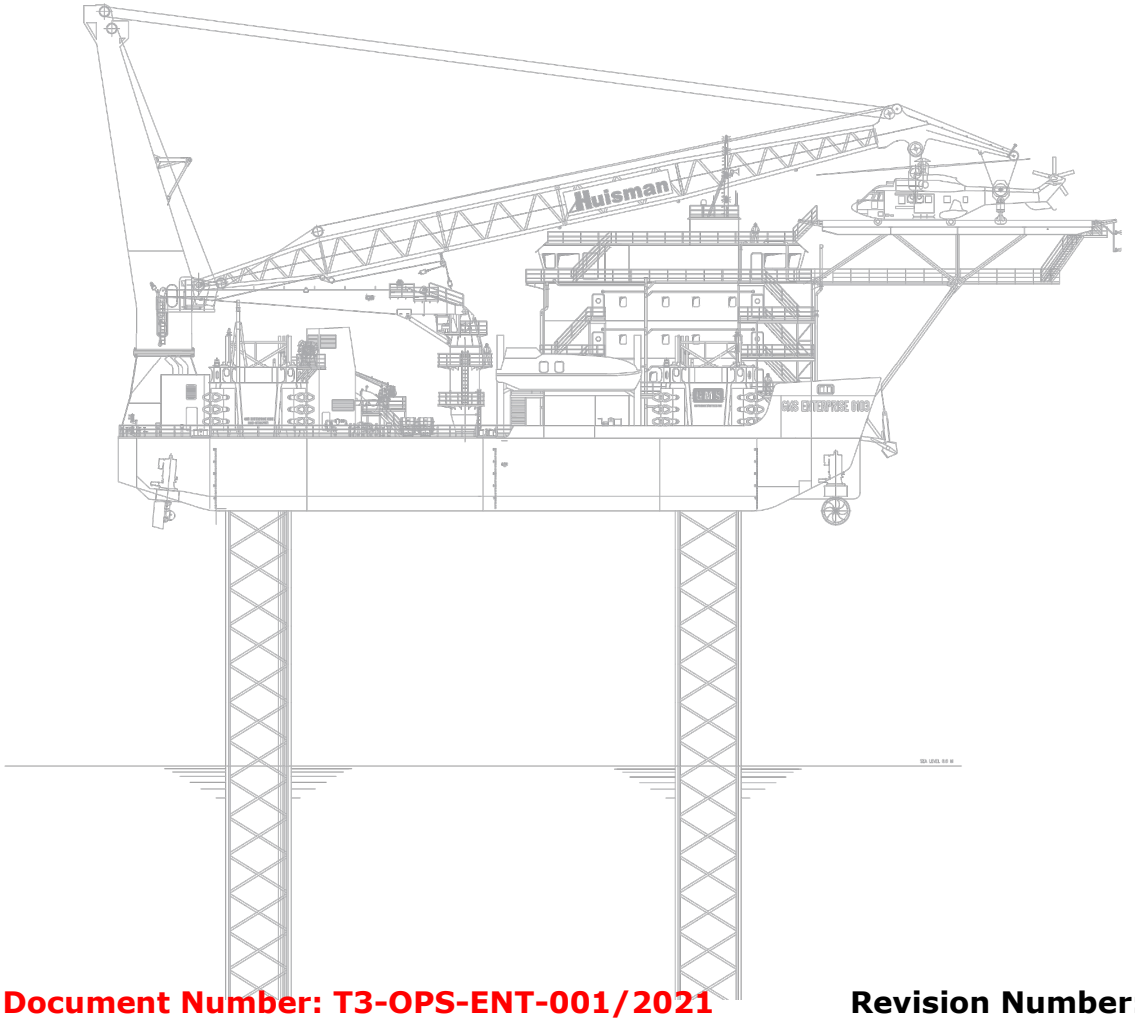
Gulf Marine Services

GMS Enterprise 6103

Vessel Move Procedure

NKOM RLIC to PU platform NW location, North Field



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Vessel Move from NW face to SE face is covered under T3-OPS-ENT-002/2021

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APPROVAL REGISTER

Document Information	
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Prepared by

Position	Signature	Name	Date
Operations Superintendent	Scott Rowell	Scott Rowell	09 / 06 / 2021

Reviewed by

Position	Signature	Name	Date
Vessel Master	Vitaliy Shastun	Vitaliy Shastun	09 / 06 / 2021
HSEQ Manager	James Taylor James Taylor (Jun 9, 2021 08:36 GMT+4)	Jamie Taylor	Jun 9, 2021
Marine Manager		Viktor Fedorchenko	08/06/2021

Approved by

Position	Signature	Name	Date
General Manager	Mark Harvey	Mark Harvey	09 / 06 / 2021
McDermott SME			
Global Maritime MWS		Mark Phillips	09 / 06 / 2021

REVISION HISTORY

Rev.	Issue Date	Reason for Revision	Originator	Approver
0	10/11/2020	Drafting of move procedure for a move from NKOM RLIC to NW face of PU platform in North Field Bravo	Operations Superintendent	Marine Manager
1	11/11/2020	Reviewed, issued for initial client review and comments platform in North Field Bravo	Marine Manager	General Manager
2	15/11/2020	Revised with QatarGas (CRS (RMP T3-OPS-ENT-0012021 Rev01) and (DNVGL QAT1238-TRN 109 Rev 0) comments, issued for further client review	Marine Manager	General Manager
3	24/11/2020	Reviewed with QatarGas (CRS (RMP T3-OPS-ENT-002 2021 Rev01)	Marine Manager	General Manager
4	16/12/2020	Amended with final revision of interface drawings as in Section 8.3, SSA and debris clearance survey results as in Section 8.8, last revision of CoA as in Section 8.10	Marine Manager	General Manager
5	21/12/2020	Amended with interface top view drawing as in Section 8.3, latest revisions of SSA as in Section 8.8 and CoA as in Section 8.10	Marine Manager	General Manager
6	31/12/2020	Amended with client comments as in 200-20-CC-PRC-0074_B1_QG_PMT_CRS dd 29.12.2020	Marine Manager	General Manager
7	08/06/2021	Amended with latest client comments dd 07/06/2021	Marine Manager	General Manager

1. Purpose

The purpose of this procedure is to describe the processes and requirements to ensure that vessel move operations are carried out safely and efficiently.

All personnel involved in vessel move operations are expected to take recognition of the requirements described in this procedure to ensure the safety and protection of personnel, the environment, and GMS assets.

All personnel involved in vessel move operations are empowered and expected to stop work activities associated with vessel move operations if safety is being compromised

2. Scope

The scope of this document includes:

- Vessel Move Responsibilities
- Operations Overview
  - Vessel Stability
  - Trigger Points
  - HOLD Points
  - Clearance Requirements
- Support
  - Towing Arrangement
  - Navigation Package
  - Weather Forecasting Services
  - Notification and Advisory Messages
  - Supporting Documentation
- Preparation
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  - Other Preparation
  - General Points to be Observed During Marine Operations
  - Weather Restricted Operations
- Departure
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  - Leg Extraction
  - Departure from NKOM in RLIC
- Arrival
  - Prior to Entering 500m Zone of NW location at PU platform (HOLD Point 2)
  - Move to Final Location (HOLD Point 3)
  - Soft Pinning at Final Location (HOLD Point 4)
  - Site Specific Assessment
  - Pre-load Requirements
  - Pre-driving and Pre-Loading Procedures (HOLD Point 5)
- Location acceptance by all parties, location approval by GMS MWS, CoA issuance (HOLD Point 6)
- Operational Air Gap
- Post Vessel Move Review

- References
- Appendices

3. Introduction

The Enterprise will be departing NKOM in RLIC and carrying out a vessel move to the edge of 500 zone of NW location at PU platform in North Field Bravo covering a total distance of 42.9nm in total.

Final approach to NW location at PU platform and installation of Enterprise will be carried out in a way as its described in Section 6.7.1 and onwards.

The move from NW location to SE location of PU platform is covered with T3-OPS-ENT-002/2021 Rev. 5 vessel move procedure.

The GMS vessel Enterprise is a self-propelled DP2 Mobile Offshore Unit and requires no vessel towing arrangements to complete the vessel move.

Prior to the vessel move, a Vessel Move Risk Assessment shall be carried out onshore. The output from the risk assessment is appended to this document and located in Section 8.7.

The pre-move risk assessment is the Stage 1 Risk Assessment with further risk assessments taking place offshore by the vessel move team in conjunction with the vessel crew prior to commencement of the vessel move.

3.1. Health Safety and Environment

GMS believe that every operation can be completed safely, efficiently and without causing harm to personnel or the environment. Persons in charge of operations should impress upon those involved in the operations, the need to tackle tasks, including those regarded as routine, in a safe and controlled manner. While the use of Toolbox Talks and Risk Assessments are positively encouraged, their effectiveness will be diminished if unsafe behaviour goes unchecked.

Deviation from this procedure is permitted but, in all cases, where such deviations are to take place, McDermott Global Management of Change procedure shall be applied.

Records shall be maintained as defined within the aforementioned documents and copies held on board the vessel in order to ensure that the consequences of a procedure change have been fully reviewed.

3.2. Management of Change

The processes and procedures described in this document are for the guidance of all parties involved with the vessel move.

Deviation from the procedures detailed in the Vessel Move Procedure (VMP) are acceptable subject to agreement provided that:

- Technical Management of Change Procedure as referenced in Section 7 is followed
- Departure from procedures are made in order to ensure a safe and efficient operation

Any major change to procedures in the VMP shall only be carried out in compliance with Technical Management of Change Procedure 200-20-PE-PRC-0033 Rev.00

and approved by CPY via Project MOC process. The reason for the Management of Change should be clearly defined such that there is no ambiguity as to the reason(s) for the change.

The following personnel are to be included in any Management of Change process:

- GMS Master
- McDermott Representative
- QatarGas Representative
- MWS
- All signatories to the VMP

Where possible, all vessel move participants will be issued with a copy of this vessel Move Procedure prior to departure from port / present location. All participants will be fully briefed on the proposed vessel move operation and the GMS Master shall confirm that the vessel is capable of carrying out the proposed operation.

All participants will be required to review the VMP and Risk Assessment and comment accordingly.

The Master shall ensure that the most recent revision of all documents referenced in the VMP are retained on board the vessel and available for reference.

The GMS Master shall ensure that GMS are informed of any observations which may lead to deviation from the VMP in time.

4. Definitions

4.1. Abbreviations

Abbreviations used in this document are presented below in alphabetical order.

GMS	Gulf Marine Services
HSE	Health, Safety and Environment
RA	Risk Assessment
CAM	Critical Mode of Operations
CCD	Central console display
DP	Dynamically Positioned
GOMO	Guidelines for Offshore Marine Operations 0611-1401
ft	Feet
hrs	Hours
kts	Knots
m	Metres
ICP	Independent Competent Person
IMCA	International Marine Contractors Association
LBH	Legs below hull
LAT	Lowest Astronomical Tide
MOU	Mobile Offshore Unit
nm	nautical miles
OIM	Offshore Installation Manager
POB	Personnel on Board
PPE	Personal Protective Equipment
TAM	Task Appropriate Mode
QA/QC	Quality Assurance / Quality Control
RPD	Rack Phase Difference
(T)	True
VHF	Very High Frequency

5. Responsibilities

5.1. Ownership and Custodian

The owner of this Procedure is the GMS Marine Manager with responsibilities for:

- Identifying deficiencies or potential improvements
- Giving clear direction on how the Procedure is to be implemented and maintained
- Ensuring adequate resources are in place to ensure adherence to the procedure
- Issuing the Procedure and any revisions

5.2. Vessel Move Responsibilities

Responsibilities relating specifically to vessel move operations are detailed in Section 6.1 of this document.

6. Enterprise Vessel Move

The content of the following sections is intended to describe the processes and procedures that must be followed in order to safely carry out vessel move operations.

Supporting information that is specific to the vessel move is referenced throughout the following sections where applicable and is included in the Appendices in Section 8.0 of this document.

Additional information such as supporting Procedures, Reports, Surveys and legislation are referenced throughout the following sections where applicable and are listed in Section 7.0 of this document.

6.1. Vessel Move Responsibilities

Prior to commencing vessel move operations, a meeting will be held on board the vessel, chaired by the Master and attended by all personnel who have been identified as having responsibilities in connection with the safe and efficient execution of the vessel move, i.e.

- GMS Enterprise 6103 Master
- GMS Enterprise 6103 Chief Officer/DPO
- GMS Enterprise 6103 Chief Engineer
- McDermott Representative
- QatarGas Representative
- Marine Warranty Surveyor (MWS)
- Vessel Positioning / Survey Contractor

The meeting must be documented in the form of formal meeting minutes and confirmation given by the GMS Enterprise Master that all fundamental safety systems are fully operational.

Following the vessel move meeting, all personnel who participated in the meeting will sign an attendance sheet confirming that they have read and understood the content of the Vessel Move Procedure and shall adhere to the same.

In addition, they shall agree that if they deem the procedures defined in the VMP are being deviated from, they will stop the job until such time that a Management of Change process has been carried out and the changes have been Risk Assessed.

All vessel move operations will be conducted in accordance with the GMS Enterprise Operations Manual, QatarGas Marine Operational Manual, and any other industry or client specific marine procedures.

6.1.1. GMS Enterprise Master

The person in overall charge is the GMS Enterprise Master, as documented on board the vessel and in accordance with statutory requirements. Reference should be made to the GMS Management System.

The Master shall have total responsibility for the safety of the vessel and personnel at all times as per statutory requirements.

The Master is overall in charge for management of emergencies on GMS Enterprise at any stage of vessel's operations, who executes the vessel emergency response procedures as per GMS Safety Management System / Vessel Emergency Response Manual (T3-HSE-MAN-001).

The Master will:

- Observe HSE operational notices.
- Leading vessel compliance with all GMS HSE initiatives (TBT's/RA's/Lifting Plans/ Safety Meetings/SOC's/ STOFS etc).
- Ensuring that safety, pollution prevention, emergency preparedness, health hazard drills and Emergency Response Drills/Training is imparted to all ship staff according to GMS policies, procedures, Muster Bills and international regulations.
- Ensure that pre-vessel move safety meeting is held on board prior to the move
- Ensure that Stage 2 Risk Assessments are carried out on board prior to commencing the vessel move
- Ensure a continuous log of events is maintained
- Ensure there are charts available, corrected and up-to-date for the intended passage
- Ensure the correct deployment of competent vessel personnel to operate the vessel as required
- Leading the safety culture on board the vessel by ensuring all incidents and safety observations are reported; ensuring that the vessels crew are able to react quickly and efficiently to an emergency situation and that all Emergency Response Drills are carried out on schedule.
- Obtain copies of all Risk Assessments and Stability Calculations prior to commencing the move
- Ensure the stability of the vessel at all times, including making any adjustments to trim and heel as necessary
- Retain overall authority during the period of a location move and will decide when it is safe and practicable to commence the vessel move operation within the limitation of the vessel Operations Manual

- Nominate a VHF working channel to be used by all parties for the duration of the vessel move.
- Ensures compliance with GMS and QatarGas procedures as to the entry into the field and 500m zone of the platform, not limited to but completing all checks and getting a permission to enter.

During the location move the Master will have the support of an experienced marine crew. These additional personnel will act in the capacity of 'Responsible Persons'.

Accountabilities during emergency shall include:

- Establish arrangements for effective emergency management and decision making
- Clear non-conflicting responsibilities for those who undertake emergency response, including evacuation, rescue, and onshore/offshore emergency control and recovery
- Establish response plans which are tested in drills / exercises and are available to all persons on the installation to gain an increased level of understanding
- Establish emergency prompts / aids to enable precise emergency management for a variety of scenarios
- Establish effective emergency communications arrangements between all parties
- Liaison with North Field Bravo Authority via McDermott or QatarGas Representative
- Ensuring that all persons using equipment, or engaged in operations, are competent and suitably experienced, or that such persons work under close supervision of a person who is competent and suitably experienced

The Master shall also ensure that the appropriate authorities have been advised of the move in accordance with port regulation authorities / Bridging documents. In addition to the regulatory reporting criteria, it is the responsibility of the Master to ensure that all parties identified within this procedure as having to be notified and updated as to the status of vessel move operations, are advised accordingly. The responsibilities for reporting will be discussed at the pre-move meeting.

Note: The GMS Enterprise Master will issue all notices.

The GMS Enterprise Master should regularly check, based on weather, experience, manning levels and available equipment, that all involved personnel are confident of completing a task safely, and reassure all that they can, and have an obligation to, 'stop the job' for any reason they feel the need to do so.

6.1.2. GMS Enterprise Chief Engineer

The Chief Engineer has the following responsibilities:

- Manning the jacking console and acting as principal Jacking Engineer during all jacking operations

- Coordinating with the Master to ensure all jacking commands are carried out as requested
- Ensuring that all vessel systems (electrical, propulsion, jacking etc.) are in a fully operational condition, ready for use, and any deficiencies reported to the Master
- Participating in pre-vessel move safety meeting held on board prior to the move
- Participating in Stage 2 Risk Assessments carried out on board prior to commencing the vessel move
- Providing accurate information to the Master to allow correct completion of Stability Calculations prior to commencing the move
- Ensuring a continuous log of events relating to the jacking operation is maintained
- Ensuring the correct deployment of competent Engine room personnel to operate the vessel as required

6.1.3. GMS Enterprise Dynamic Positioning Officer

The Dynamic Positioning Officer (DPO) has the following responsibilities:

- Assisting and supporting the Master as required in the operation of the DP console and general bridge duties
- Participating in pre-vessel move safety meeting held on board prior to the move
- Participating in Stage 2 Risk Assessments carried out on board prior to commencing the vessel move
- Ensuring a continuous Bridge log of events is maintained during the approach operation
- Ensuring there are charts available, corrected and up-to-date for the intended passage
- Ensuring the correct deployment of competent vessel deck personnel to operate the vessel as required
- Assisting the Master in ensuring the stability of the vessel at all times, including making any adjustments to trim and heel as necessary

6.1.4. Rig Positioning & Survey Contractor (Fugro)

The Rig Positioning & Survey Contractor (Fugo) and in particular the Party Chief, will be responsible for supplying, setting up and maintaining the survey equipment as contracted and detailed below.

They will also:

- Review the vessel Move Procedure and Survey Procedure, especially the positioning tolerances, and will accurately log the vessel position and heading
- Prepare a report that captures all the important aspects of the positioning operations including notes on tidal heights and water depths at key points in the operation

- Be responsible for providing constant data showing the position of the vessel at all times during the vessel move and will ensure that all relevant field data is displayed on the navigation display screens
- Liaise with the GMS Enterprise Master, QatarGas Representative and MWS with respect to navigation equipment status and position confidence
- Perform system checks to prove navigation system confidence prior to commencement of the vessel move and at intervals during the vessel move operation. Any failures/shortfalls in navigation equipment must be immediately reported to the QatarGas Representative, GMS Enterprise Master and MWS
- Ensure that all positioning systems are operating correctly and highlight at an early stage any positioning problem which could delay the operation or put any asset at risk
- Maintain detailed logs of all movements of the vessel, as advised by the GMS Enterprise Master, MWS, McDermott and QatarGas Representatives
- Ensures that deployment of sector scan sonar equipment and measurement of clearances between the subsea assets and the legs of jack up barge are in accordance with survey procedure and targeted values as in interface drawings

6.1.5. MCDERMOTT Representative onboard

Role: Senior Offshore Representative based on the GMS Enterprise 6103 will ensure that all relevant for the move requirements are met during the execution phase of the project

Responsibilities:

- Establish an integrated organogram for managing shared activities, showing key accountable and responsible persons with their lines of communication.
- Establish systems, polices, standards or other controls which will be employed to manage the risk.
- A process to manage the control of change and cumulative risks from combined operations.
- Interface with North Field Bravo Authority during execution phase of the project to ensure work is conducted in a risk based planned approach and in case of emergencies supporting the Master.
- Responsible for overseeing the control of all operations conducted within the PU platform 500m zone.
- Establish a single position of primacy for dealing with emergency response within the North Field Bravo PU platform zone

The McDermott Representative, as well as QatarGas Representatives, are responsible for ensuring the safety and integrity of the Operator's assets during the move. They have final recourse to veto any proposed actions which may adversely affect the safety and integrity of those assets and interests, including vessel deployment and route.

They should actively participate in all the decision-making processes associated with the vessel move operation. If in disagreement with any of the decisions made in support of the operation, he shall notify the Master. If deemed appropriate these objections should be made in writing.

McDermott Representative and / or QatarGas Representative onboard will also:

- Review the Vessel Move Procedure especially the positioning tolerances and will accurately log the vessel position and heading.
- Prepare a report that captures all the important aspects of the positioning operations including notes on tidal heights and water depths at key points in the operation.
- Liaise with the GMS Enterprise 6103 Master for the co-ordination of a pre-move meeting on board the vessel, ensuring that the meeting is recorded.
- Liaise with the GMS Enterprise 6103 Master and advice on marine operations.
- Ensure the POB is recorded in the vessel Move Report
- Highlight at an early stage any problems which could delay the operation or put any asset at risk
- Ensure that the necessary vessel move notification advices are transmitted and navigation warnings broadcast, and liaise with third party operators/representatives when required
- Liaise daily with the GMS Enterprise 6103 Master regarding any changes in the ballast or stability conditions, equipment failures, or any other circumstances likely to affect fundamental marine safety. He will have the right to conduct checks on safety critical marine equipment operability
- Report to other parties as required regarding the vessel move progress.
- Ensure that any and all additional marine equipment provided is certified, and fully operational.

6.1.6. QatarGas Representative

QatarGas will appoint a Representative who will represent QatarGas Company interests on board the barge during barge move, positioning, preloading and jacking operations. The QatarGas Representative has monitoring status, with right to refuse the barge to proceed, if a situation should occur where the QatarGas Representative deems the coming or proposed action, from barge owner or other participants in the barge move, as a safety risk to personnel or any of QatarGas's assets.

Following the emplacement of the unit and acceptance of the Barge position at operational level by the Barge Master and McDermott Representative, QatarGas Representative will have been considered to have completed his responsibilities.

6.1.7. Marine Warranty Surveyor (MWS)

The Marine Warranty Surveyor will issue a Certificate of Approval when he is satisfied that the unit is secured and ready for move operations.

- To ensure GMS Enterprise is ready for a move by inspecting the following, but not limited to: Sea Fastening, Stability and Load Distribution.

- To review this move procedure and routing and provide advice and comment as appropriate.
- To ensure the operation is conducted within the limits of the GMS Enterprise Operating Manual and Location Approval.
- To verify and approve the seaworthiness (including sea fastening of loose equipment) and watertight integrity of the unit prior to departure from location.
- To monitor and record the unit's transit stability and calculations.
- To monitor and record the unit's preload operations and calculations.
- Certificate of Approval (CoA) will be issued by MWS as follow:
  a. Readiness to jack down at the present location.
  b. Once GMS Enterprise is within 500m Zone (transition - afloat to standoff position) after reviewing the stability calculation and move meeting onboard and prior to move operation for GMS Enterprise to go onto final position, another CoA for Jacking will be issued.
  c. Location Approval Certificate - issued in advanced for move operation, upon finalizing and acceptance of RMP.

6.2. Operations Overview

6.2.1. Current Proposes Locations

Current and Proposed Location			
Current Location	**NKOM yard**	**Proposed Location**	**PU platform, NW location**
Vessel Heading	180 (T)	Vessel Heading	265 (G)
Platform North Heading	N/A	Platform North Heading	N/A
Water Depth	13.0 m LAT	Location	North Field Bravo
Legs Penetration	1.0m	Latitude (Platform position)	As in Appendix 3
Airgap	2m above LAT	Longitude (Platform position)	As in Appendix 3
		TM Projection	WGS84
		Heading Tolerance	+/- 1 degree
		Position Tolerance	+/- 1.0m
			+/- 1.0m
		Min Allowed Approach Distance (stem to centre of platform)	10.0m
		Water Depth	53.3-54.0m
		Expected Penetration	14.2 – 19.0m
		Minimum Safe Airgap	9.1m
		Working/Planned Airgap	18.965m

6.2.2. Proposed and Safe Haven Location

Proposed Safe Havens:

- RLIC anchorage
- NKOM shipyard

For each port of call local agent will have to provide GMS Enterprise Master with all relevant information such as navigational, geotechnical and geophysical information where applicable, emergency contacts, local tide tables, berth arrangements etc. See Section 8.5 for agent contact details.

In case if no geotechnical or geophysical data available for RLIC anchorage, GMS are to refer to historical data available as to the locations GMS Enterprise had been in stand by outside RLIC. Assurance that legs are clear from geophysical hazards and harmful debris during legs pinning in RLIC anchorage area, will be provided with deployed sector scan sonar for a check that seabed is clear prior to the legs pinning.

6.2.3. Estimated Duration of Vessel Move Operations

The vessel move process consists of a number of stages with each stage having an estimated time period to complete the tasks as indicated in the following table. Each stage is supported with different environmental criteria (either for jacking, transit or DP Operations) as indicated in Section 6.3.2. Calculations of weather window required are provided in Section 6.4.4

Estimated Duration of Vessel Move Operations	
Activity	**Duration (Hours)**
Jacking down, watertight integrity check, leg retrieval, departure	3
Transit from NKOM to North Field Bravo, PU platform, NW location, 500m zone	8
DP Set-up at 500m zone of PU platform, 500m zone checklists are completed (daytime operations only, ref. to Sec. 6.7)	1
Approach location and final positioning, launching and operations with sector scan sonar (daytime operations only, ref. to Sec. 6.7)	6
Pre-drive / Pre-load	12
Total	**30**
Time may be required for stand-by waiting for daylight	**12**
Total Weather window required including contingency	**75.0**

Note: Total weather window includes time required to return to the safe haven as outlined in Sec. 6.4.4.

6.2.4. Vessel Stability

GMS Enterprise 6103 is a self-propelled DP2 MOU. Adequate reserve stability shall be maintained at all stages of the planned vessel move.

Prior to getting underway, the Master shall ensure that stability assessment is completed and anticipated floating condition is in compliance with all stability criteria. MWS attending the move will verify the stability condition what will be a part of the process of accepting GMS Enterprise to start with move.

With the vessel in the floating condition, drafts shall be visually checked fore and aft from port and starboard sides of the vessel in order to ensure that the anticipated conditions are achieved. In case of any discrepancies between calculated and actual drafts, consideration for re-assessment of trim and stability condition and amendment to calculations as indicated in Section 8.6 of this document with respect to the quantity of ballast water to be taken.

6.2.5. Trigger Points

The following events will initiate a discussion between all parties involved in the vessel move including but not limited to, the Master, Chief Officer, Chief Engineer, McDermott Representative, QatarGas Representative and MWS:

- Approach to offshore installation
  - Significant sea height reaches 1.2m Hs
  - Wind speed reaches 10kts
- Transit/Standby
  - Significant sea height reaches 2.5m Hs
  - Wind speed reaches 25kts
- Any changes in the weather forecasts which are always referenced
- Visibility reduced to under one nautical mile
- Unexpected leg load changes experienced on GMS Enterprise 6103
- Any mechanical problems aboard vessel which may affect the operation
- Any technical faults with the survey equipment
- If at any stage, there is any doubt about any aspect of the operation being undertaken

Following the discussion, the operation will either continue as per the VMP or suspended until the situation is resolved, or a departure from the VMP is initiated in accordance with the Management of Change process.

Note: The above does not release any individual from their obligation to stop the job if they consider it to be unsafe or if they consider that the VMP is not being followed.

6.2.6. HOLD Points

Throughout the vessel move operation, a number of critical operations will be undertaken, all of which have natural 'HOLD POINTS'. A full assessment of each stage of the vessel move operation should be undertaken prior to continuing each stage.

Prior to commencing the next stage of the vessel move operation, all parties must agree that the weather window is of sufficient duration to complete the planned operation, all vessel systems are functional, and that there are no other factors that could disrupt the planned activities.

Prior to proceeding with each stage of the vessel move operation, all parties including the vessel Master, MWS, McDermott and QatarGas Representatives shall sign each hold point before being authorized to proceed to the next Point.

The anticipated duration of all critical operations, including normal allowances for unexpected contingencies, should be taken into consideration.

Below is the Hold Point table that details out each of the Hold point during the operation.

HOLD POINT TABLE		
HOLD Point 1	**Vessel Master, McDermott & QatarGas Representatives, MWS**	• All vessel systems operational and ready for departure and passage outside • Jacking plan agreed by Master and McDermott & QatarGas Marine Representatives • All required personnel on board • Weather forecast checked and found suitable with sufficient weather window • CoA is issued for departure and sailing by MWS
Ready in all respects to depart NKOM		
HOLD Point 2	**Vessel Master, McDermott & QatarGas Representatives, MWS**	• Weather forecast checked and found suitable with sufficient weather window to complete the remaining part of the operation. Duty Forecaster is available for 24 hrs operations • All vessel systems operational and ready to approach PU platform location • All DP set-up procedures completed, and checklists signed • QatarGas 500m Red Zone Checklist is completed • QatarGas 500m Zone Communication Checklist is completed • DP, generators, thrusters and associated systems are fully operational • Additional vessel positioning equipment tested and fully operational • Permission to enter 500m zone granted
Prior to entering 500m zone of NW location at PU platform		
HOLD Point 3	**Vessel Master, McDermott & QatarGas Representatives, MWS**	• Environmental forces assessed and found within criteria • Sea state acceptable (wave/swell height/direction) acceptable and complies with limits listed in Section 6.3.2 of current procedure • CoA is issued by MWS prior to entry 500m zone
Prior to final approach of proposed position		
HOLD Point 4	**Vessel Master, McDermott & QatarGas Representatives, MWS**	• Platform approach completed under environmental criteria specified in Sec. 6.3.2 of present VMP • Vessel confirmed in position within required tolerance by Fugro Positioning Surveyor • Weather forecast checked and found suitable with sufficient weather window to complete the remaining part of the operation
Prior to soft pinning legs on proposed position		

HOLD Point 5	**Vessel Master, McDermott & QatarGas Representatives, MWS**	• Master final checks on all positions to ensure heading, position and distances are within tolerable limits • Weather forecast checked and found suitable with sufficient weather window to complete the remaining part of the operation • Any additional ballast is taken on-board prior to pre-loading
Prior to pre-driving and pre-loading		
HOLD Point 6	**Vessel Master, McDermott & QatarGas Representatives, MWS**	• Pre-drive and pre-load completed as per vessel operations manual and vessel move procedure with NO deviations • Achieved penetrations at the end of both pre-drive and pre-load calculated, found in accordance with expectations and recorded • MOC process is followed as outlined in Section in case of any deviations, with CPY official approval of the MOC for such deviation • Any additional ballast dumped • Vessel stable and ready for jacking in all respects
Upon completion of to pre-driving and pre-loading		
HOLD Point 7	**Vessel Master, McDermott & QatarGas Representatives, MWS**	• Approval of all FINAL SET UP PARAMETERS (as recorded in the table below, signed by all relevant parties • Location approval issued in advanced for move operation (i.e. upon finalizing and acceptance of RMP) is endorsed by issuance of CoA for jacking • Weather forecast checked and found suitable with sufficient weather window to complete the remaining part of the operation

Prior to jacking up to operational airgap		FINAL SET UP PARAMETERS:
		• Heading:
		• Distance:
		• Final Legs penetrations:
		  ○ Leg 1 (BP)
		  ○ Leg 2 (BS)
		  ○ Leg 3 (AP)
		  ○ Leg 4 (AS)

6.2.7. **Clearance Requirements**

To prevent damage to subsea infrastructure the following shall be observed when working in the vicinity of subsea assets:

- When lifting / lowering the legs within the 500m zone, there must be a minimum vertical clearance between the spudcan bottom and subsea asset of not less than 10 m with no exceptions
- There must be a minimum horizontal clearance between the spudcan side and the subsea assets of not less than 10m with no exceptions
- The Master should also be aware of Under Keel Clearance (UKC) at all stages of the operation to prevent leg/thruster contact with the seabed, also during a final approach to the location when legs are close to the seabed

Note: Under Keel Clearance - meaning in this procedure is a clearance under any of the legs or thrusters.

6.3. Support

6.3.1. Towing Arrangement

GMS Enterprise is equipped with emergency towing facilities fore and aft but is self-propelled and dynamically positioned vessel, complying with ABS DPS2 Class requirements as to DP2 redundancy concept which excludes a scenario of catastrophic failure i.e. total loss of power (black out), what is proven by FMEA and FMEA proving trails. GMS Enterprise is not normally in need of tow support also if after experiencing a DP worst case failure as defined by FMEA, where DP post failure capability allows to terminate the execution of task and leave 500m zone under own power safely.

Nevertheless a standby / assist tug, which is a project supporting OSV similar to OSV Sea Conquest which was previously engaged in shadowing GMS Enterprise in previous moves within QP NFA field operations under similar arrangements, will be provided for covering the transit within 500m zone and approach, positioning and installation of GMS Enterprise in NFB PU platform locations, what is in compliance with requirements of the QG Marine Operation Manual (P36-X03-003 May 2020 Rev 4) Section 7.4.1.

Emergency towing equipment on GMS Enterprise will be prepared and kept ready for immediate use in case of any contingency related to catastrophic failure of DP system and its components, such as full black out, which may lead to inability by the vessel to maintain its position and heading.

GMS Enterprise Emergency Towing Manual (T3-OPS-ETPS-MAN-003 Rev.1) provides a procedure of emergency towing including in situations described as above, when emergency pull off the jack up barge from the danger is considered (ref. to the Section 6.4.3 of a/m manual). A bollard pull requirement for this specific task is 70 tons.

Emergency towing equipment applicable to such scenario, as in accordance with pattern contained in Section 6.4.3 of GMS Enterprise Emergency Towing Manual, consists of 3-legged soft line towing bridle rigged as it follows:

- Two bowlegs of the bridle are connected to the Smith brackets on forecastle deck on GMS Enterprise from one end, and connected from other ends to,
- One soft line tow line, the free soft eye of which goes to the standby / assist tug in prompt manner, as soon as it’s decided that tug assistance is needed.

Two bowlegs are connected to the Smith brackets as well as with the tow line - with bow type shackles. Both bowlegs are placed onto bulwark of GMS Enterprise, ready for immediate deployment without any further assistance from the GMS Enterprise’s crew.

The tow line is coiled on a main deck, the free eye is connected to the heaving line which will go to attending standby / assist tug in case of emergency. The tug will be shadowing the moves of GMS Enterprise staying at a safe distance, while in case of contingency as described above the tug will shorten the distance, heaving line will be received from GMS Enterprise, tow line pulled out, and the free eye deployed either to the towing hook, towing bollard or connected to the main towing wire of the tug, which ever method is considered faster and reliable.

Communication is to be established between GMS Enterprise and standby / assist tug before entering to PU platform 500m zone, it will be maintained till completion

of jacking operations in final position. Proper plan of shadowing the move, communication protocol, commands in exchange and actions in the contingency situations – are to be agreed between Masters of two vessels prior to entry to 500m zone and recorded in deck logbook as the evidence. Communication established as per bridging document between the vessels.

Only Master of GMS Enterprise has authority to give the order the stand by / assist tug to approach GMS Enterprise and request for assistance and pull out, duly assessing the situation with post DP failure capability on GMS Enterprise and ability of GMS Enterprise to terminate the activity and exit 500m zone in DP mode, unless it's a total black out.

6.3.2. Weather Forecasting Services

Two weather forecasts will be provided for covering all operations as per this procedure on a daily basis, being activated not later than 72 hrs prior to beginning of the move, for a duration covering the complete move of GMS Enterprise till it's elevated to operational level. One will be provided by McDermott from first source of weather information (i.e. Fugro, MeteoGroup, Stormgeo, etc.), another forecast will be provided by GMS from second source of weather information.

A sufficient weather window with a minimum period of 60 hours is required for this move within tide times that will permit departure from NKOM and arrival at PU platform location. The time allotted for contingencies in mentioned periods should allow GMS Enterprise 6103 to reach the nearest safe haven respectively.

Limitations for vessel Sea Transit as per ABS approved Vessel operations manual are:

- Transit Operations
  - Wind Speed 25kts
  - Sea Height 2.5mHs
  - Current Speed: 1.03m/sec

Taking into consideration DP Capability Analysis of GMS Enterprise 6103, the following environmental limitations for a transit within 500m zone are introduced:

- DP2 Operations
  - Wind Speed 10 kts
  - Sea Height 1.2m Hs
  - Current Speed: 1.03 m/sec
- Jacking operations
  - Wind Speed 21 kts
  - Sea Height 1.5 mHs
  - Current Speed: 1.03m/sec

It shall be noted that the above limits are issued for guidance and do not consider relative directions. Final decision to commence or continue vessel operation will be at the full discretion of GMS Master.

6.3.3. Notification and Advisory Messages

Internal GMS notifications shall be issued as per GMS Management System requirements.

McDermott will issue notification messages in accordance with their own internal procedures, while QatarGas Representative will follow the procedures of QatarGas what is to be governed by approved Bridging Document.

All communications should be documented. The preferred method of communication shall be determined and agreed upon by all relevant parties prior to the vessel move getting underway.

QatarGas North Field Bravo Authority is to be kept appraised of ongoing plans and timing for field arrival, this is to be facilitated by QatarGas Representative and McDermott Representative onboard. QatarGas North Field Bravo Authority is to be kept appraised with regard to plans and timing of field entry.

6.3.4. Supporting Documentation

The GMS Enterprise Master shall ensure that during the vessel move, all relevant industry guidance shall be observed which is applicable to the safe conduct of the operation. This will include, but is not limited to:

- GMS Enterprise Operations Manual
- GMS Safety Management System
- GMS Enterprise Helideck Operations Manual
- GMS Marine Procedures
- GMS Enterprise 6103 DP Operations Manual
- GMS Enterprise 6103 DP ASOG
- Guidelines for Offshore Marine Operations (GOMO)
- Bridging Document – approved by all parties
- QatarGas Marine Operational Manual
- North field bravo charts & Tide Tables

6.4. Preparation

6.4.1. Pre-move Meetings and Risk Assessments

Prior to commencement of Marine Operations, a pre-move meeting and Stage 2 Risk Assessment will be held on-board the vessel to review the output of the Stage 1 Risk Assessment conducted onshore on 15th November 2020.

A Stage 3 Risk Assessment will be held prior to departure; the GMS vessel Master is responsible for ensuring that the Stage 3 Risk Assessment takes place.

6.4.2. Other Preparations

The processes, procedures and requirements defined in the VMP have been discussed with all personnel involved in the operation.

Risk Assessments and Toolbox Talks completed, and all actions closed out.

Stability calculations carried out confirming adequate stability for all stages of the planned operation. Trim and stability calculation results with consideration of amount of additional ballast water being calculated as per Appendix 6 of current procedure, - is to be revisited by Master before the move. It’s Master’s responsibility to ensure that required quantity of the ballast is taken for achievement of required preload capacity at footings level. No McDermott or QatarGas approvals for this check is required.

DP Position Reference Systems transponder and reflectors are passed to McDermott and installed at PU platform in agreed positions prior entering 500m zone.

Provided Fugro survey positioning equipment is confirmed fully operational. Calibration of the equipment is carried out before departure from NKOM up to satisfaction of QatarGas Representative, with verification that the latest QatarGas survey & GIS Data in use. Final checks and calibration of equipment is to be carried out by Survey Supervisor / Party Chief prior to entry North Field Bravo.

6.4.3. General Points to be Observed During Marine Operations

Any assisting or support vessels shall notify GMS Master without delay of any change in his vessel's operational status, which will significantly affect its ability to continue with planned operations.

GMS Master shall notify GMS Office without delay regarding any difficulties anticipated in undertaking the proposed procedures.

Vessel consumables will be recorded in the vessel move log.

A minimum vertical clearance of 10m shall always be maintained between spud cans and subsea equipment, pipelines or umbilical during a transit within and withing 500 mtrs zone. Legs lowering process while GMS Enterprise 6103 is transiting within 500m zone must comply with the sequence outlined in Section 6.7.1 of current procedure. Should there be any possibility of compromising the minimum clearance requirements at any time, necessary steps shall immediately be taken to maintain the required clearance. Clearance with legs and seabed will be decreased to 3 mtrs, right prior to soft pinning in stand-off position, i.e. 25 mtrs from final position. Legs clearance of 1 mtr is required for final approach, with adequate number of hold points during a transit for proper DP model update.

At all times a sufficient weather window to complete the operation must be identified. Such weather window shall include sufficient contingency for unexpected events, and should be derived in a way as outlined in Section 6.4.4

6.4.4. Weather Restricted Operations

The transit of the vessel is considered a weather restricted operation, and weather window required for covering the move with all contingencies is calculated as it follows:

$$TR = Tpop + TC + WF$$

Where,

TR = Reference period

Tpop = Planned Operations Time for move

TC = Time Contingency, 50% of Tpop

WF = Time between weather forecasts

The weather window required for the vessel move from starting jacking down at departure location until pre-loaded and elevated at arrival location will be 75 hours:

$$TR = Tpop + TC + WF = 30 \text{ hrs} + (30 / 2) + 6 \text{ hrs} = 51.0 \text{ hrs}$$

Note: Taking into consideration that the nearest to North Field Bravo safe haven which can be used by GMS Enterprise in case of not completed procedure in PU platform location - is RLIC anchorage and / or NKOM shipyard, the Reference Period (TR) is increased by 12 hours required for a transit to and installation in safe havens as specified above.

Considering the restriction for a barge move in afloat during daylight conditions only, weather window requirement will be increased by additional 12 hours which will cover any delays may be coming from any unforeseen circumstances while in transit.

Total weather window required for covering the vessel move including for all contingencies and extra requirements is therefore 75 hours.

6.5. Departure

6.5.1. Departure Preparation (Ref HOLD Point 1)

The vessel will be prepared for departure as per requirements and checklists in the Vessel Operations Manual.

Stability to be calculated and checked, and calculated draft and trim confirmed by observation of draft marks and recorded in the vessel logbook.

6.5.2. Legs Extraction

Legs extraction in NKOM shipyard is not deemed to be a problem, however regardless legs pulling procedure as outlined below is to be followed with no deviations unless in agreement between signatories to this procedure also by mean of initiating / following the MOC process.

Limitations of jacking system are known and verified, legs pulling capacity i.e. jacking capacity 1620 tons measured at jacking level shall not be exceeded in no any case.

Legs pulling process will be started at floating draft when all four legs are in contact with seabed and are with positive spudcans base suction at all four. Methodology of increasing the loads on first diagonal of legs gradually and evenly (with 100 tons steps) will be commenced, analysis of the effects from such increase via activated load trends on CCD of jacking system on the bridge will be carried out throughout a process. Switching from one diagonal of the legs to another in timely manner, provisionally offloading the first pair of legs – should allow to break the spudcan base suction gradually, what will require less pulling capacity of the jacking system for extraction all legs out at later stage.

Hold points are to be introduced after each stage of load increase, activated on CCD of jacking system load trends are monitored closely.

When any of the legs is freed, it should be lowered back into ex-pin hole till the moment when load changes are evident on CCD screen, what will indicate that the leg is in contact with the seabed and vessel's pivoting around remaining for freeing leg(s) is prevented.

In case if two or three legs are freed, legs extraction can be continued with utilization of hull buoyancy method by mean of jacking the hull down to the water, reducing the freeboard / increasing the hull draft respectively, what will be constrained by inclination limits as dictated by Operations Manual and utilization

of freeboard which shall not exceed the limits as prescribed by GMS Marine Procedures.

Operations within above said inclination limits, may be controlled with ballasting operations, what will affect the freeboard and hull buoyance available at the same time. Freeboard utilization shall not exceed 0.5m beyond the floating draft of the vessel, unless agreed between signatories to this procedure by mean of following the MOC process, also being supported with task specific risk assessment.

In no case the positive freeboard of the vessel is overutilized to the extent of getting a seawater on deck, unless other means available for safe legs extraction are tried, further actions are risk assessed as a part of completed MOC process.

Jetting system is on stand-by and ready for operations any time it may be needed during a move. Legs pulling process with application of method of hull buoyancy will be stopped when its proved ineffective without jetting, i.e. when 90% of jacking system capacity (1500 tons) is reached, or inclination / freeboard utilization limits are reached.

Vessel is to be returned to the floating draft before start of jetting. Jetting should be applied for a duration pre-defined by Master prior to another attempt to apply some pulling load to the leg, in order to reduce and / or break a spudcans base suction. Simultaneous operations with application of two methods (hull buoyancy and jetting) may be considered at later stage if none of the methods being applied separately helped to free the legs. This operation should be properly planned, risk assessed and approved as specified above, to be carried out with great care.

In case if 90% of jacking system capacity (1500 tons) is reached during legs pulling, a method of legs pulling utilizing the holding capacity of jacking system on rising tide may be considered. Safety considerations related to the tidal range prevailing and freeboard available in the beginning of operations at low tide, with hull buoyancy being utilized for reaching 1620 tons load of pulling capacity, as well as inclination before / after leg(s) freeing, distance to the platform and other safety aspects related to this stage of operations – are to be taken into account at the stage of planning of this operation and execution.

6.5.3. Departure from NKOM

The observed weather on departure should be as forecast or improving and confirmed by two independent weather forecasts obtained starting from 72 hours before planned departure time.

The vessel passage plan is located in Section 8.2 of this document, with final waypoint which is outside of 500m zone of PU platform of North Field Bravo. Passage plan is drafted on a basis that all surface installations are passed well clear, as well as subsea installations in case if legs lowering is carried out as prescribed by procedure below.

