Annex 1

PORT OF MOSTYN

Tidal Lagoon	
Soundings reduced to Mostyn Chart Datum (OND-4.5m)	
Latitude and Longitude WGS84 and OSGB	
Surveyed by: Capt. R Jackson BSc	
Scale 1:40,000	Survey Date: 2020 03
Paper Size A3	Rev 2020 04 30

ENGLAND AND WALES

APPROACHES TO THE RIVER DEE

DEPTHS IN METRES

SCALE 1:25 000

Depths are in metres and are reduced to Chart Datum, which is approximately the level of Lowest Astronomical Tide.
Heights are in metres. Underlined figures are drying heights above Chart Datum. Vertical clearance heights are above Highest Astronomical Tide. All other heights are above Mean High Water Springs.
Positions are referred to the WGS84 compatible datum, European Terrestrial Reference System 1989 Datum.
Navigational marks: IALA Maritime Buoyage System – Region A (Red to port).
Projection: Transverse Mercator.
Sources: The origin, scale, date and limits of the hydrographic information used to compile the chart are shown in the Source Diagram. The topography is derived chiefly from Ordnance Survey maps.

NATIONAL HORIZONTAL DATUM

...ections read from chart 1953 must be ...usted by 0·01 minutes SOUTHWARD ...d 0·07 minutes EASTWARD before ...tting on documents referred to OSGB36 ...stem.

CHANGING DEPTHS

HISTORIC WRECK

The sites of historic wrecks are protected from unauthorised interference.

SUBMARINE CABLES AND PIPELINES

Mariners are advised to ...or anchor in areas in the vicinity of ...arine cables and ...pelines. Pipelines ...

N

W E

S

Annex 2

PORT OF MOSTYN

Tidal Lagoon	
Soundings reduced to Mostyn Chart Datum (OND-4.5m)	
Latitude and Longitude WGS84 and OSGB	
Surveyed by: Capt. R Jackson BSc	
Scale 1:40,000	Survey Date: 2020 03
Paper Size A3	Rev 2020 04 30

ENGLAND AND WALES

APPROACHES TO THE RIVER DEE

DEPTHS IN METRES

SCALE 1:25 000

Depths are in metres and are reduced to Chart Datum, which is approximately the level of Lowest Astronomical Tide.
Heights are in metres. Underlined figures are drying heights above Chart Datum. Vertical clearance heights are above Highest Astronomical Tide. All other heights are above Mean High Water Springs.
Positions are referred to the WGS84 compatible datum, European Terrestrial Reference System 1989 Datum.
Navigational marks: IALA Maritime Buoyage System – Region A (Red to port).
Projection: Transverse Mercator.
Sources: The origin, scale, date and limits of the hydrographic information used to compile the chart are shown in the Source Diagram. The topography is derived chiefly from Ordnance Survey maps.

NATIONAL HORIZONTAL DATUM

...ections read from chart 1953 must be ...usted by 0·01 minutes SOUTHWARD ...d 0·07 minutes EASTWARD before ...tting on documents referred to OSGB36 ...stem.

CHANGING DEPTHS

HISTORIC WRECK

The sites of historic wrecks are protected from unauthorised interference.

SUBMARINE CABLES AND PIPELINES

Mariners are advised to ...or anchor in areas in the vicinity of ...arine cables and ...pelines. Pipelines ...

N

W E

S

Annex 3

Description	Position (WGS 84)	
	Latitude	Longitude
A	53°19.56' N	003°15.69' W
B	53°19.71' N	003°15.66' W
C	53°20.66' N	003°15.43' W
D	53°20.81' N	003°15.61' W
E	53°21.29' N	003°16.94' W
F	53°21.48' N	003°17.47' W
G	53°21.59' N	003°18.28' W
H	53°21.56' N	003°18.37' W
I	53°21.39' N	003°19.06' W
J	53°21.37' N	003°19.02' W

Annex 4

N 53-22.00
W 3-17.00
W 3-16.00
N 53-21.00
W 3-15.00
W 3-14.00
387000Y
314000X
386000Y
315000X
316000X
385000Y
317000X
384000Y
318000X
383000Y
W 3-14.00
W 3-18.00
N 53-22.00
N 53-20.00
W 3-15.00
386000Y
313000X
382000Y
W 3-19.00
N 53-21.00
385000Y
312000X
381000Y
316000X
N 53-19.00
W 3-16.00
384000Y
312000X
383000Y
313000X
382000Y
314000X
381000Y
315000X
W 3-19.00
W 3-18.00
W 3-17.00
N 53-20.00
N 53-19.00

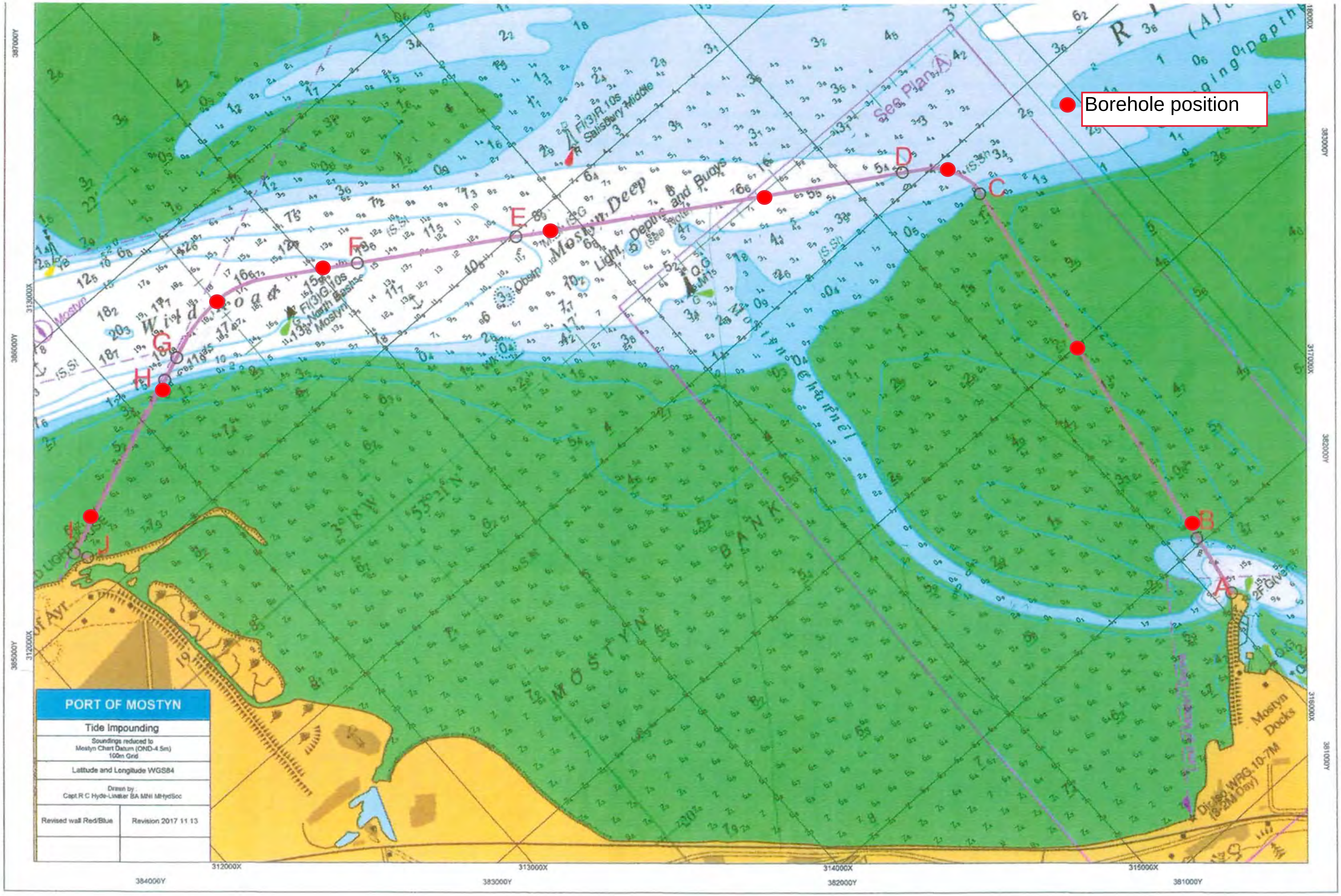
Borehole position
Vibrocore position
CPT position

Salisbury Middle
FAIRWAY
Dee
Wild Road
N E Mostyn
Mostyn Deep
Mostyn Channel
Mostyn Docks
7M Fl.G.5s
Dir.Iso.WRG.10
(3-2M by day)
S4

PORT OF MOSTYN

Tide Impounding Borehole, CPT & Vibrocore Positions	
Soundings reduced to Mostyn Chart Datum (OND-4.5m)	
Latitude and Longitude WGS84 and OSGB	
Surveyed by: Capt. R Jackson BSc	
Scale 1:15,000	Survey Date: 2020 03
Paper Size A3	Rev 2020 04 30

Annex 5



Borehole position
A
B
C
D
E
F
G
H
I
J
Mostyn Deep
Wild Road
Light, Depths and Buoys (See Note)
Salisbury Middle
See Plan A
MOSTYN BANK
Mostyn Docks
PORT OF MOSTYN
Tide Impounding
Soundings reduced to Mostyn Chart Datum (OND-4.5m) 100m Grid
Latitude and Longitude WGS84
Drawn by: Capt R C Hyde-Linaker BA MNI MHydSoc
Revised wall Red/Blue
Revision 2017 11 13
312000X
313000X
314000X
315000X
384000Y
383000Y
382000Y
381000Y

Annex 6

SEABED VIBRO-CORE SAMPLING METHOD STATEMENT

River Dee Ground Investigation

Issue / Revision Description: **Issue 2 – VC Method Statement**	Date: **Issued 29/05/20**

Development:	Title & Company	Name	Signature	Date
Author:	Senior Geologist – InSitu SI	Mathew Taylor		29/05/2020
Reviewed by:	Managing Director – In Situ SI	Darren Ward		29/05/2020

Document Status:

ISSUE 1

Client:		Contractor:	
	Jim O'Toole Mostyn Holywell Flintshire CH8 9HE	IN SITU SITE INVESTIGATION	**InSitu SI Innovation Centre, Unit 23, Highfield Drive, St Leonards On Sea, East Sussex, TN38 9UH**

CLIENT ACCEPTANCE

Name of Lead Reviewer	Jim O'Toole

Any subsequent variation to this method statement must be accepted by the client. Any such variations shall be formally recorded and signed by both parties.

No.	Comments

1.0 SCOPE OF WORKS

InSitu SI have been instructed by Jim O'Toole to carry out vibro-core sampling (VC) on the River Dee Ground Investigation.

It is anticipated that 2 days vibro-core sampling will be required at approximately 14 No. locations with a target depth of 6m, although the actual test locations are to be confirmed on site.

Inferred ground conditions for the site are superficial alluvial river estuary deposits over the Carboniferous Coal Measures / Bunter Sandstone Formations.