The vessel stability calculations for the vessel are to be undertaken by the Master who will ensure that the CoG and KG values allowing for Free Surface Effect, do not exceed Operations Manual limits for a sea passage with legs fully raised. The jacking condition will be verified to ensure jacking operations limits are not exceeded.

All items of loose equipment must be sea fastened, cranes stowed, watertight doors and hatches confirmed closed and the vessel properly prepared for passage.

The Master, Chief Engineer, and Chief Officers pre-move check lists are to be completed and a Pre-Move meeting held with the vessel crew and move personnel.

The vessel move will not take place if any significant defects with the following equipment are noted:

- Jacking system
- Propulsion system
- Power generation system
- Power distribution system
- DP system
- Navigational equipment

The hull will be lowered to 2.5 m hull draft and a watertight integrity check carried out to confirm no ingress of water before continuing to floating draft.

The vessel will be lowered then to floating draft and the legs raised clear of the seabed. There are no issues with legs extraction are expected in NKOM shipyard, however if any load on legs are observed, legs pulling process as outlined in Section 6.5.2 is to be followed. Once the legs are confirmed to be clear from the seabed or nearest subsea obstruction, the vessel will be manoeuvred clear off the jetty and shall proceed on passage under her own propulsion.

During a departure, the vessel must be either in manual thruster control mode or manual position control mode (i.e. joystick mode), with the power management system set up in TAM configuration. It's solely Master's authority to decide when to change to manual position control mode if required during departure, taking into consideration the distance to the nearest surface installations or any geophysical hazards on a seabed, prevailing weather conditions, navigational and other concerns.

The passage will be timed where possible to coincide with commencing passage in favourable weather/tide conditions.

Resetting of leg extensions and RPD to ZERO when all legs are fully retrieved.

GMS Enterprise shall be prepared for passage according to the Vessel Operations Manual. The Vessels state of readiness shall be confirmed by the Master, clients' Representatives onboard and MWS as per their signatory to HOLD Point 1.

6.6. Sea Passage

Passage will be conducted under full compliance with the vessel passage plan as located in Section 8.2 of this document.

GMS Enterprise Master is responsible for the safe navigation of the vessel and ensuring passage will be conducted under full compliance with all applicable regulations and the practice of good seamanship.

The GMS Master is responsible for preparing and executing a full passage plan for the intended passage in compliance with SOLAS and the GOMO.

Weather forecasts and navigation warnings will be monitored, and courses adjusted as necessary to ensure the safety of the vessel.

Distance of the passage 42.9 Nm

Passage will be via as direct route as possible and in compliance with clients' requirements. Last waypoint in passage plan is a position outside of 500m zone from PU platform of North Field Bravo. All movements within the field and 500m zone are to be arranged so just to provide safe clearance with all surface and subsea installations.

Watertight integrity checks of all tanks including void tanks shall be carried out prior to departure, and sea fastening checks shall be completed regularly when on passage, checks shall be recorded in the vessel log.

For the duration of the passage, the vessel track will be carefully monitored by the Officer of the Watch using all available means to ensure the vessel follows the charted courses avoiding all navigational dangers.

The ETA at the next location will be passed to required parties as advised by client during the passage.

Note: Mariners are reminded of the legal requirement to carry and use the correct charts for the area of navigation and that they must be corrected up to the latest available Notice to Mariners. Failure to do so may result in the vessel being declared 'un-seaworthy'

6.7. Arrival

Entry to the North Field Bravo will be carried out as covered with the passage plan in Section 8.2.

Entry to 500m zone of PU platform will be carried out from West direction with the heading set up as in final position at PU platform i.e. 264 degrees. Permission to enter 500m zone is to be obtained by Master from North Field Bravo Authority prior to entry.

All operations within 500m zone are planned so that final approach and legs pinning operations are completed during a daytime, approach and / or re-positioning (if necessary) during a night-time shall not be carried out.

Consideration shall be given to the presence and location of subsea pipelines and cables, and their proximity to the approach path and final location, which are displayed on the survey package screen.

Confirmation should be received that a seabed survey box covering the platform approach face has been thoroughly inspected, to make sure that any potentially harmful debris is identified and removed.

All seabed obstructions and subsea infrastructure within rig box are known, are displayed on the survey package screen.

Pre-Move seabed survey shall be reviewed / accepted by GMS and MWS prior issuing the CoA for the proposed location.

It should be expected that there may be a presence of relic footprints (potentially backfilled) which could remain from previous installation of jack ups or depressions which may affect final positioning of GMS Enterprise 6103 and further installation in PU platform location. RPD management process will be initiated as per the

procedure outlined in Section 6.7.5 for covering the risks may be coming from such interaction.

A geotechnical legs penetration analysis which has been carried out for GMS Enterprise in PU platform location (as in Section 8.8) should be available for further reference upon completion of positioning and beginning of pre-loading operations.

The vessel shall not enter PU platform 500 m zone until:

- all pre-entry checks, DP field arrival checks (as per DP Operations Manual) are completed;
- vessel systems are configured as per CAMO;
- verification that acceptable weather conditions and window required to complete remaining tasks is completed;
- GMS 500m zone entry checklist has been completed;
- QatarGas 500m Red Zone Checklist (25.21)
- QatarGas 500m Zone Communication Checklist (25.22)
- DP model is built up within a period of not less than 30 mins and station keeping within accepted tolerances;
- all required permits are in place;
- permission to enter 500m safety zone is given to the Master by North Field Bravo.

All requirements from pre-move meeting must be complied with and all other required vessel move checklists completed as per the vessel Operations Manual. All operations covered by current move procedure are to be executed in strict compliance to the QG Marine Operating Manual requirements (Ref. P36-X03-003 Rev.04) and ASOG agreed and implemented for this move.

6.7.1. Move to Final Location (HOLD Point 3)

The vessel will enter 500m zone in Auto DP control mode and continue in DP2 mode as per DP Operations Manual, GMS Enterprise 6103 Operations Manual procedures and ASOG (as in Section 8.9) as required. Three different in principle DP position reference systems will be in use (2 x DGNSS, RADius, and SpotTrack), stable communication of relative DP PRS with the transponder and prism reflector installed on PU platform is verified and being confirmed throughout the operations.

The Master will make a final assessment on wind and current conditions in relation to the DP2 control of the vessel and will make a final decision as to continue or abort the approach. Nett environmental forces (resultant of wind and current) should be preferably in a favourable direction from PU platform.

The vessel will enter and proceed with the transit within 500m zone towards final set up position at speed as guided by ASOG, as also extracted and inserted to the bottom of this section, with pre-set heading as required.

The Chief Engineer will man jacking console throughout the operations and will follow Master's instructions on a legs' lowering process. The Second Engineer on standby in the machinery room.

A system of hold points for updating DP model is required upon completion of each legs lowering session in a way as its described below:

- on arrival to 400m distance to final set up position – legs are lowered for 10m down (LBH 10m). The vessel maintains a position for 5 minutes for DP model update;
- on arrival to 300m distance to final set up position – legs are lowered for another 10m (LBH 20m). The vessel maintains a position for 5 minutes for DP model update;
- on arrival to 200m distance to final set up position:
    - Master is to verify a water depth and compare with legs readings
    - Anticipated legs / subsea installations clearance the crossing of which is planned (NC 6 and NC7 umbilical) which vessel intends to cross after next session of legs lowering to LBH 30m is verified, shall not less than 20m at the moment of crossing
    - Lowering of the legs for another 10m reaching LBH 30m is completed, water depth is verified and compared with legs readings;
    - Vessel maintains a position in for 5 minutes for DP model update and continue the move towards final set up position.

  The vessel will start moving within 200m zone, the Master will be receiving the information on a crossing of subsea assets from Fugro Party Chief, controlling the legs clearance which shall not be less than 20m during such crossing.
- Upon completion of crossing the subsea assets (NC6 and NC7 as shown in Section 8.2) and on arrival to 10m distance from final set up position, the vessel shall stop, allowing time for DP model to update;
- At 10m distance to final set up position, water depth is verified and compared with legs readings, legs are lowered for another 10m, providing a vertical clearance with seabed and nearest subsea assets not less than 10m.

GMS Enterprise 6103 will maintain a position at 10m distance from final set up position, assessing station keeping ability and getting ready for a final move as described in Section 6.7.2.

The Activity Specific Operating Guidelines (ASOG) is always to be referenced by the Master during approach to PU platform, namely with maximum position change (steps) as it follows: 500m - 200m: <= 50m, 200m to 50m: <= 10m, 50m to worksite <=5m, and speed of approach as follows: 500m to 200m: <= 0.5m/s (1.0 kn), 200m to 50m <= 0.3m/s (0.6kn), 50m to worksite: <= 0.1m/s (0.2 kn).

6.7.2. Soft Pinning at Final Location (HOLD Point 4)

The vessel will make two 5m moves with the speed 0.1m/s (0.2kn) until the final set up position is reached as shown in interface drawing (Section 8.3).

The information on a position of the vessels in relation to the final set up position will be provided by Fugro Positioning Contractor (Party Chief), which will be cross checked with information received from DP position reference systems (bearing and distance to the transponders).

Bosun on deck will call the distances to the final location by radio to the Master on approach, with further lookout to be posted on the stern ensuring that separation of 10 mtrs is always maintained between GMS Enterprise and PU platform.

The Master will be getting visual information from CCTV cameras, what will allow to ensure that such separation is always maintained.

The Master shall verify the water depth and compare with legs readings when vessel is in final set up position. Legs shall remain with 10m clearance in such position till clearances between legs and subsea assets are verified with sector scan sonar.

Sector scan sonar is to be deployed, clearances are verified, are within the range expected.

The legs will be lowered to 5m clearance from seabed, while monitoring of legs clearance with NC6 cable will be carried out with sector scan sonar.

GMS Enterprise will maintain a position with 5m clearance ensuring that vessel is stable, and lower legs to 1m clearance with the seabed preparing for soft pinning. Legs / NC6 cable clearances are to be verified with sector scan sonar deployed, confirmed within the range expected.

"Freeze model" function of DP system will be used before soft pinning. Master and DPO shall ensure there are no position / no heading offset prior soft pinning and there is no movement of the vessel which may lead to drive-off during transition from afloat to bottom bearing (pinned) conditions.

Once the position is confirmed, legs clearances from subsea assets are verified, and it's agreed that legs can be pinned, - a command from the Master to pin down the legs will follow. Control over the vessel will be changed to manual position control mode (i.e. joystick mode) as soon as indication of adequate load on legs due to contact with seabed appear.

Acceptance on position will be given by the McDermott Marine Representative onboard in accordance with the agreed tolerances, to be confirmed with MWS. As soon it's accepted and its agreed that jacking procedure can be started, the DP system will be disabled.

A changeover between Critical Activity Mode (CAM) as supported by ASOG to Task Appropriate Mode of operations (TAM) when the switchboard configuration is changed from "open-bus" to "close-bus" is only permitted for legs-pinned, for jacking operations and in elevated condition, when hull weight is reliably transferred to the legs and DP system is no longer in use. Therefore, as soon as the position is accepted by all involved parties, GMS Enterprise 6103 will be jacked to 2.5m where a changeover of cooling supply (from sea chest to sub pump) and change of switchboard configuration to common system with bus tiebreakers closed (close-bus) will be carried out.

Jacking operations (incl. pre-drive, pre-load, jacking to operational level) and operations in elevated condition will be carried out in close-bus switchboard configuration, however in case if a decision to return the vessel back to afloat condition is made, a change over from TAM to CAM at 2.5m draft must be performed.

6.7.3. **Site Specific Assessment**

Based on the results of spudcan penetration analysis, there is indication that location is prone to multiply punch through or rapid penetration during pre-driving of GMS Enterprise 6103 in PU platform location. For reference, Section 8.8 of this procedure should be used.

In case if predicted penetration is not achieved, legs penetration process is not matching with predictions, or in case of any doubts while in progress with pre-driving / pre-loading, - all further operations must be suspended until the situation is re-assessed by offshore and onshore management teams, in consultation with geotechnical engineers.

Accurate leg load control during the installation process shall be established in order to ensure that the footing reactions do not exceed or come close to the calculated foundation capacity during the whole process of installation.

The Rack Phase Difference (RPD) between leg chords this should also be regularly monitored, compared with manual readings and recorded during installation maintaining RPDs within design limits.

Should no conclusion be reached on the achieved or should weather deteriorate the GMS Enterprise shall return to the nearest safe location.

Note: The RPD must not exceed 35 mm (+/-17.5mm) and in the event where it exceeds 25 mm (+/-12.5mm), manual measurements must be taken for each 5 m of elevating the hull at least.

The distance indicating RPD can be measured on top of the leg guide, as the distance from a leg tooth to top of the upper guide. By measuring this distance for every chord an indication of a comparison between the racks by the position according to the hull is given. The primary reason for measuring the RPD is to secure that the leg braces are operating within their design criteria.

6.7.4. **Pre-load Requirements**

A maximum preload capacity utilization for of 0.77 was calculated using footing reactions which include the effect of environmental load factor of 1.15. The ISO preload resistance factor of 1.10 was applied to the preload footing reaction. This is based on preload jacking reactions of approximately 2,750 tons per leg to achieve preload footing reactions of approximately 3,080 tons per leg.

The GMS Enterprise is therefore considered to have sufficient preload capacity to satisfy ISO requirements for the proposed operations at PU platform location.

6.7.5. **Pre-driving and Pre-Loading Procedures (HOLD Point 5)**

The Site-Specific Assessment for the GMS Enterprise 6103 requires that static test of the seabed is conducted until maximum preload of 3080 tonnes per leg at the footings.

The pre-driving shall be performed sequentially to penetrate the soil in a controlled manner while the hull still remains in water, as detailed in subsection 3 below and governed by GMS Enterprise 6103 Operations Manual.

Each sequence provides a stage, comprising various tasks which must be completed with the desired outcome, before proceeding to the next stage.

Taking into account the risks outlined in geotechnical part of SSA (Section 8.8), namely a risk of punch through predicted for occurring during installation of GMS Enterprise 6103 with legs vertical reaction in a region of 10.5MN to 25MN, an enhanced jacking procedure as it's described in sub-section 3 below will be carried out.

On a completion of approach to the platform and safe pinning in the location, the following is to be considered:

1. Calculation of penetration

It is essential to have a reference point on water depth for accurate calculation of penetration while in pre-driving / pre-loading status with use of legs extension readings, taking into consideration changes coming from hull draft decrease after each jacking session and tidal activity which is a changeable figure as well.

Therefore, the following methods of calculating the actual water depth is to be carried out:

- Water depth @ LAT (Lowest Astronomical Level) being corrected with tidal range prevailing at that particular moment of time when the reference is made;
- Water depth readings obtained from echo sounder;
- Legs load changes at the moment of initial contact of the legs captured on jacking console CCD screen.

Precisely calculated legs penetration at each stage of pre-driving & pre-loading operations have paramount importance for safe completion of jacking process and safe operations of GMS Enterprise 6103 in elevated condition further.

2. Calculation of free RPD

After soft pinning, i.e. in soft pinned condition, manual RPD readings should be taken for further reference. Such readings need to be taken when the jacking frame transition will be carried from lower shock pads to the upper shock pads, what normally corresponds to 200-300 tons of load measured at jacking level. Taken RPD can be considered as free RPD however with great caution, always taking into consideration a seabed geophysical situation in the area of the legs, taken RPD will be compared with the readings from jacking console CCD, at initial and further stages of jacking operations;

Cautious loading of the legs while elevating hull further out of water shall be performed, RPD trends for all legs shall be activated, RPD changes are monitored through the CCD (jacking console) continuously.

In all cases when RPD limits which are 35mm (i.e. +17.5mm / - 17.5mm) are reached or RPD trend is showing continuous increase with each further stage of jacking operations, - all operations are to be stopped, GMS Marine Manager is to be advised, further steps are to be agreed involving third parties as it may be needed. The following, as a part of contingency planning, after agreement with all parties involved, also ensuring compliance with Section 3.2 of this procedure, may be considered further:

- Jacking to floating draft and legs retrieval for resetting the RPD
- Re-inserting the leg into ex-pin hole with rechecking of RPD readings from CCD screen of jacking console and manually taken at each further stage of jacking operations
- All legs de-stressing with repeating of pre-drive and pre-load sequence
- Any other actions agreed with geotechnical consultants and GMS Enterprise designers, also based on additional studies

3. Enhanced jacking procedure

Legs pre-driving procedure is to be started from 2.5m hull draft and continued in a way as it's described below. The hull weight in water (i.e. displacement) should be adequate enough for reaching maximum pre-load reaction at final stage of pre-loading and shall not be less than it's provided in Section 8.6. Therefore, Master is to verify that's additional ballast required to be taken is loaded onboard before first step of pre-driving.

Special consideration shall be given by the Master to the situation if legs or any of the legs are remaining in "hang up" after any of described below sequence of pre-drive and / or pre-load procedure.

In circumstances when differential legs penetrations are observed, it's Master's responsibility to stop all further jacking, pre-drive or pre-loading operations and inform GMS Marine Manager about the situation seeking for advice, who will initiate a process of further study of the case involving geotechnical consultants and all other parties involved, also ensuring compliance with Section 3.2 of this procedure, which may result to the following actions:

- Repeating of pre-drive / pre-load sequence at that stage of pre-drive and pre-load
- Reaming with the legs / stomping
- Utilization of jetting system with no load on the leg, repeating the sequence of pre-drive / pre-load sequence at that stage of pre-drive and pre-load
- Utilization of jetting system with load on the leg, while repeating the sequence of pre-drive / pre-load sequence at that stage of pre-drive and pre-load

- **at draft 2.5m:** it should be noted that hull weight at this draft should provide enough vertical reaction on 2 pre-driven legs for provoking a caprock break though if to refer to Low Estimate in legs penetration analysis. Master is to adopt all necessary precautions against consequences might be happening in case of such event, and in any case shall proceed further with the procedure with great caution.
    - 30 mins pre-drive (15 mins per each diagonal) is carried out in such way that offloaded legs will remain with 100 tons measured at jacking level, what should lead to vertical footing reaction equal to 8.5MN
    - No major changes in leg load trends are observed during load holding period in order to proceed with pre-drive further
    - Reached legs penetrations are calculated, plotted to LPA curve as in Section 8.8, no deviations / no abnormalities noted
    - RPD are within designed limits, trending was not showing suspicious changes during jacking, no significant changes in RPD between initial and current stages of pre-drive are noted
    - In case of significant changes in leg loads readings between start and completion of pre-driving at this stage noted, the sequence is to be repeated, duration of pre-drive at this stage is to be increased, GMS Marine Manager is to be informed for further consultation involving geotechnical consultants and other stakeholders as needed

- In case of any concerns or abnormalities, all operations are to be stopped; GMS Marine Manager is to be informed.

In case if break though hasn't happened at this draft, hull will be elevated to draft 2.3m and procedure below is to be followed further.

- **at draft 2.3m** – it should be noted that hull weight at this draft should provide enough vertical reaction on 2 pre-driven legs for provoking a caprock break though in case if it hasn't happened at previous hull draft. Master is to ensure all necessary precautions against consequences might be happening in case of such event are in place, and in any case shall proceed further with the procedure with great caution.
  - 30 mins pre-drive (15 mins per each diagonal) is carried out in such way that offloaded legs will remain with 100 tons measured at jacking level, what should lead to vertical footing reaction equal to 10.5MN
  - No major changes in leg load trends are observed during load holding period in order to proceed with pre-drive further
  - Reached legs penetrations are calculated, plotted to LPA curve as in Section 8.8, no deviations / no abnormalities noted
  - RPD are within designed limits, trending was not showing suspicious changes during jacking, no significant changes in RPD between previous and current stages of pre-drive are noted
  - In case of significant changes in leg loads readings between start and completion of pre-driving at this stage noted, the sequence is to be repeated, duration of pre-drive at this stage is to be increased, GMS Marine Manager is to be informed for further consultation involving geotechnical consultants and other stakeholders as needed
  - In case of any concerns or abnormalities, all operations are to be stopped; GMS Marine Manager is to be informed.

In case if break through the caprock is passed successfully, GMS Marine Manager is to be notified; in case if either any of the legs or all legs are still in hang up, GMS Marine Manager is to be informed for further consultation involving geotechnical consultants and other stakeholders as needed.

Upon successful completion of pre-drive at 2.3m draft, Enterprise will be elevated to 2.0m hull draft.

at draft 2.0m: it should be noted that hull weight at this draft should provide enough vertical reaction on 2 pre-driven legs for provoking a caprock break though if to refer to High Estimate in legs penetration analysis. Master is to ensure all necessary precautions against consequences might be happening in case of such event are in place, and in any case shall proceed further with the procedure with great caution.

- 30 mins pre-drive (15 mins per each diagonal) is carried out in such way that offloaded legs will remain with 100 tons measured at jacking level, what should lead to vertical footing reaction equal to 13.5MN
- No major changes in leg load trends are observed during load holding period in order to proceed with pre-drive further
- Reached legs penetrations are calculated, plotted to LPA curve as in Section 8.8, no deviations / no abnormalities noted

- RPD are within designed limits, trending was not showing suspicious changes during jacking, no significant changes in RPD between initial and current stages of pre-drive are noted
- In case of significant changes in leg loads readings between start and completion of pre-driving at this stage noted, the sequence is to be repeated, duration of pre-drive at this stage is to be increased, GMS Marine Manager is to be informed for further consultation involving geotechnical consultants and other stakeholders as needed
- In case of any concerns or abnormalities, all operations are to be stopped; GMS Marine Manager is to be informed.

In case if break though hasn't happened at this draft, hull will be elevated to draft 1.8m and procedure below is to be followed further.

- **at draft 1.8m:** it should be noted that hull weight at this draft should provide enough vertical reaction on 2 pre-driven legs for provoking a break though if to refer either to High or Low Estimates of legs penetration analysis. It is important to verify as to which legs penetration case is being followed (either upper bound or lower bound) and consider this during further jacking operations.

  Master is to ensure all necessary precautions against consequences might be happening in case of break-through are in place, and in any case shall proceed further with the procedure with great caution.

  - 30 mins pre-drive (15 mins per each diagonal) is carried out in such way that offloaded legs will remain with 100 tons measured at jacking level, what should lead to vertical footing reaction equal to 15.4MN
  - No major changes in leg load trends are observed during load holding period in order to proceed with pre-drive further
  - Reached legs penetrations are calculated, plotted to LPA curve as in Section 8.8, no deviations / no abnormalities noted
  - RPD are within designed limits, trending was not showing suspicious changes during jacking, no significant changes in RPD between previous and current stages of pre-drive are noted
  - In case of significant changes in leg loads readings between start and completion of pre-driving at this stage noted, the sequence is to be repeated, duration of pre-drive at this stage is to be increased, GMS Marine Manager is to be informed for further consultation involving geotechnical consultants and other stakeholders as needed
  - In case of any concerns or abnormalities, all operations are to be stopped; GMS Marine Manager is to be informed.

  In case if break through is passed successfully, GMS Marine Manager is to be notified; in case if either any of the legs or all legs are still in hang up, GMS Marine Manager is to be informed for further consultation involving geotechnical consultants and other stakeholders as needed.

  Upon successful completion of pre-drive at 1.8m draft, Enterprise will be elevated to 1.5m hull draft.

- **at draft 1.5m:** risk of experiencing the break through if to refer to Low Estimate of legs penetration analysis is still there, therefore Master is to ensure all necessary precautions against consequences might be happening

in case of break-through are in place, and in any case shall proceed further with the procedure with great caution.

- 30 mins pre-drive (15 mins per each diagonal) is carried out in such way that offloaded legs will remain with 100 tons measured at jacking level, what should lead to vertical footing reaction equal to 18.4MN
- No major changes in leg load trends are observed during load holding period
- Penetrations are calculated, plotted to LPA curve in Section 8.8, no deviations / no abnormalities noted
- Legs penetrations case is verified using LPA curves, clarifying either Low Estimate or High Estimate case being followed with the conclusions being made
- RPD are within designed limits, trending was not showing suspicious changes during jacking, no significant changes in RPD between previous and current stages of pre-drive are noted
- In case of significant changes in leg loads readings between start and completion of pre-driving at this stage noted, the sequence is to be repeated, duration of pre-drive at this stage is to be increased, GMS Marine Manager is to be informed for further consultation involving geotechnical consultants and other stakeholders as needed
- In case of any concerns or abnormalities, all operations are to be stopped; GMS Marine Manager is to be informed.

- **at draft 1.0m:**
  - 30 mins pre-drive (15 mins per each diagonal) is carried out in such way that offloaded legs will remain with 100 tons measured at jacking level, what should lead to vertical footing reaction equal to 23.3MN
  - No major changes in leg load trends are observed during load holding period
  - Penetrations are calculated, plotted to LPA curve in Section 8.8, no deviations / no abnormalities noted
  - Legs penetrations case is verified using LPA curves, clarifying either Low Estimate or High Estimate case being followed with the conclusions being made
  - RPD are within designed limits, trending was not showing suspicious changes during jacking, no significant changes in RPD between previous and current stages of pre-drive are noted
  - In case of significant changes in leg loads readings between start and completion of pre-driving at this stage noted, the sequence is to be repeated, duration of pre-drive at this stage is to be increased, GMS Marine Manager is to be informed for further consultation involving geotechnical consultants and other stakeholders as needed
  - In case of any concerns or abnormalities, all operations are to be stopped; GMS Marine Manager is to be informed.

Upon successful completion of pre-drive at 1.0m draft, Enterprise will be elevated to 0.7m hull draft.

- **at draft 0.7m:** it should be noted that hull weight at this draft should provide enough vertical reaction on 2 pre-driven legs for provoking a break though if to refer to High Estimate in legs penetration analysis. Master is to ensure all necessary precautions against consequences might be happening in case of break-through are in place, and in any case shall proceed further with the procedure with great caution.
    - 60 mins pre-drive (30 mins per each diagonal) is carried out in such way that offloaded legs will remain with 100 tons measured at jacking level, what should lead to vertical footing reaction equal to 26.0MN
    - No major changes in leg load trends are observed during load holding period
    - Penetrations are calculated, plotted to LPA curve in Section 8.8, no deviations / no abnormalities noted
    - Legs penetrations case is verified using LPA curves, clarifying either Low Estimate or High Estimate case being followed with the conclusions being made
    - RPD are within designed limits, trending was not showing suspicious changes during jacking, no significant changes in RPD between previous and current stages of pre-drive are noted
    - In case of significant changes in leg loads readings between start and completion of pre-driving at this stage noted, the sequence is to be repeated, duration of pre-drive at this stage is to be increased, GMS Marine Manager is to be informed for further consultation involving geotechnical consultants and other stakeholders as needed
    - In case of any concerns or abnormalities, all operations are to be stopped; GMS Marine Manager is to be informed.

  In case if break through is happened at this stage, GMS Marine Manager is to be informed before proceeding further. In case if break through hasn't happened at this stage, all further operations are to be stopped, GMS Marine Manager is informed for re-assessment the situation, involving all parties required.

  Upon successful completion of pre-drive at 0.7m draft with break-through and legs penetration reached 10-12m, Enterprise will be elevated to 0.5m hull draft.
- **at draft 0.5m:**
    - 60 mins pre-drive (30 mins per each diagonal) is carried out in such way that offloaded legs will remain with 100 tons measured at jacking level, what should lead to vertical footing reaction equal to 27.5MN
    - No major changes in leg load trends are observed during load holding period
    - Penetrations are calculated, plotted to LPA curve in Section 8.8, no deviations / no abnormalities noted
    - Legs penetrations case is verified using LPA curves, clarifying either Low Estimate or High Estimate case being followed with the conclusions being made

- RPD are within designed limits, trending was not showing suspicious changes during jacking, no significant changes in RPD between previous and current stages of pre-drive are noted
- In case of significant changes in leg loads readings between start and completion of pre-driving at this stage noted, the sequence is to be repeated, duration of pre-drive at this stage is to be increased, GMS Marine Manager is to be informed for further consultation involving geotechnical consultants and other stakeholders as needed
- In case of any concerns or abnormalities, all operations are to be stopped; GMS Marine Manager is to be informed.

Upon successful completion of pre-drive at 0.5m draft, Enterprise will be elevated to 0.2m hull draft.

- **at draft 0.2m:** it should be noted that hull weight at this draft should provide enough vertical reaction on 2 pre-driven legs for reaching a maximum required footing reaction to refer to Site Specific Assessment Requirements. Master is to ensure that footing reaction mentioned below is reached, however in any case shall proceed further with the procedure with great caution.
  - 60 mins pre-drive (30 mins per each diagonal) is carried out in such way that offloaded legs will remain with 100 tons measured at jacking level, what should lead to vertical footing reaction equal to 30.2MN
  - No major changes in leg load trends are observed during load holding period
  - Penetrations are calculated, plotted to LPA curve in Section 8.8, no deviations / no abnormalities noted
  - Legs penetrations case is verified using LPA curves, clarifying either Low Estimate or High Estimate case being followed with the conclusions being made
  - RPD are within designed limits, trending was not showing suspicious changes during jacking, no significant changes in RPD between previous and current stages of pre-drive are noted
  - In case of significant changes in leg loads readings between start and completion of pre-driving at this stage noted, the sequence is to be repeated, duration of pre-drive at this stage is to be increased, GMS Marine Manager is to be informed for further consultation involving geotechnical consultants and other stakeholders as needed
  - In case of any concerns or abnormalities, all operations are to be stopped; GMS Marine Manager is to be informed.

  Upon successful completion of pre-drive at 0.2m draft, Master is to re-assess a situation with achieved legs penetrations against estimated values if to refer to LPA as in Section 8.8 and penetration case has been followed, situation with RPD and situation in general, prior jacking to and pre-loading at zero air gap.

  All concerned parties are to be advised as to the results on legs penetration, and if all stakeholders and signatories to this procedure are in agreement – further jacking to ZERO air gap (as minimal air gap above waves crest as possible) is to be performed.

- **at zero airgap:** Legs diagonal pre-loading will be carried out in accordance with Operations Manual, being carried out in such way that offloaded legs remain with 100 tons measured at jacking level, what should lead to vertical footing reaction equal to 30.2MN, with extended duration than specified in Barge Operations Manual namely 60 mins (i.e. 30 mins per each diagonal). No major changes in leg load trends are observed during load holding period. Penetrations are calculated, plotted to LPA curve in Section 8.8, no deviations / no abnormalities noted. RPD are within designed limits, trending was not showing suspicious changes during jacking, no significant changes in RPD between previous and current stages of pre-drive are noted. In case of significant changes in leg loads readings between start and completion of pre-driving at this stage noted, the sequence is to be repeated, duration of pre-drive at this stage is to be increased, GMS Marine Manager is to be informed for further consultation involving geotechnical consultants and other stakeholders as needed

In order to summarize the procedure outlined above, the following table is to be used as additional reference:

Sequence step	Legs numbers	Load on legs at footing level	Expected penetration	Holding time
2.5m hull draft	1/4	8.5MN	HE 2.8m LE 3.4m	15 minutes
	2/3			15 minutes
2.3m hull draft	1/4	10.5MN	HE 3.2m LE 6.3m	15 minutes
	2/3			15 minutes
2.0m hull draft	1/4	13.5MN	HE 3.2m LE 6.3m	15 minutes
	2/3			15 minutes
1.8m hull draft	1/4	15.4MN	HE 6.1m LE 10.8m	15 minutes
	2/3			15 minutes
1.5m hull draft	1/4	18.4MN	HE 6.3m LE 12.4m	15 minutes
	2/3			15 minutes
1.0m hull draft	1/4	23.3MN	HE 6.4m LE 15.1m	15 minutes
	2/3			15 minutes
0.7m hull draft	1/4	26.0MN	HE 12.4m LE 16.2m	30 minutes
	2/3			30 minutes
0.5m hull draft	1/4	27.5MN	HE 13.0m LE 17.2m	30 minutes
	2/3			30 minutes
0.2m hull draft	1/4	30.2MN	HE 14.2m LE 19.0m	30 minutes
	2/3			30 minutes
Zero airgap	1/4	30.2MN	HE 14.2m LE 19.0m	30 minutes
	2/3			30 minutes

The leg penetrations are to be known at each stage of pre-driving and pre-loading resulting from calculations as prescribed above in sub-section 2; In case of any concerns or abnormalities, all operations are to be stopped; GMS Marine Manager is to be informed.

If due to any reason the footing reaction of 30.2MN at footings level during pre-driving / pre-loading is not reached, GMS Marine Manager is to be informed before next step of jacking operations. Review of the case with ballasting condition of the vessel as it's supported by calculations as in Section 8.6 and preparations for pre-driving and pre-loading operations made as it's outlined in Section 6.3.2, will be

carried out as a part of contingency plan, while the case will be also addressed to geotechnical consultants (in order to exclude the effects from geotechnical aspects) and GMS Enterprise designers for the input on a technical capability systems in use during pre-driving and pre-loading operations.

If additional ballast was required for pre-driving and pre-loading operations, it need to be planned carefully when the ballast is taken on-board and later dumped.

6.7.6. Operational Airgap

When all pre-drive and pre-load operations have been completed (HOLD Point 6) including dumping of additional ballast if any, the vessel will be ready to be elevated to final air gap of 18.965m. Final acceptance of the position will be carried out by all signatories to the HOLD Point 7, with recording the final set up parameters in the same Section 6.2.6

Should a storm equivalent to 50 yrs met data return expected, vessel may stay at this airgap what has been confirmed by results of SSA, however jacking to as minimum safe air gap which is 9.7m can be considered.

6.8. Post Vessel Move Review

All parties involved in the operation i.e. those who attended the pre-move meeting offshore, shall meet to review the vessel move events, particularly detailing what went well, with respect to planning, procedures, equipment and/or personnel that resulted in above average performance, good ideas, and best practices. As well as noting any problems or concerns that should be addressed for future performance improvements.

The findings and lessons learned should be recorded in the vessel move report completed by GMS Enterprise 6103 Master.

Vessel Move Report to be issued to CPY for information.

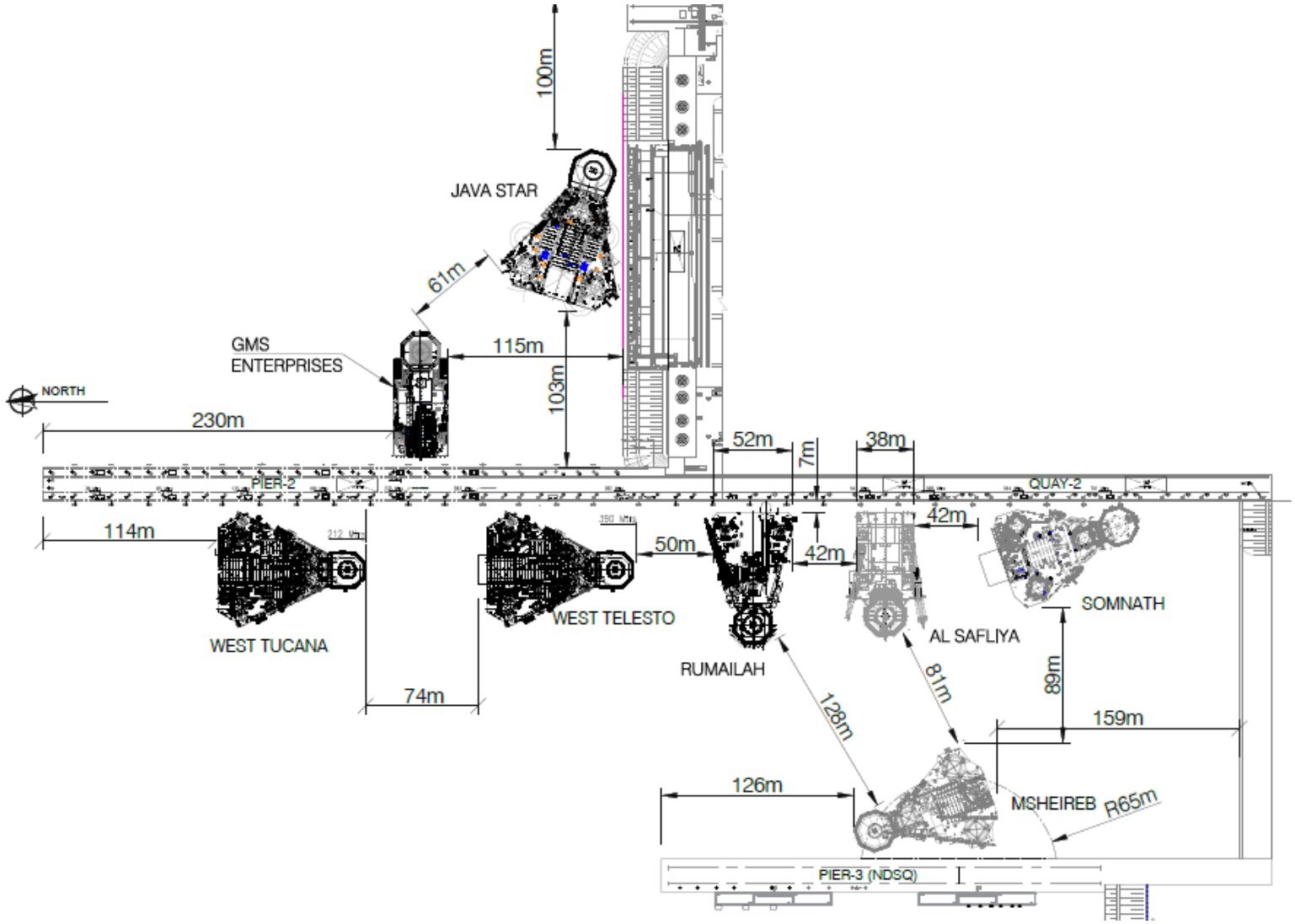
7. References

Title/Description
External References, Standards, Regulations and Codes of Practice
PRJ105043-RP-001 Rev 5 Site Specific Assessment - 200-20-CC-PRC-0073_00
Guidelines for Offshore Marine Operations (GOMO)
QatarGas Marine Operational Manual, P36-X03-003 May 2020 Rev 4
EERA - OF-01-SH-REP-0005 Rev. C5
McDermott MOC procedure MDR-GLOBAL-L2-MGT-002
Technical Management of Change Procedure, 200-20-PE-PRC-0033, Revision 00
Bridging Document- 200-20-SH-PRC-0015 Rev 04
Document No: T3-OPS-ENT-002/2021 / Revision 2
VMP SE Location: T3-OPS-ENT-002/2021 Rev.05. - 200-20-CC-PRC-0075 Rev. B2
Final Seabed Survey Report Reference: QatarGas / 18 / 20 Rev.01
GMS Documents

T3-HSE-PROC-003, Rev.5	Risk Assessment Procedure

8. Appendices

8.1. Appendix 1- Departing Locations



8.2. Appendix 2- Passage Plan

Gulf Marine Services

Passage Plan (NKOM Pier#2 to North Field Bravo)

Name of Vessel:	GMS ENTERPRISE 6103						Date:	15.11.2020
Prepared by:	*Aleksei Konontsev*		Position:	*2nd Officer*			Signature:	

No	W.P. ID	Latitude	Longitude	Position Fixing [1] Method: GPS, Vis, Rad	Position Fixing [1] Frequency	Course to next W.P.	Distance to next W.P. nm	Speed kts	TTG to next W.P min	Chart No.	DTG nm	Remarks	① Water depth from Chart [2]	② Height of Tide	③ Vertical range of Subsea obstacle	(① + ② - ③) - Max draft UKC calculation Dft= 5.5 m	Actual UKC from Echo Sounder [3]
1	WP1	25°53.93'N	051°38.62'E	GPS, Vis, Rad	3 min	011°	0.6	4.0	9	3781	42.9	Pier #2	11.5	1.6	1.0	6.6	
2	WP2	25°54.78'N	051°38.81'E	GPS, Vis, Rad	3min	099°	3.5	5.5	38	3781 3772	42.3	Port area / South Breakwater Head SB1 - Fl(1)R3S: 122.6°, 0.41 nM	15.0	1.6	1.0	10.1	
3	WP3	25°54.15'N	051°43.29'E	GPS, Vis, Rad	30 min	028°	32.4	5.5	353	3772 2523	38.8	South channel / Light with AIS aid for navigation RB6 (Fl Wm2s): 266.7°, 3.30 nM	19.5	1.6	1.0	14.6	
4	WP4	26°22.80'N	052°00.00'E	GPS, Vis, Rad	3 min	010°	6.4	4.0	96	2523	6.4		48.0	1.5	1.0	43.0	
5	WP5	26°29.02'N	052°01.27'E	GPS, Vis, Rad						2523	0.0	N/W of PU, outside 500m					
							42.9	**NM**	**8.3**	**HRS**							

Approved by Master: **Capt. Jakob Neergaard** (Name) (Signature)

Remarks: 1) Position Fixing - Primary and Secondary method to be identified; 2) Water depth means minimum water depth on the voyage leg between two waypoints; 3) Actual UKC is to be recorded at stage of move execution

References	IMO Resolution A.893(21), Sailing Directions; List of Light & Fog Signals; List of Radio Signals; Tide Tables; SOLAS; MARPOL; List of Coast Stations; COLREG; Client's Marine Instructions

T4-OPS-FORM-003 - Passage Plan (All Regions) Page 1 of 1 Revision 4

Schematic drawing of move within 500m zone with sequence described in Sections 6.7.1 and 6.7.2

See the drawing on a next page

GRID NORTH

LQ (NEW)

LQ

PU PLATFORM

PR

BRIDGE TO LQ

BRIDGE TO PR

BRIDGE TO WH1

BRIDGE TO WH2

BRIDGE TO BSP1

BRIDGE TO BSP2

BSP1

BSP2

WH1

WH2

RADAR STATION

DC-05

500M

250M

100M

CP FUTURE

FL FUTURE 18.8

56.9

RPQ1

DP MODE APPROACH TO FINAL LOCATION

NC6 - FOC FROM STP-M3 TO NFB-PU (QATAR GAS)

NC6 - FOC FROM STP-M3 TO NFB-PU (QATAR GAS)

NC7 - FOC FROM STP-M4 TO FMB-N2

OG 32" PIPELINE FROM NFB TO RAS LAFFAN

OG 32" PIPELINE FROM NFB TO RAS LAFFAN

NO MBES COVERAGE

19.0x2.4

15.9x1.7

16.1x1.8

14.9x1.7

8.3x0.5

9.6x0.7

nmh

0.3

0.5

0.9

1.0

1.1

0.6

0.7

0.8

GRID NORTH

0.9
1.0
1.0
0.3
1.1
1.1
0.3
0.3
STATION RADAR STATION

NC6 - FOC FROM STP-M3 TO NFB-PU (QATAR GAS)

NC6 - FOC FROM STP-M3 TO NFB-PU (QATAR GAS)

LQ (NEW)

0.3

0.3

0.5

LQ

9.6x0.7

8.3x0.5

9.5

PR

BRIDGE TO LQ

BRIDGE TO PR

PU PLATFORM

56.9

500M

DC-05

0.6

CP FUTURE

250M

DP MODE APPROACH TO FINAL LOCATION

RPQ1

NC7 - FOC FROM STP-M4 TO FMB-N2

NO MBES COVERAGE

19.0x2.4

WH2

FL FUTURE

18.8

0.9

0.8

0.8

OG 32" PIPELINE FROM NFB TO RAS LAFFAN

OG 32" PIPELINE FROM NFB TO RAS LAFFAN

BRIDGE TO BSP1

BRIDGE TO WH2

BRIDGE TO WH1

BRIDGE TO BSP2

BSP1

15.9x1.7

0.6

WH1

0.9

0.5

nmh

WH1

nmh

0.7

0.9

14.9x1.7

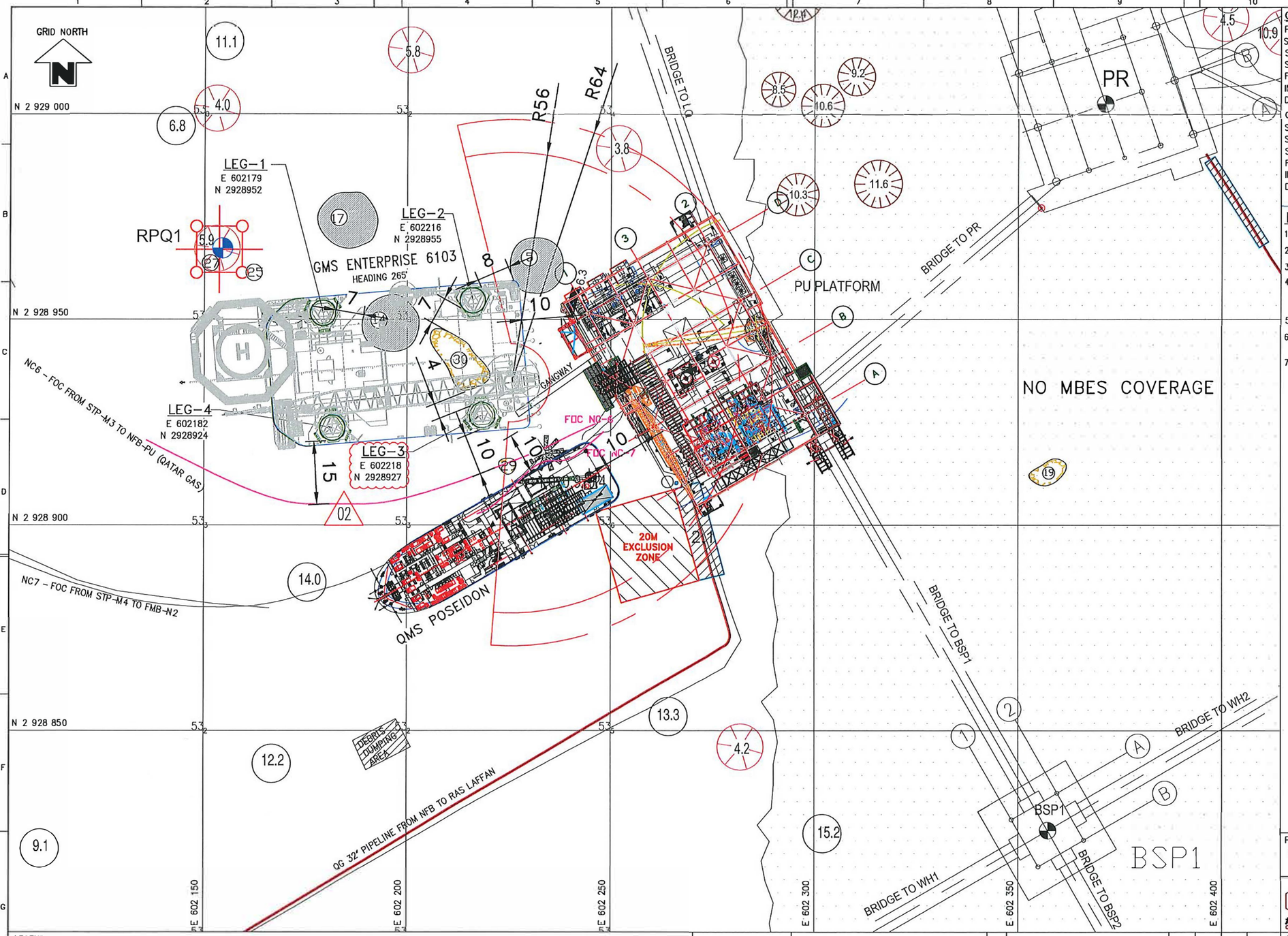
16.1x1.8

BSP2

R1.3

8.3. Appendix 3- Arrival Location

See the drawing on a next page



GEODETIC PARAMETERS:

PROJECT GEODETIC PARAMETERS:

SPHEROID	: CLARKE 1880
SEMI-MAJOR AXIS (A)	: 6 378 249.145 M
SEMI-MINOR AXIS (B)	: 6 356 514.869 M
FIRST ECCENTRICITY SQUARED (E^2)	: 0.006 803 511 283
INVERSE FLATTENING (1/F)	: 293.465
DATUM	: NAHRWAN 1967

GPS SATELLITE SYSTEM GEODETIC PARAMETERS:

SPHEROID	: WGS84
SEMI-MAJOR AXIS (A)	: 6 378 137.000 M
SEMI-MINOR AXIS (B)	: 6 356 752.314 M
FIRST ECCENTRICITY SQUARED (E^2)	: 0.006 694 379 990
INVERSE FLATTENING (1/F)	: 298.257 222 101
DATUM	: WORLD GEODETIC SYSTEM 1984 (WGS84)

NOTES:

1. ALL DIMENSIONS & COORDINATES ARE IN METRES, UNLESS NOTED OTHERWISE.
2. WATER DEPTHS REFER TO LOWEST ASTRONOMICAL TIDE (L.A.T.) DATUM.
3. VESSEL APPROACH MAY CHANGE AS PER ACTUAL SITE CONDITION.
4. FINAL LOCATION OF JACKUP MAY VARY AS PER SEABED SURVEY REPORT & RIG MASTERS DECISION. ACTUAL POSITION OF EXISTING CABLES/ PIPLINES TO BE VERIFIED FROM THE SEABED SURVEY REPORT BEFORE RIG SETUP.
5. GANGWAY LENGTH SHOWN IS= 21m (APPROX.)
6. GANGWAY POSITIONING & SIZE TO BE CONFIRMED BY HOOK-UP. HANDRAILS ON PLATFORM OBSTRUCTING GANGWAY SHOULD BE REMOVED.
7. SOME JACK-UP & DECK DETAILS NOT SHOWN FOR CLARITY.