2.0 EMERGENCY CONTACT DETAILS

The following InSitu SI / GeoForce staff will be involved in the project:

- Mr James McDonald. GeoForce CPT Operator

  james.mcdonald@geoforcetech.co.uk – 07769 730612

- Mr Mathew Taylor. ISSI Senior Geologist

  mathewtaylor@insitusi.com - 07584160543

- Mr Darren Ward. Managing Director and overall responsibility for the cone penetration testing contract.

  darrenward@insitusi.com 07917823541

The nearest hospital to the site with an Accident & Emergency department is:

- Glan Clwyd Hospital
  Sarn Lane
  Bodelwyddan
  Rhyl
  LL18 5UJ

  Tel: 01745 583910

The location of the Accident & Emergency department relative to site is shown on the attached Hospital Location Plan, document reference PRELIM/HLP attached to this document.

3.0 HEALTH AND SAFETY REQUIREMENTS

Prior to InSitu SI / GeoForce staff mobilising to site, they will receive an InSitu SI Project and Method Statement/Risk Assessment briefing. Upon mobilisation to the site and prior to commencing any work, they will also receive a site-specific induction from Jim O'Toole.

The VC operator is responsible for wearing the required PPE during the works, which for this contract is considered to be:

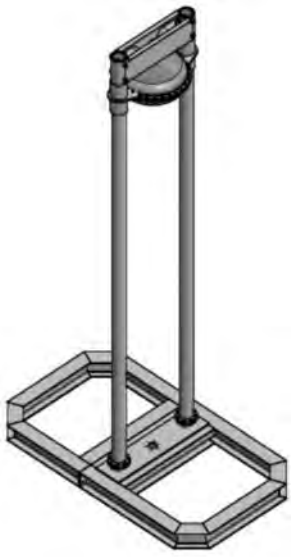
Hi-Vis Jacket & Trouser or Overalls
Life Jacket
Safety Boots
Hard Hat
Gloves
Eye Protection

Specific instructions regarding actual the test location and requirements will be provided to the VC operators by the clients site representative. The positioning of the vessel and deployment of the rig to the seabed will be the responsibility of the vessel captain and deck operatives under guidance from the ISSI / GeoForce VC operators, performing the test and subsequent sample handling will be the responsibility of the VC operatives.

4.0 DEFINITION

The VC is an in-situ sampling technique carried out to obtain sediment samples for subsequent geotechnical logging, analysis and associated laboratory testing. The test is performed by vibrating / pushing a steel hollow barrel into the seabed in order to recover sediment core samples. On this contract the sampling is to be carried out using a specialist offshore 3.5 tonne HPVC Vibro-core Marine Seabed Unit (or similar) utilising a 6m core barrel.

Figure 1: HPVC Vibro-core Marine Seabed Unit.



5.0 PROCEDURE

5.1 Test Procedure

At each test location the VC unit (Figure 1 above) will be lowered to the seabed from the deck of the multi-cat survey vessel “Vital” (Figure 2 below) using the vessel crane. The launch and recovery of the unit from the deck shall be undertaken by the deck operatives onboard under the supervision of the ISSI / GeoForce VC operator. The VC unit will be positioned over each survey location using the vessels navigational GPR positioning system.

Figure 2: “Vital” Multi-Category workboat.

Once deployed on the seabed additional line will be paid out from the crane to allow the core barrel to penetrate the sediment and also allow the vessel to hold position without moving the VC unit while the sampling is completed. The ISSI / GeoForce CPT operator will then complete the sampling (approximately 10min duration). On completion of the test, the operator will inform the lift operator that the unit can be safely recovered to deck. The operation of the unit shall be carried out from the system control cabin on the ship's deck via a control umbilical.

Once on deck the vibro-core unit shall be made sea fast before line is paid out of the vessel crane in order to lower the core barrel into its horizontal position on the vessel deck. The recovered sample in its retaining liner shall then be extracted from the barrel ready for processing.

5.2 Sample Handling and processing

The vibrocores shall be recovered using an electrically powered HPVC vibrocore unit (or similar), owned and operated by GeoForce, fitted with a 6m long core barrel and using clear PVC 83mm OD liner. A 'basket-spring type' core catcher shall be fitted above the cutting shoe, in the base of the vibrocore barrel, to maximise retention of the penetrated sediment during retraction from the seabed and subsequent retrieval of the unit to the vessel deck.

The nomenclature of the vibrocore attempts shall be XXX-VC-001. Any repeat attempt will be termed XXX-VC-001A, respectively.

Information related to the location, such as co-ordinates and water depth etc shall be recorded on a Master Sampling Log (in xls format) and also presented on the final VC log and tabulated in the report, together with any other relevant recorded information during each sampling attempt. At each location, a maximum of two attempts shall be made to retrieve a representative sample.

Following recovery of the vibrocore sample to the vessel deck and extraction from the barrel, the total recovery is recorded by measuring from the base of the recovered sample, up to assessed seabed level. If the seabed material has slumped in the liner, the last point of 50% full diameter recovery is used as the 0.00 m seabed level. A mark is then put across the sample with permanent ink marker at this point. Each VC liner is then successively cut into 1.0 m sections, loosely capped and labelled. Each length of liner shall be labelled with:

- Specific vibrocore ID, e.g. XXX-VC-001
- Arrows indicating direction to base of liner
- Top and bottom depths, relative to depth penetrated below seabed
- Liner number i.e. for a VC with 2.50 m recovery, L1 corresponding to 0.00 to 1.00 m, L2 to 1.00 to 2.00 m, L3 to 2.00 to 2.50 m
- Vibrocore ID, 'Top', depth and liner number, shall be written on each cap belonging to the uppermost end of each liner (Figure 1).

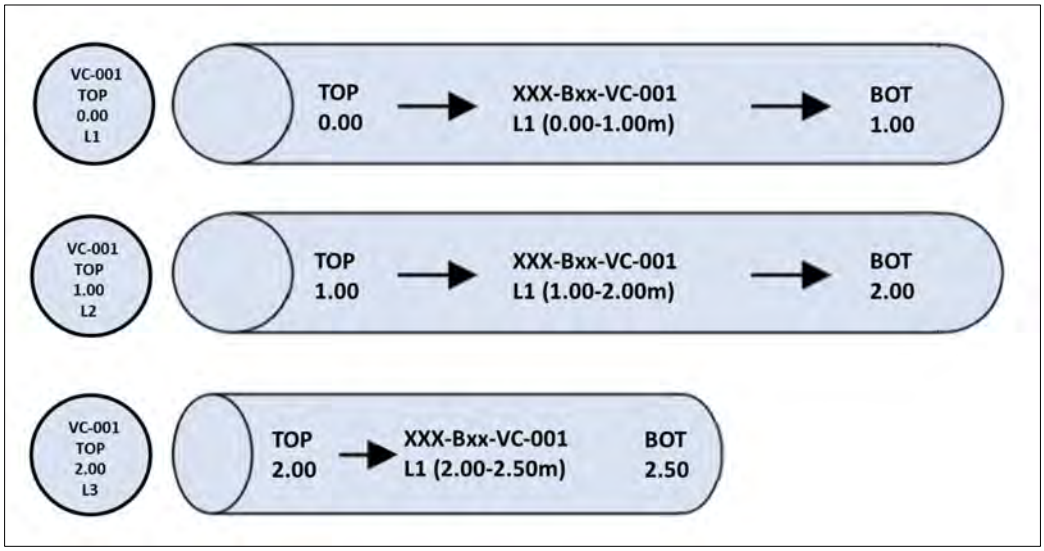


Figure 1 Vibrocore liner labelling.

Following a check that all relevant information has been recorded on the Master Sampling Log; the cores shall be securely capped, sealed and placed in robust storage crates, standing vertically. A Chain of Custody shall be produced for each crate detailing the vibrocore liners included within. The crates shall be tightly packed together to ensure minimal sample disturbance during subsequent transportation.

Upon completion of the offshore sampling, the vibrocores shall be transported to the logging facility of InSitu SI, at Rotherham, UK. It is the normal procedure of In Situ to complete the sample processing onshore, such that a detailed geotechnical assessment of the recovered material can be made in accordance with BS5930:2015, and the most suitable samples can be selected for geotechnical testing, carried out at a UKAS accredited laboratory.

6.0 WEATHER

Information on the weather for the coming 48 hours will be obtained continuously from different sources, which gives the weather forecast for the survey area(s).

The operation will be aborted if it is deemed unsafe to successfully launch and recover the VC unit to the vessel deck. The maximum typical safe working wave height is 0.5 to 1.0m during a geotechnical survey of this type. The survey staff will inform the clients site representative who, in agreement will abort the works for weather standby. The vessel's captain will be responsible for handling of the vessel and for the vessel's safety. The captain's decision regarding vessel safety will not be negotiable.

7.0 ENVIRONMENTAL CONSIDERATIONS

The River Dee Estuary is classified as a SSSI – Ramsar Site – SAC and SPA with the presence of migratory birds and cockle beds formerly noted.

The following measures shall be adopted during VC operations in order to minimise the impact on the estuary / marine environment:

- All site operations over inter-tidal areas shall be undertaken over high tide periods.
- VC sampling shall only be carried out within +/- 10m of the pre-agreed sampling locations provided by the client within the designated survey corridor.
- Support vessel movements shall be restricted to the existing shipping channels within the estuary and a designated corridor along the proposed survey route.
- Sampling shall be carried out using a specialist HPVC rig consisting of a single self-contained unit specifically engineered to minimise its impact on the marine environment. The vibratory mechanism produces a relatively short, non-impulse or continuous broadband sound with a peak frequency less than 1 kHz at approximately 3,000 to 11,000 vibrations per minute (VPM). Vibrocoring is not included on the UK Joint Nature Conservation Committee (JNCC) list as it is generally considered to be quiet enough to not be an issue for marine habitats.
- The HPVC unit will operate using an electrically powered motor utilising power supplied via a control umbilical from the support vessel power supply. Removing the requirement for fuel to be carried onboard by the survey team during operations.
- The HPVC unit will arrive on site clean and fully inspected / serviced. The rig shall also be constantly inspected for defects and cleaned by the operators onboard the support vessel following its deployment at each sampling location. The rig will be thoroughly cleaned and inspected prior to de-mobilisation on completion of survey operations.
- 85mm OD sediment cores contained within clear PVC liners are recovered during the sampling operation, each sample shall be securely capped, sealed with tape to retain the moisture content and tightly packed vertically together in robust storage crates secured on board the support vessel to ensure minimal

sample disturbance and exposure to daylight during fieldwork. The recovered samples shall be removed from the vessel on completion of the works (in a single operation) onto an awaiting transport vehicle in order to minimise the risk of disturbance / damage to the recovered material prior to laboratory analysis.

- Waste generated during VC operations is very minimal. Small amounts of general waste generated from the processing of the recovered samples shall be bagged and contained within a designated covered storage crate onboard the support vessel both during and on completion of sample processing at each survey location. The upmost care shall be taken to prevent any foreign material from entering the marine ecosystem at all times.

8.0 REFERENCES

AGS (2017) Electronic transfer of geotechnical and geoenvironmental data (Edition 4.0.4 February 2017). Association of Geotechnical and Geoenvironmental Specialists.

BS 1377 (1990) Methods of test for soils for civil engineering purposes. British Standards Institution.

BS 5930 (2015) Code of Practice for Ground Investigations. British Standards Institution.

BS EN 1997-2 (2007) Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. British Standards Institution.

BS EN ISO 14688-1 (2018) Geotechnical investigation and testing - Identification and classification of soil - Part 1 Identification and description. British Standards Institution.

BS EN ISO 14688-2 (2018) Geotechnical investigation and testing - Identification and classification of soil - Part 2 Principles for a classification. British Standards Institution.

9.0 BRIEFING ARRANGEMENTS

- Upon first arriving on site, **ALL** persons shall receive a Site Induction from a Supervisor, Manager or delegated competent person.
- This Method Statement shall be briefed out to **ALL** persons at risk PRIOR to the commencement of activities on site.
- *I confirm I have been briefed and fully understand this Method Statement, I have also had the opportunity to raise any queries relating to the tasks that are to be carried out. I will not deviate from the contents of the method statement and if anything does change whilst carrying out the work I will stop and seek advice from a superior.*

Name:	Company:	Role:	Signed:	Briefed by:

Occupational Health, Safety and Environmental Risk Assessment

Activity/task	**Cone Penetration Testing**			
Relevant documents	ISSI-MS13 Seabed Vibrocore Sampling MS			
Project/contract location	**River Dee GI**	**Document Reference:** PRELIM-ISSI-MS01-002	**Contract N°**	PRELIM

IN SITU SITE INVESTIGATION

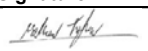
Work must not proceed until the level of risk associated with ALL hazards is LOW

Hazard category	Groups affected			Nature of risk What might go wrong?	Risk before controls I/T	Preventative/control measures How do you stop it going wrong?	Risk after controls I/T
	P	O	M				
				The following risks are specific to undertaking Pressuremeter Testing			
1, 2, 3, 4, 5, 7, 8, 9, 10, 13, 14, 16, 19, 25	X	X		General Site Activities	**High/Medium**	InSitu staff to be inducted upon mobilisation and receive full Project briefing, including reference to all site specific hazards and risks. Any InSitu general site activities to adhere to Principal Contractors Construction Phase Health & Safety Plan.	**Low**
1, 2, 3, 4, 5, 8, 15, 25	X	X		Slips, trips and falls	**Medium**	Ensure slip and trip hazards are minimised in the working area. Keep small tools & equipment tidy and any hoses or cables away from walking routes. Ensure working area is kept as level as possible. Ensure walking routes are clear of obstructions and are not wet or slippery underfoot. Wear PPE (minimum level required: life jacket, hi-vis top and trousers, hard hat, boots, eye protection, gloves). Three points of contact to be maintained during access/egress of vessel.	**Low**
4, 5, 6, 7, 8, 9, 10, 18	X			Manual handling / Sample handling	**Medium**	Use mechanical means where possible. Ensure lift zones and crane/ winch line is clear of hazards,& people. Only staff familiar with handling the equipment to assist with lifting it into position to ensure no harm to instrument or people. Gloves and eye protection to be worn at all times when cutting core samples. Wear PPE (minimum level required: life jacket, hi-vis top and trousers, hard hat, boots, eye protection, gloves).	**Low**
3	X			Working in an elevated position	**High/Medium**	Use 3 points of contact when using stairs or step ladders. Hold hand rails at all times when climbing stairs. Plan movements around vessel.	**Low**
9, 10, 12, 18, 26,	X	X		Use of Hand Tools	**Medium**	Ensure all tools are in good working order with no signs of defects or damage. Ensure tools are correct for purpose. Wear PPE (minimum level required: life jacket, hi-vis top and trousers, hard hat, boots, eye protection, gloves). When carrying tools, assess any manual handling risks or walking routes. Take regular breaks to avoid fatigue.	**Low**
4, 5, 6, 7, 8, 10	x	x		Struck by moving object / entrapment	**High/Medium**	Plan all movements prior to undertaking any lifting operations. Keep clear of all working parts and lifting equipment when in use. Ensure lift zones and crane/ winch line is clear of hazards,& people. Maintain high level of housekeeping at all times. Wear PPE (minimum level required: hi-vis top and trousers, hard hat, boots, eye protection, gloves).	**Low**

Hazard category	Groups affected			Nature of risk What might go wrong?	Risk before controls I/T	Preventative/control measures How do you stop it going wrong?	Risk after controls I/T
	P	O	M				
22	X	X		Working over water / Drowning	**Medium**	Life jackets to be worn at all times when on vessels and quayside All staff to be inducted on crew transfer and vessel movement plan No Lone Working to occur on site at any time Vessel support crew to brief staff on man-overboard emergency plan prior to start of marine work. All staff to remain within railings when on working deck area.	**Low**
12, 20, 32	X	X	X	Fire	**Low**	Ensure all staff have been briefed in the main site induction. Ensure all staff know the appropriate actions to take in emergency i.e Numbers to call in emergency All staff to know the location of muster points. Fire extinguishers to be present onboard vessel.	**Low**
25	X	X		Adverse Weather (Hot/Cold/Wet)	**Low**	Wear suitable PPE, overalls to be worn on site to cover arms and legs, foul weather / water proofs as required Carry sufficient amounts of drinking water Wear sun screen on any exposed parts ie face and neck. In event of electrostatic weather all works to halt immediately, make area safe and withdraw inside vessel.	**Low**
11	X	X	X	Strong Winds i.e. (Dust hazards, catching open doors, window shutters, lifting operations)	**Medium**	No working under extreme weather conditions All lifting operations will be assessed prior to being carried out and halted during strong winds. Staff to withdraw inside vessel if strong winds expected. Daily forecast to be checked prior to each shift	**Low**
32	X	X		Environmental Impact	**Medium**	Sampling from inter-tidal areas shall be undertaken over high tide periods. All vessel movements to remain with pre-agreed survey corridor location. Sampling to be carried out using specialist marine plant only. HPVC rig to run on electricity from support vessel, no fuel required onboard. HPVC rig to be constantly checked for damage / defects during survey operations. HPVC rig to be cleaned after completion of each sampling location. All general waste to be securely stowed away in designated storage area on-board vessel at all times	**Low**
33	X	X		Site Emergency Communication	**High**	All working groups will have at least mobile phones. VHF radio present on vessel. All staff to be briefed on emergency communication procedures.	**Low**

Key
H Health; **S** Safety **E** Environment; **L** Low Risk; **M** Medium Risk; **H** High Risk; **P** People carrying out the activity/task; **O** Others working in the vicinity; **M** Members of the public

Notes
1. Where young persons or expectant mothers are involved in the activity, ensure that any additional controls are put in place in accordance with local procedures
2. In addition to the above, consideration must be given to other individuals' susceptibility due to pre-existing health conditions, eg bad back, poor hearing, etc
3. Where a hazard is identified that is not listed, enter 33 in the Hazard Category column and describe under 'Nature of risk'

	Name	Signature	Date
Person completing the assessment:	M Taylor		29-May-20
Supervisor of the work:			
Person Reviewing the assessment:			

Occupational Health, Safety and Environmental Risk Assessment

Hazard category - What might cause harm?

		S	H	E
1	Fall from height	☑	☑	☐
2	Fall on same level	☑	☑	☐
3	Fall Down stairs/steps	☑	☑	☐
4	Struck by moving object	☑	☑	☐
5	Struck by falling object	☑	☑	☐
6	Struck/trapped by something collapsed/overturned	☑	☑	☐
7	Trapped between objects	☑	☑	☐
8	Step on/struck against stationery object	☑	☑	☐
9	Manual Handling (Is separate MHA required?)	☑	☑	☐
10	Contact with tool/equipment/machinery	☑	☑	☐
11	Contact with flying particle	☐	☐	☐
12	Contact with electricity	☑	☑	☐
13	Contact with/exposure to oil/water pressure	☐	☐	☐
14	Contact with/exposure to heat/cold	☐	☑	☑
15	Contact with/exposure to hazardous substance	☐	☐	☐
16	Exposure to noise	☑	☑	☐
17	Exposure to vibration	☐	☐	☐
18	Repetitive motion/action	☐	☐	☐
19	Collision	☑	☐	☐
20	Fire/flammable Atmosphere	☑	☑	☑
21	Explosion	☐	☐	☐
22	Drowning	☑	☑	☐
23	Asphyxiation	☐	☐	☐
24	Loss of containment/unintentional release	☐	☐	☐
25	Adverse weather conditions	☑	☑	☐
26	Sharp objects	☑	☑	☐
27	Exposure to ionising radiation	☐	☐	☐
28	Oxygen enrichment	☐	☐	☐
29	Exposure to fumes or dust	☐	☐	☐
30	Young persons	☐	☐	☐
31	New or expectant mothers	☐	☐	☐
32	Environmental threat	☐	☑	☑
33	Other[3]	☑	☑	☐

Quantifying the Risk		No injury, damage or env impact	Minor injury, damage or env impact	Major injury, damage or env impact	Fatality, building loss, catastrophic env impact
		0	1	2	3
Almost no probability	0	L	L	L	L
A small probability	1	L	L	M	H
A high probability	2	L	M	H	H
Almost certain	3	L	H	H	H

Tolerable	Intolerable

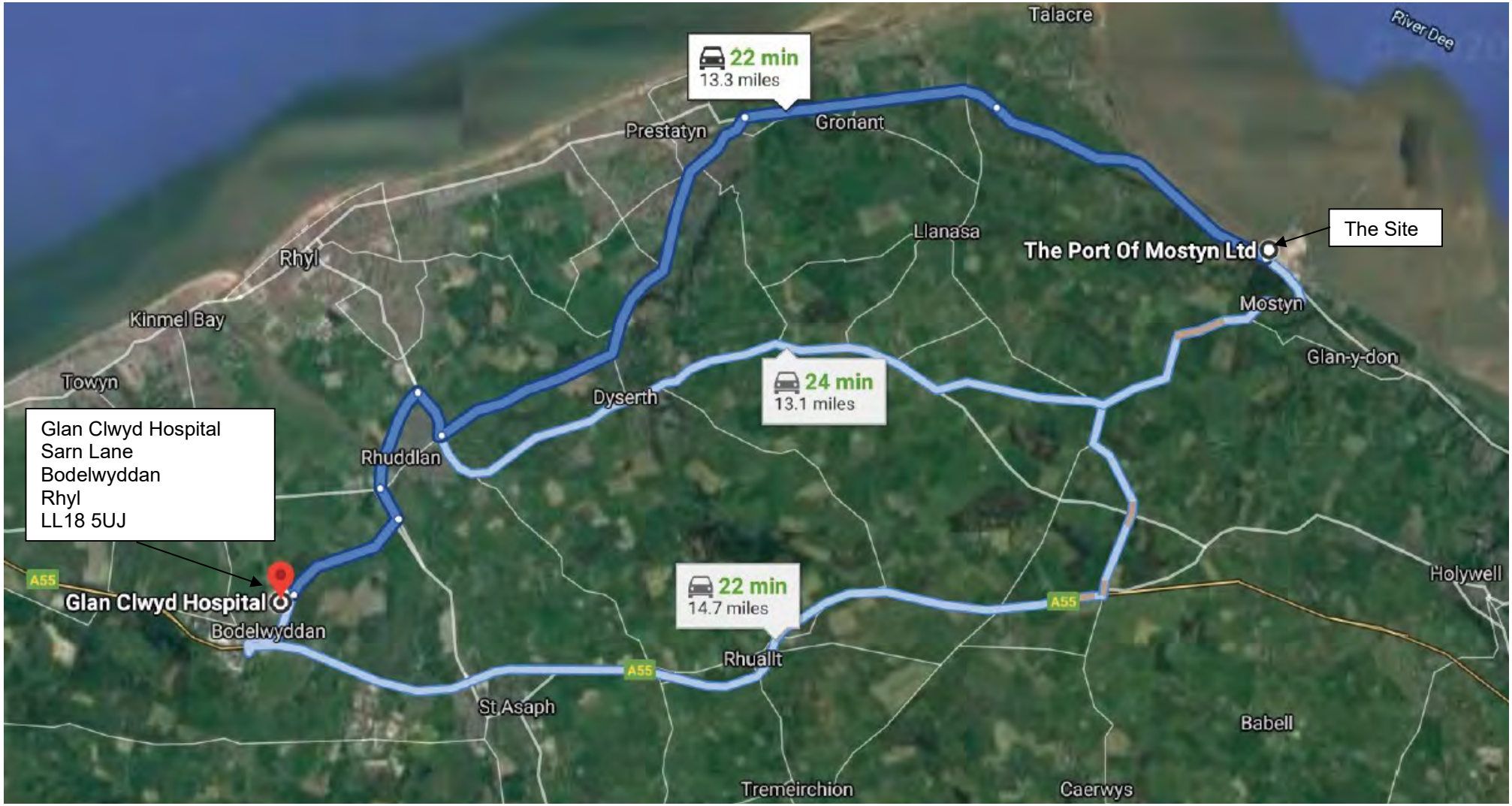
Operatives

I confirm I have read and understood the risk assessment and have had the opportunity to raise any concerns