GMS ENTERPRISE 6103
MAIN PARTICULARS

LENGTH (OVERALL APPROX.)	: 83.6 m
LENGTH WATERLINE	: 61.0 m
BEAM	: 36.0 m
DEPTH	: 6.0 m
DRAFT	: 5.5 m
LEG LENGTH	: 104.0 m
OPERATING WATER DEPTH	: 80.0 m
SPUDCAN	: ø6.2mx2.3m

LEGEND:

- BATHY SPOT DEPTHS
- EXISTING PIPELINES AND CABLES
- AS-FOUND CABLES (02)
- EXISTING PIPELINES
- SPUDCAN DEPRESSION WITH DIAMETER AND DEPTH IN METRES
- POCKMARK WITH DIAMETER IN METRES
- SEABED DEPRESSION WITH DIAMETER IN METRES
- THREE DIMENSIONAL CONTACT WITH LXWXH IN METRES
- RIG LEG FOOTPRINT
- EXISTING PLATFORM LOCATION
- NO MBES COVERAGE DUE TO VESSEL APPROACH CONSTRAINTS
- LINEAR CONTACT WITH LENGTH IN METRES
- MATTRESS
- SEABED DEPRESSION
- CAP-ROCK
- BORE HOLE

NO.	DESCRIPTION	BY	CHKD	APVD	DATE
02	RE-ISSUED FOR CONSTRUCTION	SPD/ALEX	ECC/BM	WB	19.12.20
01	RE-ISSUED FOR CONSTRUCTION	SPD	ECC/BM	TC	08.12.20
00	ISSUED FOR CONSTRUCTION	SPD/ALEX	ECC/BM	TC	11.11.20
A1	ISSUED FOR IDC	SPD/ALEX	ECC/BM	TC	28.10.20

REVISIONS

DWG NO.	TITLE
NFB-PU & PR_31622324_SBS_FR	PRE-RIG MOVE SEABED SURVEY AND DEBRIS RECOVERY
GWM-P6271-DAA-001	GENERAL ARRANGEMENT OVERALL PLAN (GMS ENTERPRISE)
200-25-PL-DWG-0001	QG1 SUBSEA OVERALL FIELD LAYOUT
	(INTRA-FIELD PIPELINES AND CABLES)

REFERENCE DRAWINGS

DATE	3C CONST.ENGR	3C CONST.MNGR	3C RIGGING SME	GEN. SUPDT.	APVD
19.12.20	SS/NAS	HMC	PF	DT	VTM

PROJECT TITLE:
EPC FOR NORTH FIELD PRODUCTION SUSTAINABILITY INVESTMENT 1 PROJECT 1

Qatargas Operating Company Ltd.

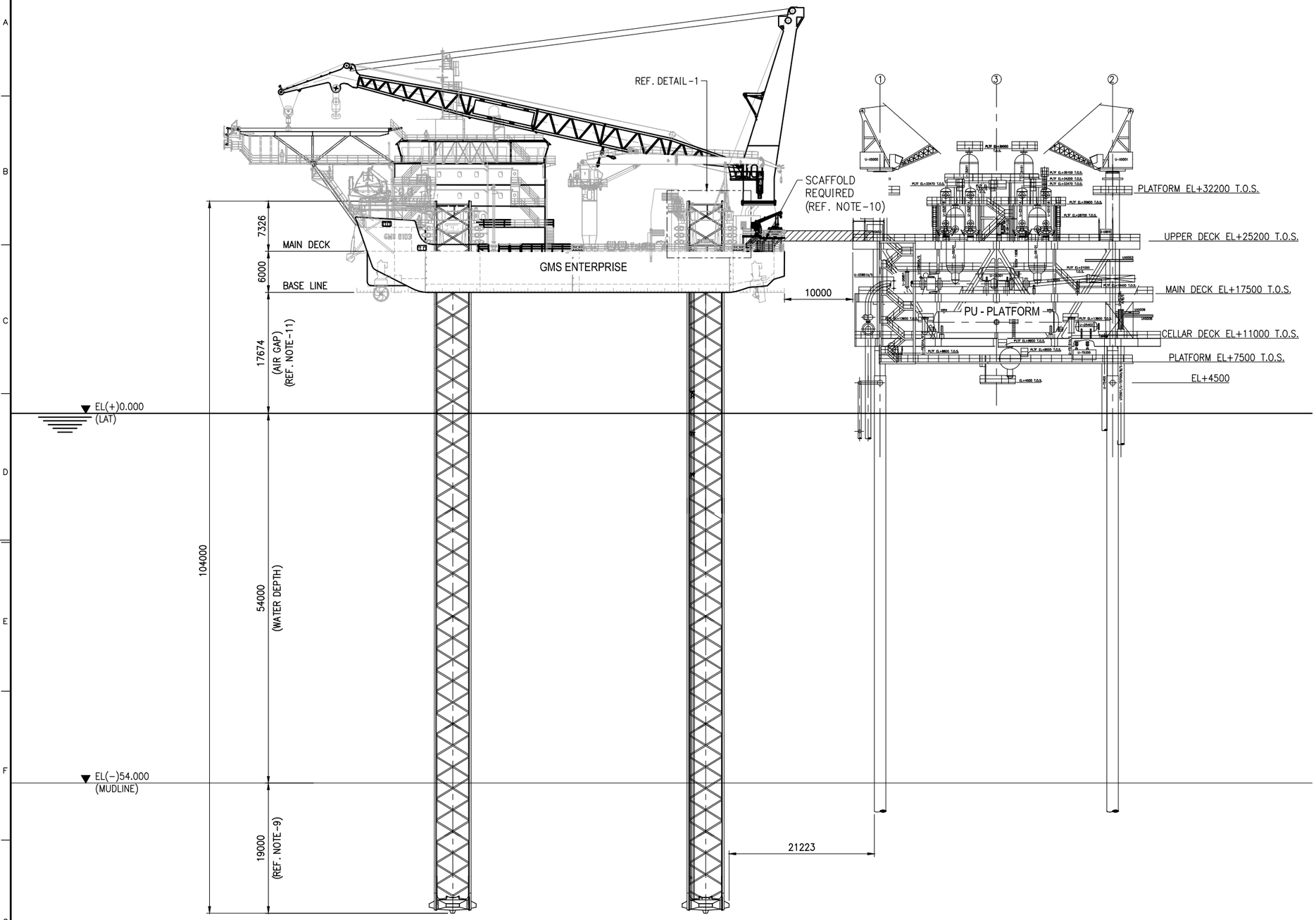
CONSULTANT/CONTRACTOR:
MCDERMOTT

TITLE:
VESSEL SET-UP
AT PU PLATFORM WEST SIDE
GMS ENTERPRISE

SCALE : 1:1000 | SHEET SIZE : A3 | CONTRACT NO. : LTC/C/NFP/3386/18

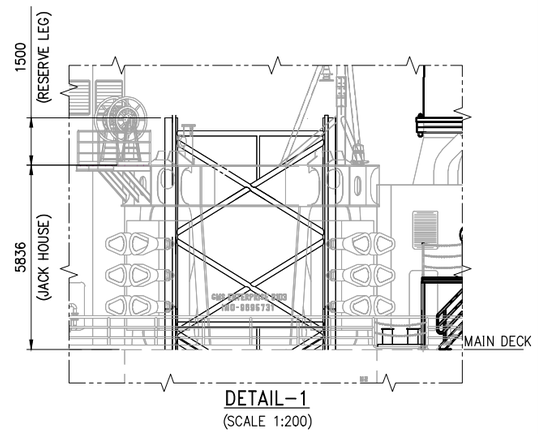
PROJECT	DRAWING NO.	SHEET	REVISION
D6978	D6978-PR-OF-8902	001	02

FILE NAME :K:\Offshore Construction Drafting\Drawings in progress\Middle east projects\D6978 - QG NFPS\05 - Hook-up Support\Vessel Set-up\D6978-PR-OF-8902-001_02 (VESSEL SET-UP - PU PLATFORM NRTHWEST - GMS ENTERPR



GENERAL NOTES:

1. ALL DIMENSIONS & ELEVATIONS ARE IN MILLIMETERS, & UNLESS NOTED OTHERWISE (U.N.O.)
2. ALL ELEVATIONS REFER TO LOWEST ASTRONOMICAL TIDE (L.A.T.) DATUM.
3. ALL DEMOLITION & INSTALLATION TO BE IN ACCORDANCE WITH PROJECT APPROVED PROCEDURES.
4. SOME VESSEL DETAILS & EXISTING DECK EQUIPMENT MAY NOT BE SHOWN FOR CLARITY.
5. HOOK UP TO PROVIDE TEMPORARY HANDRAILS FOR PERSONNEL SAFETY WHEREVER HANDRAILS ARE REMOVED UNTIL COMPLETION OF ACTIVITY.
6. ALL PLATFORM MODIFICATIONS TO BE MADE GOOD AFTER COMPLETION OF HOOK-UP ACTIVITY.
7. PLATFORM CRANE MAY BE ROTATED TO AVOID CLASH DURING INSTALLATION. REF. DWG. NO. D6978-PR-OF-8902-001 FOR VESSEL SET-UP.
8. MAXIMUM CRANE RADIUS MAY NOT BE ACHIEVABLE DUE TO PLATFORM OBSTRUCTIONS.
9. THE SEABED PENETRATION CONSIDERED FOR JACK-UP SPUD CANS = 19 M (WORST CASE) AND IS AS PER THE MAX. THEORETICAL PENETRATION GIVEN IN THE SSA DOC NUMBER PRJ105043-RP-001.
10. SCAFFOLD SHOWN IS INDICATIVE ONLY. ACTUAL SITE CONDITIONS WILL DETERMINE SCAFFOLD CONFIGURATION REQUIRED.
11. MAXIMUM ALLOWABLE OPERATIONAL AIR GAP PERMISSIBLE IS 18.7M AS PER SSA DOC NUMBER PRJ105043-RP-001.



DETAIL-1
(SCALE 1:200)

GMS ENTERPRISE 6103
MAIN PARTICULARS

LENGTH (OVERALL APPROX.)	:	83.6 m
LENGTH WATERLINE	:	61.0 m
BEAM	:	36.0 m
DEPTH	:	6.0 m
DRAFT	:	5.5 m
LEG LENGTH	:	104.0 m
OPERATING WATER DEPTH	:	80.0 m
SPUDCAN	:	ø6.2mx2.3m

PROJECT TITLE:
EPC FOR NORTH FIELD PRODUCTION SUSTAINABILITY INVESTMENT 1 PROJECT 1

Qatargas Operating Company Ltd.

CONSULTANT/CONTRACTOR:
MCDERMOTT

TITLE:
VESSEL SET-UP ELEVATION PU PLATFORM WEST SIDE GMS ENTERPRISE

NO.	DESCRIPTION	BY	CHKD	APVD	DATE
00	ISSUED FOR CONSTRUCTION	SPD	ECC/BM	TC	08.12.20
A1	ISSUED FOR IDC	SPD	ECC/BM	TC	11.11.20

REVISIONS

REFERENCE DRAWINGS								
DWG NO.	TITLE	08.12.20	SS/NAS	HMC	PF	–	–
		DATE	3C CONST.ENGR.	3C CONST.MNGR.	3C RIGGING SME	GEN. SUPDT.	APVD
D6978-PR-OF-8902-001	VESSEL SET-UP - PU PLATFORM - GMS ENTERPRISE						
GWM-P6271-DAA-001	GENERAL ARRANGEMENT OVERALL PLAN (GMS ENTERPRISE)						
200-25-PL-DWG-0001	QG1 SUBSEA OVERALL FIELD LAYOUT (INTRA-FIELD PIPELINES AND CABLES)						

SCALE : 1:1000 | SHEET SIZE : A3 | CONTRACT NO. : LTC/C/NFP/3386/18

PROJECT	DRAWING NO.	SHEET	REVISION
D6978	D6978-PR-OF-8902	002	00

FILE NAME :K:\Offshore Construction Drafting\Drawings in progress\Middle east projects\D6978 - QG NFPS\05 - Hook-up Support\Vessel Set-up\D6978-PR-OF-8902-002_00, (VESSEL SET-UP ELEVATION - PU PLATFORM WEST SIDE - G

8.4. Appendix 4- Tide Table

NORTH FIELD

Local Time (GMT+0300) UNITS METRES

June 2021

	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
1 Tue	1.16	0.96	0.81	0.77	0.82	0.93	1.07	1.17	1.20	1.17	1.08	0.95	0.80	0.65	0.55	0.54	0.62	0.82	1.07	1.33	1.53	1.63	1.63	1.52
2 Wed	1.34	1.14	0.95	0.81	0.76	0.79	0.89	1.01	1.10	1.15	1.14	1.08	0.98	0.85	0.73	0.64	0.62	0.70	0.86	1.09	1.31	1.49	1.58	1.57
3 Thu	1.46	1.30	1.10	0.92	0.78	0.72	0.74	0.82	0.94	1.04	1.12	1.14	1.11	1.03	0.92	0.80	0.71	0.69	0.75	0.89	1.09	1.29	1.45	1.52
4 Fri	1.51	1.40	1.24	1.04	0.86	0.72	0.65	0.67	0.76	0.89	1.02	1.12	1.17	1.16	1.09	0.98	0.87	0.77	0.74	0.79	0.92	1.10	1.28	1.42
5 Sat	1.48	1.44	1.33	1.16	0.97	0.78	0.64	0.58	0.61	0.71	0.87	1.03	1.16	1.22	1.22	1.15	1.04	0.91	0.81	0.77	0.82	0.94	1.11	1.27
6 Sun	1.39	1.43	1.37	1.24	1.07	0.87	0.68	0.55	0.51	0.56	0.70	0.89	1.08	1.23	1.30	1.28	1.20	1.08	0.94	0.83	0.80	0.85	0.97	1.13
7 Mon	1.28	1.37	1.37	1.29	1.14	0.96	0.76	0.58	0.48	0.47	0.57	0.75	0.97	1.18	1.32	1.37	1.34	1.23	1.09	0.94	0.84	0.82	0.88	1.00
8 Tue	1.16	1.28	1.34	1.31	1.20	1.03	0.84	0.65	0.50	0.43	0.47	0.62	0.84	1.09	1.30	1.42	1.44	1.37	1.24	1.07	0.92	0.84	0.84	0.92
9 Wed	1.05	1.19	1.29	1.30	1.23	1.10	0.92	0.73	0.55	0.44	0.43	0.53	0.72	0.98	1.23	1.42	1.50	1.48	1.38	1.21	1.04	0.90	0.83	0.86
10 Thu	0.97	1.10	1.23	1.29	1.26	1.15	0.99	0.81	0.63	0.49	0.43	0.47	0.63	0.86	1.13	1.37	1.52	1.56	1.49	1.35	1.16	0.99	0.87	0.84
11 Fri	0.91	1.03	1.16	1.26	1.27	1.20	1.07	0.90	0.72	0.56	0.46	0.45	0.56	0.76	1.02	1.28	1.49	1.59	1.57	1.46	1.29	1.10	0.94	0.85
12 Sat	0.86	0.96	1.09	1.21	1.27	1.25	1.14	0.98	0.81	0.64	0.51	0.46	0.51	0.66	0.90	1.17	1.41	1.57	1.62	1.56	1.41	1.22	1.04	0.90
13 Sun	0.85	0.90	1.02	1.15	1.25	1.28	1.21	1.08	0.91	0.74	0.59	0.49	0.48	0.58	0.77	1.03	1.29	1.50	1.61	1.62	1.52	1.35	1.15	0.98
14 Mon	0.87	0.85	0.93	1.07	1.19	1.27	1.26	1.17	1.02	0.85	0.68	0.55	0.49	0.52	0.66	0.88	1.14	1.38	1.56	1.63	1.59	1.46	1.28	1.09
15 Tue	0.93	0.85	0.86	0.96	1.10	1.21	1.26	1.23	1.13	0.97	0.80	0.65	0.54	0.51	0.57	0.73	0.97	1.22	1.44	1.58	1.62	1.55	1.41	1.22
16 Wed	1.03	0.89	0.82	0.86	0.96	1.10	1.20	1.24	1.20	1.09	0.94	0.78	0.64	0.55	0.54	0.62	0.80	1.04	1.28	1.48	1.59	1.60	1.51	1.35
17 Thu	1.15	0.97	0.84	0.79	0.83	0.94	1.07	1.17	1.21	1.17	1.08	0.94	0.79	0.65	0.58	0.58	0.67	0.85	1.09	1.32	1.49	1.58	1.57	1.47
18 Fri	1.29	1.09	0.91	0.78	0.73	0.77	0.89	1.02	1.13	1.18	1.17	1.09	0.97	0.82	0.70	0.63	0.63	0.72	0.89	1.12	1.34	1.50	1.57	1.54
19 Sat	1.42	1.23	1.02	0.83	0.70	0.65	0.70	0.81	0.96	1.09	1.18	1.20	1.15	1.03	0.89	0.77	0.69	0.67	0.76	0.92	1.14	1.34	1.49	1.55
20 Sun	1.51	1.37	1.17	0.95	0.75	0.61	0.56	0.61	0.74	0.92	1.09	1.22	1.27	1.24	1.13	0.99	0.85	0.75	0.72	0.78	0.94	1.14	1.34	1.48
21 Mon	1.53	1.47	1.31	1.10	0.86	0.66	0.51	0.46	0.52	0.69	0.90	1.12	1.29	1.37	1.35	1.24	1.09	0.93	0.80	0.75	0.80	0.95	1.15	1.34
22 Tue	1.47	1.51	1.43	1.25	1.02	0.78	0.57	0.42	0.38	0.47	0.67	0.93	1.20	1.40	1.50	1.48	1.35	1.18	0.99	0.84	0.77	0.81	0.95	1.15
23 Wed	1.35	1.47	1.49	1.39	1.20	0.96	0.71	0.49	0.35	0.32	0.45	0.69	1.00	1.31	1.53	1.63	1.59	1.45	1.24	1.03	0.86	0.78	0.82	0.97
24 Thu	1.17	1.36	1.47	1.47	1.35	1.15	0.90	0.65	0.43	0.30	0.31	0.47	0.76	1.11	1.43	1.65	1.74	1.68	1.51	1.28	1.05	0.86	0.78	0.83
25 Fri	0.99	1.19	1.37	1.47	1.45	1.31	1.10	0.85	0.60	0.40	0.29	0.34	0.54	0.86	1.22	1.55	1.75	1.81	1.73	1.54	1.29	1.05	0.86	0.79
26 Sat	0.85	1.02	1.22	1.39	1.46	1.42	1.28	1.06	0.82	0.58	0.40	0.32	0.40	0.63	0.97	1.34	1.64	1.82	1.85	1.74	1.53	1.27	1.03	0.86
27 Sun	0.81	0.88	1.05	1.25	1.40	1.45	1.39	1.24	1.04	0.80	0.58	0.43	0.39	0.49	0.74	1.09	1.44	1.71	1.85	1.85	1.72	1.50	1.24	1.01
28 Mon	0.86	0.83	0.92	1.08	1.26	1.39	1.42	1.36	1.21	1.02	0.80	0.61	0.48	0.47	0.60	0.86	1.19	1.51	1.74	1.84	1.81	1.67	1.45	1.20
29 Tue	0.99	0.86	0.85	0.94	1.09	1.25	1.36	1.38	1.32	1.19	1.01	0.82	0.65	0.56	0.58	0.72	0.97	1.27	1.55	1.74	1.81	1.76	1.60	1.38
30 Wed	1.16	0.96	0.86	0.85	0.94	1.08	1.23	1.32	1.34	1.29	1.18	1.02	0.86	0.72	0.65	0.68	0.83	1.06	1.33	1.57	1.71	1.75	1.68	1.52

DATUM OF PREDICTIONS=CHART DATUM

NORTH FIELD

Local Time (GMT+0300) **UNITS METRES**

July 2021

	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
1 Thu	1.31	1.10	0.93	0.83	0.83	0.91	1.05	1.18	1.27	1.31	1.27	1.18	1.05	0.91	0.79	0.75	0.79	0.93	1.14	1.37	1.56	1.67	1.68	1.59
2 Fri	1.43	1.23	1.04	0.88	0.79	0.79	0.87	1.00	1.13	1.24	1.29	1.27	1.20	1.09	0.97	0.88	0.84	0.88	1.00	1.18	1.37	1.52	1.60	1.59
3 Sat	1.50	1.34	1.15	0.96	0.82	0.74	0.74	0.82	0.95	1.10	1.22	1.29	1.30	1.24	1.15	1.04	0.95	0.91	0.94	1.05	1.20	1.36	1.48	1.53
4 Sun	1.50	1.40	1.24	1.06	0.89	0.75	0.68	0.69	0.78	0.93	1.09	1.24	1.33	1.35	1.30	1.21	1.10	1.01	0.96	0.98	1.07	1.20	1.33	1.43
5 Mon	1.46	1.41	1.30	1.15	0.97	0.81	0.68	0.62	0.65	0.76	0.94	1.13	1.29	1.39	1.41	1.36	1.26	1.14	1.04	0.98	1.00	1.08	1.19	1.30
6 Tue	1.38	1.39	1.33	1.21	1.06	0.89	0.73	0.62	0.58	0.64	0.78	0.98	1.20	1.37	1.46	1.47	1.40	1.28	1.15	1.04	0.98	1.00	1.07	1.18
7 Wed	1.28	1.34	1.34	1.26	1.13	0.98	0.81	0.66	0.57	0.57	0.66	0.84	1.07	1.30	1.46	1.54	1.52	1.42	1.28	1.13	1.01	0.97	1.00	1.08
8 Thu	1.19	1.28	1.33	1.29	1.20	1.06	0.90	0.74	0.61	0.55	0.59	0.73	0.94	1.19	1.42	1.56	1.60	1.54	1.41	1.25	1.09	0.98	0.95	1.01
9 Fri	1.11	1.22	1.30	1.32	1.26	1.14	0.99	0.82	0.67	0.56	0.55	0.64	0.82	1.07	1.33	1.53	1.64	1.63	1.53	1.37	1.19	1.03	0.95	0.95
10 Sat	1.04	1.16	1.27	1.33	1.32	1.23	1.08	0.92	0.75	0.61	0.54	0.57	0.71	0.94	1.21	1.46	1.63	1.69	1.64	1.50	1.31	1.12	0.98	0.93
11 Sun	0.97	1.09	1.22	1.33	1.36	1.31	1.19	1.03	0.85	0.68	0.57	0.54	0.62	0.82	1.08	1.36	1.58	1.71	1.71	1.61	1.44	1.24	1.06	0.94
12 Mon	0.92	1.01	1.15	1.29	1.38	1.38	1.30	1.15	0.96	0.78	0.63	0.54	0.56	0.70	0.93	1.22	1.49	1.68	1.76	1.71	1.57	1.37	1.16	0.99
13 Tue	0.91	0.93	1.05	1.21	1.34	1.41	1.39	1.28	1.10	0.91	0.72	0.59	0.54	0.60	0.79	1.06	1.35	1.59	1.74	1.77	1.68	1.51	1.29	1.09
14 Wed	0.93	0.88	0.94	1.08	1.24	1.37	1.42	1.37	1.25	1.06	0.87	0.69	0.58	0.56	0.67	0.89	1.17	1.46	1.67	1.77	1.76	1.63	1.43	1.21
15 Thu	1.01	0.88	0.85	0.93	1.09	1.25	1.37	1.41	1.35	1.22	1.04	0.85	0.69	0.60	0.62	0.75	0.99	1.27	1.53	1.71	1.77	1.71	1.56	1.34
16 Fri	1.12	0.93	0.81	0.81	0.90	1.06	1.23	1.35	1.38	1.33	1.21	1.04	0.86	0.72	0.65	0.69	0.83	1.07	1.34	1.56	1.70	1.73	1.64	1.47
17 Sat	1.25	1.02	0.84	0.75	0.75	0.85	1.02	1.19	1.31	1.36	1.33	1.23	1.07	0.91	0.78	0.73	0.77	0.91	1.13	1.37	1.56	1.66	1.66	1.56
18 Sun	1.37	1.15	0.94	0.77	0.68	0.68	0.79	0.96	1.14	1.28	1.36	1.36	1.28	1.14	0.99	0.87	0.81	0.84	0.96	1.15	1.36	1.52	1.60	1.58
19 Mon	1.47	1.29	1.07	0.86	0.70	0.60	0.61	0.72	0.90	1.10	1.27	1.39	1.42	1.36	1.24	1.09	0.96	0.89	0.89	0.98	1.15	1.32	1.47	1.53
20 Tue	1.51	1.40	1.22	1.00	0.80	0.63	0.54	0.54	0.65	0.85	1.08	1.30	1.45	1.50	1.46	1.34	1.19	1.04	0.94	0.91	0.98	1.12	1.28	1.41
21 Wed	1.48	1.46	1.34	1.16	0.95	0.75	0.58	0.47	0.48	0.61	0.83	1.10	1.35	1.53	1.60	1.56	1.43	1.26	1.09	0.96	0.91	0.96	1.08	1.24
22 Thu	1.38	1.44	1.42	1.31	1.13	0.92	0.71	0.53	0.43	0.44	0.59	0.85	1.15	1.43	1.63	1.70	1.65	1.50	1.31	1.11	0.95	0.89	0.93	1.06
23 Fri	1.22	1.36	1.44	1.41	1.30	1.11	0.90	0.68	0.49	0.39	0.43	0.61	0.90	1.23	1.53	1.72	1.78	1.70	1.53	1.31	1.09	0.93	0.86	0.91
24 Sat	1.05	1.23	1.38	1.45	1.41	1.29	1.10	0.87	0.65	0.47	0.39	0.45	0.67	0.99	1.34	1.63	1.80	1.82	1.72	1.53	1.29	1.06	0.89	0.84
25 Sun	0.91	1.07	1.26	1.40	1.46	1.41	1.28	1.08	0.85	0.63	0.46	0.41	0.51	0.76	1.10	1.45	1.71	1.85	1.84	1.70	1.49	1.23	1.01	0.86
26 Mon	0.84	0.93	1.11	1.30	1.43	1.47	1.41	1.26	1.05	0.83	0.61	0.48	0.47	0.61	0.88	1.23	1.55	1.77	1.86	1.81	1.65	1.42	1.16	0.96
27 Tue	0.84	0.84	0.96	1.14	1.33	1.44	1.46	1.39	1.23	1.03	0.81	0.63	0.53	0.56	0.73	1.02	1.34	1.63	1.80	1.84	1.75	1.56	1.33	1.09
28 Wed	0.90	0.82	0.85	0.98	1.17	1.34	1.44	1.44	1.35	1.20	1.01	0.81	0.66	0.61	0.68	0.87	1.15	1.44	1.67	1.79	1.78	1.66	1.46	1.22
29 Thu	1.01	0.85	0.80	0.86	1.00	1.17	1.33	1.41	1.41	1.32	1.18	1.00	0.83	0.72	0.71	0.80	1.00	1.25	1.50	1.67	1.74	1.69	1.54	1.34
30 Fri	1.12	0.93	0.81	0.78	0.85	0.99	1.16	1.30	1.37	1.37	1.30	1.17	1.02	0.88	0.80	0.81	0.92	1.10	1.32	1.51	1.63	1.65	1.57	1.42
31 Sat	1.22	1.02	0.86	0.77	0.76	0.84	0.97	1.13	1.27	1.34	1.35	1.29	1.18	1.05	0.94	0.89	0.91	1.01	1.17	1.34	1.48	1.55	1.54	1.44

DATUM OF PREDICTIONS=CHART DATUM

NORTH FIELD

Local Time (GMT+0300) **UNITS METRES**

August 2021

		0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
1	Sun	1.29	1.11	0.94	0.80	0.73	0.73	0.81	0.95	1.10	1.24	1.33	1.35	1.30	1.21	1.10	1.00	0.96	0.98	1.06	1.19	1.32	1.42	1.46	1.42
2	Mon	1.32	1.18	1.02	0.87	0.76	0.70	0.71	0.79	0.92	1.08	1.23	1.33	1.36	1.33	1.25	1.14	1.05	1.00	1.01	1.07	1.17	1.27	1.34	1.36
3	Tue	1.32	1.22	1.09	0.95	0.82	0.71	0.66	0.68	0.76	0.91	1.08	1.24	1.36	1.40	1.36	1.28	1.18	1.08	1.01	1.00	1.05	1.12	1.21	1.27
4	Wed	1.28	1.24	1.15	1.03	0.90	0.77	0.67	0.62	0.65	0.75	0.92	1.11	1.29	1.40	1.44	1.40	1.30	1.18	1.07	0.99	0.97	1.01	1.09	1.17
5	Thu	1.23	1.24	1.19	1.10	0.98	0.85	0.72	0.62	0.59	0.64	0.77	0.96	1.17	1.36	1.47	1.48	1.42	1.30	1.16	1.03	0.95	0.93	0.98	1.07
6	Fri	1.16	1.22	1.23	1.17	1.07	0.94	0.80	0.66	0.57	0.56	0.64	0.81	1.03	1.26	1.44	1.53	1.52	1.42	1.27	1.11	0.97	0.89	0.90	0.98
7	Sat	1.08	1.19	1.25	1.24	1.16	1.04	0.89	0.73	0.59	0.52	0.54	0.67	0.88	1.14	1.37	1.53	1.58	1.53	1.40	1.22	1.04	0.90	0.85	0.89
8	Sun	1.00	1.13	1.24	1.29	1.25	1.15	0.99	0.82	0.65	0.52	0.48	0.55	0.74	1.00	1.27	1.49	1.62	1.62	1.52	1.34	1.14	0.95	0.84	0.82
9	Mon	0.91	1.06	1.21	1.31	1.34	1.27	1.12	0.94	0.74	0.57	0.46	0.47	0.60	0.84	1.13	1.41	1.61	1.68	1.63	1.48	1.27	1.05	0.87	0.78
10	Tue	0.81	0.95	1.12	1.29	1.38	1.37	1.26	1.08	0.87	0.66	0.50	0.43	0.49	0.69	0.98	1.28	1.54	1.69	1.71	1.60	1.40	1.17	0.94	0.79
11	Wed	0.74	0.82	0.99	1.19	1.35	1.42	1.38	1.24	1.04	0.81	0.60	0.47	0.44	0.56	0.80	1.12	1.42	1.64	1.74	1.70	1.54	1.31	1.06	0.84
12	Thu	0.71	0.71	0.83	1.03	1.24	1.39	1.44	1.37	1.22	1.00	0.77	0.58	0.48	0.50	0.66	0.93	1.25	1.53	1.70	1.74	1.64	1.44	1.19	0.95
13	Fri	0.75	0.65	0.69	0.83	1.05	1.26	1.40	1.43	1.36	1.20	0.98	0.77	0.60	0.53	0.58	0.77	1.05	1.35	1.58	1.70	1.68	1.55	1.33	1.08
14	Sat	0.84	0.67	0.61	0.66	0.83	1.05	1.26	1.39	1.42	1.35	1.20	1.00	0.80	0.66	0.61	0.69	0.88	1.14	1.39	1.58	1.64	1.59	1.44	1.22
15	Sun	0.97	0.76	0.62	0.57	0.64	0.81	1.03	1.23	1.36	1.40	1.35	1.22	1.05	0.88	0.75	0.72	0.79	0.96	1.18	1.39	1.52	1.55	1.48	1.32
16	Mon	1.11	0.89	0.70	0.58	0.54	0.62	0.78	0.99	1.19	1.33	1.40	1.38	1.27	1.12	0.97	0.85	0.81	0.86	0.99	1.17	1.33	1.43	1.45	1.38
17	Tue	1.23	1.04	0.85	0.68	0.56	0.52	0.58	0.73	0.94	1.15	1.32	1.41	1.42	1.34	1.21	1.06	0.94	0.88	0.89	0.98	1.12	1.25	1.34	1.36
18	Wed	1.30	1.18	1.01	0.83	0.67	0.54	0.49	0.54	0.68	0.89	1.12	1.32	1.45	1.48	1.42	1.30	1.15	1.00	0.91	0.89	0.94	1.05	1.17	1.26
19	Thu	1.30	1.26	1.16	1.01	0.84	0.67	0.53	0.46	0.49	0.63	0.86	1.12	1.35	1.50	1.55	1.50	1.37	1.20	1.03	0.90	0.85	0.89	0.99	1.12
20	Fri	1.23	1.28	1.26	1.17	1.02	0.84	0.66	0.50	0.42	0.45	0.61	0.87	1.15	1.41	1.57	1.62	1.55	1.40	1.21	1.01	0.86	0.80	0.84	0.96
21	Sat	1.10	1.23	1.30	1.28	1.19	1.04	0.84	0.64	0.47	0.39	0.44	0.63	0.92	1.23	1.49	1.64	1.67	1.58	1.40	1.18	0.96	0.81	0.75	0.81
22	Sun	0.95	1.13	1.27	1.34	1.32	1.21	1.04	0.82	0.61	0.44	0.38	0.47	0.70	1.01	1.33	1.58	1.70	1.69	1.56	1.35	1.11	0.89	0.75	0.73
23	Mon	0.82	0.99	1.18	1.33	1.38	1.34	1.21	1.02	0.79	0.58	0.43	0.41	0.55	0.81	1.14	1.44	1.65	1.73	1.67	1.50	1.27	1.02	0.81	0.70
24	Tue	0.72	0.85	1.05	1.24	1.38	1.41	1.35	1.19	0.98	0.76	0.56	0.46	0.49	0.67	0.95	1.28	1.55	1.70	1.72	1.61	1.41	1.16	0.92	0.74
25	Wed	0.68	0.74	0.90	1.11	1.30	1.42	1.42	1.33	1.16	0.95	0.73	0.57	0.52	0.60	0.82	1.11	1.40	1.61	1.70	1.66	1.50	1.28	1.04	0.82
26	Thu	0.69	0.67	0.77	0.96	1.17	1.35	1.43	1.41	1.30	1.12	0.92	0.73	0.62	0.62	0.74	0.97	1.24	1.48	1.63	1.65	1.55	1.37	1.14	0.92
27	Fri	0.74	0.65	0.68	0.81	1.01	1.21	1.36	1.42	1.39	1.27	1.09	0.91	0.76	0.69	0.73	0.88	1.10	1.33	1.51	1.59	1.55	1.42	1.23	1.01
28	Sat	0.82	0.68	0.64	0.71	0.85	1.04	1.23	1.36	1.40	1.35	1.23	1.08	0.92	0.81	0.78	0.84	0.99	1.18	1.36	1.48	1.50	1.42	1.28	1.09
29	Sun	0.90	0.75	0.66	0.65	0.73	0.88	1.06	1.23	1.34	1.37	1.32	1.22	1.08	0.95	0.86	0.86	0.93	1.06	1.21	1.34	1.40	1.38	1.29	1.14
30	Mon	0.98	0.82	0.71	0.65	0.67	0.75	0.89	1.06	1.21	1.31	1.34	1.30	1.21	1.09	0.98	0.92	0.91	0.97	1.08	1.19	1.27	1.30	1.26	1.17
31	Tue	1.04	0.91	0.78	0.69	0.65	0.67	0.76	0.89	1.04	1.18	1.29	1.33	1.30	1.22	1.11	1.01	0.95	0.94	0.98	1.05	1.13	1.18	1.20	1.16

DATUM OF PREDICTIONS=CHART DATUM

8.5. Appendix 5 - Contact Details

Gulf Marine Services Contact Details		
Contact	**Telephone / Mobile / Fax**	**Email**
GMS MENA Switchboard	+971 2 502 8888	gmsops@gmsuae.com
Mark Harvey General Manager	+971543099206	mark.harvey@gmsuae.com
Viktor Fedorchenko, Marine Manager	+971 56 4121859 +974 66709577	viktor.fedorchenko@gmsuae.com
Scott Rowell, Operations Superintendent	+971 2 5028737 +974 50 709981 +44 77 69294495	scott.rowell@gmsuae.com
GMS Enterprise Contact Details		
Enterprise Master	+442922002931 / +97455196410	enterprise.master@fleet.gmsuae.com
Enterprise Radio Room/Bridge	+442 92 200 2930 / +974 55 252 637	enterprise.6103@fleet.gmsuae.com
General / External Contact Details		
Fugro Geos	+971 25545101 +971589822013	forecast@fugro.com
Storm Geo	+971 56 466 0348	offshore@stormgeo.com
Global Maritime Contact Details		
Imran Siddiqui	+971 2 553 5291 +971 (0) 50 443 7626	imran.siddiqui@globalmaritime.com
A7S Onshore Emergency Response Centre		
A7S Onshore Emergency Response Centre	+974-4013-3999	
Emergency Control Center (ECC)	40134899, 40134893, 40134894	
McDermott Contact Details		
Iain Hill (Sr. Project Director)	+971 56 401 0150	ihill@mcdermott.com
Noli Villanueva (Project HSE Manager)	+974 5513 6365	NVillanueva@mcdermott.com
Jim Bowie (Snr Brown Field Construction & HUC Manager)	+974 5515 4851	jbowie@mcdermott.com
Navin Srivastava (Offshore Installation Manager)	+974 5516 0472	NSrivastava@mcdermott.com
QatarGas Contact Details		
James Lee Galinksy (Project Manager)	M: +974 5544 4640	jgalinsky@qatargas.com.qa
Richard James Kerr (Head of Brownfield Project Execution)	+974 5025 8440	RKerr@qatargas.com.qa
Boualem Lassas (Interface & Execution Mgr)	+974 6676 4105	BLassas@qatargas.com.qa
Luca Tabanelli (Installation Manager)	+974 44482459	LTabanelli@qatargas.com.qa
Craig Nolan (Head of HSE)	+974 5050 6883	Rnolan@qatargas.com.qa
Jon Watson	+974 7474 2967	jwatson@qatargas.com.qa

(Brownfield HSE & Risk Lead)		
Tabish Faheem (Environmental Lead)	+974 5080 1921	TBhat@qatargas.com.qa
GMS Agent Contact Details		
Sajin Raj	+974 50670938 +974 40018034	sajin.raj@gac.com
Deepesh Sivarama Pillai	+974 66810886 +974 40018034	deepesh.pillai@gac.com
GAC Operations	+974 66810886 +974 40018034	operations.raslaffan@gac.com
Hospitals		
Hamad Hospital	+974-4439-4444	sajin.raj@gac.com
Hamad Emergency Medical Service	+974-4439-1111	

8.6. Appendix 6 - Worksheet for Calculations of ballast required

Worksheet for calculation of ballast to be taken			
For achieving legs maximum pre-load capacity at considering the losses coming due to the legs and spud cans buoyancy			
Item	**Calculation of required weight afloat / elevated for max pre-load**	**Weight [t]**	
	Dry leg weight, each	365	
	+ Ballast water in each spud can	+32	
1	- Leg buoyancy at water depth (54 - 2.38m) x 0.7 t/m	-36	
1a	- Spud can buoyancy	-38	
	= Effective leg weight (at water depth as specified ref. to 1), each	323	
		At spud can level [t]	**At hull level [t]**
2	Required load at each pre-load per driven / loaded leg	3080	5500
3	Required load left on lifted leg	423	200
	Required load at 2 x pre-loaded legs (= ref. 2 x 2 times)	6160	5700
	Required load at 2 x lifted legs (= ref. 3 x 2 times)	+846	+200
4	= Required for pre-loading TOTAL hull weight at ZERO airgap		=5900
4a	= Required displacement in soft pinned condition	= 7006	
		Weight / Displacement [t]	**Hull weight [t]**
	Required TOTAL weight at ZERO airgap - ref. 4		5900
	- Hull elevated weight taken from stability calculations worksheet		5744
	Required TOTAL displacement with legs in stowed position - ref. 4a	7006	
	- Afloat weight (displacement) from stability calculations worksheet with legs in stowed position	-6850	
	= Required ballast, t	156	156

8.7. Appendix 7- Stage 1 Risk Assessment

Gulf Marine Services

Risk Assessment Form

Task / Activity Description: **Navigation / transit and installation of GMS Enterprise 6103 from RLIC anchorage to PU platform NW face in North Field**	**Doc Ref: GMS JUV Move Procedure, GMS PTW&RA procedure; GMS Marine procedures, QP Marine Operations Manual**
Location / Vessel: PU platform, NW face, North Field	**Permit Required to carry out job: GMS MAC, MWS location approval**
Risk Assessment Date: 01.02.2021	**Risk Assessment Number: Stage 1 Rig Move RA**

Consequences					Frequency of Occurrence				
					Rare (1)	Unlikely (2)	Credible (3)	Likely (4)	Almost Certain (5)
Severity	**People**	**Asset Integrity / Business Impact**	**Environment**	**Reputation**					
Insignificant (1)	First aid	Slight damage, loss or impact	Slight impact of limited duration	Local media interest		LOW RISK			
Minor (2)	RWDC, MTC, 1 Minor Illness	Business impact or loss <1 day, damage <100k US	Tier 1 Minor effect	Local written media					
Moderate (3)	LTI, 1 Serious Illness	Business impact or loss <1 week damage between 100k - 500k US	Tier 1 Localised effect	Local TV National papers			ALARP AREA		
Major (4)	Multiple LTI's, one PD Multiple Serious Illnesses	Business impact or loss <1-month damage between 500k – 1000k US	Tier 2 Regional assistance required	National TV International papers				HIGH RISK	
Critical (5)	One or more fatality One or more Critically Ill	Business impact or loss >1-month damage >1000k US	Tier 3 International assistance required	International TV Extended coverage					