Name	Signature	Date

Revalidation/review

I confirm I have been briefed and understand the changes to the risk assessment (noted overleaf) and have had the opportunity to raise any concerns

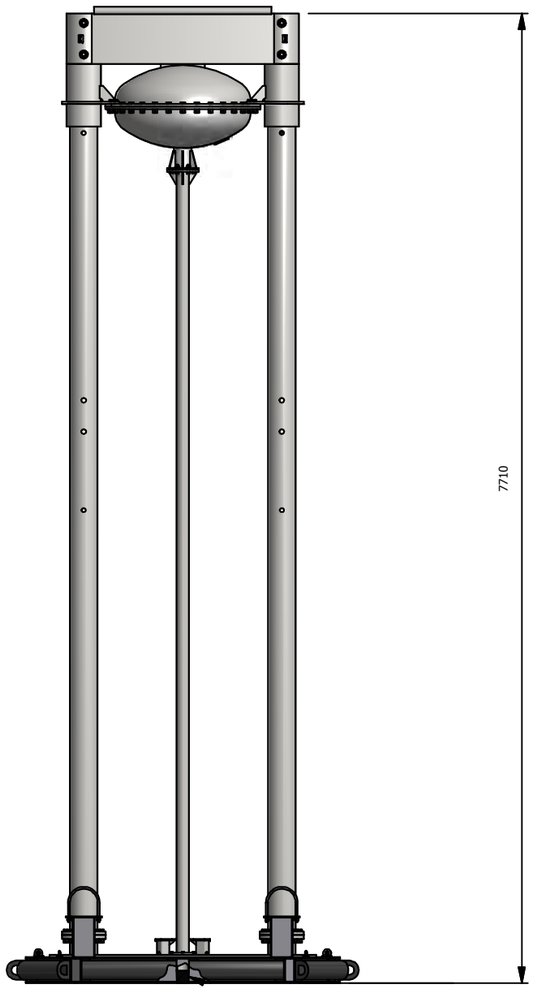


IN SITU SITE INVESTIGATION	**Contract:** River Dee Ground Investigation		
	Drawing Title: Hospital Location Plan		
Drawing No: PRELIM/HLP	**Date:** May 2020	**Scale:** NTS	**Drawn by:** MT

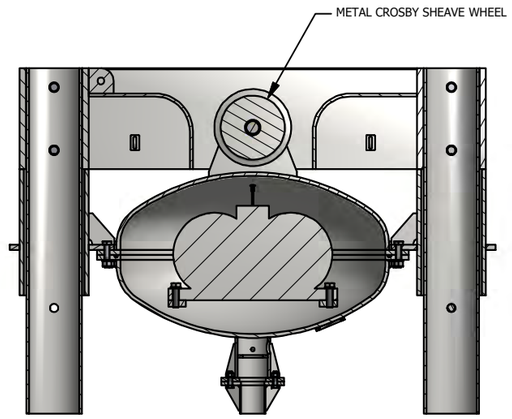
GeoForce TECHNICAL SERVICES LTD

High Performance VibroForce Corer

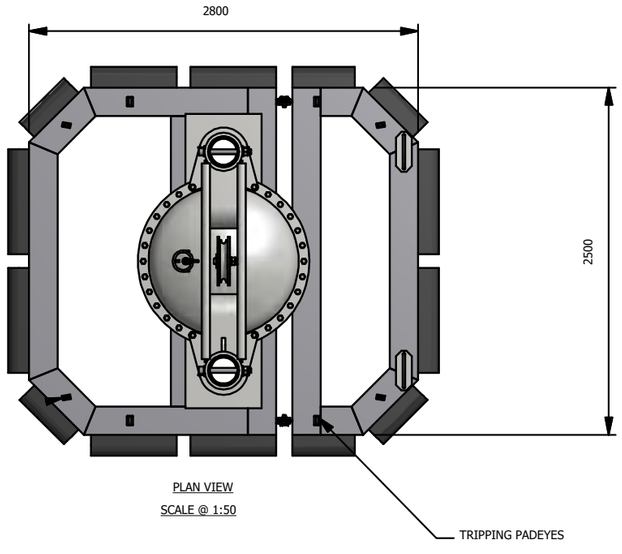
- Robust, Reliable and Efficient design and operation
- 3m/6m Configurations with 85mm Core Sample
- Power requirements: 3 Phase 400 V ac @ 60hZ
- 89kN High Power Centrifugal Force
- Dedicated Constant Tension Winch for Safe operations
- Variable core catchers for optimized sediment recovery
- Integrated pull reduction sheave to reduce pullout/lifting requirements.



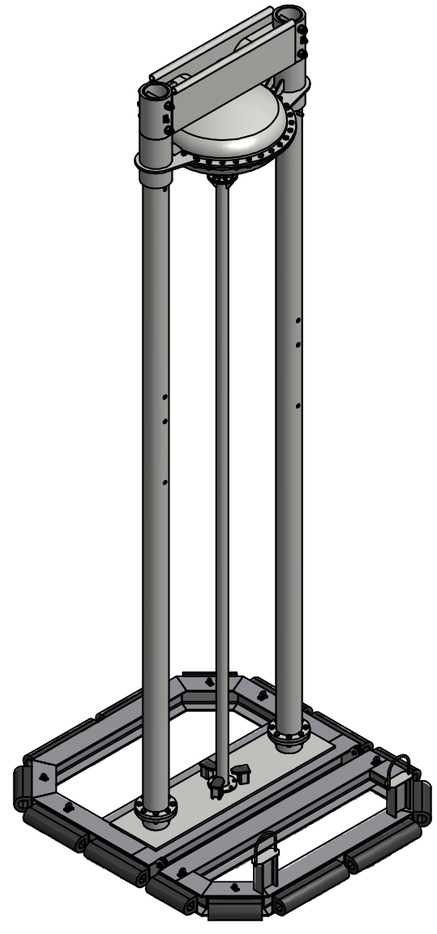
SIDE ELEVATION
SCALE @ 1:50



SECTION DETAIL
SCALE @ 1:50



PLAN VIEW
SCALE @ 1:50



3D ELEVATION
SCALE @ 1 : 50

Annex 7

SEABED CONE PENETRATION TESTING METHOD STATEMENT

River Dee Ground Investigation

Issue / Revision Description: **Issue 2 – CPT Method Statement**		Date: **Issued 29/05/20**		
Development:	Title & Company	Name	Signature	Date
Author:	Senior Geologist – InSitu SI	Mathew Taylor		29/05/2020
Reviewed by:	Managing Director – In Situ SI	Darren Ward		29/05/2020
Document Status:				
ISSUE 1				

Client:		Contractor:	
	Jim O'Toole **Mostyn** **Holywell** **Flintshire** **CH8 9HE**	IN SITU SITE INVESTIGATION	**InSitu SI** **Innovation Centre,** **Unit 23,** **Highfield Drive,** **St Leonards On Sea,** **East Sussex,** **TN38 9UH**

CLIENT ACCEPTANCE

Name of Lead Reviewer	Jim O'Toole

Any subsequent variation to this method statement must be accepted by the client. Any such variations shall be formally recorded and signed by both parties.

No.	Comments

1.0 SCOPE OF WORKS

InSitu SI have been instructed by Jim O'Toole to carry out cone penetration testing (CPT) on the River Dee Ground Investigation.

It is anticipated that 3 days cone penetration testing will be required at approximately 14 No. locations with a target depth of 20m, although the actual test locations are to be confirmed on site.

Inferred ground conditions for the site are superficial alluvial river estuary deposits over the Carboniferous Coal Measures / Bunter Sandstone Formations.

2.0 EMERGENCY CONTACT DETAILS

The following InSitu SI / GeoForce staff will be involved in the project:

- Mr James McDonald. GeoForce CPT Operator

  james.mcdonald@geoforcetech.co.uk – 07769 730612

- Mr Mathew Taylor. ISSI Senior Geologist

  mathewtaylor@insitusi.com - 07584160543

- Mr Darren Ward. Managing Director and overall responsibility for the cone penetration testing contract.

  darrenward@insitusi.com 07917823541

The nearest hospital to the site with an Accident & Emergency department is:

- Glan Clwyd Hospital
  Sarn Lane
  Bodelwyddan
  Rhyl
  LL18 5UJ

  Tel: 01745 583910

The location of the Accident & Emergency department relative to site is shown on the attached Hospital Location Plan, document reference PRELIM/HLP attached to this document.

3.0 HEALTH AND SAFETY REQUIREMENTS

Prior to InSitu SI / GeoForce staff mobilising to site, they will receive an InSitu SI Project and Method Statement/Risk Assessment briefing. Upon mobilisation to the site and prior to commencing any work, they will also receive a site-specific induction from Jim O'Toole.

The CPT operator is responsible for wearing the required PPE during the works, which for this contract is considered to be:

Hi-Vis Jacket & Trouser or Overalls
Life Jacket
Safety Boots
Hard Hat
Gloves
Eye Protection

Specific instructions regarding actual the test location and requirements will be provided to the CPT operators by the clients site representative. The positioning of the vessel and deployment of the rig to the seabed will be the responsibility of the vessel captain and deck operatives under guidance from the ISSI / GeoForce CPT operators, performing the test will be the responsibility of the CPT operatives.

4.0 DEFINITION

The CPT is an in-situ test carried out to identify material types and assess geotechnical parameters of the ground for engineering design.

The test is performed by pushing an instrumented cone into the ground on the end of push rods, mounted in a suitable rig. Pushing capacities of up to 20 tonnes are normally used, requiring a suitably heavy vehicle for reaction. On this contract the tests are to be carried out using a specialist offshore 4.5 tonne capacity Neptune 5000 Marine Seabed CPT Unit utilising a 20m coiled push rod system.