T4-HSE-FORM-004 - Risk Assessment Form
Revision 5

1

No	Description of Hazard	Effect	Initial Risk Rating			Control Measures	Person Responsible	Residual Risk Rating		
			5	2	10			3	1	3
1	Weather conditions which can affect barge move at any stage of its progress	- Loss of control due to a weather - Loss of control over the JUV - Collision - Grounding - Inability to complete the move within environmental criteria - Property damage - Injury - Pollution - Damage to reputation - Damages to asset - Fatality in the event of live asset is damaged	5	3	15	- Weather forecast to be obtained from two independent sources - Identification of sufficient weather window as per GMS Barge Move Procedure - Decision to sail to be agreed by Master and GMS Operations - GMS Emergency Response procedures - Meteorological Equipment to be checked and used as required prior sailing - Arrival WX conditions discussed between GMS and Master - Standby locations (safe havens) are identified for waiting on a weather - Navigation equipment to be in use as required and checked prior to Barge Move - Proper discussion between all personnel engaged during pre-move meeting	- Barge Master - Certified and approved DPOs	3	1	3
2	Equipment / Machinery failure at any stage of barge move, such as: - Power generation units - Propulsion / thrusters - Jacking System - Power distribution system	- Black out - Loss of control leading to collision / grounding - Loss of control leading to unsafe condition of barge during jacking	5	3	15	- Barge planned maintenance system - FMEA, FMEA proving trials, annual DP trials - DP2 redundancy - ASOG	- Barge Master - Certified and approved DPOs	3	3	9

	- Navigation systems - DP system	operation - Loss of control in case of excessive weather - Property damage - Injury - Pollution - Damage to reputation - Damages to asset - Fatality in the event of live asset is damaged				- Barge operating within the limitations of the operations of the equipment and Barge Operation Manual and DP Manual - Crew competency assured and barge crew familiar with equipment - Pre-move inspections, pre-move check lists are completed - GMS Emergency response procedures - Barge to be bunkered with sufficient fuel for the voyage and adequate endurance - Jacking system pre-move trials are carried out, no active alarms, RPD & legs extensions reset - Barge power management system set up as designed - Jacking system ready for emergency pin down				
3	Collision with subsea and surface installations	- Damage to assets - Injury - Loss of life - Pollution - Damage to reputation - Fatality in the event of live asset is damaged	5	3	15	- JUV move procedure in place and followed - Competent, certified and experienced Marine crew - Passage plan prepared and agreed with all parties - UKC requirements are in place and followed (VMP) - Navigational Equipment in good and operational condition - BA charts up to date - Field charts are onboard and in	- Barge Master - Certified and approved DPOs	5	1	5

						use - GMS Emergency response procedure - Damage control / SOPEP equipment in place ready to use				
4	Seabed conditions in a location, with potential hazards such as: - Unknown debris on site - Unknown bathymetry of seabed, seabed depressions/old pin holes - Unknown soil strength parameters	- Spud cans physical damage due to contact with subsea obstruction - Damage to the legs, damage to subsea infrastructure - Legs splay/sliding damages to the spud cans, legs braces - Barge instability and inclination excess - Rapid and uncontrolled Penetration - Injury - Loss of life	5	3	15	- Seabed survey - Seabed is clear from harmful debris - Locations of relic footprints are known and procedure for interacting with legs in place - Adequate jacking speed during legs touchdown and jacking - RPD monitoring - Leg loads monitoring - Hull draft monitoring - Barge Operations Manual - LPA - SSA - Pre-loading as per JUV move procedure - CoA	- Barge Master	5	2	10
5	Hazards while in JUV move preparations which may come from: - Lifting operations - Manual handling	- Injury - Loss of life - Property damage	5	3	15	- All operations will be done under PTW and RA - Competent, certified and experienced sea staff	- Barge Master - Chief Engineer	5	2	10

	- Human Error					- TBT - Max lift 22.5 kg per person or reassess the task - Established planned maintenance routine to prevent equipment failure - Barge crew familiar with JUV equipment - Barge crew familiar with JUV equipment - Relevant GMS procedures to be followed at all times	- Chief Officer - Person carrying out the task			
6	Hazards while in jacking operations on departure, which are related to: - Equipment failure - Slip, trip and fall - Rotating machinery - Noise - Vibration - Manual handling - Energy release (Mechanical, hydraulic, pneumatic, electric and thermal) - Incorrect preparations - Communication problems between bridge and personnel on the legs - Dropped objects - Hands and fingers being trapped, possibility of being crushed - Loss of power - Breach in hull integrity - Human Error - Lack of familiarity with equipment and its limitations	- Injury - Property loss - Loss of hearing - Electric shock / injury - Entanglement - Back injury - Damage to the environment - Damage to company reputation - Subsequent delays and loss in production in case of production shutdown	5	3	15	- All operations will be done under PTW and RA - Competent, certified and experienced sea staff - TBT - Established planned maintenance routine to prevent equipment failure. - Keep walkways free from obstructions as far as reasonably practical - Keep work area clean and tidy, clean up any spills ASAP - Barrier or mark any trip hazards or obstructions - Opening and holes to have guardrails or barriers. - Adequate storage of the tools and equipment on the work site - Secure long sleeve and loose items - Remove all jewellery	- Barge Master - Barge Master - Chief Engineer - Chief Officer / Certified and Approved DPOs - Person carrying out the task	5	2	10

						- Do not use gloves in immediate vicinity of rotating parts - Proper PPE - Tools to be inspected and verified to be in good working order before the job - Use adequate manual handling techniques - Barge pre-move c/l - VHF communications between leg personnel and bridge, with spare batteries - Leg behaviour to be closely monitored and reported to the bridge by personnel on the legs - Dropped objects survey before start of operations - Tank survey once the JUV is in the water - Barge crew familiar with JUV equipment - All deck equipment secures - All GMS and International regulations to be followed at all times				
7	Hazards while in transit, which are related to: - Equipment failure - Collision with other vessels - Grounding - Loss of control - Loss of power - Insufficient weather window - Inadequate weather forecast - Poor weather conditions - Incorrect Interpretation of weather forecast	- Injury - Property loss - Damage to the environment - Damage to company reputation	5	2	10	- Barge crew familiar with JUV equipment - Pre-move meeting, TBT in place - COLREG adhered to at all times - Charts corrected to the last NTM available o/b for the intended passage - Passage plan created and approved by barge Master - `	- Barge Master - Chief Engineer - Chief Officer - Person carrying out the task	5	1	5

	- Unexpected or un-forecasted weather conditions - Poor visibility - Mistakes in navigation - Human Error - Poor passage planning - Non-compliance with collision regulations - Poor information/charts - Loss of stability due to adverse weather - Fatigue - Loss of stability due to incorrect loading of the barge - Lack of familiarity with equipment and its limitations					- Established planned maintenance routine to prevent equipment failure - Favourable weather forecast for the whole duration of the operation obtained from 2 individual sources - All available navigational equipment o/b to be utilized for the move - Weather forecast to be monitored during the JUV move - In case barge required to take shelter, barge will return to the closest port available - Watch schedule implemented according to regulations and approved by barge Master - Stability calculation performed to satisfy operation manual criteria and approved by barge Master - All GMS and International regulations to be followed at all times				
8	Hazards while in approach and installation in final position, which are related to: - Incorrect preparations - Equipment failure - Collision with surface and subsea installations - Collision with other vessels - Grounding	- Injury - Property loss - Damage to the environment - Damage to company reputation - Subsequent delays and loss in production in case of platform	5	3	15	- Established planned maintenance routine to prevent equipment failure. - Competent, certified and experienced sea staff - Barge crew familiar with JUV equipment and move procedures - DP2 positioning system in use	- Barge Master - Chief Engineer - Chief Officer / Certified and approved DPOs	5	2	10

	- Loss of control during approach to live platform - Loss of power - Human Error - Insufficient weather window - Inadequate weather forecast - Poor weather conditions - Fatigue - Excessive Current - Lack of familiarity with equipment and its limitations - Drift off/run off/ drive off - Unfamiliarity with field layout - Failure of navigation equipment	shutdown - Damage to subsea assets - Fatality / loss of life				- with dual redundancy concept excluding the potential of full black out and loss of DP capability as applicable to DPS-2 class vessel - FMEA, FMEA proving trials, Annual DP trials - Low environmental criteria for DP-2 move as specified in Operations Manual and RMP is adhered to - DP post-failure DP capability of GMS Enterprise in case of worst-case failure - DP system is configured as per CAMO, i.e. 4 generators online, split switchboard configuration, etc. - ASOG in place and followed, regulating the speed, position changes, hold points for DP model update, etc. - RMP in place and followed, dictating the actions in GO / NO GO situation, abort of approach, etc. - All operations will be done under PTW and RA - TBT before 500m zone entry - Barge pre-move c/l. - GMS DP pre-set up check list - GMS 500m zone entry check lists - QatarGas 500m Red Zone Checklist - QatarGas 500m Zone				

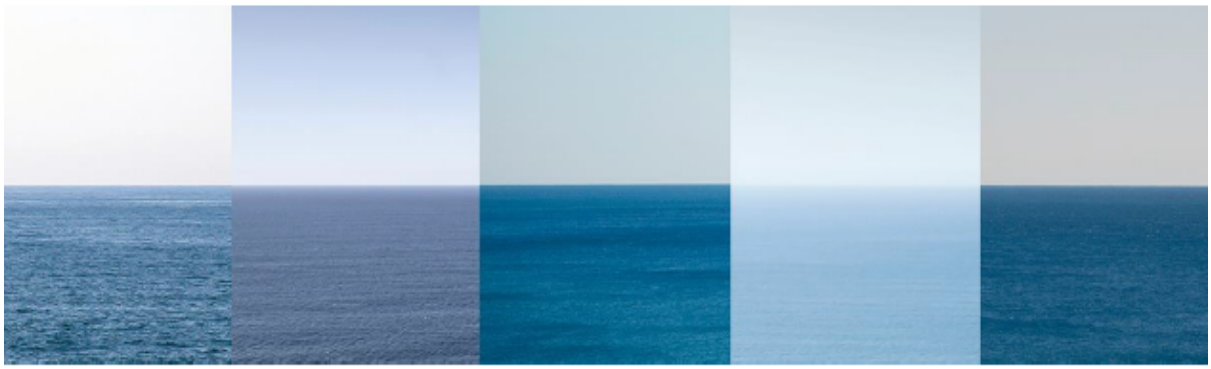
						Communication Checklist - Favourable weather forecast - Tug on standby - COLREG adhered to at all times - Charts corrected to the last NTM available o/b for the intended passage - Fugro survey package onboard, real time - All GMS, QG and International regulations to be followed at all times.				
9	Hazards while in jacking operations upon arrival in final position, which are related to: - Equipment failure - Slip, trip and fall - Rotating machinery - Noise - Vibration - Manual handling - Energy release (Mechanical, hydraulic, pneumatic, electric and thermal) - Incorrect preparations with subsequent delay and loss in production - Communication problems between bridge and personnel on the legs - Dropped objects - Hands and fingers being trapped, possibility of being crushed - Loss of power - Breach in hull integrity - Human Error - Lack of familiarity with equipment and its limitations - Damage to leg spud cans	- Injury - Property loss - Loss of hearing - Electric shock / injury - Entanglement - Back injury - Damage to the environment - Damage to company reputation - Damage to subsea assets	5	3	15	- All operations will be done under PTW and RA - Competent, certified and experienced sea staff - TBT - Established planned maintenance routine to prevent equipment failure. - Keep walkways free from obstructions as far as reasonably practical. - Keep work area clean and tidy, clean up any spills ASAP. - Barrier or mark any trip hazards or obstructions. - Opening and holes to have guardrails or barriers. - Adequate storage of the tools and equipment on the work site. - Secure long sleeve and loose items. - Proper PPE	- Barge Master - Chief Engineer - Chief Officer / Certified and approved DPOs - Person carrying out the task	5	2	10

	- Rapid or uncontrolled penetration (punch through)					- Tools to be inspected and verified to be in good working order before the job. - Use adequate manual handling techniques. - Barge pre-move c/lists - VHF communications between leg personnel and bridge, with spare batteries. - Leg behaviour to be closely monitored and reported to the bridge by personnel on the legs. - Dropped objects survey before start of operations. - Barge crew familiar with JUV equipment. - All deck equipment secured - All GMS and International regulations to be followed at all times. - LPA, SSA - Preloading as per SSA - CoA				
10	Hazards while in jacking to operational level, which are related to: • Cooling system failure • Man overboard	- Injury - Property loss - Damage to company reputation	5	3	15	- Cooling water system to be closely monitored by engine room personnel - In the event of cooling system failure operation to be aborted and barge jacked down to restore cooling water intake. - Transfer Ballast Water to cool down the Buffer Tank - Only essential people on deck	- Barge Master - Chief Engineer - Chief Officer - Person carrying out the task	5	1	5

							- Personnel to stay within area guarded by railings						

	Name	Signature	Date
Originator:	Capt. Vitaliy Shastun	V.Shastun V.Shastun (May 20, 2021 11:21 GMT+3)	01/02/2021
Risk Assessment Approved by:	Viktor Fedorchenko		01/02/2021

8.8. Site Specific Assessment & Bathymetric Survey Reports



GMS Enterprise at PU Platform Location

Site Specific Assessment

For Gulf Marine Services

PRJ105043-RP-001

Rev	Date	Document Status	Prepared by	Reviewed by	Approved by
			Principal Engineer	Technical Lead	Technical Lead
5	21/12/2020	Issued	Akbar Attar	Imran Siddiqui	Imran Siddiqui

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DOCUMENT ISSUE RECORD

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0	11/11/2020	Issued	AA	IS	IS
1	13/11/2020	Issued	AA	IS	IS
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Rev	Section(s)	Page(s)	Brief Description of Change
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1			Updated with client comments
2			Updated with clients and DNV comments
3			LPA with BH5 and BH8 included
4			Orientation Drawing Updated
5			Orientation Drawing Updated REV 02

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Section(s)	Page(s)	Brief Description of HOLD

Global Maritime Consultancy Ltd.
2nd Floor, Office 223-227, Al Fahim Building
Street 10, Mussafah Industrial, Abu Dhabi
P.O. Box 127573

T +971 2 553 5291
F +971 2 553 5292

1. SUMMARY

1.1.1 At the request of Gulf Marine Services (GMS), Global Maritime (GM) has carried out a site assessment of the GMS Enterprise jack-up unit at the PU Platform location, North field Offshore Qatar.

1.1.2 The assessment has been performed in accordance with ISO 19905-1 [Ref.1] and has considered the unit to be operating in the elevated mode under all-year storm survival conditions. The 50-year, all year, Omni directional environmental extremes for this location were provided by the client [Ref.3]. The LAT water depth is specified as 54.00 m [Ref.4].

1.1.3 An operational airgap of 18.70m above LAT has been considered for the purpose of this assessment

1.1.4 Specifically, this study has assessed preload capacity, overturning stability, leg sliding, foundation bearing capacity, leg strength and leg holding system strength.

1.2 Results

1.2.1 Based on the soil data provided [Ref. 4 to 8], tip penetrations at the PU Platform location are predicted to be within the range of 14.20 m to 19.00 m under full preload of 3080 tonnes at footing level.

1.2.2 A summary of the principal utilisation checks (UC's) is provided in Table 1.1 below. A UC ≤ 1.0 indicates that the check satisfies the ISO-19905-1:2016 requirements.

	Maximum Penetration Case		Hang up (Sensitivity Case)	
Overturning Stability	0.40		0.41	
Leg Sliding	0.18		0.29	
Preload Capacity (1)	0.77		0.81	
Foundation Bearing (1)	0.51		0.65	
	Keel at midbay	Keel at brace	Keel at midbay	Keel at brace
Leg Strength – Chords	0.86	0.86	0.95	0.92
Leg Strength – Braces	0.51	0.51	0.55	0.61
Leg Holding Strength	0.84	0.84	0.92	0.92

[1]Based on a preload capacity of 3080 tonnes at footing level
[2]Based on a factored ultimate capacity of 260 tonnes per pinion

Table 1.1 : Summary Results

1.3 Conclusions

1.3.1 Based on the preload capacity of 3080 Tonnes (30.20 MN) at footing level, tip penetrations are estimated to be within the range of 14.20 to 19.00 m.

In both high and low estimate cases, the spudcan tip is expected to come to rest in the clay (unit 6). The LPA profile shows two hang up/punch throughs occurring in both High Estimate and Low Estimate cases during preloading. The first is predicted to occur between preloads of 8 MN and 14 MN resulting a circa. 2.5 m rapid leg run. The second is predicted to occur between 15 MN and 26 MN resulting in a similar rapid leg run of between 4 m and 6 m. An additional sensitivity case has indicated possible hang-up scenario at 14 m depth close to maximum preload.

The results based on BH5 and BH8 boreholes indicates similar penetration range of 12.6 m to 19.0 m as identified from other closer boreholes with potential punch through and hang-up risk during preloading operation.

Considering the potential punch through and hang-up risk, it is recommended that the punch through precautions are to be adopted at this location which should include stagewise preloading with hull at a positive draft during all the stages. Leg RPD to be continuously monitored during preloading operation.

1.3.2 The 2017 geophysical survey and the more recent vessel set up drawing show the GMS Enterprise spudcans to be located on a relatively level seabed clear of relic spudcan depressions, debris and infrastructure. The seabed is covered in small pockmarks which are not considered to present a significant risk to jacking operations. It is recommended that latest seabed survey to be obtained to identify any new footprints or debris since last survey.

1.3.3 If deep leg penetrations do occur the spudcans will be embedded within clay. In this instance there is a risk of high extraction forces when raising the legs. It is recommended that the jetting system is ensured to be operational prior to move to this location and has sufficient pressure to break the suction forces which will develop across the base of the spudcan.

1.3.4 For deep penetration case (low estimate), leg length could be an issue for proposed operational airgap. It is therefore recommended that the operational airgap shall be adjusted based on actual penetrations such that a leg length is sufficient for operational case.

1.3.5 The results of the site assessment, considering 50-year, all-year environmental extremes, show that the unit satisfies the ISO-19905-1 criteria with respect to overturning stability, leg sliding, leg strength, preload capacity, foundation bearing capacity and pinion holding capacity.

1.3.6 This study was limited to environmental factors and their effects on idealised analytical models of the unit. No consideration has been made of the effects of fatigue, defective workmanship or materials, improper maintenance or operation, and accidental loads.

2. REFERENCES

1. BS EN ISO 19905-1:2016, Petroleum and Natural Gas Industries – Site Specific Assessment of Mobile Offshore Units.
2. Operations Manual for GMS ENTERPRISE 6103_IMS-MSMS-O-ENT-OPM.
3. FUGRO, OMQ011(181571_1 Part2), Revision 2, Updated Metocean Criteria Offshore Qatar, dated February 2019.
4. Fugro, final engineering report, marine shallow sub-surface site surveys – PRQ1, GIQ315/204 issued 3 May 2018
5. Horizon Geoscience, Survey Report Provision of Analogue and 2DHR Survey Services NFPS Investment-1 RG/QG Integrated Drilling Project Pre-FEED Blocks 'NFB' & 'RLB', Offshore Qatar Proposed Cable Route from RPQ1 to WHPQ11. Document No. S-RSG-QAT-0146-CL-RPQ1-WHP11-Vol 7-Rev 1. Dated 10 July 2017
6. McDermott Report, NFPS Investment-1, RG/QG Integrated Drilling Pre-Feed Project Offshore Qatar, Arabian Gulf PU Platform, North Field Development. Dated 22 February 2017.
7. Fugro McClelland factual report on geotechnical site investigation WH2 Location, N-3021/011 issued June 1993(Borehole BH8 and PCPT 8)
8. Fugro McClelland factual report on geotechnical site investigation PU Location, N-3021/041 issued June 1993(Borehole BH3, BH4 and PCPT 2 and PCPT3)
9. Fugro McClelland factual report on geotechnical site investigation BSP1 Location, N-3021/051 issued June 1993 (Borehole BH5 and PCPT 4)
10. Horizon Geoscience, Survey Report Provision of Analogue and 2DHR Survey Services NFPS Investment-1 RG/QG Integrated Drilling Project Pre-FEED Blocks 'NFB' & 'RLB', Offshore Qatar Proposed 28" pipeline route from WHPQ11 to RPQ1. Document No. S-RSG-QAT-0146-PL-WHP11-RPQ1 Vol 5-Rev 1. Dated 2 October 2017
11. Fugro, Final Position Acceptance Seafox Matsu. Dated 19 March 2020
12. Aqualis Braemar Marine Services LLC, Seafox Mastu At PU Platform, QG1 Field, Offshore Qatar Site Specific Assessment. Dated 13 March 2020
13. McDermott, Vessel Set-up PU Platform West Side GMS Enterprise. Drawing No: D6978-PR-OF-8902 (02). Dated 19th Dec 2020
14. McDermott, Vessel Set-up PR Platform South Side GMS Enterprise. Drawing No. D6978-PR-OF-8903-001_03. Dated 19th Dec 2020

3. INTRODUCTION

3.1 Background and Objectives

3.1.1 Gulf Marine Services (GMS) has requested GM to analyse the GMS Enterprise jack-up at the PU Platform location, in accordance with ISO-19905-1:2016 criteria [Ref 1].

3.2 Assessment Approach

3.2.1 The overall assessment approach is described below:

- Based on the geotechnical data provided, calculate the likely spudcan penetrations and calculate the foundation stiffnesses and ultimate capacities.
- Provide comments on the seabed and shallow geological conditions and identify potential geophysical / geotechnical hazards.
- Construct an FEA global 'bar stool' analytical model based on the calculated penetration, a water depth (LAT) of 54.0m and air gap of 18.70m for storm survival condition.
- Calculate the dynamic amplification factors (DAF's) in the time domain using the 'drag-inertia parameter' method. Perform global non-linear analyses for a range of storm headings where the loadset comprises; dead, variable wind, wave/current and inertia loads.
- Calculate utilisation checks with respect to overturning stability, leg sliding, preload capacity and foundation bearing capacity in accordance with the ISO-19905-1:2016 criteria.
- Construct a detailed leg FEA model of a single leg and leg-hull interface (guides / jack house / pinion etc.). Within this detailed model each leg member is represented by an FE beam element and the jack frame, guides and leg holding system are individually modelled.
- Perform a detailed leg analysis to determine leg member strength and leg holding system strength in accordance with ISO-19905-1:2016.

3.3 Information Sources

3.3.1 Information sources are summarised below.

- Jack up drawings provided by GMS.
- GMS Enterprise Marine Operations Manual [Ref 2]
- Met ocean data provided by GMS [Ref 3]
- Geotechnical/Geophysical data provided by GMS [Ref 5 to 10]

3.4 Guidelines for Use of Report

3.4.1 All data interpretation and engineering analysis included in this report is based on data supplied by the Client. Interpreted data is strictly applicable only at the

individual test locations provided; soil conditions may differ in between test locations. Whilst this report includes commentary relating to the quality and fitness for purpose of the Client supplied data, Global Maritime are not able to provide warranty of such.

3.4.2 Use of this report is limited to the stated purpose for which it is intended. Should the report be used for any other purpose it is recommended that a review be conducted to assess its suitability

4. JACKUP DETAILS

4.1 Principal Dimensions

4.1.1 The principal rig dimensions for GMS Enterprise are given in Table 4.1 below.

Length, Overall (m)	83.60
Hull Width (m)	36.00
Hull Depth (m)	6.00
Longitudinal Leg Spacing (m)	37.00
Transverse Leg Spacing (m)	28.00
Leg Length, Overall (m)	104.00

Table 4.1 : Principal Dimensions

4.2 Weights

4.2.1 The storm survival hull weights and centres of gravity have been taken from the GMS Enterprise Marine Operations Manual [Ref 2] provided by GMS. As requested, we have considered a maximum variable load of 716 tonnes with the hull weight distributed equally between each of the four legs for storm survival condition.

4.2.2 The maximum hull weight condition is based on 100% reduced storm variable load whilst the minimum hull weight is based on 50% reduced storm variable load. The LCG and TCG are measured from the legs centroid, with LCG +ve forward and TCG +ve to stbd. The VCG is measured from the keel and is +ve upwards.

Hull Lightship Weight (t)	4,384
Maximum Storm Variable Load (t)	716
Maximum Elevated Weight (t)	5100
Minimum Elevated Weight (t)	4,742
Total Hull LCG (m)	0.00
Total Hull TCG (m)	0.00
Total Hull VCG (m)	8.64

Table 4.2 : Hull Weights and COG's

4.2.3 The (single) dry leg weight, including spudcan is given as 362 tonnes [Ref 2].

4.3 Wind Areas

4.3.1 Hull wind areas and centres of effort were calculated from general arrangement drawings of the unit.

4.3.2 The calculated wind areas and centres of effort (CofE) are summarised in Table 4.3 and include the appropriate shape coefficients. The CofE is measured from the keel. During the global analyses, the wind areas are factored to account for the wind force profile at the specified air gap. A 0° heading is taken as bow-on, a 90° heading as port-on, etc.

Heading (°)	Area. Cs (m^2)	C of E (m)
0	759	8.90
30	1301	8.99
60	1522	9.31
90	1333	9.60
120	1522	9.31
150	1301	8.99
180	759	8.90

Table 4.3 : Hull Wind Areas & CofE's

4.4 Hydrodynamic Coefficients

4.4.1 Equivalent leg hydrodynamic properties have been calculated in accordance with the ISO-19905-1:2016 criteria [Ref 1] and the direction-averaged values are given in Table 4.4 below.

4.4.2 The leg hydrodynamic properties have accounted for leg-mounted raw water hoses (1 per leg, 355 mm OD) extending from top of jack house to about 15 metres below LAT.

4.4.3 Rough Cd's and Cm's are used for leg sections below the waterline and include a marine growth thickness of 12.5mm, while smooth values are used for sections above the waterline. These are used in conjunction with the deterministic wave height (Hdet = 0.86 Hmax), as per ISO-19905-1:2016 guidelines [Ref 1].

Leg Section	Rough		Smooth	
	$C_D . D_e$ (m)	$C_M .D^2$ (m^2)	$C_D .D_e$ (m)	$C_M .D^2$ (m^2)
Bare Leg	3.17	1.79	2.26	1.54
Bare Leg + JL's	3.47	1.89	2.48	1.65
Bare Leg + JL's + RWT	3.74	2.03	2.66	1.80

Table 4.4 : Leg Hydrodynamic Coefficients

4.4.4 A current blockage factor of 0.85 was considered in the assessment.

5. ENVIRONMENTAL DATA

5.1.1 The assessment considered all-year, omni-directional independent extreme metocean conditions provided by Client [Ref 3]. These are given in Table 5.1 below.

5.1.2 Wind, wave and current are assumed collinear.

5.1.3 The current speeds listed in the tables do not include the current blockage factor of 0.85.

Water Depth, LAT	54.00 m
Tidal Rise + Storm Surge	2.60 m
MSWL	56.60 m
Air gap from LAT to Keel	18.70 m
Maximum Wave Height (Hmax)	10.50 m
Associated Wave Period (Tass)	10.70 sec
Deterministic Wave Height (Hdet)	9.03 m
Significant Wave Height (Hs)	5.40 m
Peak Wave Period (Tp)	9.90 sec
Wind Speed (1-min sustained)	21.20 m/s
Current speed: Surface (56.60m)	1.51 m/s
10 m from Surface (46.60m)	1.47 m/s
20 m from Surface (36.60m)	1.42 m/s
30 m from Surface (26.60m)	1.36 m/s
40 m from Surface (16.60m)	1.27 m/s
50 m from Surface (06.60m)	1.11 m/s
Near Seabed (00.50m)	0.76 m/s
Seabed (00.00m)	0.32 m/s

Table 5.1 : Environmental Data

5.2 Minimum safe Airgaps & Leg Length Requirements

5.2.1 The minimum required air gap has been based on ISO 19905-1.

5.2.2 The leg reserve calculations are shown for GMS Enterprise jack-up unit in the table below.

Anticipated Penetrations	19.00 m
Water Depth, LAT	54.0 m
Operational Air gap from LAT to Keel	18.70 m
Distance from Keel to Top of Jack house	12.26 m
Total Leg Length Requirement	103.96 m
Actual Leg Length	104.00 m
Leg reserve length	00.04 m
Minimum leg reserve requirement	1.50 m

Table 5.2 : Minimum safe airgap and Leg reserve length

5.2.3 At the Operational Airgap of 18.70 m and corresponding maximum penetration of 19 m (In Low Estimate Case), the leg reserve length is less than minimum required. It is recommended that the operational airgap shall be adjusted at site based on the actual penetrations.

6. SOIL CONDITIONS

6.1 Available Data

6.1.1 The following geotechnical data has been supplied.

- Fugro, Final engineering report, marine shallow subsurface site survey – PRQ1. The report presents the results of a geotechnical investigation at the PRQ1 location (120m WNW of the PU platform) comprising a composite borehole (BH-PRQ1) to 130.9m bsf, as well as engineering assessments for driven piles, mudmat and spudcan penetration [Ref.4].
- Horizon cable survey report which includes a composite borehole, BH-RPQ1 to 130.7m bsf located 100m WNW of the PU Platform, [Ref.5].
- McDermott report [Ref.6] which includes the results of a geotechnical investigation carried out by Fugro McClelland in 1993 [Ref.8] at the PU platform comprising two continuous sampling boreholes: BH3 and BH4 to 100.6m and 120.5m bsf respectively and two CPT: PCPT2 and PCPT3 to depths of 102.5m and 122m.
- Fugro report, which includes the results of a geotechnical investigation carried out WH2 location in June 1993 [Ref.7] comprising one continuous sampling boreholes: BH8 80.6m bsf and one CPT: PCPT8 to depths of 80.6m
- Fugro report, which includes the results of a geotechnical investigation carried out BSP1 location in June 1993 [Ref.8] comprising one continuous sampling boreholes: BH5 80.6m bsf and one CPT: PCPT4 to depths of 80.6m.

6.1.2 Geophysical data is included in two reports provided by Horizon [Ref. 5 & Ref. 10] who carried out surveys in 2017 along a cable and pipeline route between the WHPQ11 platform and the RPQ1 platform which is positioned approximately 100m WNW of the PU platform. The surveys include multi-beam bathymetry and side scan sonar charts which incorporate the PU location. It also includes sub-bottom interpretation of the strata along the pipeline/cable routes which although not extending beneath the PU platform does give an indication of the likely profile in the general area.

6.1.3 Historical penetration records for the Seafox Matsu has been provided to assist with interpretation of the soil strengths [Ref. 11]. The Seafox Matsu spudcan details and preloads are provided within a Site-Specific Assessment report issued by AqualisBraemar March in 2020 [Ref. 12].

6.1.4 Two vessels set up drawings are provided [Ref.13 & Ref.14] which show the location of the GMS Enterprise on the West side of the PU platform on WSW heading, and on the south side of the PU Platform on a ENE heading as shown in Figure 6.1.

Figure 6.1 : Proposed Orientation of GMS Enterprise at PU Platform Location

6.2 Bathymetry and Seabed Features

6.2.1 The seabed appears to be reasonably level shoaling gently to the west as indicated in Figure 6.2.

6.2.2 The water depth beneath the PU platform was reported to be 53.3 m LAT [Ref. 5].

6.2.3 Numerous none-active pockmarks are observed in the area. However, none are located within 50 m of the geotechnical sampling boreholes or CPTs. The position of the pock marks relative to the Legs of GMS Enterprise should be confirmed prior to jacking at this location.

6.2.4 No debris items other than a few small transient fish traps were noted on the seabed. Up to thirty magnetic anomalies were detected. Twenty-eight could not be attributed to any known sources and could represent minor ferrous debris buried at shallow depths below the seabed.

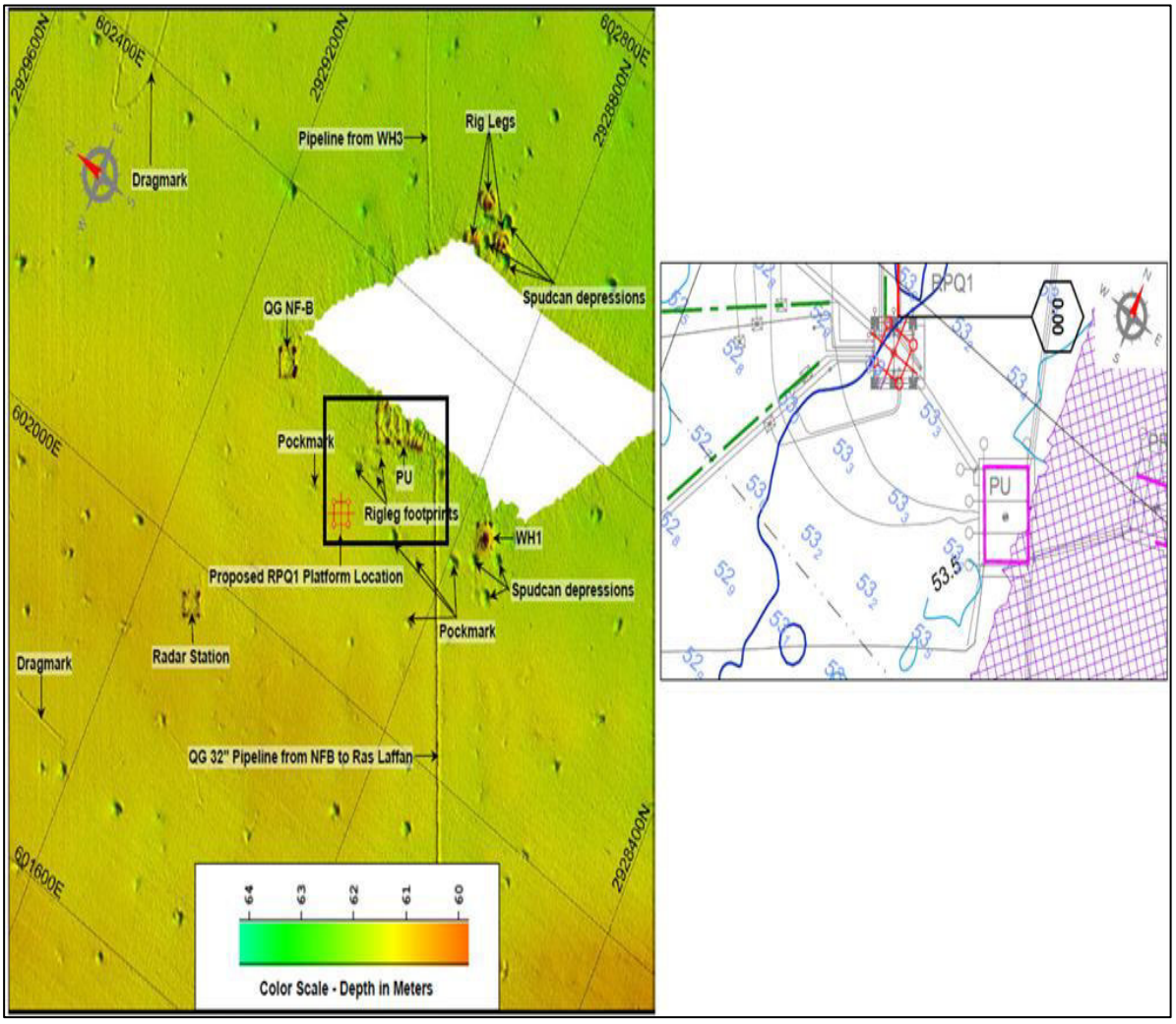


Figure 6.2 : Bathymetry surrounding the PU platform

6.2.5 Several relic spudcan depressions were observed to the north of the PU platform but based on their positions indicated on the vessel set up drawing, none present a risk to jack up operations. Several items of debris occur in the area but again

none appeared to be located beneath any of the legs. There are several products tying into the PU platform with the closest being a Fibre Optic Cable passing to within 10m of the port side of the Enterprise at its closest point. There are numerous small pockmarks in the area including beneath the Enterprise footprint

6.3 Seabed Soils

6.3.1 The sub-bottom data which extends to the RPQ1 Borehole location indicates a fairly consistent strata dipping gently towards the east.

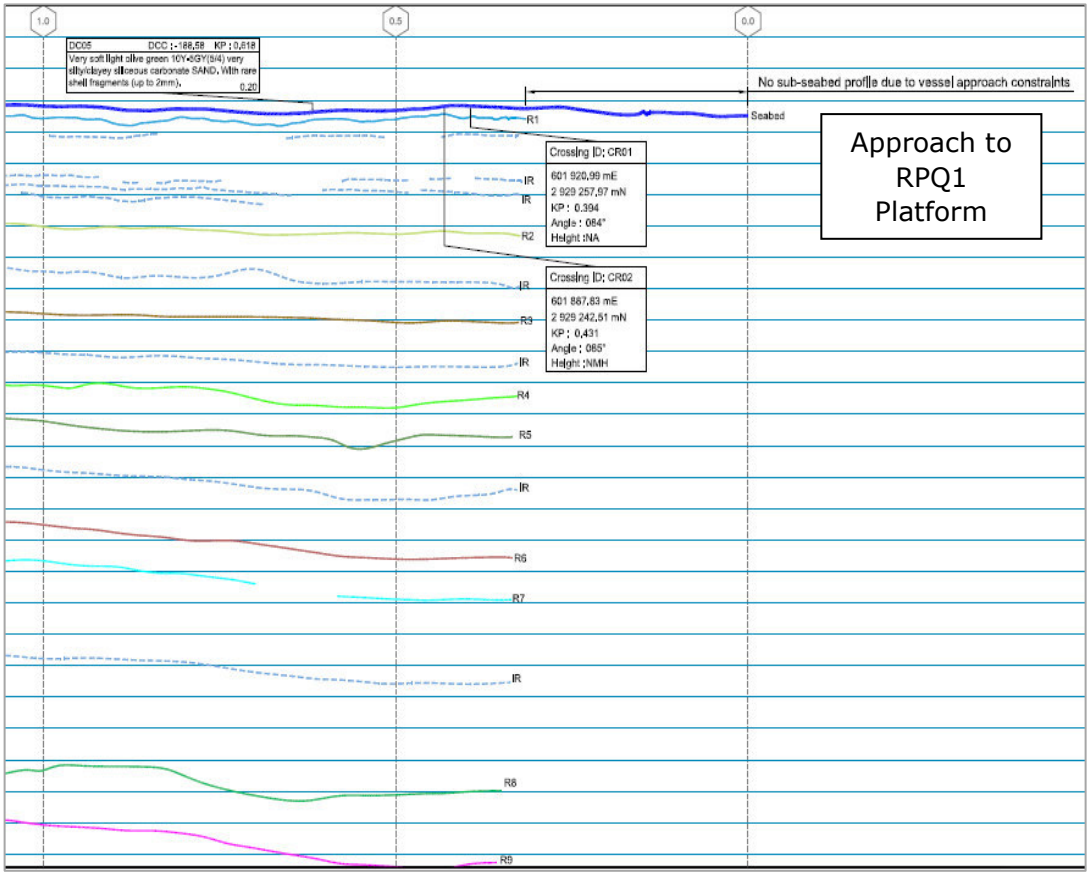


Figure 6.3 : SBP (Boomer) data extract showing the interpreted geology near to the RPQ1 location

6.3.2 Several borehole and CPT were carried out around the PU and RPQ1 platform and the location of the geotechnical samples relative to the jack up positions are shown in Figure 6-4

6.3.3 In general, the various borings show a relatively consistent lateral profile across the area comprising a thin upper layer of very loose sand overlying a thick unit of soft to firm becoming stiff silty clay which in turn overlies a thick sand unit. Thick beds of loose sand and/or silt were encountered within the clay in some of the borings as well as much thinner layers of cemented material or Calcarenite. There appears to be some variation in the thickness and lateral extent of these sandy/silty sub-layers between sampling locations and this has been considered when modelling the leg penetrations.

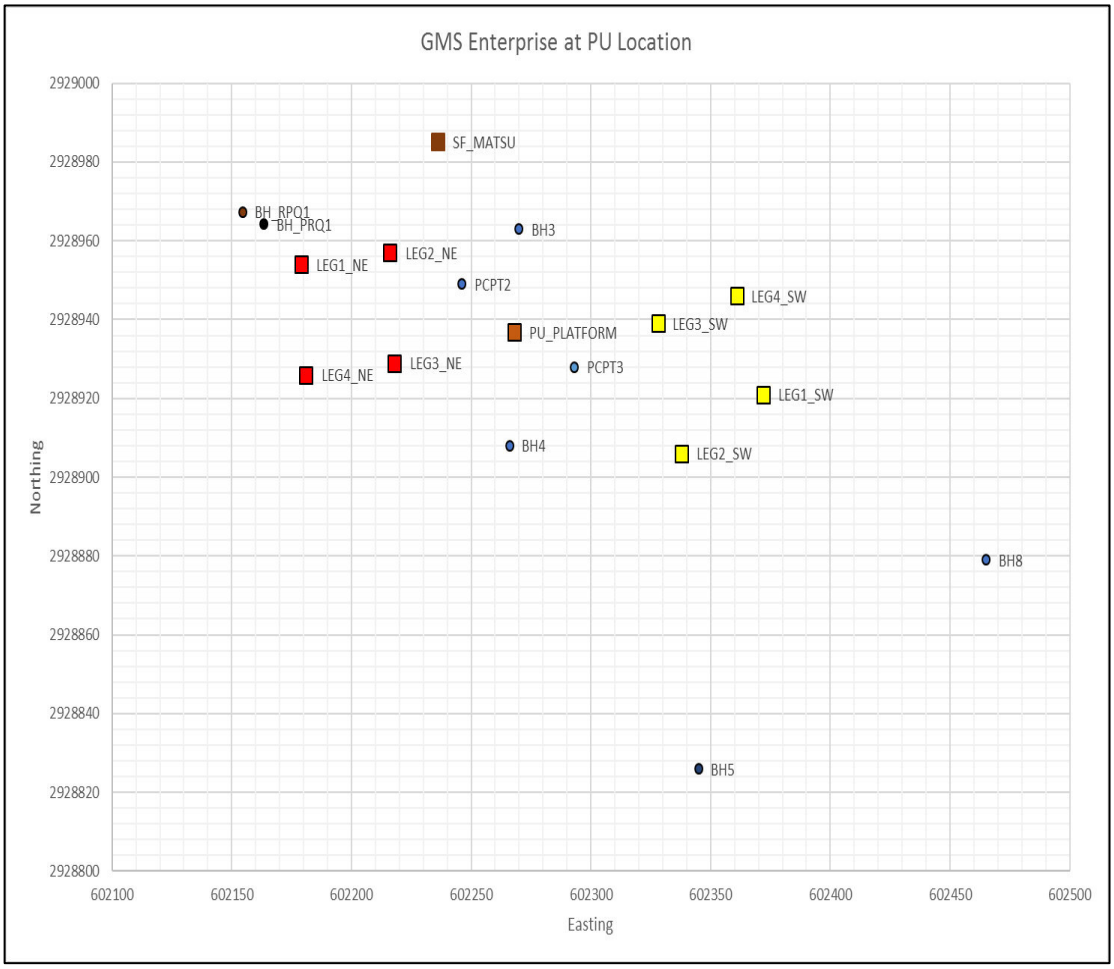


Figure 6.4 : Geotechnical sampling locations

6.3.4 Boreholes BH-PRQ1, BH-RPQ1, BH3, BH4 , PCPT2 and PCPT3 are closer to both proposed jack-up locations and therefore has been considered for this assessment.

6.3.5 Further geotechnical data at WH2 (BH8) and BSP1 (BH5) location has been provided which is located at 200 m and 135 m south-west from the PU Platform, respectively. This data is considered additional to that mentioned in 6.3.4. and Leg penetration plots based on these data is provided separately.

6.3.6 In general, the various borings show a relatively consistent lateral profile across the area comprising a thin upper layer of very loose sand overlying a thick unit of soft to firm becoming stiff silty clay which in turn overlies a thick sand unit. Thick beds of loose sand and/or silt were encountered within the clay in some of the borings as well as much thinner layers of cemented material or Calcarenite. There appears to be some variation in the thickness and lateral extent of these sandy/silty sub-layers between sampling locations and this has been considered when modelling the leg penetrations.

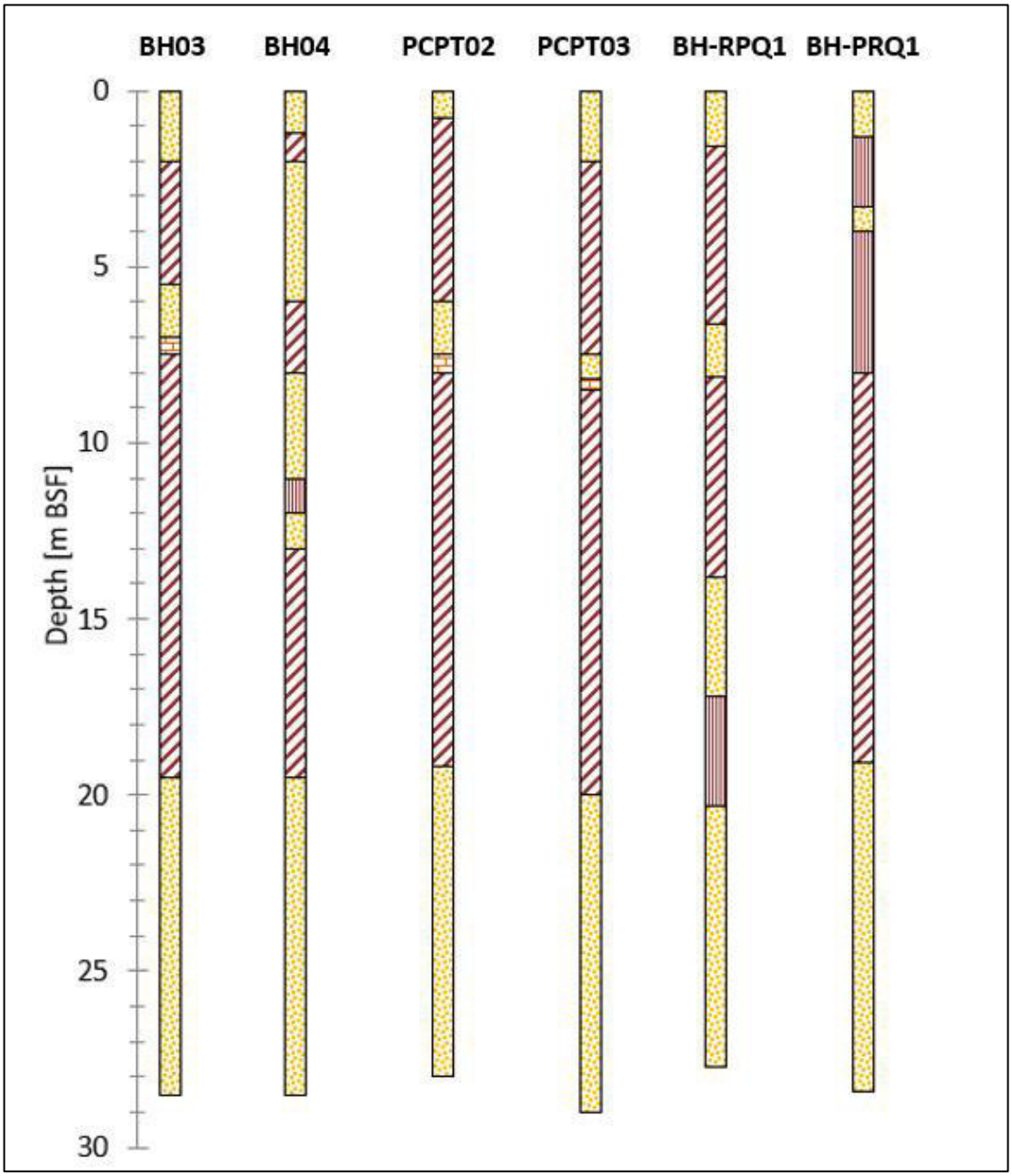


Figure 6.5 : Geotechnical cross section with proposes platform locations

6.3.7 A summary of the geological stratigraphy at the PU Platform site is presented in Table 6.1 below.

Layer	Depth to base (m)	Description
1	0.8 to 2.0	Very loose to loose siliceous carbonate clayey fine to medium SAND
2	5.5 to 7.5	Soft to firm sandy silty carbonate CLAY/SILT.
3	7.0 to 8.5	Very silty siliceous carbonate SAND with localised medium bed of calcarenite
4	19.5 to 20.3	Firm to stiff carbonate CLAY with
5	27.7 to 29.0	Loose to dense slightly to moderately cemented silty carbonate fine SAND

Table 6.1 : Summary of Strata at PU Platform

6.4 Historical Penetrations

6.4.1 The historical penetration records for the Seafox Matsu has been provided to assist with interpretation of the soil properties. Details are presented in Table 6.2

Seafox Matsu leg	Year	Easting [m]	Northing [m]	Penetration [m]	Maximum Leg reactions at Hull level (t)
Leg 1 (Starboard bow)	19th March 2020	602186.275	2928 977.137	13.80	2740
Leg 2 (Starboard stern)		602219.745	2928 992.887	13.50	2667
Leg 3 (Port bow)		602231.669	2928 967.561	13.85	2602
Leg 4 (Port stern)		602198.200	2928 951.811	14.09	2584

Table 6.2 : Historical Data

7. SPUDCAN PENETRATION ANALYSIS

7.1 Geotechnical Design Parameters

7.1.1 For the purposes of the spudcan penetration analysis at this site, the critical features are the weakest and strongest soils that may be expected, and the maximum plausible extent of such soils. To allow for lateral variation in the soils, upper and lower bound estimate soil profiles have been established.

7.1.2 For the granular soils the internal angle of friction has been determined from the relative density with a reduction applied to account for the scale effects of a large conical spudcan and the compressible nature of carbonate sand. Load spread factors of 5 and 3 are applied in the lower and upper bound estimate cases respectively as recommended in ISO-19905-1:2016.

7.1.3 The design High Estimate and Low Estimate soil profiles are presented in Table 7.1 and Table 7.2 below.

Unit No.	Soil Type	Depth, z (m bml)		Sub. Unit Weight, γ' (kN/m³)	Undrained Shear Strength, s_u (kPa)		Friction Angle, φ (°)
		From	To		Top	Base	
Lower Bound Estimate - Maximum Penetration							
1	SAND	0	1.2	6	-	-	20
2	CLAY	1.2	3.0	7	20	30	-
3	SAND	3.0	4.0	7	-	-	20
4	CLAY	4.0	6.0	7	30	40	-
5	SAND	6.0	8.0	8	-	-	20
6	CLAY	8.0	19.5	8	40	100	-
7	SAND	19.5	28.0	8	-	-	30
8	CLAY	28.0	42.0	8	60	100	-

Table 7.1 : High Estimate Design Soil Profiles

Unit No.	Soil Type	Depth, z (m bml)		Sub. Unit Weight, γ' (kN/m³)	Undrained Shear Strength, s_u (kPa)		Friction Angle, φ (°)
		From	To		Top	Base	
Upper Bound Estimate - Minimum Penetration							
1	SAND	0.0	2.0	7	-	-	22

2	CLAY	2.0	3.0	8	30	40	-
3	SAND	3.0	4.0	8	-	-	22
4	CLAY	4.0	6.0	8	40	60	-
5	SAND	6.0	8.0	9	-	-	22
6	CLAY	8.0	19.2	9	60	140	-
7	SAND	19.2	28.5	9	-	-	35
8	CLAY	28.5	42.0	9	80	140	-

Table 7.2 : Low Estimate Design Soil Profiles

7.1.4 There is some uncertainty regarding the nature of a silt unit between circa. 13.5 m and 16.5 m, and whether it may cause the spudcan to hang up close to the maximum preload. An additional sensitivity assessment has been carried out to check the hang risk and the curve is presented as an additional Plot in Figure 7.3. The design profile for sensitivity case is presented in Table 7.3 below.

Unit No.	**Soil Type**	**Depth, z (m bml)**		**Sub. Unit Weight, γ′ (kN/m³)**	**Undrained Shear Strength, s_u (kPa)**		**Friction Angle, φ (°)**
		From	**To**		**Top**	**Base**	
Sensitivity Case							
1	SAND	0.0	2.0	7	-	-	25
2	CLAY	2.0	4.0	8	40	50	-
3	SAND	4.0	4.7	8	-	-	25
4	CLAY	4.7	7.5	9	50	60	-
5	SAND	7.5	9.0	9	-	-	30
6	CLAY	9.0	13.5	9	60	65	-
7	SAND	13.5	16.5	10	-	-	35
8	CLAY	16.5	21.0	10	65	105	-

Table 7.3 : Sensitivity Case Design Soil Profiles

7.1.5 Further cases have been included from geotechnical data provided for BH8 and BH5 Borehole logs and soil profile based on this data are provided in Table 7.4,Table 7.5,Table 7.6 and Table 7.7.

Unit No.	Soil Type	Depth, z (m bml)		Sub. Unit Weight, γ′ (kN/m³)	Undrained Shear Strength, s_u (kPa)		Friction Angle, φ (°)
		From	To		Top	Base	
Lower Bound Estimate - Maximum Penetration							
1	SAND	0	2	8	-	-	20
2	CLAY	2	3	8	30	40	
3	SAND	3	5	8	-	-	20
4	CLAY	5	6	8	40	40	-
5	SAND	6	7.9	9	-	-	25
6	CLAY	7.9	12.1	9	40	60	
7	SAND	12.1	15	9	-	-	25
8	CLAY	15	19	9	40	80	-

Table 7.4 : Low Estimate Design Profile based on BH5

Unit No.	Soil Type	Depth, z (m bml)		Sub. Unit Weight, γ′ (kN/m³)	Undrained Shear Strength, s_u (kPa)		Friction Angle, φ (°)
		From	To		Top	Base	
Lower Bound Estimate - Maximum Penetration							
1	SAND	0	2	9	-	-	25
2	CLAY	2	3	9	40	50	-
3	SAND	3	5	9	-	-	25
4	CLAY	5	6	9	50	50	
5	SAND	6	7.9	10	-	-	30
6	CLAY	7.9	12.1	10	50	70	-
7	SAND	12.1	15	10	-	-	30
8	CLAY	15	19	10	50	100	-

Table 7.5 : High Estimate Design Profile based on BH5

Unit No.	Soil Type	Depth, z (m bml)		Sub. Unit Weight, γ′ (kN/m³)	Undrained Shear Strength, s_u (kPa)		Friction Angle, φ (°)
		From	To		Top	Base	
Lower Bound Estimate - Maximum Penetration							
1	SAND	0	1.5	6	-	-	20
2	CLAY	1.5	5.5	7	30	30	-
3	SAND	5.5	7.3	7	-	-	25
4	CLAY	7.3	10.7	7	35	35	-
5	CLAY	10.7	12	8	55	55	-
6	SILT	12	16.9	8	65	65	-
7	CLAY	16.9	18.5	8	75	75	-
8	SAND	18.5	26	9	-	-	30

Table 7.6 : Low Estimate Design Profile based on BH8

Unit No.	Soil Type	Depth, z (m bml)		Sub. Unit Weight, γ′ (kN/m³)	Undrained Shear Strength, s_u (kPa)		Friction Angle, φ (°)
		From	To		Top	Base	
Lower Bound Estimate - Maximum Penetration							
1	SAND	0	1.5	7	-	-	25
2	CLAY	1.5	5.5	8	50	50	-
3	SAND	5.5	7.3	8	-	-	30
4	CLAY	7.3	10.7	8	45	45	-
5	CLAY	10.7	12	9	65	65	-
6	SILT	12	16.9	9	-	-	30
7	CLAY	16.9	18.5	9	85	85	-
8	SAND	18.5	26	10	-	-	35

Table 7.7 : High Estimate Design Profile based on BH8

7.2 Spudcan Geometry

7.2.1 A representative cross section of the spudcan as modelled in the analysis is presented in Figure 7.1.

7.2.2 Key parameters are:

- Maximum full preload at footing, 30.20 MN.
- Maximum equivalent spudcan diameter, 6.14 m;

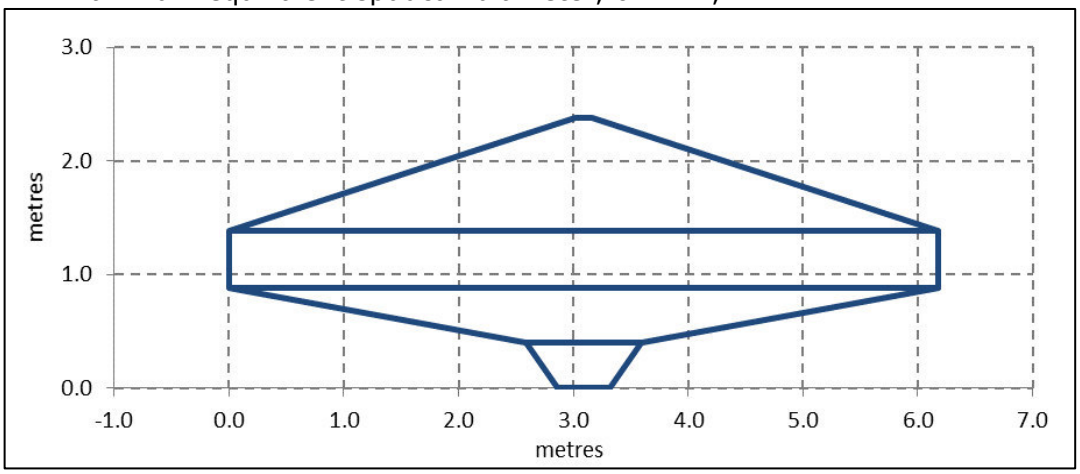


Figure 7.1 : Spudcan Idealised Cross-Section

7.2.3 For a fully embedded spudcan and at full preload, the applied bearing pressure is calculated to be 1006 kPa.

7.3 Penetration Analysis

7.3.1 The predicted tip penetrations, based on the available soil data, are presented in Figure 7.2 with minimum and maximum values summarised in Table 7.8. The sensitivity case is presented in Figure 7.3. Leg penetration plot based on BH5 and BH08 Borehole logs are presented in Figure 7.4 and Figure 7.5

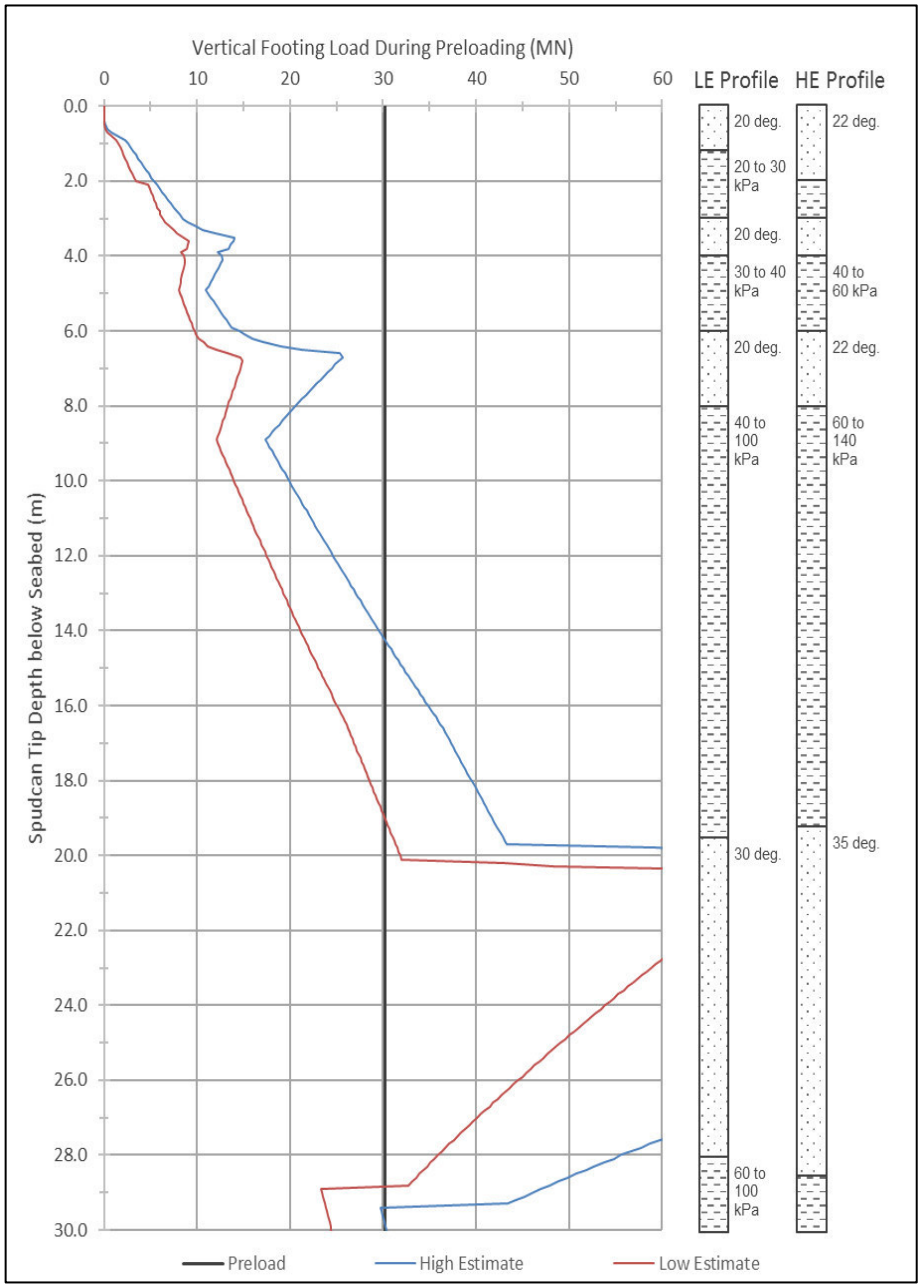


Figure 7.2 : Leg Penetration Plot

Analysis Case	Spudcan Penetration (m bml)	
	Tip	Depth to MBA
High Estimate	14.20	13.25
Low Estimate	19.00	18.05

Table 7.8 : Spudcan Penetration Results

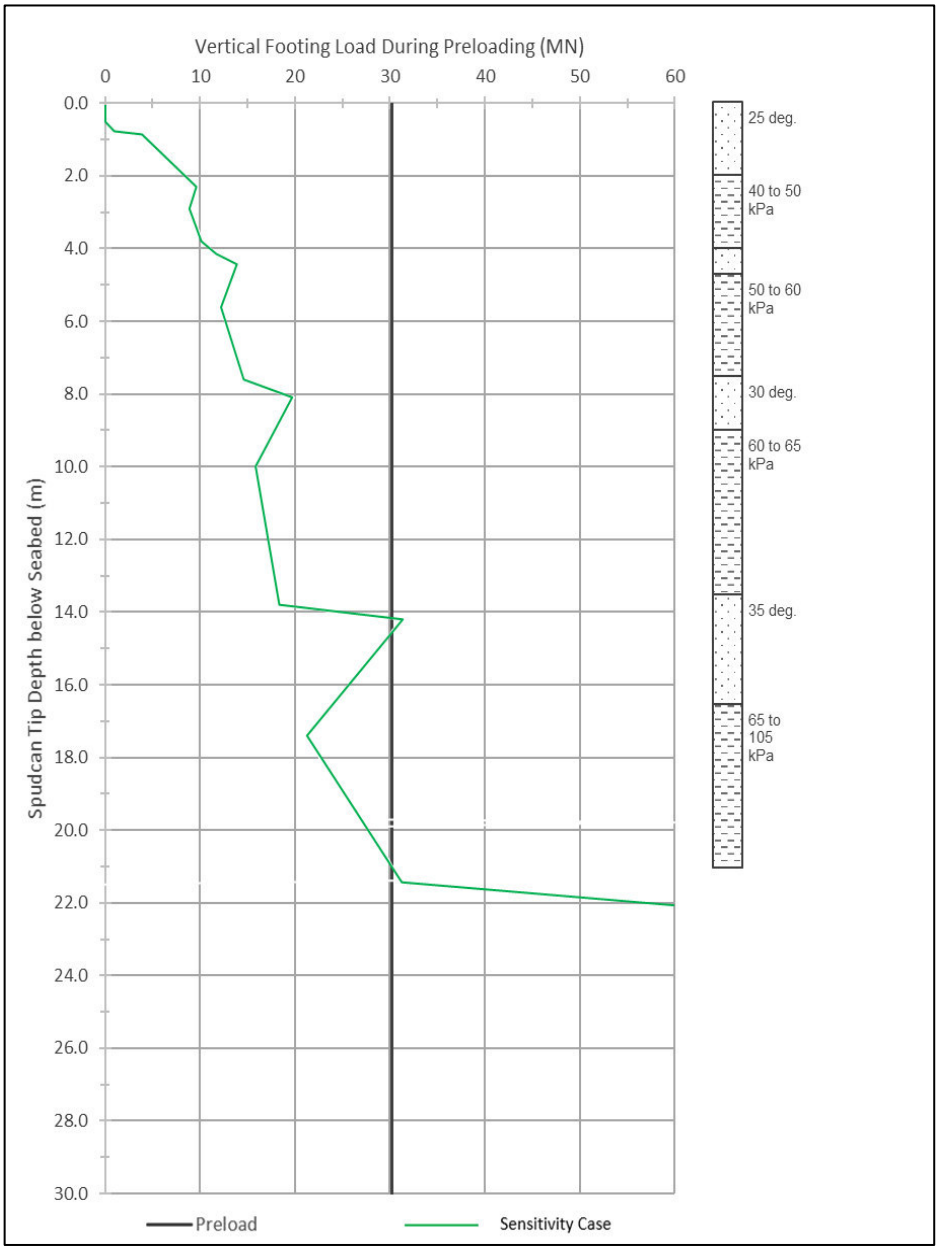


Figure 7.3 : Leg Penetration Plot – Sensitivity Case

Analysis Case	Spudcan Penetration (m bml)	
	Tip	Depth to MBA
Sensitivity Case	14.20	13.25

Table 7.9 : Spudcan Penetration Results – Sensitivity Case

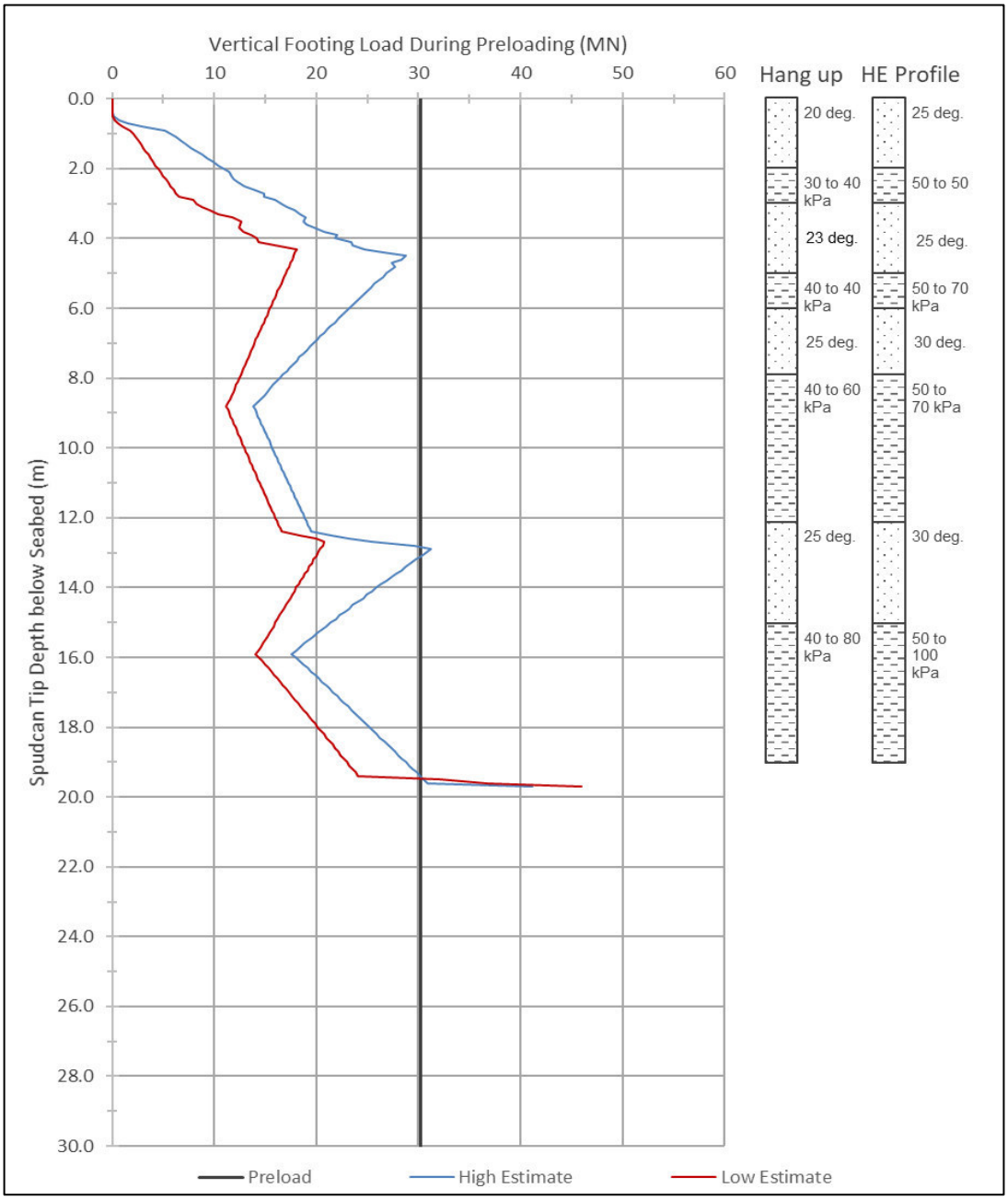


Figure 7.4 : Leg Penetration Plot – Bore hole BH5

Analysis Case	Spudcan Penetration (m bml)	
	Tip	Depth to MBA
High Estimate	13.00	12.05
Low Estimate	19.00	18.05

Table 7.10 : Spudcan Penetration Results – Borehole BH5

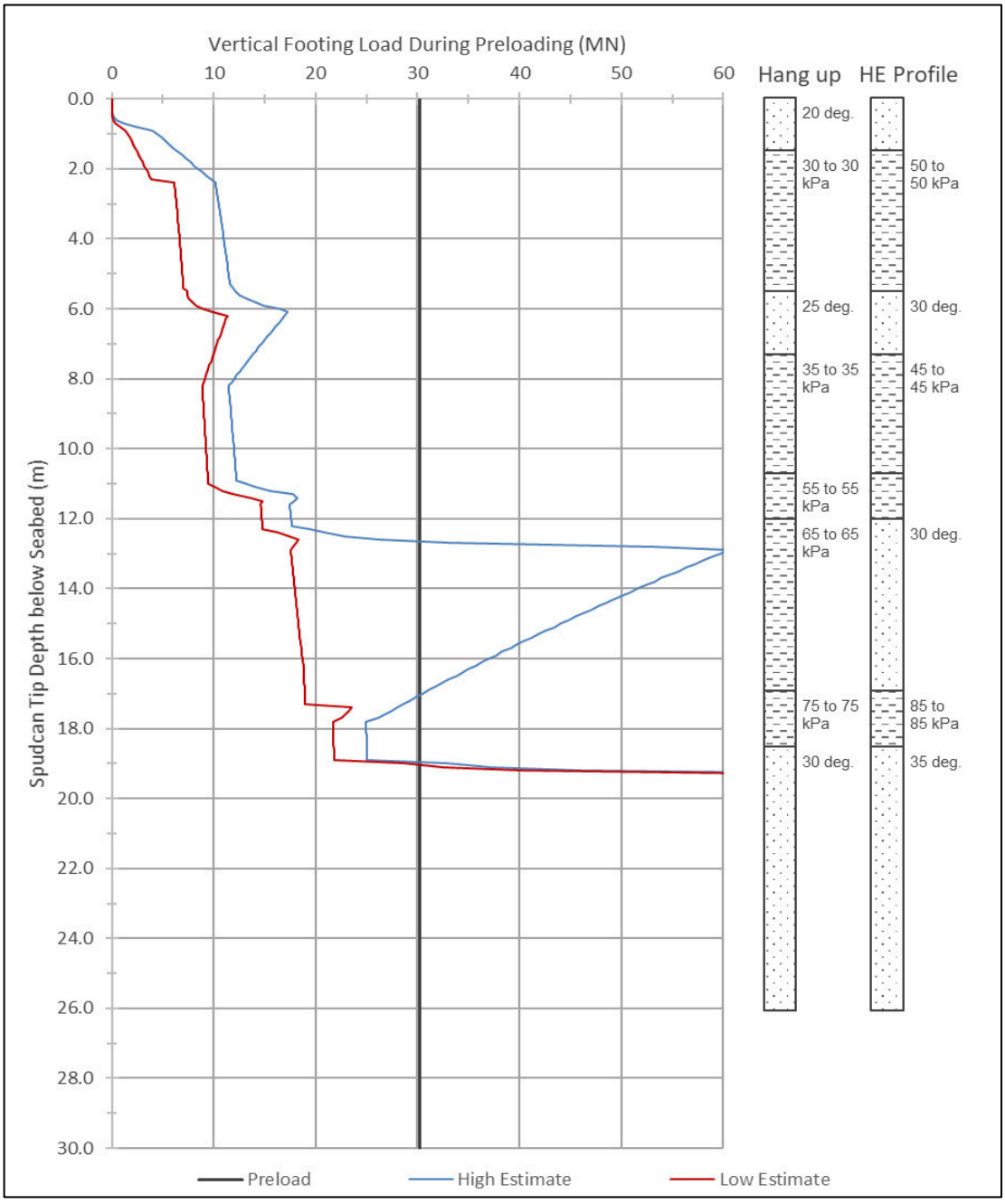


Figure 7.5 : Leg Penetration Plot – Bore hole BH8

Analysis Case	Spudcan Penetration (m bml)	
	Tip	Depth to MBA
High Estimate	12.60	11.65
Low Estimate	19.00	18.05

Table 7.11 : Spudcan Penetration Results – Borehole BH8

7.3.2 Tip penetrations of between 14.20 m and 19.0 m are predicted, in the HE and LE cases respectively. In both design cases, the spudcan tip is expected to come to rest in the clay (unit 6). The LPA profile shows two hang up/punch throughs occurring in both cases during preloading. The first is predicted to occur between preloads of 8 MN and 14 MN resulting a circa. 2.5 m rapid leg run. The second is predicted to occur between 15 MN and 26 MN resulting in a similar rapid leg run of between 4 m and 6 m. The sensitivity case indicates possible hang-up at penetration depth of 14.2 m close to maximum preload.

7.3.3 For the purposes of the site assessment, two cases have been considered namely

- Maximum penetration - 19 m have been considered.
- Hang up case – 14.2 m (Sensitivity Case)

7.3.4 The spudcan reaction point is taken at 0.952 m above the tip of spudcan.

7.4 Geotechnical Risks

7.4.1 Based on the preload capacity of 3080 Tonnes (30.20 MN) at footing level, tip penetrations are estimated to be within the range of 14.20 to 19.00 m.

7.4.2 In both design cases, the spudcan tip is expected to come to rest in the clay (unit 6). The LPA profile shows two hang up/punch throughs occurring in both High Estimate and Low Estimate cases during preloading. The first is predicted to occur between preloads of 8 MN and 14 MN resulting a circa. 2.5 m rapid leg run. The second is predicted to occur between 15 MN and 26 MN resulting in a similar rapid leg run of between 4 m and 6 m. An additional sensitivity case has indicated possible hang-up scenario at 14 m depth close to maximum preload.

The results based on BH5 and BH8 boreholes indicates similar penetration range of 12.6 m to 19.0 m as identified from other closer boreholes with potential punch through and hang-up risk during preloading operation.

Considering the potential punch through and hang-up risk, it is recommended that the punch through precautions are to be adopted at this location which should include stagewise preloading with hull at a positive draft during all the stages. Leg RPD to be continuously monitored during preloading operation.

7.4.3 The 2017 geophysical survey and the more recent vessel set up drawing show the GMS Enterprise spudcans to be located on a relatively level seabed clear of relic spudcan depressions, debris and infrastructure. The seabed is covered in small pockmarks which are not considered to present a significant risk to jacking operations. It is recommended that latest seabed survey to be obtained to identify any new footprints or debris since last survey.

7.4.4 If deep leg penetrations do occur the spudcans will be embedded within clay. In this instance there is a risk of high extraction forces when raising the legs. It is recommended that the jetting system is ensured to be operational prior to move to this location and has sufficient pressure to break the suction forces which will develop across the base of the spudcan.

7.5 Foundation Fixity & Capacities

7.5.1 Foundation stiffnesses and yield surface parameters have been calculated according to ISO-19905-1:2016 guidelines [Ref 1] and are presented in Table 7.12 below.

	Hang up case (14.2 m)	Maximum Penetration (19 m)
Stiffness Values		
Vertical (kN/m)	1.842 E6	1.990 E6
Horizontal (kN/m)	1.644 E6	1.499 E6
Rotational (kNm/rad)	1.457 E7	1.630 E7
Yield Surface Capacities		
Vertical (Vlo) (kN)	30,200	30,200
Horizontal (HLo) (kN)	3,620	9,510
Rotational (Mlo) (kNm)	14,040	28,090

Table 7.12 : Foundation Fixity & Capacities

8. SITE ASSESSMENT METHODOLOGY

8.1 General

8.1.1 A breakdown of the essential parts of the assessment is described as follows;

- Determine critical headings with respect to overturning stability, preload requirements, bearing capacity, leg strength and leg holding system strength.
- Using a simplified 'bar stool' model of the unit, determine the natural period of the unit (surge & sway modes), accounting for the effects of foundation fixity.
- Derive dynamic amplification factors (DAF's).
- Accounting for foundation fixity (as discussed in Section 7.5.1), perform a final global analysis allowing for second order (large displacement) and dynamic effects using the 'bar stool' model to determine utilisation checks with respect to overturning stability, preload capacity, leg sliding and foundation bearing capacity.
- Perform a detailed analysis, using a detailed leg model, to determine leg and leg holding system strength.

8.2 Dynamic Amplification Factors (DAF's)

8.2.1 The DAF's were calculated in the time domain using the 'drag-inertia parameter' method, which is discussed in ISO-19905-1:2016 [Ref 1].

8.2.2 A fixed damping equal to 7% of critical was assumed and relative velocity effects were not included. A PM spectrum was used to define the seastate. Added mass on the submerged part of the legs was accounted for and linear (Wheeler) stretching was used to define the current profile in the vicinity of the wave action.

8.2.3 A simplified 'bar stool' model of the unit was used to perform the dynamic simulations, see Appendix A. The legs are represented with equivalent beam elements and the hull is represented by a simplified grillage with stiffnesses properties derived from engineering drawings. At the connection between the legs and hull an FE member is used to model the finite vertical and rotational leg/hull connection stiffnesses.

8.2.4 A random wave-train of one-hour simulation time was generated and the statistics of the water surface elevation checked against recommended tolerances, this process being repeated until acceptable statistics are obtained. The validated one-hour random wave and current profile is passed through the structure in 0.5 second intervals, and at each time step the total base shear (BS) and overturning moment (OTM) is calculated. The BS and OTM responses are calculated with and without mass turned-on and the resulting DAF's are determined from the statistical properties of the two responses.

8.2.5 To account for foundation fixity, linear springs were attached to the legs at the level of assumed effective penetration and earthed. Stiffness values for these springs were taken equal to the calculated small strain foundation stiffnesses, with the exception of the rotational stiffness which was reduced to 80% of its small

strain value. Thus, the dynamic simulations were performed with linearised footing restraint springs.

8.2.6 A fixed damping equal to 7% of critical was assumed and added mass on the submerged part of the legs was accounted for.

8.3 Large Displacement Analysis

8.3.1 The final global (large displacement) analysis was performed using the 'bar stool' model. The loadset applied during the large displacement analysis comprised gravity, wind, wave/current and inertia. An environmental load factor of 1.15 was used in accordance with the ISO-19905-1:2016 criteria [Ref 1].

8.3.2 Hull dead weight was modelled partly by internally generated weight from the hull grillage and partly by applying point loads at the leg's centres. This allows not only the target hull weight and COG to be obtained, but also allows appropriate hull sagging leg moments to be included in the final results.

8.3.3 A series of lateral point loads were applied to the hull grillage at the leg centres to represent the inertia base shear.

8.3.4 The wave/current loads on the legs are automatically generated by SACS based on the input environmental data, equivalent leg hydrodynamic coefficients and selected wave theory. The wind loading is automatically calculated by SACS based on the input environmental data, hull wind areas and equivalent leg hydrodynamic coefficients.

8.3.5 To allow for foundation fixity in the global large displacement analysis linear springs are attached to the legs at the level of assumed effective penetration and earthed. The vertical and horizontal stiffness of these footing springs are maintained at their small strain values. However, the rotational stiffness is taken to be non-linear and assumed to degrade as the load vector on the foundation increases, hence giving the large strain rotational stiffness.

8.3.6 The calculation procedure for determining the large strain rotational stiffness are discussed in ISO-19905-1:2016 [Ref 1]. In essence the procedure requires the following steps;

- Initially set the rotational footing stiffnesses equal to their calculated small strain value.
- Apply all loads to the FE model, i.e. gravity, wind, wave/current and inertia, and perform a large displacement analysis.
- Extract the footing loads, i.e. vertical, horizontal and moment, and calculate the revised (reduced) rotational footing stiffness for each leg.
- Rerun the large displacement analysis using the same loadset but with the revised rotational footing stiffnesses. Extract the revised footing loads and again calculate the revised rotational footing stiffness for each leg.
- Repeat the above as necessary until the footing loads on all legs converge to a solution.

8.4 Detailed Leg Analysis

8.4.1 Whilst the simplified 'bar stool' model is suitable for performing the global analyses, a more detailed model is required to assess the strength of the leg and leg holding system. Within this detailed model leg is represented by an FE beam element and the jackhouse, guides and pinions are individually modelled as combination of beam and plate elements.

8.4.2 The lower and upper guides are represented by elements which model the correct clearances and local stiffness. Where the guide elements connect to the leg elements, releases are specified in all six degrees of freedom except the directions in which the guides work, thus ensuring the restraint offered by the guides is representative of the actual situation.

8.4.3 The pinions are represented by elements that run between the jackhouse and leg and model the appropriate clearances and local stiffness.

8.4.4 Section properties for the leg members, jackhouse and guide structures were determined from engineering drawings. Section properties of the jackhouse tubular braces are calculated directly by SACS from the input outside diameter and tube thickness.

8.4.5 An illustration of the detailed leg model is given in Appendix A.

8.4.6 The critical leg loads obtained from the global large displacement analysis are simulated on the detailed leg model and individual pinion loads are calculated.

8.4.7 Given the internal member loads, the strength utilisation checks are performed in accordance with ISO-19905-1:2016 guidelines [Ref 1].

9. RESULTS

9.1 Leg Numbering System

9.1.1 The following leg numbering system has been adopted,

- Leg 1: Forward – Portside
- Leg 2: Forward – Starboard
- Leg 3: Aft – Portside
- Leg 4: Aft – Starboard

9.2 Storm Loading Directions & Load Cases

9.2.1 The storm loading directions considered during the assessment are illustrated in Figure 9.1 below. Storm loading convention adopted here is such that 0° is bow on, 90° is port-on, etc.

9.2.2 In total four storm directions (90°, 120°, 150° and 180°) have been analysed using the 50-year, all year, wind, wave and current extremes listed in section 5. For each storm loading direction, the wind, wave and current extremes have been taken as collinear.

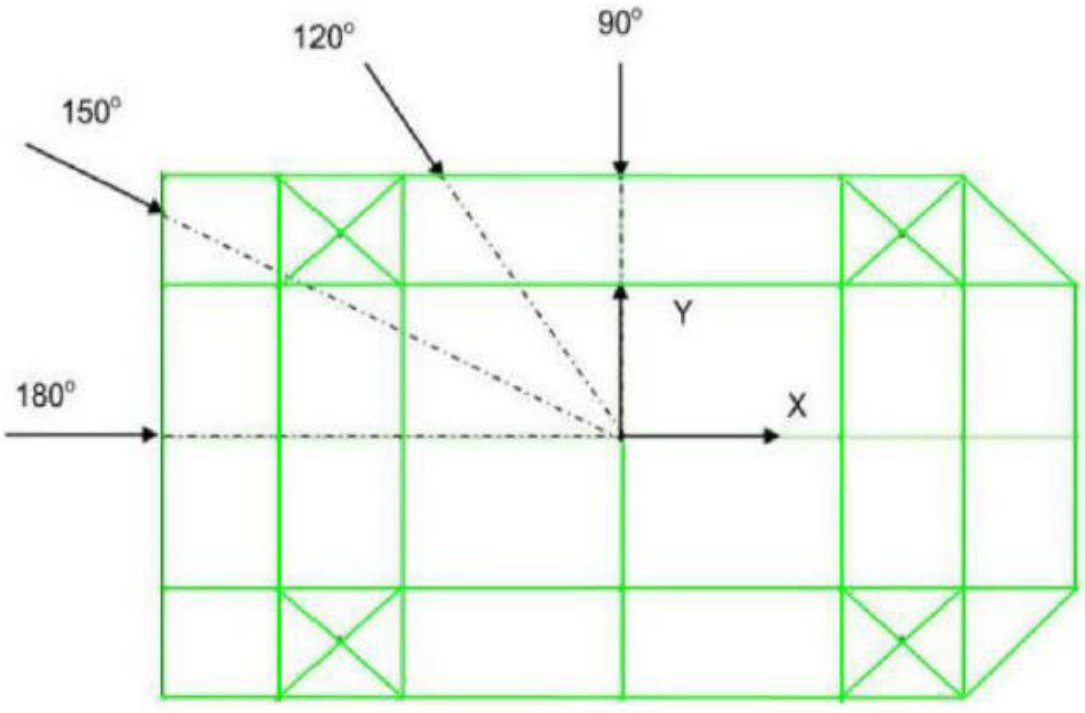


Figure 9.1 : Storm Loading Directions

9.2.3 For the purposes of the site assessment, two cases have been considered namely

- Maximum penetration - 19 m have been considered.
- Hang up case – 14.2 m (Sensitivity Case)

9.3 Dynamic Response

9.3.1 The dynamic response of the unit is presented in terms of natural periods and dynamic amplification factors (DAF's) as given in Table 9.1 and Table 9.2 below.

9.3.2 The DAF's were calculated in the time domain using the 'drag-inertia parameter' method, which is discussed in ISO-19905-1:2016 [Ref 1].

9.3.3 The dynamic response includes the effect of foundation fixity based on the foundation parameters calculated for this assessment and in accordance with the recommendations of ISO-19905-1:2016 guidelines [Ref 1].

9.3.4 The added mass of those parts of the leg below the water level was included in the dynamic analyses. No account was taken of fluid/structure interaction and the total damping was taken as 7% of critical.

Heading (°)	Tn (s)	Base Shear DAF	Overturning Moment DAF
90	6.02	1.185	1.404
120	6.02	1.201	1.433
150	6.02	1.183	1.435
180	6.02	1.182	1.540

Table 9.1 : Natural Periods (Tn) & DAF's – Maximum Penetration

Heading (°)	Tn (s)	Base Shear DAF	Overturning Moment DAF
90	5.73	1.161	1.383
120	5.73	1.173	1.392
150	5.73	1.168	1.431
180	5.73	1.211	1.685

Table 9.2 : Natural Periods (Tn) & DAF's – Hang up Case

9.4 Still Water Footing Reactions

9.4.1 Based on the weights and centres of gravity given in section 4.2, the still water footing loads have been calculated and are given in Table 9.3 and Table 9.4 below.

Heading	Leg	Still Water Footing Reaction (kN)	
		Maximum Hull Weight	Minimum Hull Weight
	1	15451	14573

All	2	15451	14573
	3	15451	14573
	4	15451	14573

Table 9.3 : Still Water Reactions – Maximum Penetration

Heading	Leg	Still Water Footing Reaction (kN)	
		Maximum Hull Weight	Minimum Hull Weight
All	1	15483	14605
	2	15483	14605
	3	15483	14605
	4	15483	14605

Table 9.4 : Still Water Reactions – Hang up Case

9.5 Environmental Loads

9.5.1 The environmental base shears & overturning moments for the critical headings are given in Table 9.5 and Table 9.6 below and include the 1.15 load factor in accordance with ISO 19905-1 guidelines [Ref.1]. The OTMs are given about the pinpoint, i.e. 0.952m above the base of the spud can tip.

Storm Heading	**Wave/Current**		**Wind**		**Inertia**		**Total**	
	BS (kN)	OTM (kNm)	BS (kN)	OTM (kN)	BS (kN)	OTM (kNm)	BS (kN)	OTM (kNm)
90°	2899	1.64E5	551	5.52E4	537	6.62E4	3987	2.85E5
120°	2858	1.62E5	622	6.22E4	574	7.00E4	4054	2.94E5
150°	2721	1.53E5	538	5.35E4	499	6.68E4	3758	2.74E5
180°	2632	1.48E5	331	3.26E4	480	7.99E4	3443	2.61E5

Table 9.5 : Environmental Loads – Maximum Penetration

Storm Heading	**Wave/Current**		**Wind**		**Inertia**		**Total**	
	BS (kN)	OTM (kNm)	BS (kN)	OTM (kN)	BS (kN)	OTM (kNm)	BS (kN)	OTM (kNm)
90°	2946	1.53E5	569	5.44E4	476	5.84E4	3991	2.65E5
120°	2907	1.51E5	640	6.10E4	502	5.90E4	4048	2.71E5

150°	2763	1.43E5	555	5.27E4	463	6.14E4	3782	2.57E5
180°	2666	1.37E5	349	3.28E4	564	9.39E4	3579	2.64E5

Table 9.6 : Environmental Loads – Hang up Case

9.6 Global Non-Linear Results

9.6.1 The results of the global non-linear analysis, showing footing reactions, are given in Table 9.7 and Table 9.8 below.

Storm Heading (°)	Footing Reaction		
	BS (kN)	Vertical (kN)	Moment (kNm)
90°	1,012	11,083	25,582
	917	19,808	25,192
	1,084	11,088	25,614
	975	19,826	25,129
120°	1,040	13,227	26,291
	889	21,191	24,272
	1,063	9,848	24,837
	1,063	17,540	26,243
150°	934	16,086	26,570
	849	20,027	25,178
	964	10,980	25,502
	1,012	14,712	26,536
180°	815	18,095	26,084
	815	18,095	26,083
	906	12,808	26,279
	906	12,808	26,279

Table 9.7 : Global Non-Linear Results – Maximum Penetration

Storm Heading (°)	Footing Reaction		
	BS (kN)	Vertical (kN)	Moment (kNm)
90°	1,043	10,296	11,915
	896	20,658	11,475
	1,104	10,303	11,845
	947	20,676	11,491
120°	1,065	12,852	13,048
	850	22,160	10,412
	1,078	9,003	10,921
	1,054	17,917	12,837
150°	945	16,217	13,445
	816	21,098	11,352
	989	10,026	11,839
	1,032	14,591	13,407
180°	825	19,137	12,547
	825	19,137	12,547
	963	11,829	12,787
	963	11,829	12,787

Table 9.8 : Global Non-Linear Results – Hang up Case

9.7 Overturning Stability

9.7.1 The critical storm heading for overturning stability was determined to be 90°. The overturning stability check was based on a minimum hull weight of 4742 tonnes (50% variable) and used a resistance factor of 1.05 as specified in the ISO 19905-1 criteria [Ref.1]. Table 9.9 and Table 9.10 below summarises the overturning stability check.