Figure 1: Neptune 5000 CPT Unit.

The cone penetrometer contains electronic load measuring transducers to measure the forces generated during penetration on the end of the cone (the cone tip) and on a section of the side of the cone (the friction sleeve). The electronic signals are relayed by an umbilical cord threaded through the push rods to a readout and logging device on the deck of the survey vessel. The total depth of penetration achieved during the test is also recorded.

The cone is fitted with an inclinometer to measure deviation from the vertical to allow the operator to terminate tests before breaking the push rod string due to excessive bending. The inclinometer data can also be used to correct the penetration length achieved for vertical depth.

The cone can also be fitted with a pressure transducer to measure the pore pressure – these cones are known as piezocones. It should be appreciated that pore pressures measured during penetration are dynamic pore pressures, i.e. pore pressures generated through deformation of the soil in excess of the ambient pore pressure in the ground due to the standing groundwater level.

The filter element connected to the pore pressure sensor of a piezocone can be located in one of two positions, on the face of the cone tip (u_1 location) or on the cone tip shoulder (u_2 location). During penetration the pore pressure response observed will vary according to the filter element position and the soil type. For testing in over consolidated stiff clays with a filter in the u_2 position it is quite possible for pore pressures to be developed that are less than the ambient pore pressure due to the groundwater level, and even negative dynamic pore pressures at times may be observed.

5.0 PROCEDURE

Cone Penetration Tests will be performed to BS EN ISO 22476-1. Penetration will be a constant 20mm/s (+ 5mm/s) throughout the stroke and the readings shall be recorded at intervals no greater than 25mm.

5.1 Cone Calibration

All cones and recording equipment will have been calibrated for use in a wide range of soil types and consistencies. Copies of all calibration certificates will be available for inspection on the rig.

Zero values for each cone are recorded via the automated software before and after each test to ensure there is no drift of the strain gauges during the test. At the start of each day and several times during the shift the cone seals are inspected and cleaned to ensure their integrity.

5.2 Test Procedure

At each test location the CPT unit (Figure 1 above) will be lowered to the seabed from the deck of the multi-cat survey vessel “Vital” (Figure 2 below) using either the vessel crane or primary deck winch (or a combination of both), this shall be dependent on the water depth and marine conditions present at each test location, with the method deployed being at the sole discretion of the vessel captain. The launch and recovery of the unit from the deck shall be undertaken by the deck operatives onboard under the supervision of the ISSI / GeoForce CPT operator. The CPT unit will be positioned over each survey location using the vessels navigational GPR positioning system.

Figure 2: “Vital” Multi-Category workboat.

Once deployed on the seabed additional line will be paid out from the crane/ winch to allow the vessel to hold position without moving the CPT unit while the test push is completed. The ISSI / GeoForce CPT operator will then complete the test push (approximately 10min duration). On completion of the test, the operator will inform the lift operator that the unit can be safely recovered to deck. Measured data from the cone will be transferred through an analogue-digital converter to the system control cabin on the ship's deck via a control umbilical, preventing the possibility of signal degradation during data transmission.

Stored data include:

- Penetration
- Cone Resistance
- Sleeve Friction
- Pore-Water Pressure.

The results of each test are presented in graphical format on a single sheet. In deriving parameters, all measured data values should be in consistent units.

Test advance may be halted for a number of reasons including but not limited to exceeding minimum required test depth, exceeding maximum allowable cone tip resistance, reaching maximum available thrust capability, exceeding the acceptable level of damage risk to equipment. CPTs will be interrupted when one of the following threshold conditions is met:

- objective end-depth is reached
- total pushing force exceeds expected criteria
- sudden increase of deviation of the seabed frame of 3° or more
- tip resistance Qc exceeds expected criteria
- obstacles are encountered
- there is a risk of damaging equipment or harming personnel or bystanders.

NOTE: The push capability of a coil rod system is dependent on several factors, the system and cones itself has a 70 MPa capability however this should be considered as the theoretical system capability and is very hard/ impossible to reach. The target depth is mainly dependent on soil type and coil support. ISSI's experience in the past with over 3000 CPT tests is that refusal will occur if any of the above factors are encountered and max tip pressure will be in the range of 22-30 MPa.

NOTE: Regarding pore pressure - ISSI will only supply cones with pore pressure filter placed on shoulder (U2 position).

At each location a total of two number attempts (if required) will be made to retrieve a representative data set. Any re-attempt shall only take place if the ISSI / GeoForce operator is satisfied that there is minimal risk of damage to the equipment.

Sediment conditions, such as coarse sediment or bedrock, may be limiting.

5.3 Data Recording Prior to Testing

The following information shall be recorded prior to the commencement of each test.

- Project name
- Client name
- Project location
- CPT test number

- CPT location (x, y coordinates)
- Cone type used
- Start time
- Zero-values of CPT parameters

Each CPT sheet will show the variation of measured and derived parameters with depth, and includes:

- cone resistance, uncorrected for geometric effects and for pore-water pressure induced during penetration, qc
- cone sleeve friction, fs
- friction ratio, the ratio of the measured cone sleeve friction to the measured cone resistance (expressed as a percentage, Rf (%)); this parameter may be used to estimate soil type and in-situ behaviour of the soil
- measured pore-water pressure, u2.

6.0 WEATHER

Information on the weather for the coming 48 hours will be obtained continuously from different sources, which gives the weather forecast for the survey area(s).

The operation will be aborted if it is deemed unsafe to successfully launch and recover the CPT unit to the vessel deck. The maximum typical safe working wave height is 0.5 to 1.0m during a geotechnical survey of this type. The survey staff will inform the clients site representative who, in agreement will abort the works for weather standby. The vessel's captain will be responsible for handling of the vessel and for the vessel's safety. The captain's decision regarding vessel safety will not be negotiable.

7.0 ENVIRONMENTAL CONSIDERATIONS

The River Dee Estuary is classified as a SSSI – Ramsar Site – SAC and SPA with the presence of migratory birds and cockle beds formerly noted.

The following measures shall be adopted during CPT operations in order to minimise the impact on the estuary / marine environment:

- All site operations over intertidal areas shall be undertaken over high tide periods
- CPT sampling shall only be carried out within +/- 10m of the pre-agreed sampling locations provided by the client within the designated survey corridor.
- Support vessel movements shall be restricted to the existing shipping channels within the estuary and a designated corridor along the proposed survey route.
- Sampling shall be carried out using a specialist CPT rig consisting of a single self-contained unit specifically engineered to minimise its impact on the marine environment. The CPT mechanism produces no noise as it runs using a silent electronic drive motor unit.

- The CPT unit will operate using an electrically powered motor utilising power supplied via a control umbilical from the support vessel power supply. Removing the requirement for fuel to be carried onboard by the survey team during operations.
- The CPT unit will arrive on site clean and fully inspected / serviced. The rig shall also be constantly inspected for defects and cleaned by the operators onboard the support vessel following its deployment at each sampling location. The rig will be thoroughly cleaned and inspected prior to de-mobilisation on completion of survey operations.
- No waste is generated during CPT operations.

8.0 REFERENCES

AGS : 2017 : Electronic transfer of geotechnical and geoenvironmental data (Edition 4.0.4 February 2017). Association of Geotechnical and Geoenvironmental Specialists.

BRE A simple guide to in-situ ground testing. Part 2: Cone penetration testing. 2003

BS EN ISO 22476-1. Geotechnical investigation and testing – Field testing – Part 1 : Electrical cone and piezocone penetration tests.

Lunne T, Robertson P K, Powell J J M : 1997: Cone Penetration Testing In Geotechnical Practice. Blackie Academic & Professional

9.0 BRIEFING ARRANGEMENTS

- Upon first arriving on site, **ALL** persons shall receive a Site Induction from a Supervisor, Manager or delegated competent person.
- This Method Statement shall be briefed out to **ALL** persons at risk PRIOR to the commencement of activities on site.
- *I confirm I have been briefed and fully understand this Method Statement, I have also had the opportunity to raise any queries relating to the tasks that are to be carried out. I will not deviate from the contents of the method statement and if anything does change whilst carrying out the work I will stop and seek advice from a superior.*

Name:	Company:	Role:	Signed:	Briefed by:

Occupational Health, Safety and Environmental Risk Assessment

Activity/task	**Cone Penetration Testing**			
Relevant documents	ISSI-MS05 Seabed Cone Penetration Testing MS			
Project/contract location	**River Dee GI**	**Document Reference:** PRELIM-ISSI-MS05-002	**Contract N°**	PRELIM

IN SITU SITE INVESTIGATION

Work must not proceed until the level of risk associated with ALL hazards is LOW

Hazard category	Groups affected			Nature of risk What might go wrong?	Risk before controls I/T	Preventative/control measures How do you stop it going wrong?	Risk after controls I/T
	P	O	M				
				The following risks are specific to undertaking Pressuremeter Testing			
1, 2, 3, 4, 5, 7, 8, 9, 10, 13, 14, 16, 19, 25	X	X		General Site Activities	**High/Medium**	InSitu staff to be inducted upon mobilisation and receive full Project briefing, including reference to all site specific hazards and risks. Any InSitu general site activities to adhere to Principal Contractors Construction Phase Health & Safety Plan.	**Low**
1, 2, 3, 4, 5, 8, 15, 25	X	X		Slips, trips and falls	**Medium**	Ensure slip and trip hazards are minimised in the working area. Keep small tools & equipment tidy and any hoses or cables away from walking routes. Ensure working area is kept as level as possible. Ensure walking routes are clear of obstructions and are not wet or slippery underfoot. Wear PPE (minimum level required: life jacket, hi-vis top and trousers, hard hat, boots, eye protection, gloves). Three points of contact to be maintained during access/egress of vessel.	**Low**
4, 5, 6, 7, 8, 9, 10, 18	X			Manual handling	**Medium**	Use mechanical means where possible. Ensure lift zones and crane/ winch line is clear of hazards,& people. Only staff familiar with handling the equipment to assist with lifting it into position to ensure no harm to instrument or people. Wear PPE (minimum level required: life jacket, hi-vis top and trousers, hard hat, boots, eye protection, gloves).	**Low**
3	X			Working in an elevated position	**High/Medium**	Use 3 points of contact when using stairs or step ladders. Hold hand rails at all times when climbing stairs. Plan movements around vessel.	**Low**
9, 10, 12, 18, 26,	X	X		Use of Hand Tools	**Medium**	Ensure all tools are in good working order with no signs of defects or damage. Ensure tools are correct for purpose. Wear PPE (minimum level required: hi-vis top and trousers, hard hat, boots, eye protection, gloves). When carrying tools, assess any manual handling risks or walking routes. Take regular breaks to avoid fatigue.	**Low**
4, 5, 6, 7, 8, 10	x	x		Struck by moving object / entrapment	**High/Medium**	Plan all movements prior to undertaking any lifting operations. Keep clear of all working parts and lifting equipment when in use. Ensure lift zones and crane/ winch line is clear of hazards,& people. Maintain high level of housekeeping at all times. Wear PPE (minimum level required: life jacket, hi-vis top and trousers, hard hat, boots, eye protection, gloves).	**Low**

Hazard category	Groups affected			Nature of risk What might go wrong?	Risk before controls I/T	Preventative/control measures How do you stop it going wrong?	Risk after controls I/T
	P	O	M				
22	X	X		Working over water / Drowning	**Medium**	Life jackets to be worn at all times when on vessels and quayside All staff to be inducted on crew transfer and vessel movement plan No Lone Working to occur on site at any time Vessel support crew to brief staff on man-overboard emergency plan prior to start of marine work. All staff to remain within railings when on working deck area.	**Low**
12, 20, 32	X	X	X	Fire	**Low**	Ensure all staff have been briefed in the main site induction. Ensure all staff know the appropriate actions to take in emergency i.e Numbers to call in emergency All staff to know the location of muster points. Fire extinguishers to be present onboard vessel.	**Low**
25	X	X		Adverse Weather (Hot/Cold/Wet)	**Low**	Wear suitable PPE, overalls to be worn on site to cover arms and legs, foul weather / water proofs as required Carry sufficient amounts of drinking water Wear sun screen on any exposed parts ie face and neck. In event of electrostatic weather all works to halt immediately, make area safe and withdraw inside vessel.	**Low**
11	X	X	X	Strong Winds i.e. (Dust hazards, catching open doors, window shutters, lifting operations)	**Medium**	No working under extreme weather conditions All lifting operations will be assessed prior to being carried out and halted during strong winds. Staff to withdraw inside vessel if strong winds expected. Daily forecast to be checked prior to each shift	**Low**
32	X	X		Environmental Impact	**Medium**	Works over intertidal areas shall be carried out over high tide periods All vessel movements to remain with pre-agreed survey corridor location. Sampling to be carried out using specialist marine plant only. CPT rig to run on electricity from support vessel, no fuel required onboard. CPT rig to be constantly checked for damage / defects during survey operations. CPT rig to be cleaned after completion of each sampling location.	**Low**
33	X	X		Site Emergency Communication	**High**	All working groups will have at least mobile phones. VHF radio present on vessel. All staff to be briefed on emergency communication procedures.	**Low**

Key
H Health; **S** Safety **E** Environment; **L** Low Risk; **M** Medium Risk; **H** High Risk; **P** People carrying out the activity/task; **O** Others working in the vicinity; **M** Members of the public

Notes
1. Where young persons or expectant mothers are involved in the activity, ensure that any additional controls are put in place in accordance with local procedures
2. In addition to the above, consideration must be given to other individuals' susceptibility due to pre-existing health conditions, eg bad back, poor hearing, etc
3. Where a hazard is identified that is not listed, enter 33 in the Hazard Category column and describe under 'Nature of risk'

	Name	Signature	Date
Person completing the assessment:	M Taylor		29-May-20
Supervisor of the work:			
Person Reviewing the assessment:			

Occupational Health, Safety and Environmental Risk Assessment

Hazard category - What might cause harm?

		S	H	E
1	Fall from height	☑	☑	☐
2	Fall on same level	☑	☑	☐
3	Fall Down stairs/steps	☑	☑	☐
4	Struck by moving object	☑	☑	☐
5	Struck by falling object	☑	☑	☐
6	Struck/trapped by something collapsed/overturned	☑	☑	☐
7	Trapped between objects	☑	☑	☐
8	Step on/struck against stationery object	☑	☑	☐
9	Manual Handling (Is separate MHA required?)	☑	☑	☐
10	Contact with tool/equipment/machinery	☑	☑	☐
11	Contact with flying particle	☐	☐	☐
12	Contact with electricity	☑	☑	☐
13	Contact with/exposure to oil/water pressure	☐	☐	☐
14	Contact with/exposure to heat/cold	☐	☑	☑
15	Contact with/exposure to hazardous substance	☐	☐	☐
16	Exposure to noise	☑	☑	☐
17	Exposure to vibration	☐	☐	☐
18	Repetitive motion/action	☐	☐	☐
19	Collision	☑	☐	☐
20	Fire/flammable Atmosphere	☑	☑	☑
21	Explosion	☐	☐	☐
22	Drowning	☑	☑	☐
23	Asphyxiation	☐	☐	☐
24	Loss of containment/unintentional release	☐	☐	☐
25	Adverse weather conditions	☑	☑	☐
26	Sharp objects	☑	☑	☐
27	Exposure to ionising radiation	☐	☐	☐
28	Oxygen enrichment	☐	☐	☐
29	Exposure to fumes or dust	☐	☐	☐
30	Young persons	☐	☐	☐
31	New or expectant mothers	☐	☐	☐
32	Environmental threat	☐	☑	☑
33	Other[3]	☑	☑	☐

Quantifying the Risk		No injury, damage or env impact	Minor injury, damage or env impact	Major injury, damage or env impact	Fatality, building loss, catastrophic env impact
		0	1	2	3
Almost no probability	0	L	L	L	L
A small probability	1	L	L	M	H
A high probability	2	L	M	H	H
Almost certain	3	L	H	H	H

Tolerable	Intolerable

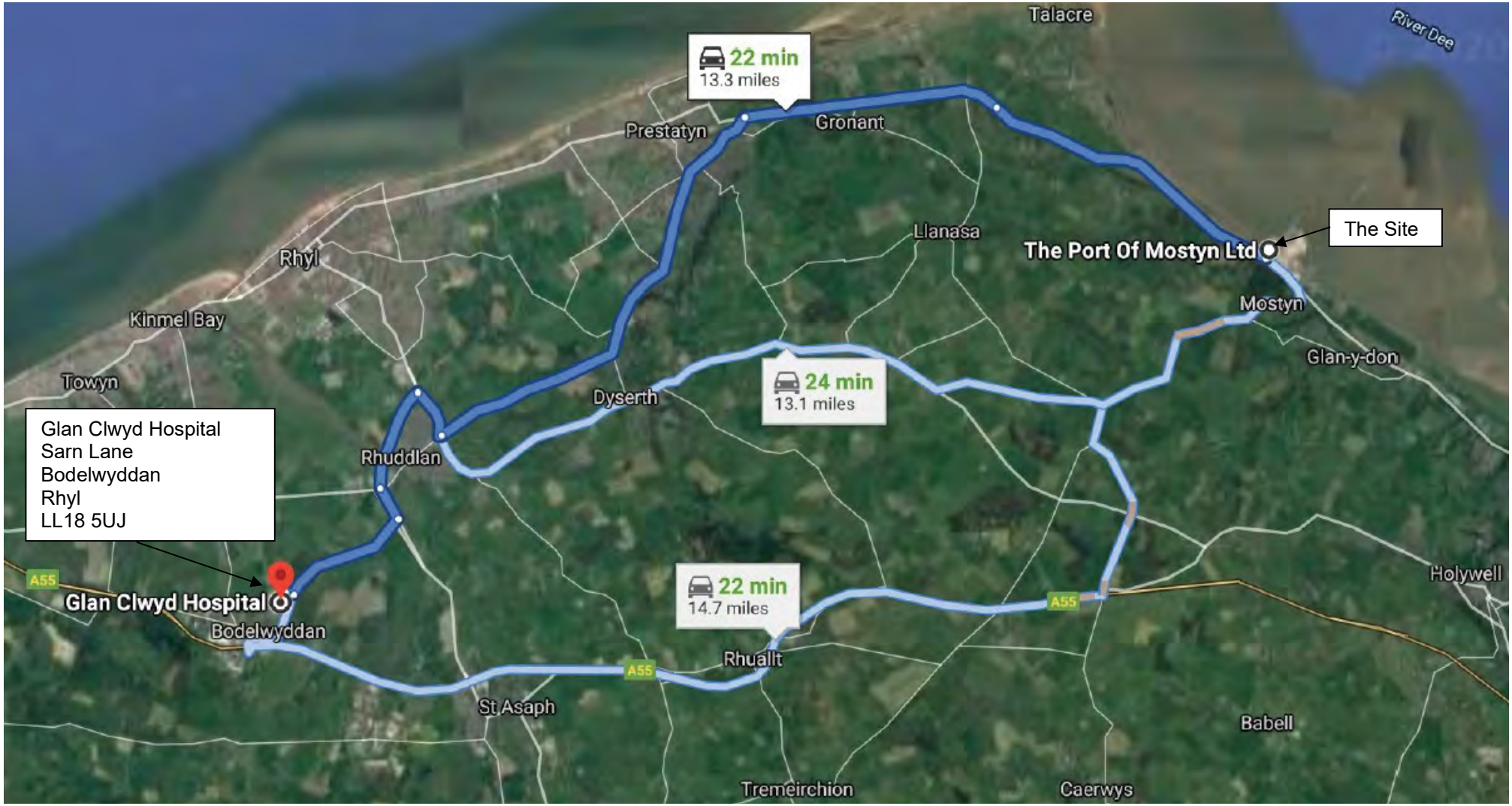
Operatives

I confirm I have read and understood the risk assessment and have had the opportunity to raise any concerns

Name	Signature	Date

Revalidation/review

I confirm I have been briefed and understand the changes to the risk assessment (noted overleaf) and have had the opportunity to raise any concerns



IN SITU SITE INVESTIGATION	**Contract:** River Dee Ground Investigation		
	Drawing Title: Hospital Location Plan		
Drawing No: PRELIM/HLP	**Date:** May 2020	**Scale:** NTS	**Drawn by:** MT

NEPTUNE 5000 35kN COILED ROD PCPT SYSTEM

In Situ Site Investigation has the capability to undertake underwater seabed / riverbed PCPT Testing, up to an operating depth of 3000m below water level, in accordance with the ISO 22476-1 standard.

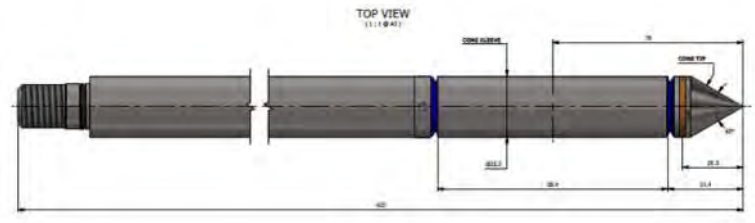
The N-5000 is a high-tech device for performing piezocone surveys from bed level using 5cm² digital non-extractive cones which penetrate the subsoil at a constant velocity of 2cm/s with a maximum achievable thrust of 35kN.

The innovative system of rods and drum has resulted in the Development of this compact, easily manoeuvrable unit, which can reach up to 20m penetration depth in ideal soil conditions. The rod system has an exterior diameter of 19mm and is made of flexible stainless steel.

The survey operation is controlled and monitored from a support vessel using dedicated software that allows real time data capture and graphical visualisation of cone resistance (qc), sleeve friction (fs), excess pore pressure (u2), penetration depth and cone inclination, along with unit tilt at bed level.

The N-5000 unit is easily transported by road to site and is lifted directly from a quayside onto an awaiting survey vessel. The seabed units provide very a rapid deployment method allowing multiple PCPT tests to be undertaken within a very short period of time. Each test can also be undertaken without the requirement to deploy a static marine platform or pontoon for shallow water and nearshore investigations.

At each test location, the 4500kg unit can be lowered down to bed level from the deck of a support survey vessel using an onboard mounted crane, hi-ab or deck winch, additional line is then paid out allowing the vessel to hold position without moving the PCPT unit while each test push is completed. Measured digital data from the cone is transferred through a control umbilical cable to the top side system control cabin on the vessel deck, allowing real time observation of the ongoing test parameters. Each test takes approximately 20 minutes to complete then the unit can be safely recovered to the vessel deck, ready to move onto the next test location.