Total Overturning Moment (kNm)	3.460 E5
Factored Righting Moment (kNm)	8.739 E5
UC	0.40

Table 9.9 : Overturning Stability – Maximum Penetration

Total Overturning Moment (kNm)	3.370 E5
Factored Righting Moment (kNm)	8.234 E5
UC	0.41

Table 9.10 : Overturning Stability – Hang up Case

9.7.2 The above results show that the unit satisfies the ISO 19905-1 criteria for overturning stability.

9.8 Preload Requirements

9.8.1 The storm loading direction giving the largest storm footing reaction was found to be 120°. The preload capacity check has been based on a preload capacity of 3080 tonnes at the footing and included a resistance factor of 1.1 as specified in the ISO 19905-1 [Ref.1] criteria.

Maximum Storm Vertical Footing Reaction (kN)	21,191
Factored Preload Capacity at Footing (kN)	27,455
UC	0.77

Table 9.11 : Preload Capacity Check – Maximum Penetration

Maximum Storm Vertical Footing Reaction (kN)	22,160
Factored Preload Capacity at Footing (kN)	27,455
UC	0.81

Table 9.12 : Preload Capacity Check – Hang up Case

9.8.2 The above results show that the unit satisfies the ISO 19905-1 criteria for preload requirements.

9.9 Foundation Bearing Capacity

9.9.1 The Vertical-Horizontal (V-H) capacity curve is presented in Figure 9.2 and Figure 9.3 for soil conditions.

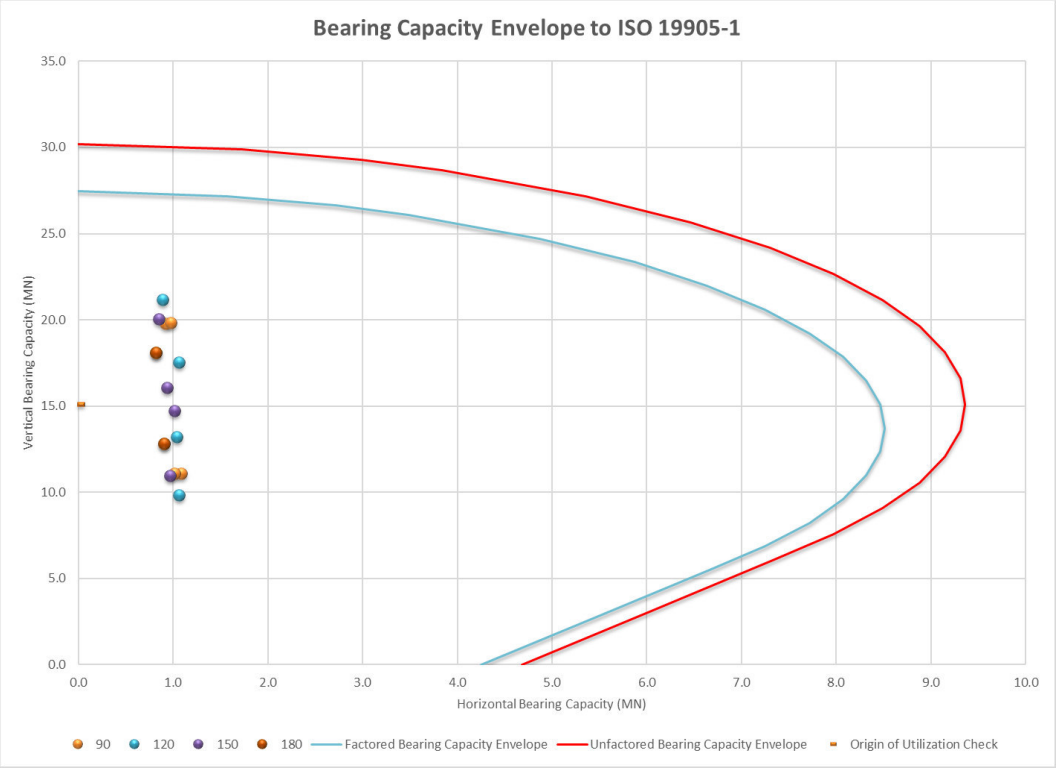


Figure 9.2 : V-H Bearing Capacity Envelope – Maximum Penetration

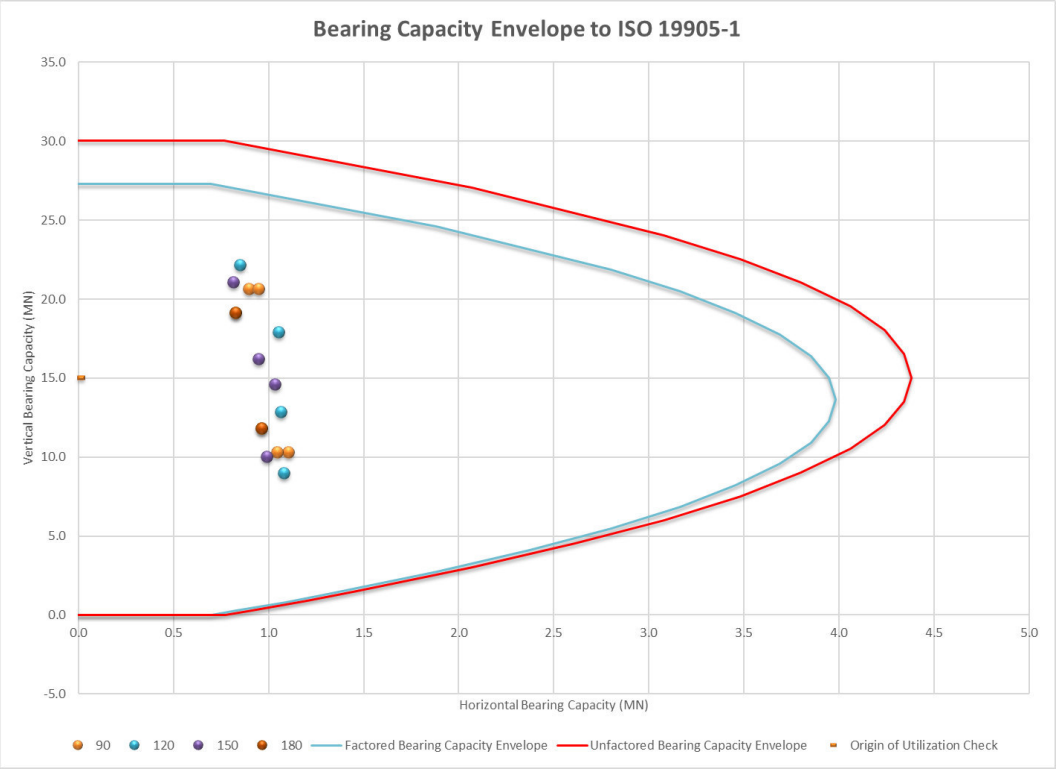


Figure 9.3 : V-H Bearing Capacity Envelope – Hang up Case

9.9.2 The V-H bearing capacity check was based on a maximum hull weight of 5100 tonnes and used a resistance factor of 1.1 as specified in ISO 19905-1 [Ref.1] The V-H bearing capacity check has conservatively been carried out using the factored bearing capacity envelope.

Critical Storm Heading	120°
Critical Leg	2
Storm Lateral Footing Reaction (kN)	889
Storm Vertical Footing Reaction (kN	21,191
V-H Bearing Capacity UC	0.51

Table 9.13 : V-H Bearing Capacity Check – Maximum Penetration

Critical Storm Heading	120°
Critical Leg	2
Storm Lateral Footing Reaction (kN)	850
Storm Vertical Footing Reaction (kN	22,160
V-H Bearing Capacity UC	0.65

Table 9.14 : V-H Bearing Capacity Check – Hang up Case

9.9.3 The above results show that the unit satisfies the specified criteria of ISO 19905-1 guidelines for the V-H bearing capacity check.

9.10 Leg Sliding

9.10.1 The leg sliding check was based on a minimum hull weight of 4742 tonnes and used a resistance factor of 1.56 for Clay foundation as specified in ISO 19905-1 [Ref.1] for the maximum penetration case.

Critical Storm Heading	90°
Critical Leg	3
Storm Lateral Footing Reaction (kN)	1,084
Factored Horizontal Capacity (kN)	6,000
Leg Sliding UC	0.18

Table 9.15 : Leg Sliding Check – Maximum Penetration

9.10.2 The leg sliding check was based on a minimum hull weight of 4742 tonnes and used a resistance factor of 1.25 for sand foundation as specified in ISO 19905-1 [Ref.1] for the Hang up case.

Critical Storm Heading	120°
Critical Leg	3
Storm Lateral Footing Reaction (kN)	1,078
Storm Vertical Footing Reaction (kN)	8,124
Leg Sliding UC	0.29

Table 9.16 : Leg Sliding Check – Hang up Case

9.10.3 The unit therefore satisfies the ISO 19905-1 criteria for leg sliding.

9.11 Leg strength

9.11.1 The chord and brace internal loads were extracted from the detailed leg analysis and strength checks were performed in accordance with the ISO 19905-1 [Ref.1] formulae.

9.11.2 Leg member strength UC's are given in Table 9.17 and Table 9.18 below.

	Keel at Midbay		Keel at Brace	
	UC	Heading / Leg	UC	Heading / Leg
Chord	0.86	120° / Leg 2	0.84	120° / Leg 2
Brace	0.51	120° / Leg 2	0.54	120° / Leg 2

Table 9.17 : Leg Member Strength Check – Maximum Penetration

	Keel at Midbay		Keel at Brace	
	UC	Heading / Leg	UC	Heading / Leg
Chord	0.95	120° / Leg 2	0.92	120° / Leg 2
Brace	0.55	120° / Leg 2	0.61	120° / Leg 2

Table 9.18 : Leg Member Strength Check – Hang up Case

9.11.3 The above results show that the unit satisfies the specified criteria of ISO 19905-1 criteria for the leg strength capacity check.

9.12 Leg Holding System Strength

9.12.1 The critical storm loading direction for jacking system strength was found to be 120° for Leg 2. The pinion strength check is given in Table 9.19 and Table 9.20

below and was based on ultimate capacity of 260 tonnes (573 kips) & a resistance factor of 1.15 as specified in ISO 19905-1 [Ref.1].

	Keel at Midbay	Keel at Brace
Maximum Pinion Storm Vertical Load (kN)	1860	1865
Factored Pinion Ultimate Capacity (kN)	2168	2168
Leg Holding System UC	0.84	0.84

Table 9.19 : Leg Holding System Strength Check – Maximum Penetration

	Keel at Midbay	Keel at Brace
Maximum Pinion Storm Vertical Load (kN)	2033	2039
Factored Pinion Ultimate Capacity (kN)	2168	2168
Leg Holding System UC	0.92	0.92

Table 9.20 : Leg Holding System Strength Check – Hang up Case

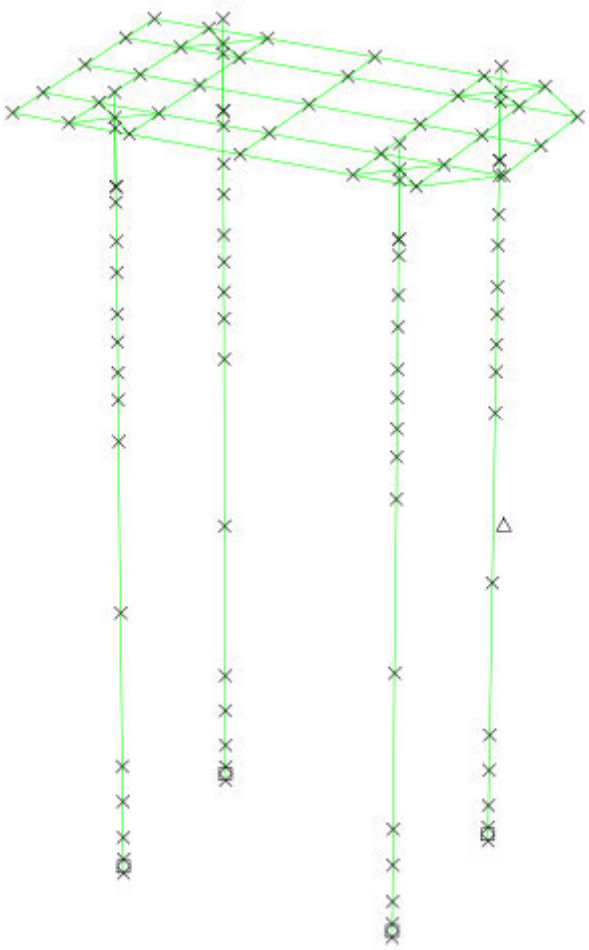
9.12.2 The unit therefore satisfies the ISO 19905-1 criteria for the leg holding system (pinion) capacity check.

APPENDICES

APPENDIX A GLOBAL 'BARSTOOL' MODEL

APPENDIX B DETAILED LEG MODEL

APPENDIX A GLOBAL 'BARSTOOL' MODEL



APPENDIX B DETAILED LEG MODEL

قطر للبترول
Qatar Petroleum

CONTRACT GC 161083E0

REPORT NO: QatarGas / 18 / 20 Rev1

ONLINE W.O. NO 31622324 >>> Refer to QP Intranet Online W.O. for Details

MRV SHADDAD

LOCATION : Qatargas: PU & PR Platforms

TASK : Seabed Surveys & Debris Clearance

STARTED : 01-12-2020

COMPLETED : 02-12-2020

SUBMITTED : 10-12-2020 (Rev.1)

FROM	TO	MODE	ACTION
ORP/21 (O)	ORP/2 (O)	Email/DVD	REGISTER & FOR DISTRIBUTION
ORP/2 (O)	ORP/3 (O)		RETAIN ORIGINAL, DEPARTMENTAL REVIEW COLLATE & FORWARD RECOMMENDATION TO ASSET HOLDER ..... COPY RECOMMENDATION TO ORP/2 (O)
ORP/2 (O)	Qatargas		TO ACTION IF REQUIRED ORP/3 (O) RECOMMENDATIONS
ORP/2 (O)			PLAN / ACTION ASSET HOLDERS REQUESTS

ELECTRONIC REPORT TRANSFER (E-REPORT)

TABLE OF CONTENTS

WO #31622324
Seabed Surveys & Debris Clearance

INSPECTION CO-ORD: A. KAPADIA **VESSEL: MRV SHADDAD**

INTRODUCTION

Halul Offshore Services Company (HOSC) ROV & dive teams onboard the DP vessel **MRV Shaddad** were instructed to carry out pre rig move seabed survey and debris clearance at **NFB-PU & NFB-PR Platforms**, located in the **North Field Bravo (NFB)**, prior to **JUB GMS Enterprise** arriving on location.

The works were carried out between **1st & 2nd December 2020**.

WORKSCOPE

As per Work Order: 31622324

1) Carry out seabed survey and debris recovery for Jack-up barge GMS Enterprise at NFB-PU and PR location as per the document "Scope of Work-200-20-CC-SOW-0004 Rev.B1.pdf.
2) Produce a field report for evaluation by the onboard ORP (O) representative.

Scope of Work-200-20-CC-SOW-0004 Rev.B1.pdf

D6978-PR-OF-8906 Rev B1.pdf

D6978-PR-OF-8907 Rev B1.pdf

SUMMARY REPORT

Following third party personnel joined the vessel at Ras Laffan Port on 1st December 2020 and were onboard during the entire operations.

- **Mr. Federico Giori (QG Representative)**
- **Mr. Balaji Chandran (McDermott Representative)**

A kick-off meeting was carried out on board prior starting the operations.

WO #31622324
Seabed Surveys & Debris Clearance

INSPECTION CO-ORD: A. KAPADIA **VESSEL: MRV SHADDAD**

PLATFORM NFB-PU (PRODUCTION UTILITIES)

Seabed survey was carried out between 1st & 2nd December 2020 (West of PU) 100m x 70m as per the provided survey coordinates in the dwg. *"D6978-PR-OF-8907 Rev B1.pdf"*.
The grid was divided in 5m line spacing as per the scope of work

The ROV tracked over the designated seabed survey grid. The visibility was approx. 2-3m at the time of survey, and the ROV sonar set to a range of 20.0m.

The seabed consisted of soft sand overlying cap rock with an average depth of 53.3m;
Depth readings were recorded between 19:18 hrs on 1st December 2020 and 01:04 hrs on 2nd December 2020.
The depth readings have not been reduced to the Admiralty Chart Datum.

Seabed features were identified as follows:

- A total of twenty-three (23) debris locations were identified. All debris items were recovered from these locations.
- A total of three (3) seabed depressions were located within the seabed survey grid area.
- Two (2) areas of cap rocks were located within the seabed survey grid area.
  Note: The cap rock areas are located around at the previously reported spud can locations. Within this, no significant depression was observed.
- Two (2) bore holes (approx. 6-8"Ø) were located within the seabed survey grid area.
- Two (2) Fiber optic cables (NC6 & NC7) were intersecting the survey grid. These were found intermittently buried during the survey. The position of the cable was plotted wherever it was exposed from the seabed.

The above items are depicted on the attached seabed survey datasheet.
Rig mover to take note of their positions.

ATTACHMENTS

NFB-PU Seabed Survey Datasheet.pdf

NFB PU Seabed Data Fixes

WO #31622324
Seabed Surveys & Debris Clearance

INSPECTION CO-ORD: A. KAPADIA **VESSEL: MRV SHADDAD**

SELECTED PHOTOGRAPHS (PU PLATFORM)

Recovered debris (lift-1)

Recvered debris (lift-2)

Seabed depression (fix-5)

Seabed depression (Fix-14)

Seabed depression (Fix-14)

WO #31622324
Seabed Surveys & Debris Clearance

INSPECTION CO-ORD: A. KAPADIA **VESSEL: MRV SHADDAD**

Bore hole (Fix-25)

Bore hole (Fix-27)

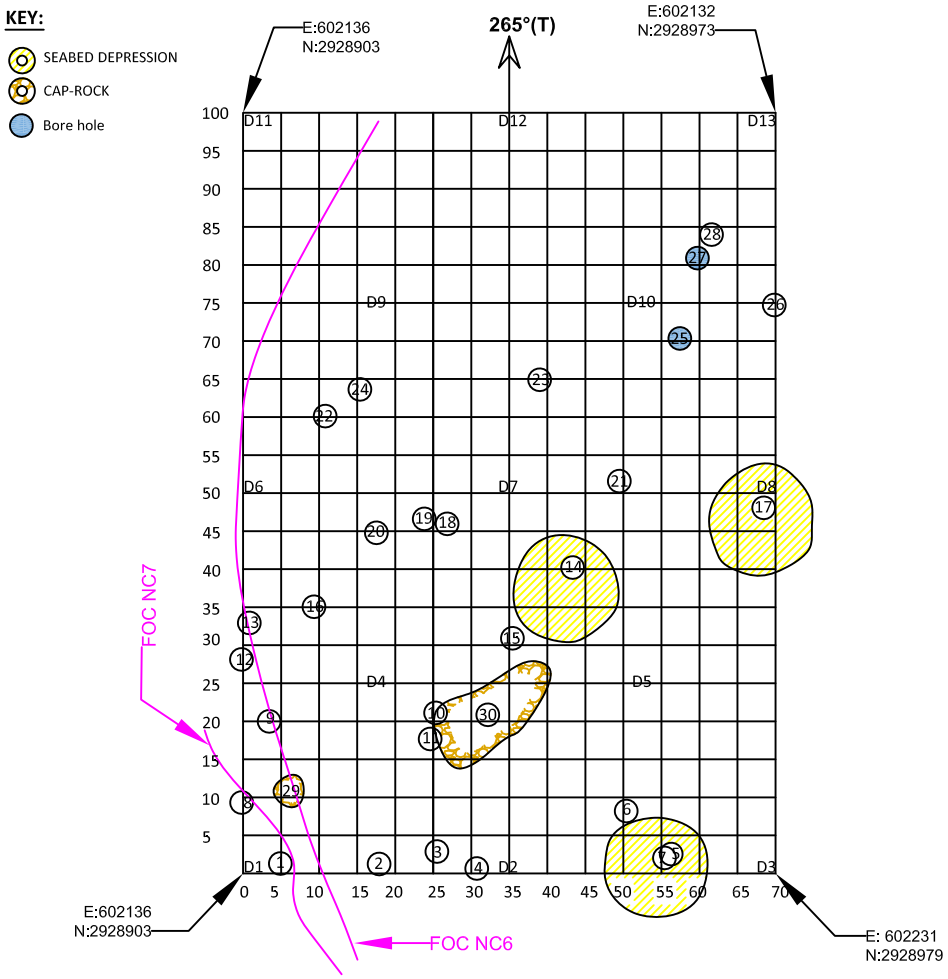
Cap rock area (Fix-29)

Cap rock area (Fix-30)

FOC NC6 Cable

FOC NC7 cable

QATAR GAS	LOCATION: NORTH FIELD BRAVO	CONTRACTOR: HOSC	SUBJECT: PRE-RIG MOVE SEABED SURVEY FOR JACK-UP BARGE GMS ENTERPRISE	START DATE: 01/12/20
	PLATFORM: NFB-PU (PRODUCTION UTILITIES)	DSV: MRV SHADDAD		END DATE: 02/12/20



(NTS)

Survey grid (West of PU) 100m x 70m as per the provided survey coordinates in the dwg. *"D6978-PR-OF-8907 Rev B1"*.

SEABED TYPE: SOFT SAND OVERLAYING CAP ROCK	AVERAGE SEABED DEPTH (m): 53.3

DEPTHS HAVE **NOT** BEEN REDUCED TO THE ADMIRALTY CHART DATUM

LOCATION	DEPTH (-)m	TIME HH:MM	DATE	LOCATION	DEPTH (-)m	TIME HH:MM	DATE
D1	53.7	19:18	01/12/20	D8	53.0	23:09	01/12/20
D2	53.9	19:28	01/12/20	D9	53.3	00:17	02/12/20
D3	53.6	19:51	01/12/20	D10	53.2	00:11	02/12/20
D4	53.3	21:16	01/12/20	D11	53.4	00:58	02/12/20
D5	53.3	21:07	01/12/20	D12	53.3	01:01	02/12/20
D6	53.3	23:00	01/12/20	D13	53.2	01:04	02/12/20
D7	53.1	23:05	01/12/20				

FIX NO.	DESCRIPTION	REMOVED	COMMENTS
1	Tyre 2mØ x 0.4m(H)	Y	Non-metallic debris
2	Flat bar 2m x 0.06m x 0.01m	Y	Metallic debris
3	Fish strap remains	Y	Metallic debris
4	Area of assorted metallic debris (4mØ area)	Y	Metallic debris
5	Seabed depression 14mØ x 3.2m(deep) - Historical spudcan location	N/A	Rig mover to note
6	Scaffold tube 3m	Y	Metallic debris
7	Non-metallic sheet 1.5m x 0.3m x 0.02m	Y	Non-metallic debris
8	Metallic channel 1.5m x 0.1m x 0.1m	Y	Metallic debris
9	Wire rope $\frac{3}{4}$"Ø x 3m(L) - found under the FOC N6 cable	Y	Metallic debris
10	Metallic step 0.6m x 0.3m x 0.3m	Y	Metallic debris
11	Chain block 0.2mØ	Y	Metallic debris
12	Metallic step 1m x 0.3m x 0.3m	Y	Metallic debris
13	Area of assorted metallic debris (2mØ area)	Y	Metallic debris
14	Seabed depression 14mØ x 3.1m(deep)	N/A	Rig mover to note
15	Matallic channel 1m x 0.1m x 0.1m	Y	Metallic debris
16	2 x Metal tubulars 1-1/2"Ø x 0.3m	Y	Metallic debris
17	Seabed depression 14m x 2.8m(deep)	N/A	Rig mover to note
18	Tyre 1.5mØ x 0.5m(H)	Y	Non-metallic debris
19	Metallic frame 1.5m x 0.5m	Y	Metallic debris
20	Hand rail frame 2m x 1m & mooring rope 4"Ø x 6m	Y	Metallic debris
21	Mooring rope (4"Ø x 8m) and wire rope	Y	Metallic debris
22	Wire rope $\frac{3}{4}$"Ø x 5m(L)	Y	Metallic debris
23	Wire rope 2"Ø x 6m & tyre 1.2mØ x 0.5m(H)	Y	Metallic debris
24	Wire rope 1"Ø x 2m	Y	Metallic debris
25	Bore hole 6-8"Ø	N/A	Rig mover to note
26	Scaffold tube 3m	Y	Metallic debris
27	Bore hole 6-8"Ø	N/A	Rig mover to note
28	Scaffold tube 2.5m	Y	Metallic debris
29	Caprocks around the historical spudcan location. No significant depression observed. Cap rock max height = 0.7m and spudcan area Ø=5m	N/A	Rig mover to note
30	Caprocks around the historical spudcan location noted. Within this, no significant depression observed. Caprock max height = 0.4m & spudcan area = 17m x 10m.	N/A	Rig mover to note
31	FOC N6 cable	N/A	Rig mover to note
32	FOC N7 cable	N/A	Rig mover to note

POSITIONAL FIX DATA

Location	NFB-PU	Date:	1 & 2 Dec 2020	Vessel	SHADDAD
Surveyor	fahim	Survey Package		Eiva NaviPac (Clarke 1880 Mod-Nahrwan Datum)	
Task	Seabed Survey	Area	70X100	Grid Heading : 265º	

Seabed survey 100m x 70m as per the provided survey coordinates in the dwg "D6978-PR-OF-8907 Rev B1".

FIX No.	DATE	TIME	Local Datum		WGS 84		FEATURES/ DESCRIPTION
			EASTING	NORTHING	LATITUDE	LONGITUDE	
DEBRIS/DEPRESSIONS/CAPROCKS							
1	01-Dec-20	19:20:01	602234.23	2928913.77	26° 28.8515	52° 1.6029	Tyre
2	01-Dec-20	19:23:31	602233.50	2928926.72	26° 28.8585	52° 1.6026	Metallic Debris
3	01-Dec-20	19:26:02	602231.40	2928934.20	26° 28.8626	52° 1.6013	Metallic Debris
4	01-Dec-20	19:27:31	602233.29	2928939.58	26° 28.8655	52° 1.6025	Metallic Debris
5	01-Dec-20	19:32:30	602229.84	2928964.98	26° 28.8793	52° 1.6005	Seabed Dep
6	01-Dec-20	19:34:22	602224.56	2928958.74	26° 28.8759	52° 1.5973	Metallic Debris
7	01-Dec-20	19:48:49	602230.40	2928964.13	26° 28.8788	52° 1.6009	Metallic Debris
8	01-Dec-20	20:12:23	602226.53	2928908.18	26° 28.8485	52° 1.5983	Metallic Debris
9	01-Dec-20	20:43:14	602215.65	2928911.15	26° 28.8502	52° 1.5917	Metallic Debris
10	01-Dec-20	20:46:59	602213.20	2928932.93	26° 28.8620	52° 1.5904	Metallic Debris
11	01-Dec-20	20:50:38	602216.68	2928932.43	26° 28.8617	52° 1.5925	Metallic Debris
12	01-Dec-20	21:21:53	602207.75	2928907.03	26° 28.8480	52° 1.5870	Metallic Debris
13	01-Dec-20	21:23:55	602202.90	2928907.75	26° 28.8484	52° 1.5840	Metallic Debris
14	01-Dec-20	21:32:49	602193.03	2928949.74	26° 28.8712	52° 1.5783	Seabed Dep
15	01-Dec-20	21:34:55	602202.80	2928942.40	26° 28.8672	52° 1.5841	Metallic Debris
16	01-Dec-20	21:47:10	602200.25	2928916.11	26° 28.8529	52° 1.5825	Metallic Debris
17	01-Dec-20	22:03:44	602183.10	2928974.73	26° 28.8848	52° 1.5724	Seabed Dep
18	01-Dec-20	22:11:22	602188.31	2928932.92	26° 28.8621	52° 1.5754	Tyre
19	01-Dec-20	22:13:39	602187.85	2928929.88	26° 28.8605	52° 1.5751	Metallic Debris
20	01-Dec-20	22:55:25	602190.05	2928923.71	26° 28.8571	52° 1.5764	Metallic Debris
21	01-Dec-20	23:13:05	602181.32	2928955.19	26° 28.8742	52° 1.5713	Non Metallic Debris
22	01-Dec-20	23:27:19	602175.15	2928916.05	26° 28.8530	52° 1.5674	Metallic Debris
23	01-Dec-20	23:38:53	602168.66	2928943.91	26° 28.8681	52° 1.5636	Tyre
24	01-Dec-20	23:44:01	602171.36	2928920.39	26° 28.8554	52° 1.5651	Metallic Debris
25	01-Dec-20	23:54:36	602162.26	2928961.37	26° 28.8767	52° 1.5598	BORE HOLE
26	02-Dec-20	0:07:49	602156.97	2928974.1	26° 28.8845	52° 1.5567	Metallic Debris
27	02-Dec-20	0:27:56	602151.43	2928963.63	26° 28.8789	52° 1.5533	BORE HOLE
28	02-Dec-20	0:35:24	602148.24	2928965.29	26° 28.8798	52° 1.5514	Metallic Debris
29	Refer the plotting fixes below						Caprock area
30	Refer the plotting fixes below						Caprock area
31	Refer the plotting fixes below						FOC NC6 cable
32	Refer the plotting fixes below						FOC NC7 cable
Plotting of the seabed depression at Fix-5							
D1	01-Dec-20	19:40:27	602227.43	2928956.69	26° 28.8748	52° 1.5990	
D2	01-Dec-20	19:40:39	602231.06	2928956.35	26° 28.8746	52° 1.6012	
D3	01-Dec-20	19:40:50	602234.01	2928956.30	26° 28.8746	52° 1.6030	
D4	01-Dec-20	19:40:57	602236.88	2928958.23	26° 28.8756	52° 1.6047	
D5	01-Dec-20	19:41:06	602238.62	2928961.78	26° 28.8775	52° 1.6058	
D6	01-Dec-20	19:41:15	602237.80	2928967.25	26° 28.8805	52° 1.6053	
D7	01-Dec-20	19:41:28	602234.23	2928970.08	26° 28.8820	52° 1.6032	
D8	01-Dec-20	19:41:36	602227.16	2928969.89	26° 28.8820	52° 1.5989	
D9	01-Dec-20	19:41:43	602224.85	2928964.57	26° 28.8791	52° 1.5975	
D10	01-Dec-20	19:41:47	602225.37	2928960.45	26° 28.8769	52° 1.5978	
Plotting of the seabed depression at Fix-14							
D29	01-Dec-20	21:28:24	602201.81	2928942.95	26° 28.8675	52° 1.5836	

D30	01-Dec-20	21:28:37	602203.29	2928949.78	26° 28.8712	52° 1.5845	
D31	01-Dec-20	21:28:43	602202.21	2928952.00	26° 28.8724	52° 1.5838	
D32	01-Dec-20	21:28:48	602199.84	2928954.77	26° 28.8739	52° 1.5824	
D33	01-Dec-20	21:28:53	602197.32	2928956.44	26° 28.8748	52° 1.5809	
D34	01-Dec-20	21:28:58	602192.88	2928955.44	26° 28.8743	52° 1.5782	
D35	01-Dec-20	21:29:03	602190.02	2928953.18	26° 28.8731	52° 1.5765	
D36	01-Dec-20	21:29:07	602188.38	2928948.90	26° 28.8708	52° 1.5755	
D37	01-Dec-20	21:29:11	602189.60	2928944.13	26° 28.8682	52° 1.5762	
D38	01-Dec-20	21:29:29	602195.53	2928941.58	26° 28.8668	52° 1.5798	
Plotting of the seabed depression at Fix-17							
D39	01-Dec-20	21:59:58	602189.31	2928968.38	26° 28.8813	52° 1.5762	
D40	01-Dec-20	22:00:13	602191.40	2928969.03	26° 28.8816	52° 1.5774	
D41	01-Dec-20	22:00:18	602192.53	2928972.38	26° 28.8835	52° 1.5781	
D42	01-Dec-20	22:00:23	602192.82	2928974.86	26° 28.8848	52° 1.5783	
D43	01-Dec-20	22:00:29	602191.29	2928978.09	26° 28.8866	52° 1.5774	
D44	01-Dec-20	22:00:34	602188.73	2928981.27	26° 28.8883	52° 1.5759	
D45	01-Dec-20	22:00:39	602186.06	2928980.64	26° 28.8880	52° 1.5743	
D46	01-Dec-20	22:00:45	602181.97	2928981.08	26° 28.8882	52° 1.5718	
D47	01-Dec-20	22:00:50	602178.02	2928976.84	26° 28.8859	52° 1.5694	
D48	01-Dec-20	22:00:53	602177.67	2928974.48	26° 28.8847	52° 1.5692	
D49	01-Dec-20	22:00:56	602178.24	2928971.81	26° 28.8832	52° 1.5695	
D50	01-Dec-20	22:01:00	602181.40	2928968.06	26° 28.8812	52° 1.5714	
D51	01-Dec-20	22:01:04	602186.08	2928966.79	26° 28.8805	52° 1.5742	
Plotting of caprock area (Fix-29)							
D11	01-Dec-20	20:16:30	602221.22	2928915.59	26° 28.8526	52° 1.5951	
D12	01-Dec-20	20:16:42	602224.68	2928910.81	26° 28.8500	52° 1.5972	
D13	01-Dec-20	20:16:54	602227.63	2928914.95	26° 28.8522	52° 1.5990	
D14	01-Dec-20	20:17:02	602225.29	2928916.71	26° 28.8532	52° 1.5976	
Plotting of caprock area (Fix-30)							
D15	01-Dec-20	20:55:31	602218.50	2928933.83	26° 28.8625	52° 1.5936	
D16	01-Dec-20	20:56:13	602221.36	2928936.34	26° 28.8638	52° 1.5953	
D17	01-Dec-20	20:56:45	602217.96	2928940.37	26° 28.8660	52° 1.5933	
D18	01-Dec-20	20:56:51	602216.96	2928941.16	26° 28.8664	52° 1.5927	
D19	01-Dec-20	20:56:58	602216.03	2928942.25	26° 28.8670	52° 1.5921	
D20	01-Dec-20	20:57:15	602215.38	2928943.32	26° 28.8676	52° 1.5917	
D21	01-Dec-20	20:57:35	602215.10	2928944.30	26° 28.8681	52° 1.5916	
D22	01-Dec-20	21:13:35	602206.92	2928948.86	26° 28.8707	52° 1.5867	
D23	01-Dec-20	21:13:44	602205.45	2928946.28	26° 28.8693	52° 1.5858	
D24	01-Dec-20	21:13:48	602205.70	2928943.91	26° 28.8680	52° 1.5859	
D25	01-Dec-20	21:13:58	602208.12	2928940.89	26° 28.8663	52° 1.5873	
D26	01-Dec-20	21:14:06	602210.37	2928937.76	26° 28.8646	52° 1.5887	
D27	01-Dec-20	21:14:10	602211.06	2928935.10	26° 28.8632	52° 1.5891	
D28	01-Dec-20	21:14:19	602212.95	2928931.99	26° 28.8615	52° 1.5902	
Plotting of FOC NC-6 cable (Event-31)							
C1	01-Dec-20	18:52:31	602136.06	2928920.69	26° 28.8557	52° 1.5439	
C2	01-Dec-20	18:55:21	602148.07	2928914.54	26° 28.8523	52° 1.5511	
C3	01-Dec-20	18:57:03	602160.52	2928908.59	26° 28.8490	52° 1.5585	
C4	01-Dec-20	18:58:14	602170.08	2928905.69	26° 28.8474	52° 1.5643	
C5	01-Dec-20	18:58:33	602174.36	2928905.12	26° 28.8471	52° 1.5669	
C6	01-Dec-20	18:59:06	602181.22	2928905.17	26° 28.8471	52° 1.5710	
C7	01-Dec-20	18:59:35	602186.29	2928905.20	26° 28.8471	52° 1.5740	
C8	01-Dec-20	19:00:04	602191.61	2928905.12	26° 28.8470	52° 1.5772	
C9	01-Dec-20	19:00:41	602198.83	2928906.14	26° 28.8475	52° 1.5816	
C10	01-Dec-20	19:01:47	602213.68	2928910.75	26° 28.8500	52° 1.5905	
C11	01-Dec-20	19:02:16	602221.45	2928913.88	26° 28.8516	52° 1.5952	
C12	01-Dec-20	19:02:35	602226.35	2928915.74	26° 28.8526	52° 1.5982	
C13	01-Dec-20	19:03:13	602234.43	2928918.77	26° 28.8542	52° 1.6031	
C14	01-Dec-20	19:03:46	602240.04	2928922.00	26° 28.8560	52° 1.6065	
C15	01-Dec-20	19:04:17	602246.23	2928924.65	26° 28.8574	52° 1.6102	
Plotting of FOC NC-7 (Event-32)							
C16	01-Dec-20	19:05:07	602248.26	2928922.69	26° 28.8563	52° 1.6114	
C17	01-Dec-20	19:06:04	602242.86	2928918.02	26° 28.8538	52° 1.6081	
C18	01-Dec-20	19:06:11	602241.32	2928916.53	26° 28.8530	52° 1.6072	
C19	01-Dec-20	19:06:22	602237.54	2928915.34	26° 28.8524	52° 1.6049	
C20	01-Dec-20	19:06:32	602234.52	2928916.00	26° 28.8527	52° 1.6031	

C21	01-Dec-20	19:06:41	602230.78	2928914.15	26° 28.8517	52° 1.6009	
C22	01-Dec-20	19:06:54	602227.42	2928910.79	26° 28.8499	52° 1.5988	
C23	01-Dec-20	19:07:12	602224.13	2928907.40	26° 28.8481	52° 1.5968	
C24	01-Dec-20	19:07:27	602220.83	2928904.06	26° 28.8463	52° 1.5948	
C25	01-Dec-20	19:07:42	602217.36	2928902.75	26° 28.8456	52° 1.5927	

INSPECTION CO-ORD: A. KAPADIA **VESSEL: MRV SHADDAD**

PLATFORM NFB-PR (RISER PLATFORM)

Seabed survey was carried out on 2nd December 2020 (South of PR) 80m x 60m as per the provided survey coordinates in the dwg. *"D6978-PR-OF-8906 Rev B1.pdf"*.
The grid was divided in 5m line spacing as per the scope of work.

The ROV tracked over the designated seabed survey grid. The visibility was approx. 3-4m at the time of survey, and the ROV sonar set to a range of 20.0m.

The seabed consisted of soft sand overlying cap rock with an average depth of 54.0m.
Depth readings were recorded between 11:23 hrs and 14:16 hrs on 2nd December 2020.
The depth readings have not been reduced to the Admiralty Chart Datum.

Seabed features were identified as follows:

- A total of eighteen (18) debris locations were identified. All debris items were recovered from these locations.
- A possible spud can location with exposed cap rock at the peripheral area was noted. No significant depression was observed.

The above items are depicted on the attached seabed survey datasheet.
Rig mover to take note of their positions.

ATTACHMENTS

NFB-PR_Seabed Survey Datasheet.pdf

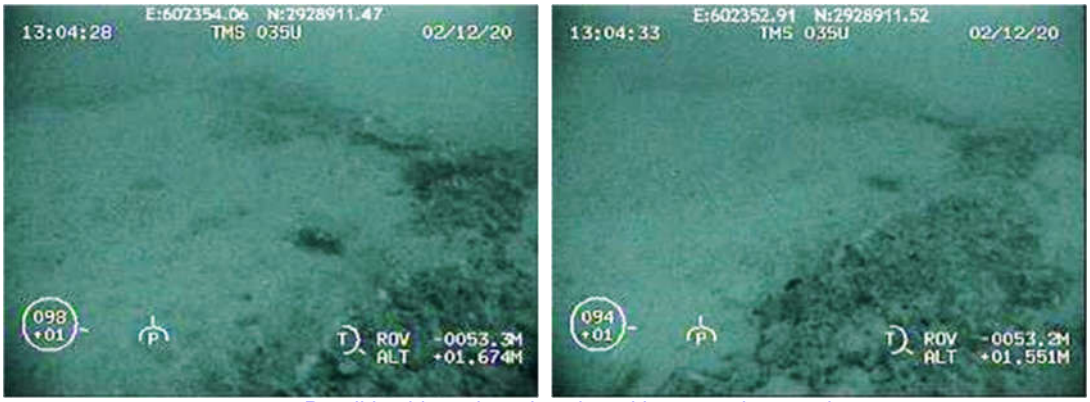
NFB PR Seabed Data Fixes

SELECTED PHOTOGRAPHS (PR PLATFORM)

Recoved Debris (Ondeck)

WO #31622324
Seabed Surveys & Debris Clearance

INSPECTION CO-ORD: A. KAPADIA **VESSEL: MRV SHADDAD**

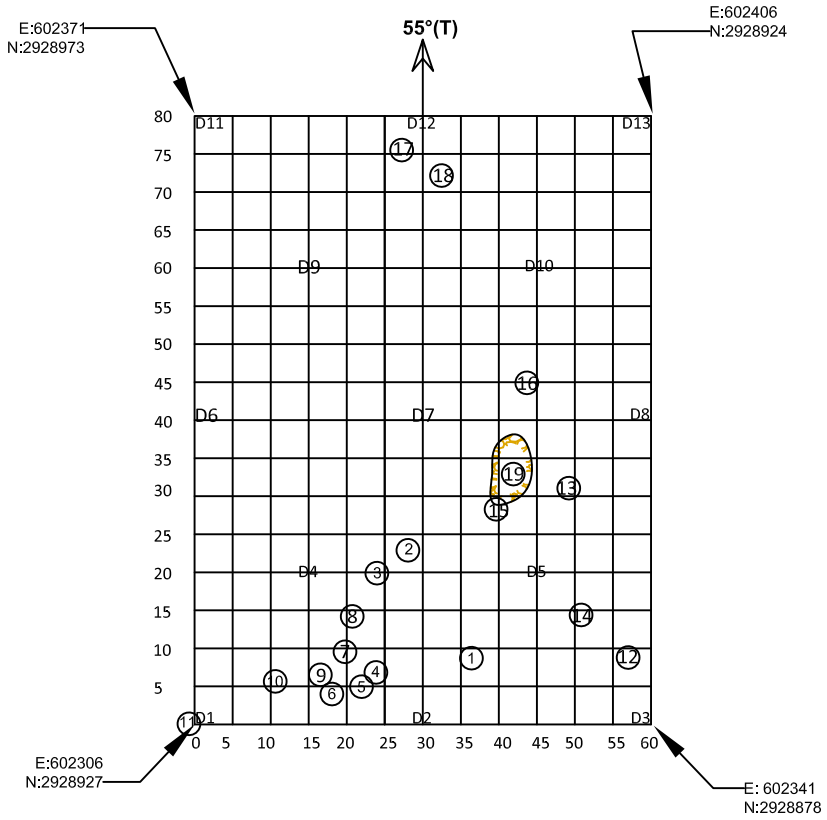


Possible old spud can location with exposed cap rock

QATAR GAS	LOCATION: NORTH FIELD BRAVO	CONTRACTOR: HOSC	SUBJECT: PRE-RIG MOVE SEABED SURVEY FOR JACK-UP BARGE GMS ENTERPRISE	START DATE: 02/12/20
	PLATFORM: NFB-PR (RISER PLATFORM)	DSV: MRV SHADDAD		END DATE: 02/12/20

KEY:

CAP-ROCK



Survey grid at south of PR 80m x 60m as per the provided survey coordinates in the dwg. *"D6978-PR-OF-8906 Rev B1.pdf"*.

(NTS)

FIX NO.	DESCRIPTION	REMOVED	COMMENTS
1	Fish trap remains	Y	Metallic debris
2	Metallic box 0.3m x 0.2m	Y	Metallic debris
3	Cable tray 0.4m x 0.15m	Y	Metallic debris
4	Scaffold tube 3m	Y	Metallic debris
5	Scaffold tube 2.5m	Y	Metallic debris
6	Fish trap remains	Y	Metallic debris
7	Metal thin sheet 3m x 1m	Y	Metallic debris
8	Scaffold tube 0.3m	Y	Metallic debris
9	Fish trap remains	Y	Metallic debris
10	Channel 2mx 0.1m	Y	Metallic debris
11	Area of assorted metallic debris (2mØ area)	Y	Metallic debris
12	Metallic tray 1.5m x 0.1m	Y	Metallic debris
13	Fish trap remains	Y	Metallic debris
14	Metallic plate 1m x 1m x 0.01m	Y	Metallic debris
15	Fish trap remains	Y	Metallic debris
16	Fish trap remains	Y	Metallic debris
17	Fish trap remains	Y	Metallic debris
18	Metal tray 0.3m x 0.3m	Y	Metallic debris
19	Possible spudcan location 10mØ with exposed caprock (0.3m height) at the periherial area. No significant depression was obseved.	N/A	Rig mover to note

COMMENTS:

SEABED TYPE: SOFT SAND OVERLAYING CAP ROCK	AVERAGE SEABED DEPTH (m): 54.0

DEPTHS HAVE **NOT** BEEN REDUCED TO THE ADMIRALTY CHART DATUM

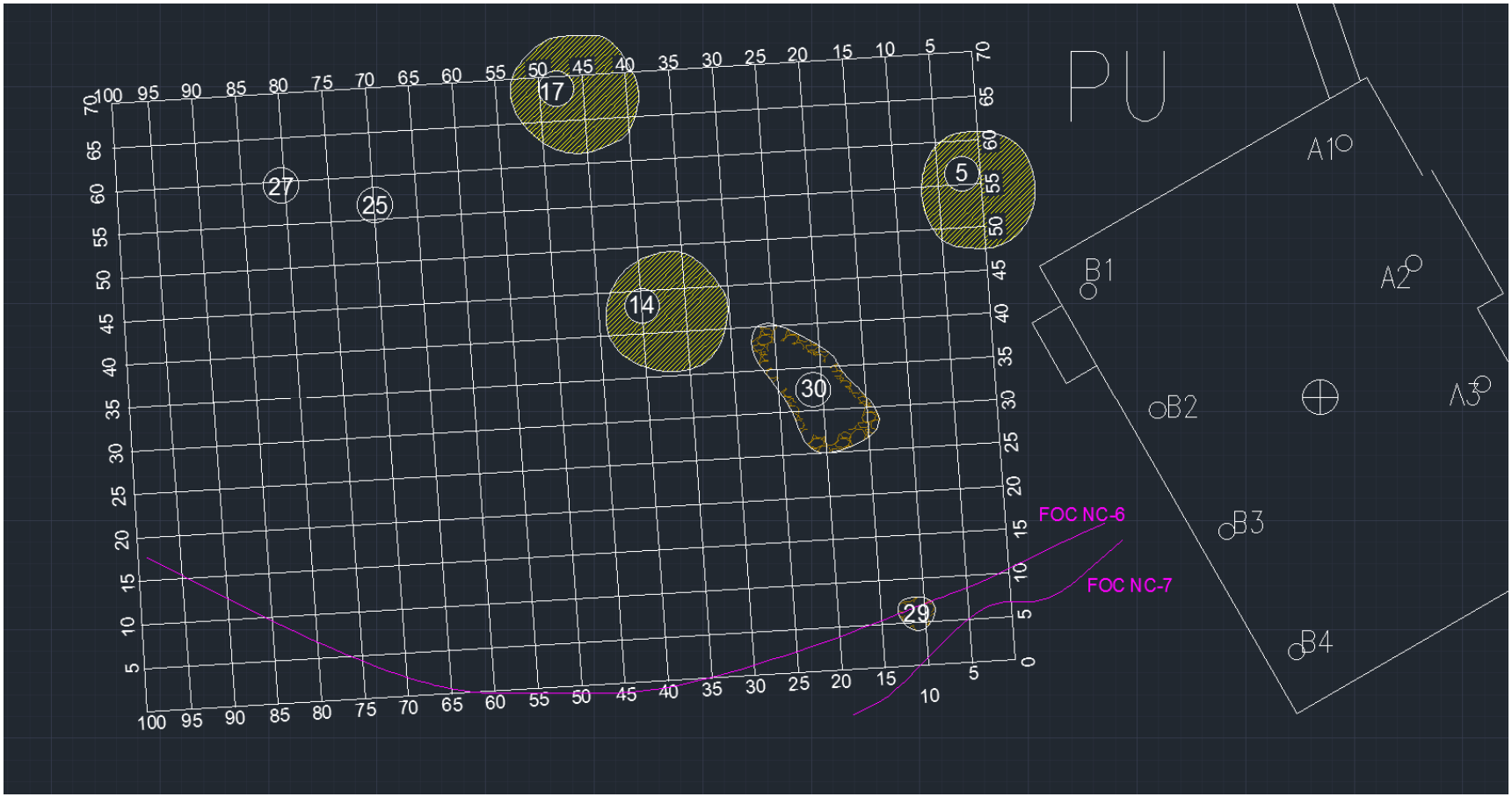
LOCATION	DEPTH (-)m	TIME HH:MM	DATE	LOCATION	DEPTH (-)m	TIME HH:MM	DATE
D1	53.9	12:08	02/12/20	D8	53.9	12:31	02/12/20
D2	53.9	11:23	02/12/20	D9	54.2	14:11	02/12/20
D3	53.9	12:34	02/12/20	D10	54.1	13:43	02/12/20
D4	53.9	11:54	02/12/20	D11	54.4	14:16	02/12/20
D5	54.0	13:00	02/12/20	D12	54.2	13:48	02/12/20
D6	53.9	12:10	02/12/20	D13	54.3	13:33	02/12/20
D7	53.9	11:27	02/12/20				

POSITIONAL FIX DATA

Location	NFB-PR	Date:	02-Dec-20	Vessel	SHADDAD
Surveyor	fahim	Survey Package		Eiva NaviPac (Clarke 1880 Mod-Nahrwan Datum)	
Task	Seabed Survey	Area	60 x 80	Grid Heading : 55º	

Survey grid at South of PR 80m x 60m as per the provided survey coordinates in the dwg. "D6978-PR-OF-8906 Rev B1"

FIX No.	DATE	TIME	Local Datum		WGS 84		FEATURES/ DESCRIPTION
			EASTING	NORTHING	LATITUDE	LONGITUDE	
DEBRIS/DEPRESSIONS/CAPROCKS							
1	02-Dec-20	11:22:24	602334.28	2928902.79	26° 28.8451	52° 1.6631	Fistrap remains
2	02-Dec-20	11:26:46	602341.11	2928917.75	26° 28.8532	52° 1.6673	Metallic Debris
3	02-Dec-20	11:32:42	602336.30	2928919.37	26° 28.8541	52° 1.6644	Metallic Debris
4	02-Dec-20	11:34:52	602325.55	2928912.00	26° 28.8502	52° 1.6579	Metallic Debris
5	02-Dec-20	11:36:05	602322.92	2928912.47	26° 28.8504	52° 1.6563	Metallic Debris
6	02-Dec-20	11:47:32	602319.90	2928915.12	26° 28.8519	52° 1.6545	Fistrap remains
7	02-Dec-20	11:48:26	602325.43	2928916.89	26° 28.8528	52° 1.6578	Metallic Debris
8	02-Dec-20	11:50:40	602329.80	2928918.77	26° 28.8538	52° 1.6605	Metallic Debris
9	02-Dec-20	11:56:34	602321.10	2928917.81	26° 28.8533	52° 1.6552	Fistrap remains
10	02-Dec-20	12:00:24	602316.99	2928922.16	26° 28.8557	52° 1.6528	Metallic Debris
11	02-Dec-20	12:08:06	602305.91	2928928.26	26° 28.8591	52° 1.6461	Metallic Debris
12	02-Dec-20	12:37:51	602346.16	2928885.95	26° 28.8360	52° 1.6702	Metallic Debris
13	02-Dec-20	12:53:53	602359.93	2928905.11	26° 28.8463	52° 1.6785	Fistrap remains
14	02-Dec-20	12:55:44	602347.21	2928894.23	26° 28.8405	52° 1.6708	Metallic Debris
15	02-Dec-20	13:02:51	602352.17	2928911.35	26° 28.8497	52° 1.6739	Fistrap remains
16	02-Dec-20	13:11:32	602368.10	2928917.58	26° 28.8530	52° 1.6835	Fistrap remains
17	02-Dec-20	13:49:56	602383.73	2928948.61	26° 28.8698	52° 1.6931	Fistrap remains
18	02-Dec-20	13:51:12	602384.01	2928942.40	26° 28.8664	52° 1.6932	Metallic Debris
19	Refer the plotting fixes below						Caprock
Caprock							
D1	02-Dec-20	13:06:34	602351.88	2928912.19	26° 28.8502	52° 1.6737	
D2	02-Dec-20	13:06:50	602353.80	2928910.35	26° 28.8492	52° 1.6749	
D3	02-Dec-20	13:06:56	602356.09	2928909.25	26° 28.8486	52° 1.6763	
D4	02-Dec-20	13:07:02	602359.09	2928910.08	26° 28.8490	52° 1.6781	
D5	02-Dec-20	13:07:07	602361.80	2928912.87	26° 28.8505	52° 1.6797	
D6	02-Dec-20	13:07:11	602362.22	2928915.31	26° 28.8518	52° 1.6800	
D7	02-Dec-20	13:07:23	602358.61	2928916.73	26° 28.8526	52° 1.6778	
D8	02-Dec-20	13:07:29	602356.02	2928914.53	26° 28.8514	52° 1.6762	
D9	02-Dec-20	13:07:38	602354.42	2928913.83	26° 28.8510	52° 1.6753	



2021 ROV Underwater Inspection Campaign

Field Report for:
Seabed Survey and Debris Removal at PU and PR Location

Prepared for
Qatargas Operating Company Ltd

SSQ Report No.: 2328-FR-028_Rev0
Inspection Date: 23rd May 2021

Document Issue:				
0	Digital	Issued for Submission	Pavithiran / Firdaus	29/05/2021
Revision	**Copy**	**Reason for Issue**	**Prepared by**	**Prepared date**

Pavithiran / Firdaus	Mohd Zakir	Richard Dermody
SSQ 3.4U Engineer	**Halul / MILAHA Party Chief**	**Qatargas CSR**

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Preface

Halul Offshore Services Company (HOSC) ROV team onboard DP vessel Halul 51 were instructed to carry out a seabed survey and debris clearance prior to JUB GMS Enterprise arriving on location at NFB-PU & NFB-PR Platforms. ,

The work was carried out on the 23rd May 2021; utilising the ROV Panther XTP.

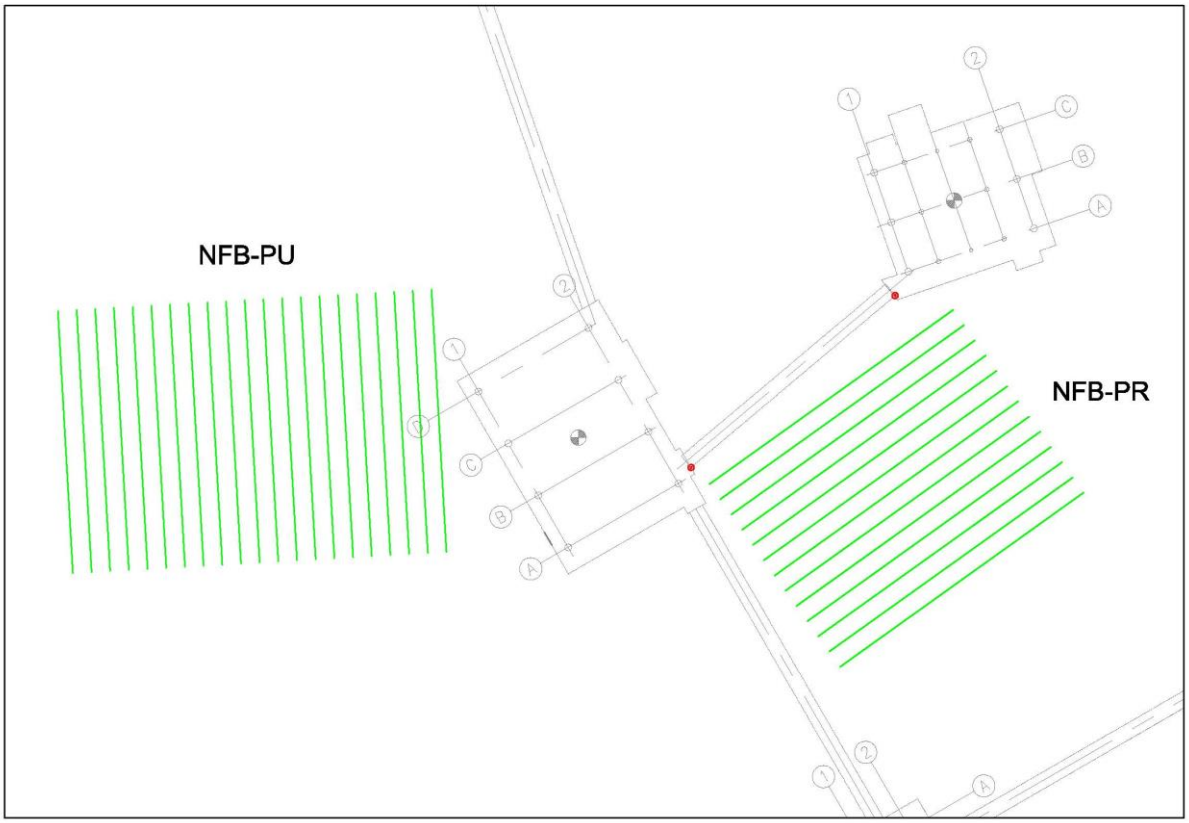


Figure 1: Overview of seabed survey and debris removal location

1.2 Project Details

Client	Qatargas Operating Company Limited (QG)		
Project Type	ROV Seabed and Debris Removal Survey		
Area	PU & PR, North Field Bravo.		
Geodetic			
Spheroid	CLARKE 1880 RGS		
Datum	Nahrwan 1967 Qatar		
Projection	Universal Transverse Mercator Zone 39N (CM: 51° E)		
Port of Call	Ras Laffan Port		
Time Zone	GMT + 3:00 hours		
Survey Dates	23rd May 2021		
Vessel and ROV Equipment			
Survey Vessel	DP2 HALUL51	**ROV System**	Seaeye Panther XTP

1.3 Scope of work

The scope of work includes:

- Identify, classify, assess, accurately position, chart and report all hazards/debris especially hard/metallic objects that could potentially hinder the jack-up rig approach or damage the rigs spud cans.
- Evaluate the seabed conditions and verify bathymetric data across the extents of the defined survey area.
- Identify and verify the position of existing subsea infrastructure (pipelines, cables) etc.
- Debris removal for significant seabed debris that may posed hazard for the jack-up rig.

1.4 Survey Area

PLATFORM NFB-PR (RISER PLATFORM)

The seabed survey for NFB-PU/PR was carried out in 80m x 60m area as per provided survey coordinates in document “D6978-PR-OF-8906-001_B1.pdf”.

The proposed seabed survey corridor for NFB-PU/PR area is shown in Table below:

NFB-PR SURVEY PRIMARY AREA (80m x 60m) Spheroid/Datum: CLARKE 1880 RGS / NAHRWAN 1967 Qatar; Projection: Universal Transverse Mercator Zone 39N (CM: 51° E)		
Corner	**Easting**	**Northing**
A	602306	2928927
B	602371	2928973
C	602341	2928878
D	62406	2928924

Table 1: NFB – PR primary area survey grid

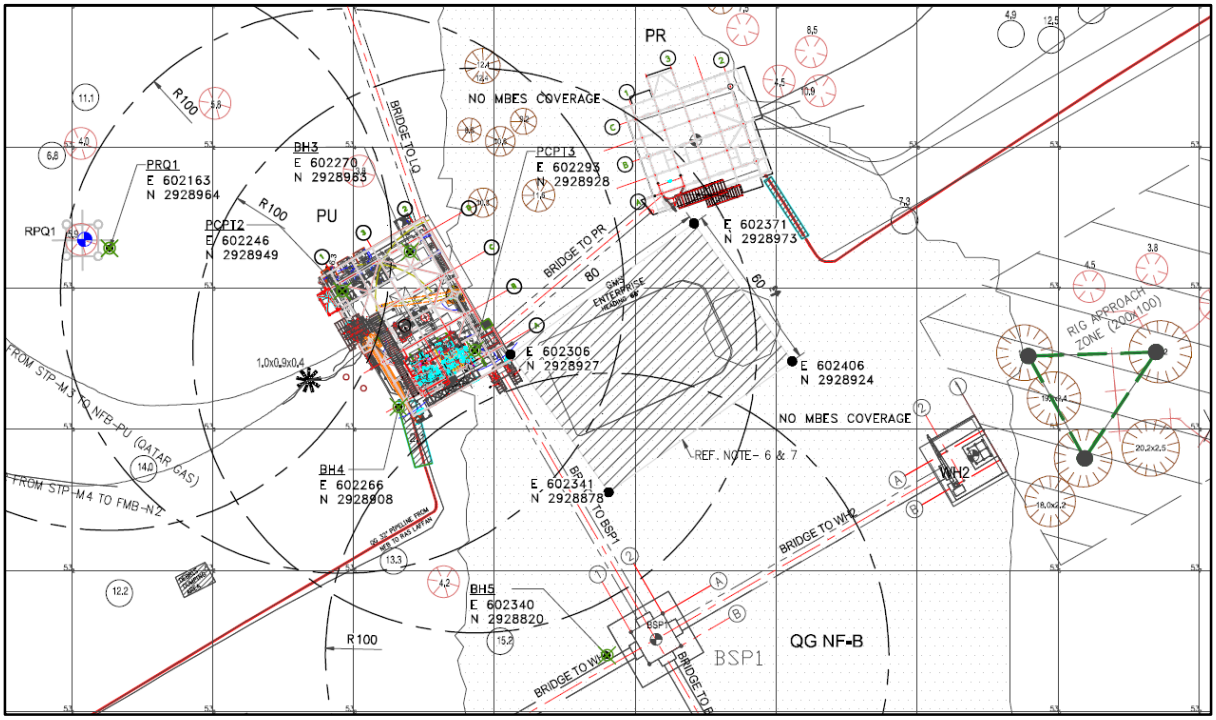


Figure 2: NFP-PR area survey grid

PLATFORM WEST SIDE - NFB-PU (PRODUCTION UTILITIES)

The seabed survey on the west side of NFB-PU was carried out on a 100m x 70m area as per the provided survey coordinates in document “D6978-PR-OF-8907-001_B1.pdf”.

The proposed seabed survey corridor for NFB-PU west side is shown in Table below:

NFB-PU SURVEY PRIMARY AREA (100m x 70m) Spheroid/Datum: CLARKE 1880 RGS / NAHRWAN 1967 Qatar; Projection: Universal Transverse Mercator Zone 39N (CM: 51° E)		
Corner	**Easting**	**Northing**
A	602132	2928973
B	602231	2928979
C	602136	2928903
D	602236	2928909

Table 2: NFB-PU primary area survey grid

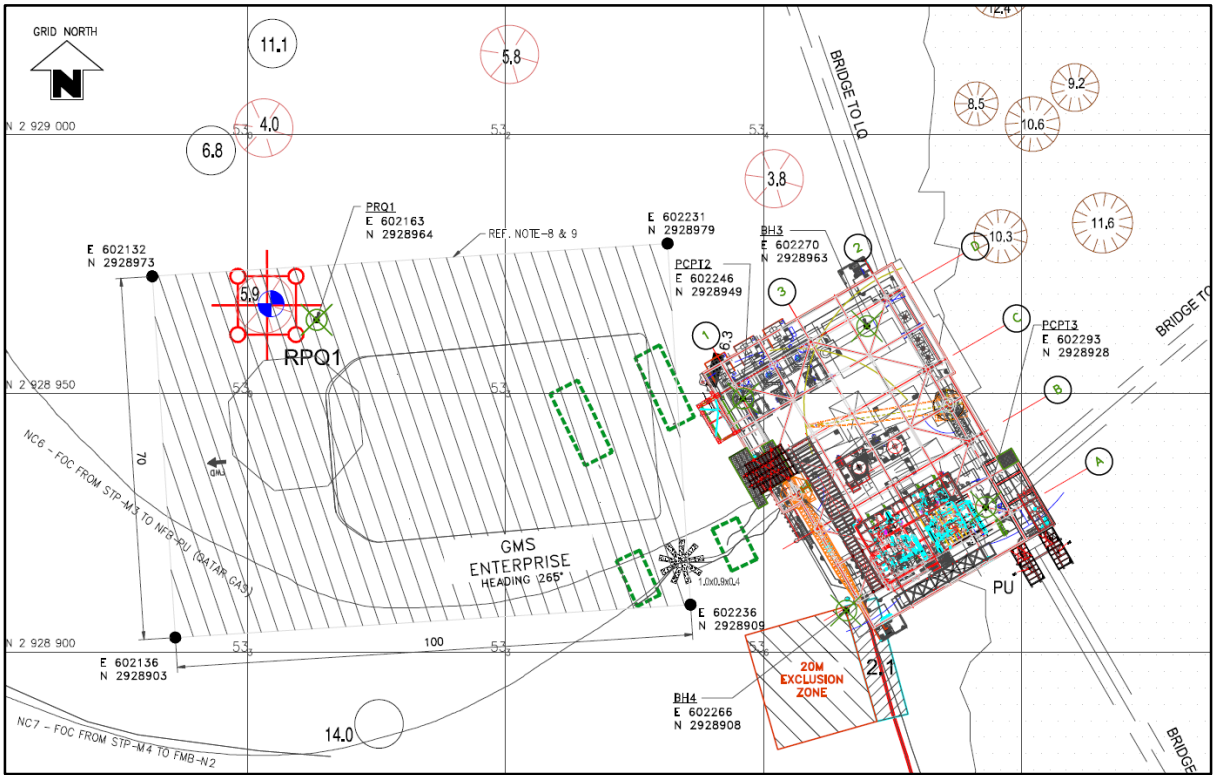


Figure 3: NFB-PU west side survey grid

2 PRIMARY AREA SEABED SURVEY FINDINGS

2.1 PLATFORM NFB-PU/PR (PRODUCTION UTILITIES & RISER PLATFORMS)

The average water depth at the survey area is approximately 60m. Based on the ROV general visual inspection of the seabed within the survey area, the uppermost seabed type is clayey sand. Findings of the seabed survey are summarised as below:

- two (2) items of seabed debris
- one (1) area of Caprock

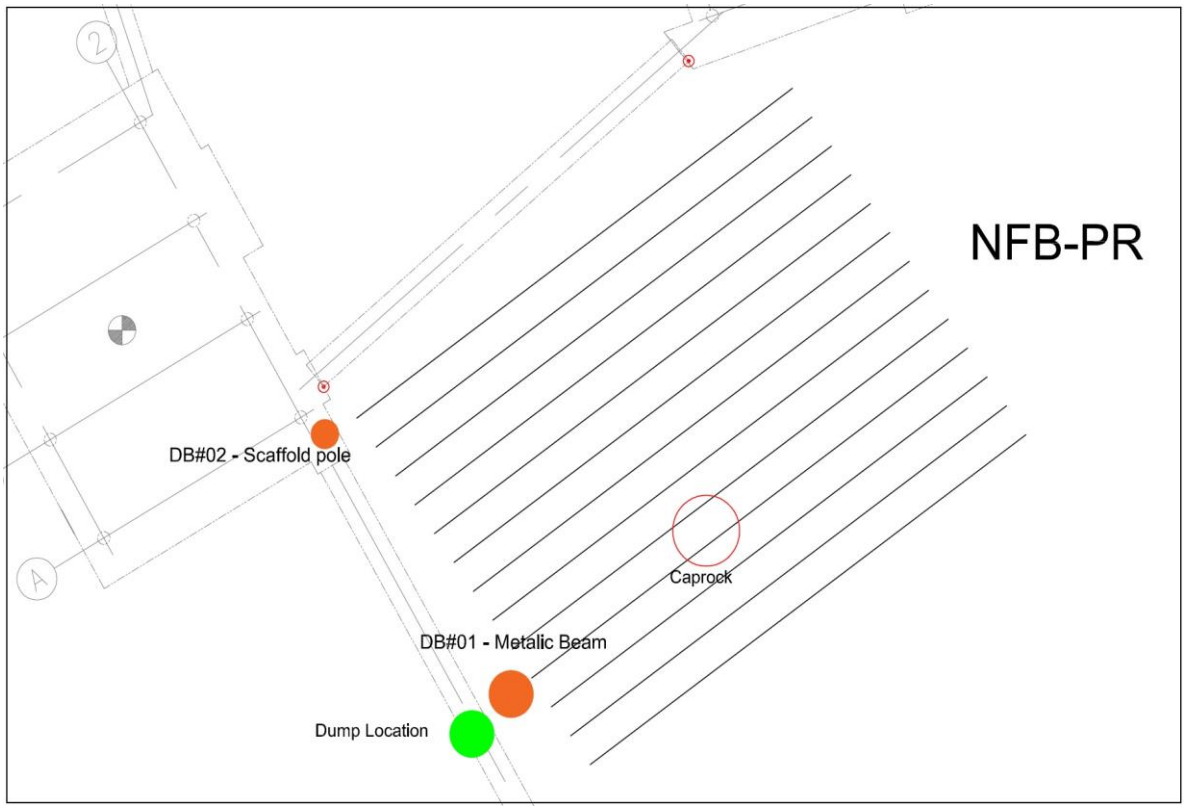


Figure 4: Findings from seabed survey at NFB-PU/PR

2.1.1 Seabed Debris

The two (2) items of seabed debris observed were located outside of the survey area. The details of the debris are as per table below:

TIME (HRS)	DEBRIS NO	NAME	POSTION		DIMENSION	SEABED TYPE	DEPTH	Line Name	Additional Info
			EASTING	NORTHING					
DATE: 23/05/2021									
1225	DB#01	Metallic Beam	602329.20	2928887.95	1m length	Soft mud	60.42	11	On Seabed (out of grid)
1323	DB#02	Scaffold pole	602307.34	2928927.29	6m length	Soft mud	61.13	1	On Seabed (out of grid)

Table 3: NFB-PU/PR seabed debris details

Image 1: Metallic beam debris, DB01

Image 2: Scaffold pole, DB02

The metallic beam was taken further outside the grid to the dump location as per Figure 4 and detail of the dump location shown in the table below:

TIME	NO	NAME	POSITION		DIMENSION	SEABED TYPE	Line Name	Additional Info
			EASTING	NORTHING				
DATE: 23/05/2021								
14:18	2	DB01 - Metallic Beam	602323.35	2928882.32	6m length	Soft sand		Out of grid

Table 4: Debris wet store location at NFB-PU/PR

2.1.2 Seabed Features

One (1) location of caprock was observed at the survey location. Three (3) fixes were taken as shown in the table below and plotted as per Figure 4 above:

No.	Features	Easting (N)	Northing (N)
1	Cap rocks Fix 1	602356.49	2928907.21
2	Cap rocks Fix 2	602363.48	2928911.89
3	Cap rocks Fix 3	602358.33	2928910.96

Table 5: Location of caprock in the survey area of NFB-PU/PR

2.2 PLATFORM NFB-PU (PRODUCTION UTILITIES) WEST SIDE

The average water depth at the survey area was 60m. Based on the ROV general visual inspection of the seabed within the survey area, the uppermost seabed type is clayey sand.

Findings during the seabed survey is summarized as below:

- Three (3) items of seabed debris
- Two (2) areas of cap rock
- Three (3) areas of seabed depression
- Two (2) locations of bore holes
- Two (2) fiber optic cable in the survey area

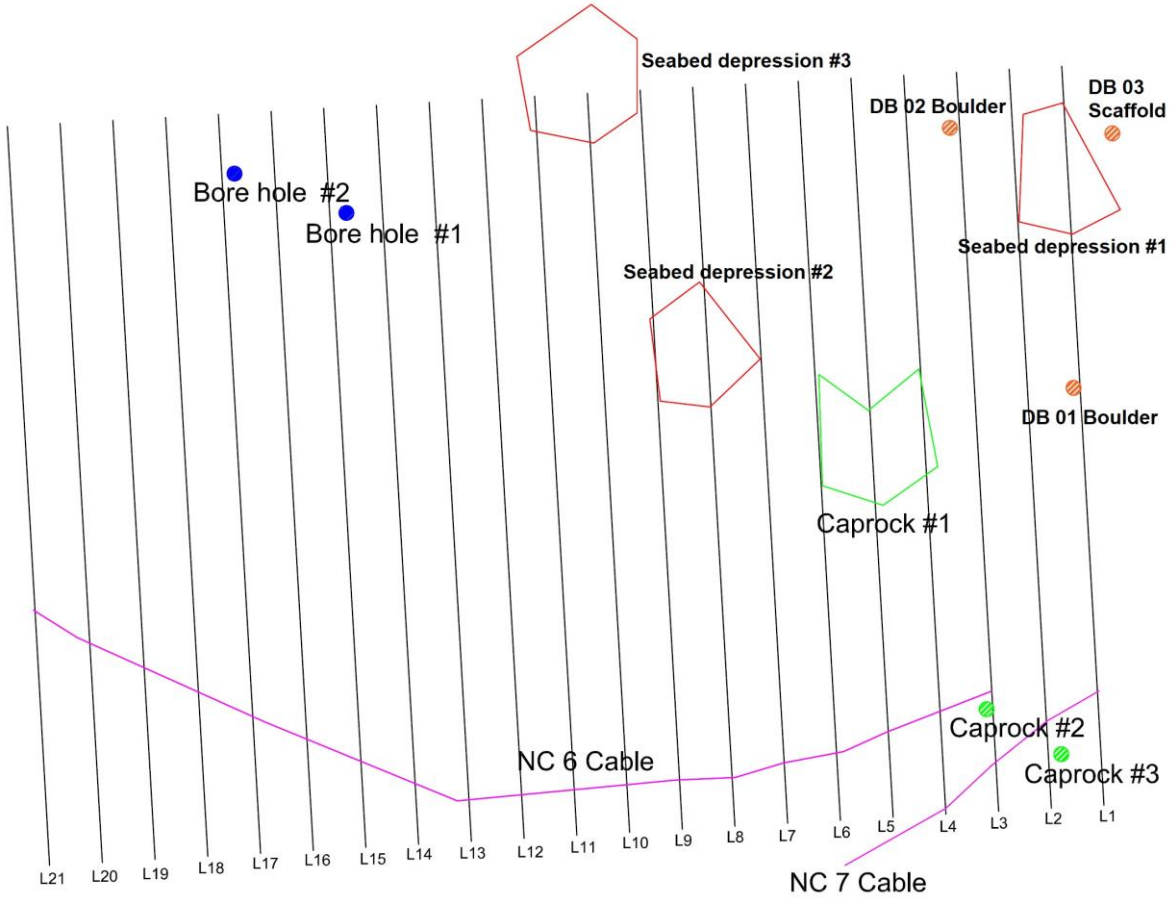


Figure 5: Findings from seabed survey at NFB-PU

2.2.1 Seabed Debris

The three (3) items of seabed debris observed are described in the table below and plotted in Figure 5:

TIME	DEBRIS NO	NAME	POSTION		DIMENSION	FIX NO.	Line Name	Additional Info
			EASTING	NORTHING				
1940	DB 01	BOULDER	602232.95	2928948.23	0.2m X0.1m	F2	1	On Seabed
1910	DB 02	BOULDER	602221.24	2928972.86	2m X 1m	F15	3	On Seabed
1920	DB 03	SCAFFOLD	602236.62	2928972.33	6m length	F7	-	On Seabed (Out Of Grid)

Table 6: NFB-PU seabed debris details

The boulders remain on the seabed in the location as per table above. Removal attempt was not successful.

Image 3: Boulder protruding from seabed, DB 01

Image 4: Boulder protruding from the seabed, DB 02

2.2.2 Seabed Depression

Three (3) areas of seabed depression (D) were observed during the survey. The details of the seabed depression shown in the data shown below:

NO	Features	Depth of depression (m)	Diameter (m)	Easting (N)	Northing (N)
1	Seabed depression	2.3	13.22	602232.32	2928965.92
2	Seabed depression	4.2	12.02	602198.53	2928946.42
3	Seabed depression	4.4	13.22	602187.53	2928971.41

Table 7: NFB-PU seabed depression details

The table below show the fixes taken for seabed depression plotting:

FIX	Features	Easting (N)	Northing (N)
F3	Edge of depression #1	602232.84 m	2928962.79 m
F4	Edge of depression #1	602237.37 m	2928965.12 m
F6	Edge of depression #1	602231.90 m	2928975.22 m

F8	Edge of depression #1	602228.18 m	2928974.13 m
F9	Edge of depression #1	602227.80 m	2928963.96 m
F27	Edge of depression #2	602203.28 m	2928950.95 m
F28	Edge of depression #2	602197.53 m	2928958.25 m
F29	Edge of depression #2	602198.53 m	2928946.42 m
F32	Edge of depression #2	602193.83 m	2928946.98 m
F33	Edge of depression #2	602192.84 m	2928954.76 m
F34	Edge of depression #3	602191.63 m	2928974.27 m
F35	Edge of depression #3	602191.63 m	2928981.26 m
F36	Edge of depression #3	602187.28 m	2928984.54 m
F37	Edge of depression #3	602187.53 m	2928971.41 m
F38	Edge of depression #3	602181.54 m	2928972.61 m
F39	Edge of depression #3	602180.25 m	2928979.61 m

Table 8: Fixes taken for seabed depression plotting

Image 5: Seabed depression No. 1

Image 6: Seabed depression No. 2

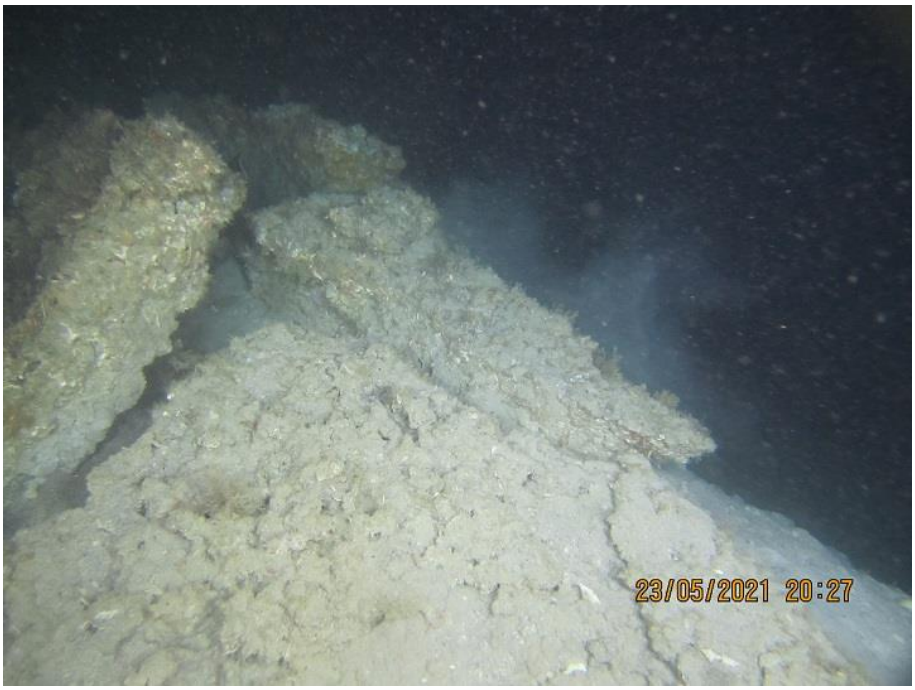


Image 7: Seabed depression No. 3

2.2.3 Fiber Optic Cable

Two (2) fiber optic cables were observed located in the survey area at the west side of PU. The details of the fiber optic cables are as per below and plotted in Figure 5:

- Fiber optic cable NC 6
- Fiber optic cable NC 7

The tables below show the fixes taken during the seabed survey and the data used to plot the cables as shown in Figure 5:

FIX	Features	Easting (N)	Northing (N)
F14	NC 6	602225.16	2928919.49
F19	NC 6	602215.25	2928915.62
F24	NC 6	602211.17	2928913.79
F26	NC 6	602205.5	2928912.71 m
F30	NC 6	602200.9	2928911.34
F31	NC 6	602195.31	2928911.09
F40	NC 6	602174.61	2928909.12
F42	NC 6	602156.4	2928916.58
F44	NC 6	602138.65	2928924.56
F45	NC 6	602134.47	2928927.19

Table 9: Fixes taken during seabed survey of fiber optic cable NC 6

FIX	Features	Easting (N)	Northing (N)
F1	NC 7	602235.37	2928919.54
F10	NC 7	602230.49	2928916.71
F12	NC 7	602225.22	2928912.49
F18	NC 7	602220.84	2928908.41
F25	NC 7	602211.3	2928903

Table 10: Fixes taken during the seabed survey of fiber optic cable NC 7

Image 8: Fiber optic cable NC 6

Image 9: Fiber optic cable NC 7

2.2.4 Bore hole

Two (2) Geotechnical Bore Holes were observed in the survey area at PU. The details of the Bore Holes are as per table below:

FIX	Features	Easting (N)	Northing (N)
F41	Bore hole #1	602164.10 m	2928964.80 m
F43	Bore hole #2	602153.50 m	2928968.52 m

Table 11: Bore hole fix location

Image 10: Bore hole #1

Image 11: Bore hole #2

3 APPENDICES

Complete list of fixes taken at the west side of Platform NFB-PU (Production Utilities) are as per below:

FIX	Features	Easting (N)	Northing (N)
F1	NC 7 Cable	602235.37 m	2928919.54 m
F2	Boulder	602232.95 m	2928948.23 m
F3	Seabed depression #1	602232.84 m	2928962.79 m
F4	Seabed depression #1	602237.37 m	2928965.12 m
F5	Centre of depression #1	602232.32 m	2928965.92 m
F6	Seabed depression #1	602231.90 m	2928975.22 m
F7	Scaffold debris	602236.62 m	2928972.33 m
F8	Seabed depression #1	602228.18 m	2928974.13 m
F9	Seabed depression #1	602227.80 m	2928963.96 m
F10	NC 7 Cable	602230.49 m	2928916.71 m
F11	Caprock	602231.79 m	2928913.54 m
F12	NC 7 Cable	602225.22 m	2928912.49 m
F13	Caprock #2	602224.72 m	2928917.80 m
F14	NC 6 Cable	602225.16 m	2928919.49 m
F15	Boulder	602221.24 m	2928972.86 m
F16	Edge of caprock	602218.31 m	2928950.02 m
F17	Edge of caprock	602220.09 m	2928940.78 m
F18	NC 7 Cable	602220.84 m	2928908.41 m
F19	NC 6 Cable	602215.25 m	2928915.62 m
F20	Edge of caprock	602214.92 m	2928937.11 m
F21	Edge of caprock	602213.52 m	2928946.10 m
F22	Edge of caprock	602208.83 m	2928949.51 m

F23	Edge of caprock	602209.17 m	2928938.96 m
F24	NC 6 Cable	602211.17 m	2928913.79 m
F25	NC 7 Cable	602211.30 m	2928903.00 m
F26	NC 6 Cable	602205.50 m	2928912.71 m
F27	Seabed depression #2	602203.28 m	2928950.95 m
F28	Seabed depression #2	602197.53 m	2928958.25 m
F29	Seabed depression #2	602198.53 m	2928946.42 m
F30	NC 6 Cable	602200.90 m	2928911.34 m
F31	NC 6 Cable	602195.31 m	2928911.09 m
F32	Seabed depression #2	602193.83 m	2928946.98 m
F33	Seabed depression #2	602192.84 m	2928954.76 m
F34	Seabed depression #3	602191.63 m	2928974.27 m
F35	Seabed depression #3	602191.63 m	2928981.26 m
F36	Seabed depression #3	602187.28 m	2928984.54 m
F37	Seabed depression #3	602187.53 m	2928971.41 m
F38	Seabed depression #3	602181.54 m	2928972.61 m
F39	Seabed depression #3	602180.25 m	2928979.61 m
F40	NC 6 Cable	602174.61 m	2928909.12 m
F41	Bore hole #1	602164.10 m	2928964.80 m
F42	NC 6 Cable	602156.40 m	2928916.58 m
F43	Bore hole #2	602153.50 m	2928968.52 m
F44	NC 6 Cable	602138.65 m	2928924.56 m
F45	NC 6 Cable	602134.47 m	2928927.19 m

Table 12: List of fixes taken at NFB-PU West Side

8.9. Activity Specific Operations Guidelines

<table>
<tr><th colspan="4">Activity Specific Operating Guidelines ASOG GMS Enterprise 6103</th></tr>
<tr><td colspan="4">This setup applies when the vessel is being positioned on DP in preparation to carry out accommodation and lifting activities off PU and PR NF Field platfomrs in QATAR</td></tr>
<tr><td colspan="4">Vessel to remain in CAMO, with designated circuit breakers OPEN, until vessel draft is <2.5m and reliable pin is confirmed
Closure of designated breakers while in jacking mode to be effected due to industrial mission equipment requirements of jacking system
Requirement to unpin and depart location triggers re-engagement of CAMO mode and opening of designated breakers</td></tr>
<tr><td colspan="4">Submitted Procedures for executing the scope of work have been reviewed and information pertinent to delivering DP station keeping performance predictably has been embedded in the ASOG. Changes in procedures are to trigger appropriate reviews and approvals (e.g. MOC, field changes procedures etc). Such reviews and approvals shall include potential impacts to the ASOG Agreed for Implementation.
Positive confirmation of foregoing is to be documented per the project/asset procedures in place.</td></tr>
<tr><td colspan="4">Loss/unavailability of any DP related equipment, while on Contract with McDermott & QatarGas to be notified to McDermott & QatarGas Project Focal Point.
Impacts on Post Failure Capability to be reassessed and concurrence from QatarGas required.
Reinstatement of Equipment into operational use requires validation, verification and concurrence from QatarGas.</td></tr>
<tr><td>CRITICAL ACTIVITY MODE CONFIGURATION REQUIRES VESSEL TO BE SET UP WITH THE POWER PLANT CONFIGURED FOR OPEN BUS TIE OPERATIONS</td><td colspan="2">Change to yellow or red triggers notification to Business Unit responsible person. Vessel to follow established return to work authorization protocols. Vessel not permitted to return to work after YELLOW or RED without concurrence from QatarGas accountable person.</td><td>Vessel to operate in CAM. Inspection, Repair, and Maintenance (IRM) while on DP is not permitted</td></tr>
<tr><td>GMS PROCEDURE SUGGESTS FOR VESSEL TO ENTER 500M ZONE IN DRIFT OFF CONDITIONS</td><td colspan="2">VESSEL TO BE SET UP IN CAM CONFIGURATION PRIOR TO JACKING DOWN AND DEPARTING WORK LOCATION. JOYSTICK MODE WILL BE USED TO MOVE VESSEL AWAY FROM INSTALLATIONS. THRUSTERS WILL BE SET TO MOVE VESSEL AWAY FROM INSTALLATION WHEN LEGS ARE FREED FROM SEABED. VESSEL WILL CLEAR 500M ZONE ON JOYSTICK OR MANUAL MODE</td><td>VESSEL TO BE IN 3-AXIS AUTO DP FROM ENTRY INTO 500M ZONE UNTIL LEGS MAKE CONTACT WITH SEABED</td></tr>
<tr><td>Transition time from DP to elevated position to be minimized. Vessel will change from 3 axes auto DP control to joystick/manual mode as soon as indications of seabed contact is evidenced by indication of loads on legs</td><td colspan="2">500M ZONE PRE-ENTRY CHECKLIST VERIFICATION LOCATION: OUTSIDE 500M ZONE. STAND OFF LOCATION 25M AWAY FROM PINNING LOCATION. SAFE POSITION: IDENTIFIED POSITION TO WHERE VESSEL WILL MOVE OFF ON JOYSTICK WHEN JACKED DOWN AND DEPARTING PINNED LOCATION</td><td>Vertical leg clearance above highest seabed obstruction to be 10m when approaching standoff location; decrease to 3m prior to soft pinning. 1m required for final approach</td></tr>
<tr><td>“Freeze model” function of DP system will be activated before soft pinning starting from 1m clearance between legs and seabed, Master shall ensure that no position and heading offsets between present and targeted values are in place.</td><td>Positioning Standby: Where required equipment is operational and available for immediate use and personnel are positioned to be able to respond to events to prevent escalation. Standby to be imposed from 500m zone entry until jacked up (entry) and from begin of jack-down until departure of 500m zone (departure). Chief Engineer at Jacking Console, Second Engineer in Machinery Control Room. Pos</td><td>Pre watch and pre task meetings to cover IJS setup and use, precautions about inadvertent change of mode, need to set up and monitor position offsets independent of DP control system</td><td>Default DP mode: Auto position
Default Center of Rotation (COR): Center of gravity
Default DP gain setting: Medium</td></tr>
<tr><td>Graphical User Interfaces (GUIs) of position monitoring systems to be optimized to enhance position excursion monitoring and early warning (Example: position reference screens independent of control system network (DP / VCS / IAS) etc.)</td><td>Remote Access and Monitoring (DP / VCS / IAS) to be disabled and isolated during industrial mission on DP. Enabling RAM not permitted within 500m zone of surface facilities. Enabling RAM requires written concurrence from accountable senior QatarGas representative. Effective control measures (including documented sign off by Master) to be in place to manage connecting external drives to DP / VCS / IAS</td><td colspan="2">Independence and segregation of auxiliary systems supporting station keeping equipment to be maintained and integrity of isolating valves to be validated and verified. No cross connections in any auxiliary system. Common power supplies to DP associated equipment to be isolated inline with the redundancy concept. No cross connections</td></tr>
<tr><td>Default position references sensors for this activity are: at least three independent systems in use (two different principles, different I/O cards, and different UPS).</td><td>Operations within 500m zone of surface facility: Required PRS: DGNSS's, SpotTrack & Radius. Relative PRS to be on different UPS's. DGNSS may be used after ascertaining effectiveness (effects of shadowing, etc.)</td><td colspan="2">Reinstating equipment post failures requires vessel to safely suspend operations, leave worksite / 500m zone prior to attempting reinstatement (e.g. low level auxiliaries, thruster, control voltages)</td></tr>
</table>