	Neptune 5000 PCPT System
Generic type	Underwater coiled rod PCPT system
Unit dimensions	Length 2.2m x Width 2.2m x Height 2.6m
Dry weight	4,500kg
Underwater weight	3,700kg
Thrust	35kN
Penetration length	5m, 10m, 20m (coiled rod assembly)
Maximum operating depth	3000m (below water level)
Cone type	5cm² PCPT digital piezocone (75cm² sleeve surface area)
Power requirement	240Vac 1ph 50/60hz
Umbilical voltage	600Vac
Penetration speed	2cm/s +-10%
Range / accuracy	Tip >100kPa, Sleeve >5kPa, Pore pressure >3.5kPa-15kPa
Unit structure sensors	Tilt +-30˚, Altimeter, Hydrostatic pressure
Deployment	Deployed from support vessel to underwater bed level test location via crane, hi-ab or deck winch. (8t minimum lift capacity required)
Preferred ground conditions for use	Suitable for superficial deposits up to stiff clay / dense sand.
Limiting ground conditions	Requires adequate rod support from overlying strata. Unable to penetrate very stiff / very dense or coarse material.
Derived parameters	Cone tip resistance (qc), Sleeve friction (fs), Excess pore pressure (u2)

Annex 8

PORT OF MOSTYN

RIVER DEE – SITE INVESTIGATION

R7M-519030-MST-001

This Sheet Must be Completed at Each Revision Once Approved for Issue

Prepared By	Andy Ramsey	Project Engineer	
Checked By	Jacob-Ben-Arie	Lead Engineer	
Approved By	Matt O'Sullivan	Marine Operations Manager	
Review Period	After Any Significant Variations on Site		

Rev	Date	Description	Prep	Chk	Appr
C0	19/09/2019	Original Document Produced	ARA	JBA	MOS

Document Signatures

Produced by: Andy Ramsey **On behalf of Red7Marine**

Position: Project Engineer **Date:** 19/09/2019

Signed:

Checked by: Jacob-Ben-Arie **On behalf of Red7Marine**

Position: Lead Engineer **Date:** 19/09/2019

Signed:

Approved by: Matt O'Sullivan **On behalf of Red7Marine**

Position: Marine Operations Manager **Date:** 19/09/2019

Signed:

Revision History

Rev	Date	Description	Revised By
C0	19/09/2019	Original Document Produced	ARA

Accompanying Documents

Document Reference	Description	Rev	Date	Approved By

Table of Contents

1 Introduction

This document has been produced to detail the procedures and methodology involving Red7Marine's supplied Jack-Up Barge which is being utilised to assist with the Client Port of Mostyn Ltd. in their Site Investigation works located along an approximately 6. 5km stretch of the River Dee ".

It should be noted that this document has been produced as a guide and is subject to change pending the site conditions on the day of operation. The Project Manager, Barge Master and other relevant parties are to agree any variations from those outlined within this document. Furthermore, this document is to be used in conjunction with other third parties' RAMS and documentation which is supplied with this Health and Safety document.

Refer to Appendix D Variations Record Sheet to record any variations to the designated procedure.

1.1 Abbreviations

ALARP	As Low As Reasonably Possible
HIRA	Hazard Identification & Risk Assessment
HSE	Health & Safety Executive
IJUBOA	International Jack Up Barge Owners Association
IMS	Integrated Management System
JUB	Jack Up Barge
R7M	Red7Marine I&C Ltd
RAMS	Risk Analysis Management Systems
TBT	Tool Box Talk
WAH	Working at Height

2 Contacts

2.1 Red7Marine Contacts

Name:	Matt O'Sullivan	**Address:**	Harbour Landing, Fox's Marina, Wherstead, Ipswich, IP2 8NJ, United Kingdom
Position:	Marine Operations Manager		
Tel:	+44 (0) 1255 886 710		
Mob:	+44 (0) 7375 444 094		
Email:	Matt.OSullivan@r7m.co.uk		
Notes:	Matt has overall responsibility for R7M operations		

Name:	Simon Benham	**Address:**	Harbour Landing, Fox's Marina, Wherstead, Ipswich, IP2 8NJ, United Kingdom
Position:	Logistics Manager		
Tel:	+44 (0) 1255 886 710		
Mob:	+44 (0) 7748 636 676		
Email:	Simon.Benham@r7m.co.uk		
Notes:	Simon arranges all logistics including transport schedules		

Name:	Perry Marvan	**Address:**	Harbour Landing, Fox's Marina, Wherstead, Ipswich, IP2 8NJ, United Kingdom
Position:	Marine Superintendent		
Tel:	+44 (0) 1255 886 710		
Mob:	+44 (0) 7584 672 842		
Email:	Perry.Marvan@r7m.co.uk		
Notes:	Perry will take overall management of R7M's operations on site including arranging labour and supervising the physical works		

Name:	Jacob Ben-Arie	**Address:**	Harbour Landing, Fox's Marina, Wherstead, Ipswich, IP2 8NJ, United Kingdom
Position:	Lead Engineer		
Tel:	+44 (0) 1255 886 710		
Mob:	+44 (0) 7908 478 731		
Email:	Jacob.ben-arie@r7m.co.uk		
Notes:	Jacob carries out calculations for site specific works		

3 Barge, Vessel & Plant Details

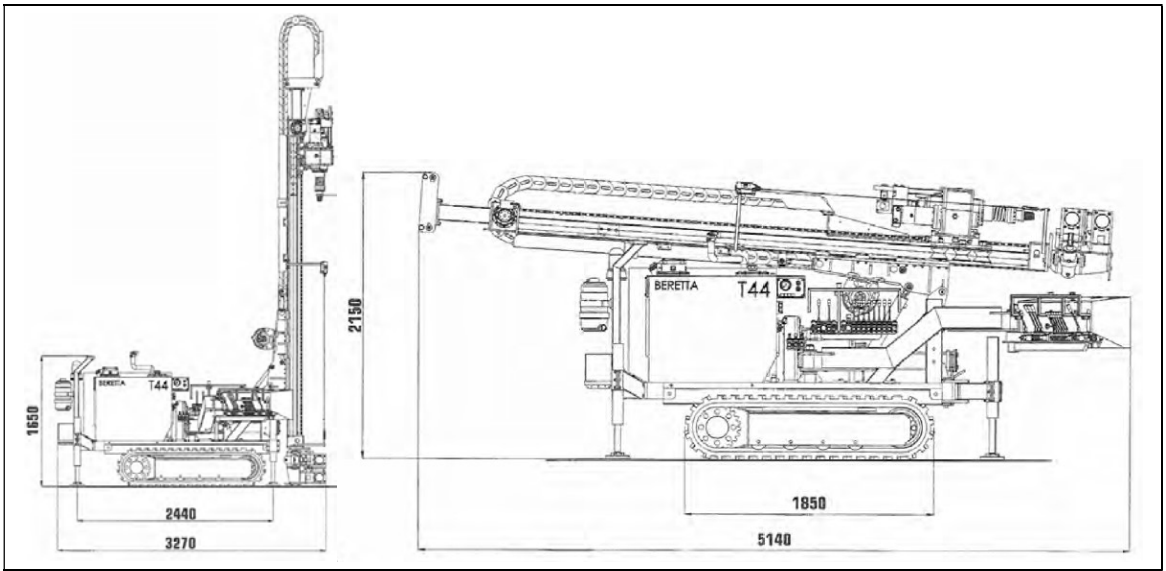
3.1 Barge Information

The Haven Seajack 3 is 18.30m in length, 18.30m wide and has a hull depth of 1.52m. The barge is equipped with 4 number of legs 0.76m diameter 27m long legs in 2 sections. Additional information of the barge can be found in the table below.

Vessel Type	S50 Flexifloat Modular Self Elevating Platform
Classification	MCA Workboat Certificate
Length	18.30m
Breadth	18.30m
Depth	1.52m
Deck Area	298m²
Maximum Leg Length	27m – (Lower leg 19m / Extension 8m)
Lightship Weight	215 Tonnes
Maximum Deck Load	100 Tonnes

3.2 Drilling Rig Information

Depending on the case conditions or specific restrictions applied onsite, the drilling rig DCR 12 Beretta T44 with a gross weight of 4500kg may either be lifted or tracked onto the Jack-Up Barge. The rig will be fully rigged on site prior to being mobilised onto the barge and will have a fully trained and competent operative team to carry out the relevant tasks. The drilling operations are outside of the scope of this document and are to be performed under a third party's Health and Safety documentation.



Height – Travelling / Operational:	2150mm / 6280mm
Length - Travelling / Operational:	5140mm / 3270mm
Width - Travelling / Operational:	1000 – 1400mm / 1000 – 1400mm
Max Torque:	7874Nm
Rotation Speed:	0 – 352rpm
Drilling Diameter:	258mm
Max Clamping Diameter:	258mm
Max Pullback Force:	43.15kN
Max Stroke:	3300mm
Winch – Max Direct Pull:	5.88kN
Drive Tracked:	Rubber
Ground Pressure:	52.55kN/m²
Typical Noise Levels at 1m:	81dBA
Weight:	4500kg

4 Location of Operation

Details of Operation Location			
Location	River Dee		
Red7Marine Project Number	xxxxxx		
Aerial Overview			
Sufficient Access to Site	☒ Yes / ☐ No	Details	Rig previously transported to site
Sufficient Rigging Space	☒ Yes / ☐ No	Details	Rig previously been rigged at site
Safe Access/Egress	☒ Yes / ☐ No	Details	Barge will be alongside quay with walkways provided by client.
Overhead Obstructions	☐ Yes / ☒ No	Details	None on site
Slew Path Obstructions	☐ Yes / ☒ No	Details	Any items present are movable
Underground Services & Voids	☐ Yes / ☒ No	Details	Area to be checked prior to operation by onsite team
Additional Comments	Other relevant details and restriction are not to R7M's knowledge. All non-essential personnel must be excluded from operating area. Plant have previously operated in this area. All plant operatives working on site will be required to hold valid industry standard training certificates for the plant/equipment they are required to operate on site. R7M will inspect all operatives' original certification prior to commencement of operations. Copies will be made available for inspection.		
Diagram/Sketch of Area Included	☒ Yes / ☐ No	Details	

5 Methodology

The methodology at the River Dee project involves the production of 10 rotary boreholes which will require to have 0-20m open hole drilling with dynamic sampling and insitu SPT / U100 testing and approximately 0-15m rotary coring. After the relevant boreholes have been drilled and the relevant testing and samples have been taken and recorded, the boreholes will be backed filled by grouting in the rock section.

The Haven Seajack 3 will arrive to the location of mobilisation at the Port of Mostyn by road and assembled onsite. The methodology to mobilise the Jack-Up Barge can be found in the Red7Marine Haven Seajack 3 Vessel Operations Manual. All the plant and equipment required to carry out with the project will be mobilised at Mostyn Port.

This document is to be used in conjunction with Solmek's RAMS documentation regarding drilling works at the 23 designated borehole locations, see Appendix C for more details. The drilling operations will be carried out by Solmek and their own competent operatives.