Calibration of relative PRS's is to be carried out with the vessel stopped (zero velocity), 100m off the surface facility, for a period no less than 10 minutes. Moves to worksite from this calibration point requires relative PRS's to be in use for station keeping					
Power plant 2 Island configuration: All generators running and connected 690Vac bus-ties OPEN (BT-A, BT-F, BT-D, BT-C) 690Vac bus-ties closed (BT-B, BT-E)			**Thruster bias may be used**	**Vessel to be setup and stabilized upon arrival at worksite. DP checks to be done with vessel at intended heading and thrust levels to be verified to be within ASOG limits. Entry into 500m zone is in DP auto position mode**	
Critical Activity Mode (CAM) Configuration					
Condition		**GREEN**	**ADVISORY**		
Notify Master, C/E, DPE, Deck, Marine Rep, Surface Facility, GMS & QatarGas		**NO**	**YES**		
	Action	**CONTINUE NORMAL OPERATIONS**	**INFORM / CONSULT / RISK ASSESS (CONSIDER ONGOING AND UPCOMING OPERATIONS)**		
Generators and Power System	**Bus Ties**	690Vac bus-ties open (BT-A, BT-F, BT-D, BT-C) 690Vac bus-ties closed (BT-B, BT-E) 440Vac bus-ties open 230Vac bus-ties open	Any other configuration		
	Generators	All generators running and connected Tested to 100% upon field arrival or within the last 6 months	Any other setup Any not tested to 100% upon field arrival, or within the last 6 months, or problems found		
Thrusters	**All Thrusters**	All available, selected to DP, tested to 100% on field arrival or within the last 6 months	Any not available, not selected or not tested at 100% on field arrival or within the last 6 months or problems found		
	All Thrusters (DPO familiarisation)	All DPOs have been familiarized and trained in recognizing unwanted thrust and the actions to be taken in the event of such occurrence	Any DPO not familiar or trained in recognising unwanted thrust		
	Emergency Stops	Tested at field arrival or as per Planned Maintenance System or within the last 4 weeks	Not tested on field arrival or as per Planned Maintenance System or within the last 4 weeks or problems found		
Manual Controls and IJS	**Thruster Manual Levers**	Tested and fully operational and set at zero position. Verified at all locations	Not tested, any known deficiencies or not set at zero position or not verified at all locations		
	Independent Joystick	Tested, fully operational and set at zero position. Verified at all locations and in standby mode	Not tested, not in standby mode, any known deficiencies, or not set at zero position or not verified at all locations		
	All DPOs practice taking control from DP to independent joystick and operating vessel on joystick	Control practiced within last 30 days	Any operator not practiced		
	All DPOs practice taking control from DP to manual and controlling vessel with individual levers	All operators practiced within last 30 days	Any operator not practiced		

Speed Step	**Speed of Moves Within 500m Zone**	500m to 200m: <= 0.5m/s (1.0kn) 200m to 50m: <= 0.3m/s (0.6kn) 50m to worksite: <= 0.1m/s (0.194kn)	Any other setting		
	Increments of Moves Within 500m Zone	500m - 200m: < 50m 200m to 50m: < 10m 50 to worksite: < 5m	Any other setting		
	Rate of Change Heading Set in DP	<= 10 degrees/min	> 10 degrees/min		
DP Control System	**DP Control System - Consequence Analysis**	Consequence analysis enabled and not in alarm	Any other setup, in alarm or problems found		
	Thruster Bias Checked at Field Arrival	Default - bias enabled (to keep thrust wash away from legs).	Thruster bias not being released upon alarms.		
	DP Reference System - Median Check	Median check set up and enabled, with agreed references	Not set up / enabled or one of the agreed references unavailable		
	DP Reference System Settings- Acceptance Limits	Set to Normal	Any consideration of changing to Wide or Narrow		
	DP CONTROLLER MODE	High Precision selected	Any other setup		
	DP Displays	Mimics correct	Any discrepancies between displays		
	DP Operator Stations - Unwanted thrust indication	Optimum GUI for detecting of and alerting the DPO to any unwanted thrust identified and used as default	Optimum GUI not used		
	Centre of Rotation (COR)	COR set at vessel center of gravity	Any other setup		
Legs	**Jacking Control System**	Validation of leg positions and leg loads inidications	No validation of leg positions and leg loads indications		
	Jacking Control System	All operational with no alarms	Any incorrect information or any alarms		
Position Reference Systems	**Position Reference Systems - within 500m of a surface facility**	SpotTrack, Radius relative position reference systems to be on different UPS's. DGNSS may be used after ascertaining effectiveness (effects of shadowing, etc)	Lack of redundancy in relative position reference systems		
	PRS Weighting (reduced GNSS weighting not to be used)	Auto weighting enabled	Any other setup		
	DGNSS - On Different Mask Elevations and Different Corrections / Configuration	Set at OEM default value for elevation mask and on different differential correction systems following redundancy group Each DGNSS on different corrections DGNSS 1 using demod #1 DGNSS 2 using demod #2	Not set at OEM default value, not on different corrections, or alarms present		
	DGNSS - Antenna Obstructions	No possibility of masking by legs/ cranes / structures	Possibility of masking by legs / cranes / structures		
	SpotTrack (Laser Reference)	Using prism as target with optimum gain threshold to reject false signals.	Any other setup		
	Radius (Radar Reference)	Fully operational	Any other setup or problems found		
Sensors	**DP Sensors (Gyro, MRU, Wind)**	Selected to DP and fully operational	Any other setup or known deficiencies		
	Gyros - Latitude and Speed Setting	Manual input of speed and latitude	Any other setup		
	Gyros - Common backup power supplies 24Vdc Brridge	Gyro 1, 2 & 3 - 24Vdc backup isolated	Any other setup		

Fuel Oil Systems	**Fuel Systems - Redundancy / Segregation**	Redundancy concept maintained by complete segregation	Segregation compromised or any redundant equipment not operational		
	Fuel Management Procedures	Effective procedures in place and adhered to	Effective procedures not implemented or not adhered to		
Cooling Systems	**Sea Water Cooling Systems**	Main Pump 1 & Pump 2 both online and running	Any known deficiencies reducing redundancy; 2 pumps not running		
	Sea Water Cooling - Jacking down	Transfer from sumerged pumps to main pumps 2 pumps running	Not transferred to main pumps		
	Thruster Fresh Water Cooling System	Both Thruster SW/FW coolers clean and online Main Pumps 1 & 2 both online and running	Any known deficiencies reducing redundancy in coolers or pumps		
	Thruster Fresh Water Cooling System - Piping	No hotwork around fresh water cooling system	Any hotwork being contemplated around fresh water cooling system		
Power Management	**PMS - Load Dependent Stop**	Load dependent stop disabled	Any other setup		
	Power Management - Auto Mode	PMS in auto mode	Any other setup		
	PMS - Power Limiting & Heavy Consumer blocking	Functions checked at field arrival or within the last six(6) months.	Not checked on field arrival, or within the last 6 months, or problems found		
	PMS - BOSS Blackout System	BOSS set to Auto PLC 1 and PLC 2 online and operational	Boss set to Manual Any know deficiencies reducing redundancy in the BOSS system		
	PMS - Blackout Restart	Blackout restart enabled	Blackout restart disabled		
UPS's / 24Vdc Systems	**UPS's**	Not in bypass mode. Tested for 30 minutes on batteries 24 hours before field arrival or within last month. Batteries fully charged. Operating on inverter. No cross connections	Any other configuration. Not tested for 30 minutes on batteries at field arrival or within last month or problems found. Batteries partly discharged Any cross connections		
	NAV UPS	Supplied from NDB-1 Backup supply from ESB isolated Auto changeover disabled	Both supplies online		
	24Vdc Power Systems	Batteries tested for 30 minutes on load (at least 24 hours before field arrival or within the last month). Batteries fully charged. Configured as per FMEA	Any other configuration, batteries not tested for 30 minutes on load (at least 24 hours before field arrival or within the last month) or problems found. Batteries partly discharged. Not configured as per FMEA		
Air	**Start Air**	Both compressors and all receivers available	Segregation compromised. A compressor or receiver not available		
HVAC	**Machinery Space Ventilation Fans**	All fans running in machinery spaces	Any fan stopped		
	Air Conditioning and Ventilation to all DP Critical Areas	Fully operational in all DP critical areas	Any known deficiencies		
Comms	**Communications (Internal and External)**	All vessel's hardwired and portable communications equipment operational	Loss of any principal item of communications equipment		

Miscellaneous	**Engine Room Manning**	ER manned	ER not manned		
	Gas Detection System	Set to disabled	Set to enabled		
	Watertight Integrity	All WTDs and openings secured	Any not secured or controlled by PTW		
	Escape Route	Escape route identified and agreed with field operations. Direction to go ……. Deg true	Escape route compromised or the possibility of the escape route being compromised during time span of planned operation		

Activity Specific Operating Guidelines - GMS Enterprise (Criteria Section)

Condition		GREEN	ADVISORY	YELLOW	RED
Notify Master, C/E, DPE, Deck, Marine Rep, Surface Facility, GMS & QatarGas for yellows and reds		**NO**	**YES**	**YES**	**YES**
	Action	**CONTINUE NORMAL OPERATIONS**	**INFORM / CONSULT (ASSESS RISK)**	**CEASE OPERATIONS, Bring Vessel to safe position, Exit 500 zone. VESSEL MAY EXIT ON JOYSTICK OR MANUAL**	**ABORT OPERATIONS and EXIT 500m zone**
Weather / Environment Conditions and Vessel Performance	**Weather / Environment Forecast**	Within operating limits	Approaching operating limits	Exceeding operational limits	
	DRIVE OFF or DRIFT OFF	No discrepancies observed in PRS's and thruster loading as expected	Discrepancies observed in PRS's and / or inexplicable ramp up of thrusters observed	Immediately when recognized by DPO	Unable to control drive off
	Vessel Footprint / Weather / Environment Related Excursion (From Setpoint)	No position alarms or warnings	Position excursions with frequent alarms or exceeding position warning excursion (> 3m)	Position excursion (> 5m)	
	Heading Excursion	No heading alarms or warnings	Heading instability with frequent alarms or exceeding heading warning excursion (> 3 degrees)	Heading excursion (> 5 degrees)	
	Maximum Position Change (Step)	500m - 200m: < 50m 200m to 50m: < 10m 50 to worksite: < 5m	Any other setting		
	Maximum Heading Change (Step)	Step <= 10 degrees	Step > 10 degrees		
Thrusters	**Azimuth thrusters**	All operational with no alarms	Any alarm, poor performance, unexpected or unexplained event	Loss of any thruster	
	Azimuth Thrusters (thrust limit)	Each < 50%	Any approaching 50%	Any > 50%	
Generators	**Generators Symmetric operation**	All operating without any alarms	Any alarm, poor performance, unexpected or unexplained event	Loss of any online generator	
	Generator Loading	All < 50%	Any approaching 50%	Any greater or equal 50%	
UPS's and 24Vdc	**UPS's**	Batteries fully charged, no alarms and not in bypass	Batteries not fully charged, any UPS alarm, in bypass or problems found	Any UPS system on batteries or UPS failed	
	24Vdc Systems	Batteries fully charged and charger supply available, no alarms	Batteries not fully charged, any charger alarm or problems found	Any 24Vdc system on batteries or 24Vdc failed	
DP Control System	**DP Controllers**	All controllers and power supplies fully operational	Any alarm, poor performance, unexpected or unexplained event	Only one controller or power supply operating	
	DP Control System (Mimics)	All displays checked and up to date	Any incorrect information		
	DP Operator Workstations	All operating normally, no alarms	Any alarm, poor performance, unexpected or unexplained event	One operator station remaining	
Legs	**Jacking Control System**	All operational with no alarms	Any incorrect information or any alarms		

PMS System	**IAS & PMS Controllers and Power Supplies**	All controllers fully operational	Any alarm, poor performance, unexpected or unexplained event	Loss of all controllers	
	IAS & PMS Control System (Mimics)	All displays checked and up to date	Any incorrect information		
	IAS & PMS Operator Workstations	All operator workstations available, one in control and one in standby	Any problem with online or standby operator workstation		
	PMS - BOSS Blackout System	PLC 1 and PLC 2 online and operational	Any alarm	Loss of either BOSS PLC	
	Thruster Phaseback (BOSS System) or DP System Power Limiting	No alarms	Any alarm	Unexpected phasing back or limiting	
Net	**DP Network**	Both networks available, no alarms	Any alarms or poor performance	Loss of one network	Complete loss of networks
	IAS / PMS Network	Both networks available, no alarms	Any alarms or poor performance		
Position Reference Systems	**Position Reference Systems within 500m of a surface facility**	SpotTrack, Radius relative position reference systems to be on different UPS's. DGNSS may be used after ascertaining effectiveness (effects of shadowing, etc.)	Any alarms or poor performance: Loss of redundancy in relative reference systems	One PRS principle remaining	
Sensors	**Heading Sensors (Gyro) into DP**	3 gyros	Loss of any gyro or alarm	Only one gyro remaining	
	Motion Reference Sensors into DP	3 MRU's	Any MRU alarm	One operational MRU remaining	
	Wind Sensors	3 wind sensors	Loss of wind sensor or alarm	Loss of all sensors & gusty conditions	
Comms	**Loss or Problem with any Essential Communications (Bridge / ECR / Deck / Fixed Platform / Surface Facility)**	Redundant communications	Any problems experienced	One system remaining	
Cooling Systems	**Sea Water Cooling System - whilst in DP/Joystick**	Both Pump 1 & Pump 2 online and running	Loss of either SW pump whilst in DP mode	Loss of both SW pumps	
	Thruster Fresh Water Cooling System - whilst in DP/Joystick	Both Pump 1 & Pump 2 online and running	Any alarm	Loss of either FW pump	
HVAC System	**DP Critical Ventilation / Fans**	All fans running in DP critical spaces	Any reduced ventilation	Any loss of ventilation affecting performance	
	Air Conditioning	Air conditioning / cooling in each room	Any reduced air conditioning / cooling	Any loss of air conditioning affecting performance	
Air	**Compressed Air**	Operating normally with no alarms	Any alarm present		
Fire / Flood / Collision/Misc	**Fire - E/R or Elsewhere**	No fire, no fire alarms	Any fire alarm or fault detected	Fire confirmed	
	Flood	No bilge alarms active, no flooding	Multiple bilge alarms	Flood confirmed	
	Collision (Errant Vessels)	No collision imminent / minimum approach >500m	Minimum approach will be < 500m	If collision possible	Collision imminent
	Jacking Control System (During approach to pinning location)	Jacking Control System (inlcuding monitoring system) fully functional and with no alarms	Any Alarms on Jacking System	Persistent alarms on jacking system Jacking Control system or monitoring system not fully functional	

SIMOPS - Activity Specific Operating Guidelines GMS Enterprise

Condition		GREEN	ADVISORY	YELLOW	RED
Notify Master, C/E, DPE, Deck, Marine Rep, Surface Facility, GMS & QatarGas for yellows and reds		NO	YES	YES	YES
	Action	CONTINUE NORMAL OPERATIONS	INFORM / CONSULT (ASSESS RISK)	CEASE OPERATIONS, Bring Vessel to safe position, Exit 500 zone. VESSEL MAY EXIT ON JOYSTICK OR MANUAL	ABORT OPERATIONS and EXIT 500m zone
SIMOPS	Change from Green DP Status of any other vessel in the field	Green	Advisory	Advisory	Advisory
SIMOPS	Comms / Interaction with Fixed Platform / Surface Facility Control Room and other Vessels	All operating normally with no known problems. Redundant comms	Comms problem or possible heading / position conflict	One comms or definite heading / position conflict	

On behalf of Operator

Sign, print, and date Viktor Fedorchenko 13/05/2021

On behalf of QatarGas

8.10. Certificate of Approval (CoA)

Global Maritime Middle East LLC
Al Emadi Business Center, 2nd floor, #23
P.O. Box 20129, Building no. 219, C-ring Road Str. No. 230
Zone: 41-Nuaija Area, Doha, Qatar
T +974 4464 1363 F +974 4029 5811
www.globalmaritime.com

CERTIFICATE OF APPROVAL

No. PRJ105043-CA-001

GULF MARINE SERVICES
"GMS ENTERPRISE" RIG MOVE TO QG PU PLATFORM

LOCATION APPROVAL OF GMS ENTERPRISE AT QG PU PLATFORM LOCATION

This is to certify that this office, acting on behalf of GULF MARINE SERVICES, has reviewed the information provided for water depth, met ocean & seabed conditions and checked calculations relating to the Location Approval of the self-elevating unit GMS Enterprise At PU Platform Location. Subject to all recommendations given in report GM-PRJ105043-RP-002 Rev 4 being closed, the location is hereby approved for all year operations. It does not include the approval of the rig move operation.

This Certificate of Approval is issued subject to Global Maritime Terms and Conditions of Business, current at the time of issue without prejudice to the terms and conditions of the insurance and/or to the interests of any or all of the parties concerned. It is issued solely for the purpose of the proposed operation and is based on document and certification reviews and a visual inspection of the external condition of the vessel(s), machinery and installation equipment without removal, operation or testing of systems, components or structures. This certificate shall not be deemed a certificate of seaworthiness for the vessel, neither is responsibility accepted for the conduct of the operation, injury to personnel, pollution or property damage.

Name: David Ward

Signed:

Location: PU PLATFORM , NORTH FIELD

Date: 21/12/2020 **Time: 1100 Hours**

Distribution:

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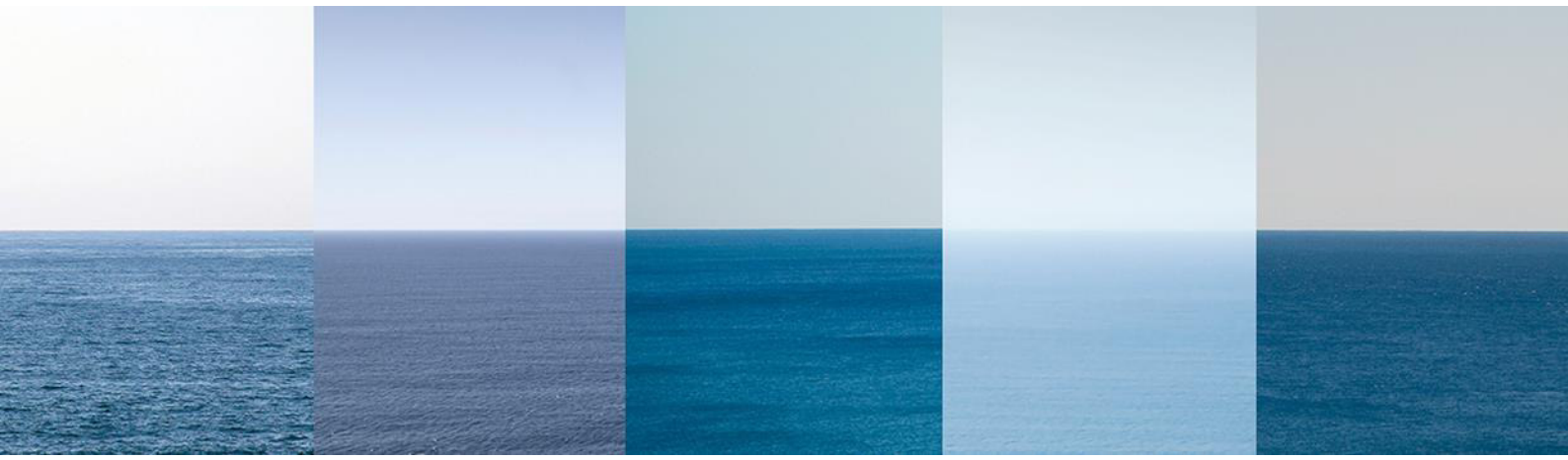

GMS ENTERPRISE MOVE TO PU PLATFORM LOCATION APPROVAL

For Gulf Marine Services (GMS)

PRJ105043-RP-002 REV 4

			Marine Manager	**Technical Lead**	**Marine Manager**
4	21/12/2020	Issued	GLOBAL MARITIME	GLOBAL MARITIME	GLOBAL MARITIME
			David Ward	Imran Siddiqui	David Ward
Rev	**Date**	**Document Status**	**Prepared by**	**Reviewed by**	**Approved by**

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DOCUMENT ISSUE RECORD

Rev	Date	Status	Prepared by	Reviewed by	Approved by
0	14/11/20	Issued	AAB	IS	DW
1	1/12/20	Issued	DW	IS	DW
2	14/12/20	Issued	DW	IS	DW
3	16/12/20	Issued	DW	IS	DW
4	21/12/20	Issued	DW	IS	DW

DOCUMENT CHANGE RECORD

Rev	Section(s)	Page(s)	Brief Description of Change
0			Original Issue to Client
1	8	18	Included waiver on minimum POB requirement
2			Orientation Drawing Updated
3			Recommendation 6 clarified
4			Orientation Drawing Updated rev 02

DOCUMENT HOLD RECORD

Section(s)	Page(s)	Brief Description of HOLD

Global Maritime Middle East LLC
Al Emadi Business Center, 2nd floor, #23
P.O. Box 20129, Building no. 219, C-ring Road Str. No. 230
Zone: 41-Nuaija Area, Doha, Qatar

T +974 4464 1363
F +974 4029 5811

1. SUMMARY

Global Maritime Middle East LLC, Qatar (GM) has been requested by Gulf Marine Services (GMS) to provide a location approval for the jack up barge move of the GMS Enterprise to PU Platform location (NW & SE) in the North Oilfield, offshore Qatar.

This report summarises the findings of the engineering review in relation to the capability of the GMS Enterprise to operate at the PU Platform (NW & SE) location and forms the basis of the location approval.

2. JACK-UP PRINCIPAL PARTICULARS

PRINCIPAL PARTICULARS	
Name	GMS Enterprise
Design	Self-Propelled, DP2, Self-Elevating Jack Up Crane Barge
Owner	Gulf Marine Services (GMS)
Date Built	2014
Hull Dimensions - Length - Width - Depth	274.3 ft. (83.6 m) 118.1 ft. (36.0 m) 19.7 ft. (6.0 m)
No. of Legs	4
Leg Length (inc. spud can)	341.2 ft. (104.0 m)
Spud can Diameter	20.27 ft.(6.18 m) across flats
Max Spud can Bearing Area	323 ft^2 (30.0m^2) each
Max. Variable Load - afloat - elevating - Operating - survival	1516.3 tonnes 1516.3 tonnes 1516.3 tonnes 1116.3 tonnes

Table 2-1 : Jack-Up Principal Particulars

3. LOCATION DETAILS

LOCATION DEPARTING				
Designation	Pier 2, NKOM Shipyard			
Operator	Gulf Drilling International			
Co-ordinates (platform)	Lat 25°53.8’ N	Long 51°38.6’E		
Barge Heading	110°T			
Water Depth	13.0 m LAT (42.7 ft.) – approx.			
Air Gap	2.0m			
Penetration	FP – 0.50m	FS – 0.50m	AP – 0.50m	AS – 0.50m
Soil Conditions	Very soft silt/clay or very loose sand overlying caprock, overlying a thick layer of limestone			

Table 3-1 : Location Departing

LOCATION ARRIVING		
Estimated Date of Move	January 2021	
Designation	PU PLATFORM	
Operator	Qatar GAS	
Jack-up center (North-West) UTM	2928940 N	602199.0 E
Jack-up center (South-East) UTM	2928926 N	602350.0 E
Barge Heading	66° T and 265°T	
Water Depth	54 m LAT (177.2 ft.)	
Operating Air Gap maximum	21m (minimum safe airgap 10.6 m)	
Soil Conditions	thin upper layer of very loose sand overlying a thick unit of soft to firm becoming stiff silty clay which in turn overlies a thick sand unit	
GM Geotechnical Report Ref.	GM-PRJ105043-RP-001	
Expected Penetration	14.20 m to 19.0m (46.6 ft. to 62.34 ft.)	

Table 3-2 : Location Arriving

4. SOIL CONDITIONS AND EXPECTED PENETRATION

4.1 Reference Geotechnical Study

4.1.1 A Site-Specific Assessment has been performed by Global Maritime for GMS Enterprise at the PU Platform location. The results of the Assessment are provided in Report SSA GM-PRJ105043-RP-001 Rev 5 dated 21th Dec 2020. The findings of the aforementioned assessments are summarised below

4.2 Available Geotechnical Data

The following information has been provided by the Client and has been referred to for the compilation of this report:

- Fugro, final engineering report, marine shallow sub-surface site surveys – PRQ1, GIQ315/204 issued 3 May 2018
- Horizon Geoscience, Survey Report Provision of Analogue and 2DHR Survey Services NFPS Investment-1 RG/QG Integrated Drilling Project Pre-FEED Blocks 'NFB' & 'RLB', Offshore Qatar Proposed Cable Route from RPQ1 to WHPQ11. Document No. S-RSG-QAT-0146-CL-RPQ1-WHP11-Vol 7-Rev 1. Dated 10 July 2017
- McDermott Report, NFPS Investment-1, RG/QG Integrated Drilling Pre-Feed Project Offshore Qatar, Arabian Gulf PU Platform, North Field Development. Dated 26 November 2016.
- Fugro McClelland factual report on geotechnical site investigation WH2 Location, N-3021/011 issued June 1993
- Fugro McClelland factual report on geotechnical site investigation PU Location, N-3021/041 issued June 1993
- Fugro McClelland factual report on geotechnical site investigation BSP1 Location, N-3021/051 issued June 1993
- Horizon Geoscience, Survey Report Provision of Analogue and 2DHR Survey Services NFPS Investment-1 RG/QG Integrated Drilling Project Pre-FEED Blocks 'NFB' & 'RLB', Offshore Qatar Proposed 28" pipeline route from WHPQ11 to RPQ1. Document No. S-RSG-QAT-0146-PL-WHP11-RPQ1 Vol 5-Rev 1. Dated 2 October 2017
- Fugro, Final Position Acceptance Seafox Matsu. Dated 19 March 2020
- Aqualis Braemar Marine Services LLC, Seafox Mastu At PU Platform, QG1 Field, Offshore Qatar Site Specific Assessment. Dated 13 March 2020
- McDermott, Vessel Set-up PU Platform West Side GMS Enterprise. Drawing No: D6978-PR-OF-8902 (02). Dated 19th dec 2020
- McDermott, Vessel Set-up PR Platform South Side GMS Enterprise. Drawing No. D6978-PR-OF-8903-001_03

4.3 Applicable Standards and Guidelines

International Standard ISO 19905-1:2016, Petroleum and Natural Gas Industries – Site Specific Assessment of Mobile Offshore Units, Part 1: Jack-Ups Society of Naval Architects and Marine Engineers, "Recommended Practice for Site Specific Assessment of Mobile Jack-Up Units" SNAME T&R Bulletin 5- 5A, Jersey City, Revision 3 dated August 2008

4.4 Soil Conditions

4.4.1 The sub-bottom data which extends to the RPQ1 Borehole location indicates a fairly consistent strata dipping gently towards the east.

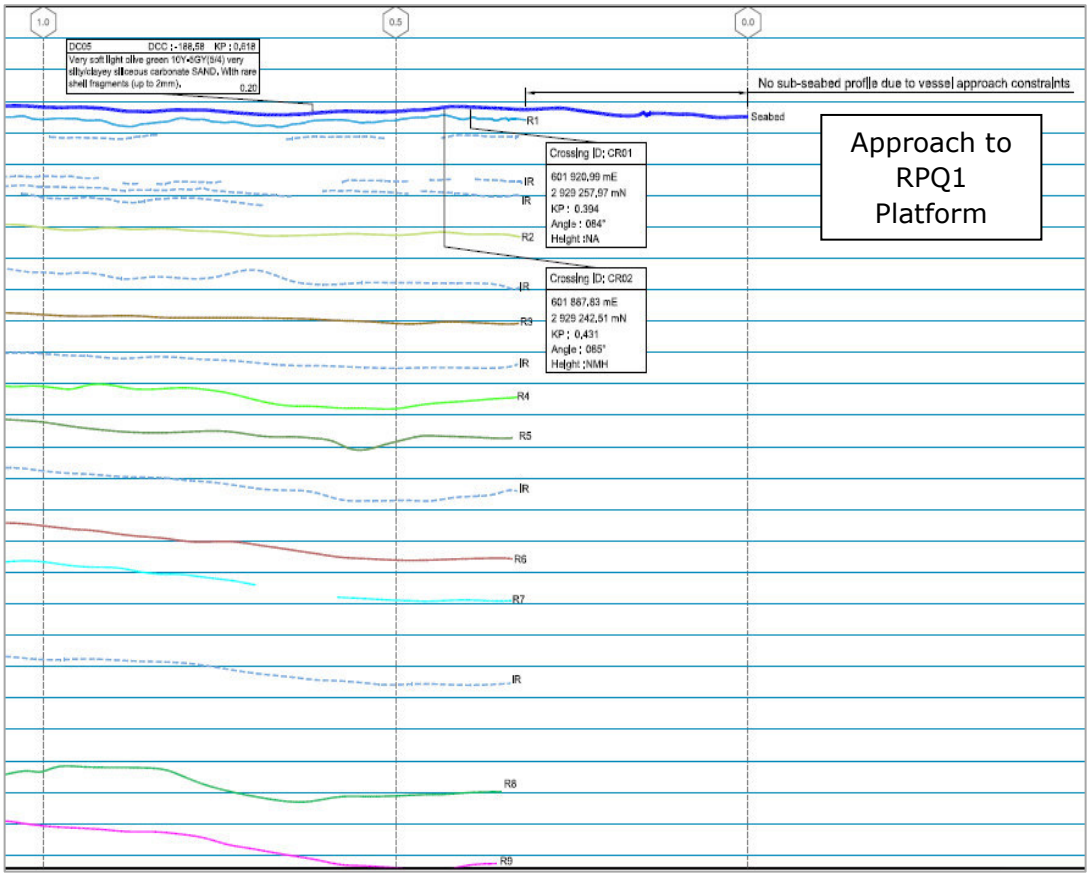

Figure 4-1 : SBP (Boomer) data extract showing the interpreted geology near to the RPQ1 location

4.4.2 Several borehole and CPT were carried out around the PU and RPQ1 platform. Comparison of the soil profiles in each indicate a relatively consistent lateral profile across the area comprising a thin upper layer of very loose sand overlying a thick unit of soft to firm becoming stiff silty clay which in turn overlies a thick sand unit. Thick beds of loose sand were encountered within the clay in some of the borings as well as much thinner layers of cemented material or Calcarenite. There appears to be some variation in the thickness and lateral extent of these sandy sub-layers between sampling locations and this has been considered when modelling the leg penetrations.

4.4.3 A summary of the geological stratigraphy at the PU Platform site is presented in Table 4-1 below.

Layer	Depth to base (m)	Description
1	0.8 to 2.0	Very loose to loose siliceous carbonate clayey fine to medium SAND
2	5.5 to 7.5	Soft to firm sandy silty carbonate CLAY/SILT.
3	7.0 to 8.5	Very silty siliceous carbonate SAND with localised medium bed of calcarenite
4	19.5 to 20.3	Firm to stiff carbonate CLAY with
5	27.7 to 29.0	Loose to dense slightly to moderately cemented silty carbonate fine SAND

Table 4-1 : Summary of Strata at PU Platform

4.5 Expected Penetration

4.5.1 The leg penetration curves based on the available data is given in Figure 4-2 and Figure 4-3 below.

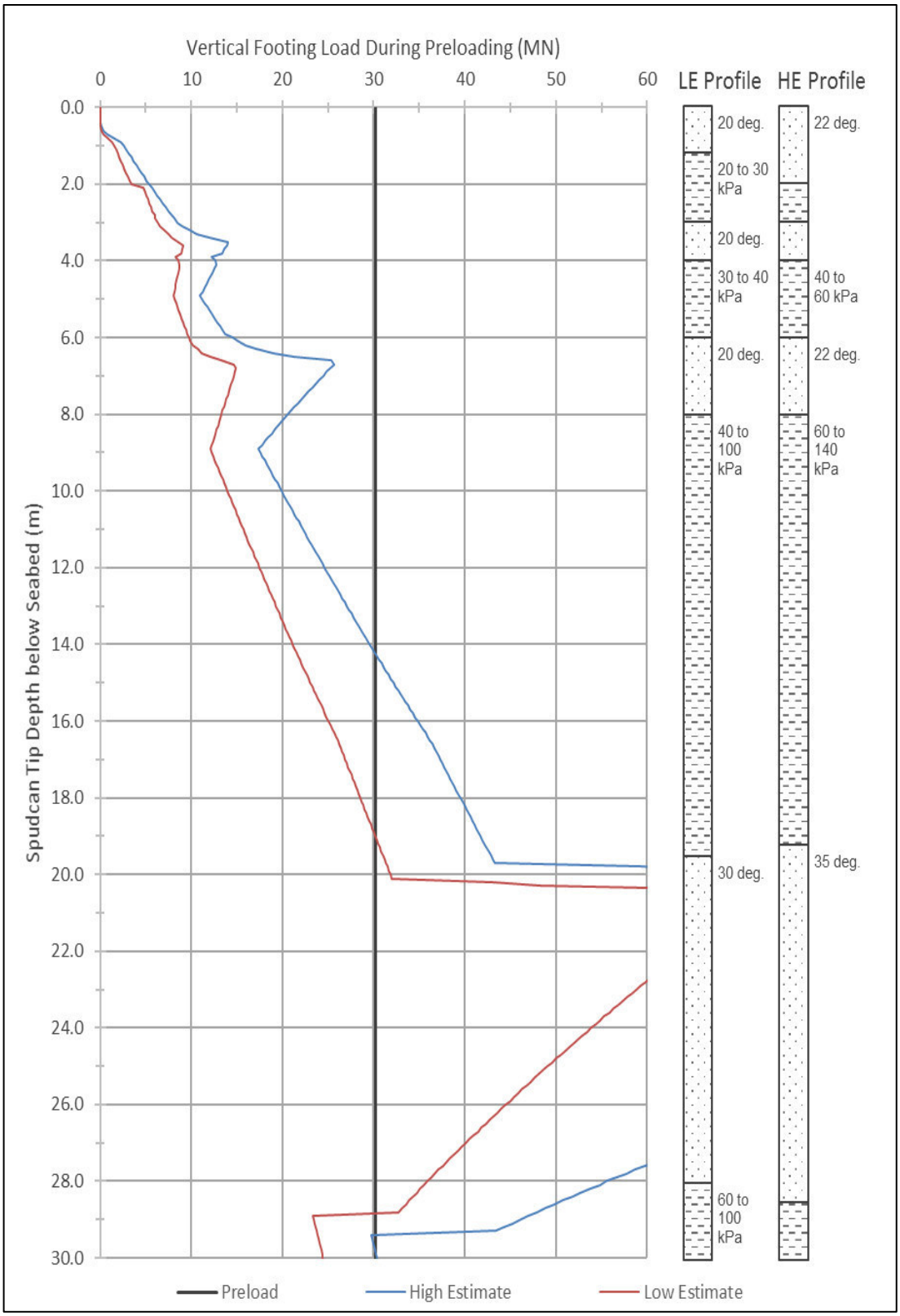

Figure 4-2 : Leg Penetration Plot

Figure 4-3 : Leg Penetration Plot - Sensitivity Case

4.5.2 Tip penetrations of between 14.20 m and 19.0 m are predicted, in the HE and LE cases respectively. In both design cases, the spudcan tip is expected to come to rest in the clay (unit 6). The LPA profile shows two hang up/punch throughs occurring in both cases during preloading. The first is predicted to occur between preloads of 8 MN and 14 MN resulting a circa. 2.5 m rapid leg run. The second is predicted to occur between 15 MN and 26 MN resulting in a similar rapid leg run of between 4 m and 6 m. The sensivity case indicate possible hang-up at penetration depth of 14 m close to maximum preload.

4.6 Bathymetry and Seabed Features

4.6.1 The seabed appears to be reasonably level shoaling gently to the west as indicated in Figure 4-4.

4.6.2 The water depth beneath the PU platform was reported to be 53.3 m LAT.

4.6.3 Numerous none-active pockmarks are observed in the area. However, none are located within 50 m of the geotechnical sampling boreholes or CPTs. The position of the pock marks relative to the Legs of GMS Enterprise should be confirmed prior to jacking at this location.

4.6.4 No debris items other than a few small transient fish traps were noted on the seabed. Up to thirty magnetic anomalies were detected. Twenty-eight could not be attributed to any known sources and could represent minor ferrous debris buried at shallow depths below the seabed.

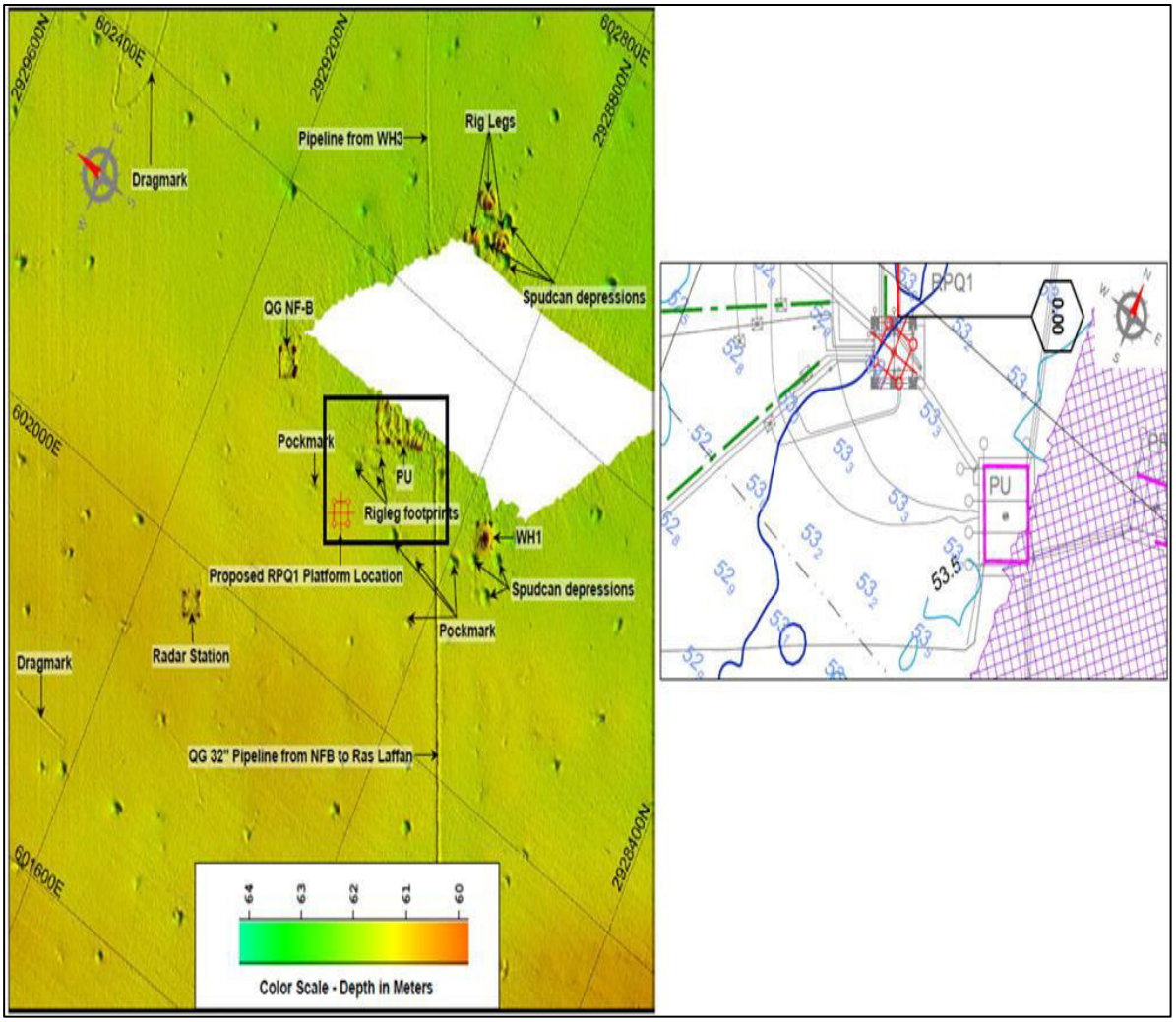

Figure 4-4 : Bathymetry surrounding the PU platform

4.6.5 Several relic spudcan depressions were observed to the north of the PU platform but based on their positions indicated on the vessel set up drawing, none present a risk to jack up operations. Several items of debris occur in the area but again none appeared to be located beneath any of the legs. There are several products

tying into the PU platform with the closest being a Fibre Optic Cable passing to within 10m of the port side of the Enterprise at its closest point. There are numerous small pockmarks in the area including beneath the Enterprise footprint.

4.6.6 Two vessels set up drawings are provided which show the location of the GMS Enterprise on the West side of the PU platform on WSW heading, and on the south side of the PU Platform on a ENE heading as shown in Figure 4.5.

Figure 4.5 : Proposed Orientation of GMS Enterprise at PU Platform Location

4.7 Geotechnical Risks

4.7.1 Based on the preload capacity of 3080 Tonnes (30.20 MN) at footing level, tip penetrations are estimated to be within the range of 14.20 to 19.00 m.

4.7.2 In both design cases, the spudcan tip is expected to come to rest in the clay (unit 6). The LPA profile shows two hang up/punch throughs occurring in both High Estimate and Low Estimate cases during preloading. The first is predicted to occur between preloads of 8 MN and 14 MN resulting a circa. 2.5 m rapid leg run. The second is predicted to occur between 15 MN and 26 MN resulting in a similar rapid leg run of between 4 m and 6 m. An additional sensitivity case has indicated possible hang-up scenario at 14 m depth close to maximum preload.

Considering the potential punch through and hang-up risk, it is recommended that the punch through precautions are to be adopted at this location which should include stagewise preloading with hull at a positive draft during all the stages. Leg RPD to be continuously monitored during preloading operation.

4.7.3 The 2017 geophysical survey and the more recent vessel set up drawing show the GMS Enterprise spudcans to be located on a relatively level seabed clear of relic spudcan depressions, debris and infrastructure. The seabed is covered in small pockmarks which are not considered to present a significant risk to jacking operations. It is recommended that latest seabed survey to be obtained to identify any new footprints or debris since last survey.

4.7.4 If deep leg penetrations do occur the spudcans will be embedded within clay. In this instance there is a risk of high extraction forces when raising the legs. It is recommended that the jetting system is ensured to be operational prior to move to this location and has sufficient pressure to break the suction forces which will develop across the base of the spudcan.

5. ENVIRONMENTAL DATA

5.1.1 The assessment considered the 50-year, all-year, omni-directional independent extreme met ocean conditions provided by Client. These are given in Table 5.1 below.

ENVIRONMENTAL DATA (50-yr, All-Year Extremes)	
Water Depth, LAT	54.00 m
Tidal Rise + Storm Surge	2.60 m
MSWL	56.60 m
Maximum Wave Height (Hmax)	10.50 m
Associated Wave Period (Tass)	10.70 sec
Deterministic Wave Height (Hdet)	9.03 m
Significant Wave Height (Hs)	5.40 m
Peak Wave Period (Tp)	9.90 sec
Wind Speed (1-min sustained)	21.20 m/s
Current speed: Surface	1.51 m/s
Near Seabed	0.76 m/s

Table 5-1 : 50-year, All-year Metocean Data

6. AIRGAP / LEG LENGTH REQUIREMENTS

6.1.1 The operating airgap has been specified as 18.70 m (29.5 ft) between LAT and keel. Minimum leg length required based on the air gap is shown below.

AIRGAP REQUIREMENTS	
Wave Crest Elevation above Still Water	6.50 m
Tidal Rise + Storm Surge	2.60 m
Safety Margin	1.50 m
Minimum Safe Airgap (above LAT)	10.60 m
Operating Airgap (above LAT)	18.70 m

Table 6-1 : Airgap Requirements

LEG LENGTH REQUIREMENTS	
Leg Length Overall	104.00 m
Estimated Maximum Penetration expected (SSA)	19.00 m
Water Depth (LAT)	54.00 m
Minimum Safe Airgap (above LAT) Strom Survival	10.60 m
Height of Upper Guide above Keel	12.26 m
Leg Reserve above Upper Guide	8.44 m
Minimum Recommended Leg Reserve for Storm Survival	1.5 m

Table 6-2 : Leg Length Requirements

7. FORCES ACTING ON THE UNIT

7.1.1 With consideration to the anticipated 50-yr storm survival conditions at this location and based on our experience of this jack up design, the GMS Enterprise jack-up is considered capable of operating at this location for the upcoming operation with all site assessment criteria checks remaining within allowable limits.

7.1.2 Calculations have not been made in respect of earthquake effects and loadings and no opinion is submitted in respect of the unit's ability to withstand the effects and loadings of an earthquake in the area

8. RECOMMENDATIONS

8.1.1 Approval of the location is subject to the following recommendations:

1) During the entire move and positioning onto location, the unit is to be operated in accordance with its Operations Manual.

2) A seabed survey is to be conducted for approach and pin down area prior to arrival. This seabed survey not to be older than 6 months with no full operations conducted. The positions of old spud can holes (if any) are to be verified.

3) The position of the spudcans in relation to any existing structure & debris shall be monitored prior to pinning down/engaging seabed. **The Barge shall be emplaced so as to avoid the existing Debris with as least Deviation as possible**.

4) Due to the possible risk of punch-through, or possible risk of rapid penetrations, preloading/predriving is to be performed with caution at positive draft.

5) Any Punch through or Rapid penetrations experienced, the MWS should be notified immediately. No action to be taken until the MWS has been consulted.

6) It is standard industry practice that the barge move is conducted with minimal personnel on board at the punch through locations, all nonessential personnel are required to depart the barge prior to move operations commencing and not return until the barge is in position at working height on completion of preload. **However, this has been temporarily waived for GMS Enterprise move to PU Location (NW & SE) due to COVID implications subject to following being complied onboard**.

   All non-essential personnel shall remain inside the accommodation until the barge move operations are completed and barge is at working height. No additional non-essential personnel to arrive on barge just prior or during the barge move. There should be sufficient empty cabins available for the attending MWS from their arrival until their departure.

7) It is essential that the barge is preloaded/predriven to the maximum achievable preload capacity to achieve 100% preload reaction.

8) Penetrations should be carefully monitored as the preload/drive is applied.

9) Final actual penetrations are to be provided to this office.

10) **Agreed on operating air gap to reach the platform. This is agreed that in any case of adverse weather FORECAST the barge jacks down to safe airgap prior to expected weather. Weather forecast sent to MWS daily for review.**

11) Monitoring of RPD to be performed in accordance with the operational instructions for RPD monitoring of the leg structure. (if required).

12) Any further recommendation issued by the attending Marine Warranty Surveyor.