Operation Procedure / Method Statement		
Step	Description of Task	✓
	**EVERY PERSON ON SITE HAS A DUTY TO ENSURE THAT THEY DO NOT PUT THEMSELVES OR OTHERS AT RISK.**	
	All persons involved in the operation are to have a prestart briefing where the operation and method statement will be explained along with all person's role within the operation. Having accepted the procedure and clarified any queries, all parties will sign up to this general methodology for the operation.	
	All appropriate PPE including Hi-Vis, safety boots, hard hats and life jackets (when working near the quay edge or on the barge) are to be worn at all times during the operation.	
1.	The Barge Master will ensure that all operatives who are not R7M employees have the adequate certification and are competent to carry out the planned drilling works. If the Barge Master deems any individual unfit for work, the employee in question will be removed from site accordingly.	
2.	The Jack-Up Barge will be delivered to Port of Mostyn via road. Refer to the Vessel Operations Manual for more details for barge mobilisation.	
3.	The Jack-Up Barge will arrive at Port of Mostyn located at the River Dee which is approximately 1km from the first borehole location. When the Barge has been mobilised (Refer to Chapter 5.1 for Jack-Up Barge Mobilisation) and secured at its intended quayside at Mostyn Port, preloading operations can then commence in preparation for the tracking of the Drill Rig onto the deck.	
4.	When the Jack-Up Barge has been adequately preloaded and all relevant parties are satisfied to continue, the next step will be to mobilise the drilling rig by either lifting or tracking onto the deck of the Jack-Up Barge. Refer to chapter 5.3 for tracking details.	

5.	After the drilling rig has been mobilised on the deck of the Jack-Up Barge and all items have been securely seafastened to the deck, preparation for the towage of the barge to the first borehole location can then commence. NOTE: The client will be informed of the barge's movement prior to towage to ensure the client is satisfied to continue or to discuss through any concerns that may arise.	
6.	Ensure all final checks have been carried out i.e. signing up to the RAMS and daily briefs sheets, stability calculations, seafastening, mooring lines and environmental factors have been taken into account before the final decision has been made to utilise the supporting vessel to tow the barge to the first agreed borehole location.	
7.	The supporting vessel which will be secured to the barge and will manoeuvre the barge to the confirmed borehole location prior to departure. The decision which borehole will be drilled first will need to be discussed and agreed with the client.	
	Port of Mostyn will need to set in place a procedure which will be followed accordingly between the Barge and the Harbour Master from the outset regarding sequencing, booking pilots and gaining the relevant permissions etc. Barge Master and Tug Skipper will communicate with VTS and Harbour Master prior and during barge moves.	
8.	In order to position the barge accurately, Solmek will need to provide their Site Engineer to assist with the positioning accordingly during the barge movements. Communication will be via radio.	
9.	Depending on the circumstances and conditions on the day of the barge positioning, the Barge Master may take the decision to drop a selected leg and utilised the lowered leg to "walk" the barge more accurately. This will be at the Barge Master's discretion.	
10.	When the Jack-Up Barge has been positioned at the intended borehole location, the barge can then be jacked up and preloaded in accordance with R7M standards.	
11.	Only when the Jack-Up Barge has been preloaded and jacked up to working height, the Barge Master can now permit the drilling operators to carry out their relevant drilling works.	
	Ensure the third party's permit to drill has been explained and signed by all the relevant operatives on site before commencing any works.	
12.	All drilling works on the 23 boreholes utilising the drilling rig will be operated by a third party and all the planned methodology of drilling along with the dynamic sampling, backfilling of the borehole and geotechnical testing are to be performed under the third party's own checked and approved Health and Safety documentation. Refer to Appendix C for Solmek's Drilling Operations RAMS.	
13.	Ensure there is always a minimum of two operatives operating the drill rig.	
14.	Ensure all third party's have conducted their standard pre-start, running and shutdown checks in accordance with their own and the drill rig's manufacturer's instructions.	
15.	Assess the position of the drill rig located at the Jack-Up Barge Moonpool and ensure it is secured and levelled accordingly. The rig will be self-levelled and stabilised by lowering the hydraulic ram outriggers on to wooden blocks to support the rig body and spread the load.	
16.	Ensure there are no overhead obstructions that may make contact with the rig's mast.	

17.	Once the mast is in the raised position (vertical) the Lead Driller will confirm the absolute verticality of the mast with a bubble level. The level will be corrected if required by using the hydraulic ram outriggers. When the verticality is confirmed any securing pins shall be placed and secured as per the manufacturer's instructions.	
18.	When all standard checks have been completed and followed accordingly, the drilling operations of the borehole can commence.	
19.	Every drill rod that would require to be added, it will be lifted into position using the rig winch and then the additional drill rod can be screwed in by hand and secured accordingly.	
20.	When the drill string is in position, a competent operative will then enclose the drill head within the protective safety cage and then step a safe distance away when ready.	
21.	A competent operative will operate the drill rig by rotating and advancing the drill string. The rotation speed and rate of penetration will be influenced by the penetrated stratum which may largely vary as the operation is progressing. This must be constantly monitored throughout, and the drilling parameters will need to change accordingly as the borehole drilling is progressing.	
22.	After all samples required from the borehole have been taken, the borehole will be adequately backfilled with bentonite and cement grout. Any excess spoil will be removed to the site skip for appropriate disposal.	
23.	After the first borehole drilling works have been carried out, the same methodology will be applied for the rest of the remaining boreholes. Refer to the Chapter 5.2 for more details on barge movements. NOTE: Throughout this project all external factors i.e. the weather, wind and tides etc will determine the outcome of the final decision the Barge Master makes before any actions is taken. If there are difficulties encountered during the drilling operations of boreholes, eg significant core loss, borehole wall instability, loss of flush returns, the Lead Driller must inform the Barge Master along with the Project Manager who will decide what appropriate action to take.	
	Throughout the project, all personnel on the Jack-Up Barge will transfer to and from the barge at the beginning and end of each working shift by transfer boat via concertina ladder with the barge at the end of each working shift preloaded accordingly and jacked up to a safe height. The Jack-Up Barge will remain in position.	
24.	When all 23 boreholes have been drilled and the required soil samples have been collected and recorded. The Jack-Up Barge will be towed back to Mostyn Port for demobilisation operations.	
25.	When the Jack-Up Barge has arrived at Mostyn Port, it will be secured to the quayside, jacked up and preloaded accordingly ready to lift or track the drilling rig off the deck. Tracking off the drilling rig will be the reverse of Chapter 5.3.	

Communications				
A briefing/ tool box talk will be performed before the operation commences. All members will sign up to this document to confirm they understand the methodology and associated risks.				
Communication Method(s)	☒ Radio	☒ Hand Signals	☒ Verbal	☐ Other:
Communications Plan including how to Identify Designated Signaller				

Designated Signaller/Banker will be identified in a pre-start meeting and will use standard hand signals. These standard hand signals will also be used to identify when the rig operator is to follow the signaller's instructions and when to cease.

5.1 Jack-Up Barge Mobilisation

5.1.1 Training Requirements

All plant operatives working on site will be required to hold valid industry standard training certificates for the plant / equipment they are required to operate on site. Red7Marine will inspect all operatives' original training certificates prior to operators commencing work on site.

5.1.2 Lifting Operations

All lifting operations will comply with the Lifting Operations and Lifting Equipment Regulations (LOLER) 1998 and will be conducted in accordance with a site-specific mobilisation lift plan. Please refer to site specific lift plan for further details.

5.1.3 Road Transport

The barge is mobilised using a series of Articulated Lorries, transported via road. Transport is carried out by external specialists using predefined routes taking into account weight restrictions, obstructions and width restrictions.

The floats are stacked at a maximum of two high on the wagons and each leg above 17m is split down into 2no. sections. Two leg carrying frames are placed on each of the extending wagons designated for the legs, these are used to safely position the legs on the transport to prevent the legs from moving. Before transit of the components occurs, they will be strapped down by a competent operative, using a combination of chains complete with tightening ratchets and ratchet straps, to ensure that the floats are secure for the journey. These fastenings will be checked by the driver of the lorry to certify that this is done to a satisfactory level.

The image above shows the transportation of C5 floats.

All chains and straps will be checked before use for signs of damage; any items which do illustrate signs of damage will be removed from service immediately for further examination.

Upon arrival at the mobilisation location, all vehicles will report to the port/ yard office informing them that they are here with the components for the mobilisation of a modular jack up in connection with Red7Marine. Vehicles will then park at a safe distance from the water's edge in an area designated as safe to do so by the site manager and await further instructions

5.1.4 Unloading and Lifting Operations

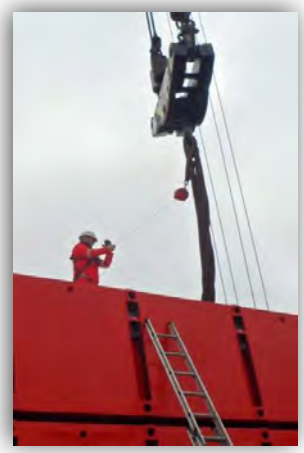
All lifting operations will be in accordance with a site-specific lift plan and must comply with the Lifting Operations and Lifting Equipment Regulations (LOLER) 1998.

Communications for lifts will be through the use of radio or standard hand signals pending crane operators' preference as identified in the lift plan.

Once the correct lifting accessories have been identified by the supervisor, ensuring that it has been inspected and has an in-date certificate, they will direct a wagon to approach ready to be unloaded.

The delivery wagon will manoeuvre into position with the rear of the wagon closest to the crane, whilst maintaining a safe working distance from the edge of the quay. Once in position, all chains and straps can then be removed to prepare the equipment for unloading. Prior to any lifting operations the driver is to vacate the cab of the vehicle.

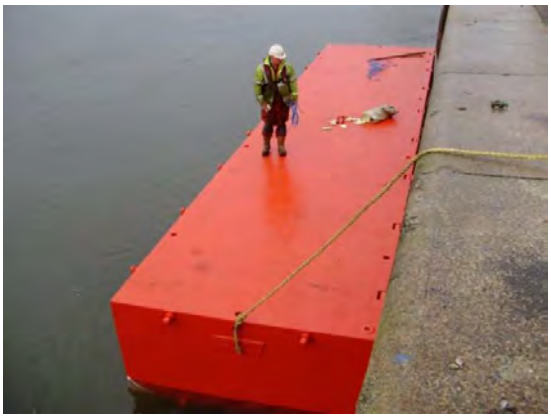
Operatives are to gain access onto the wagon via means of a footed ladder and must be appropriately trained to be able to work at height. When gaining access onto the top of the C5 floats, the operative will be required to don a full body safety harness and secure themselves to a fall arrestor which will be situated on the crane hook block.

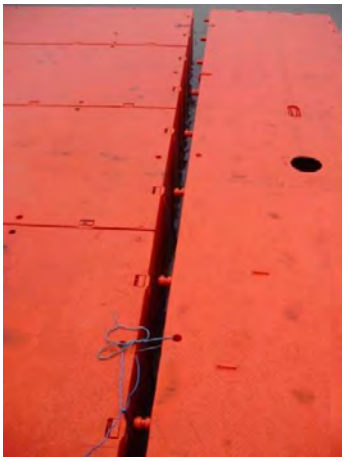
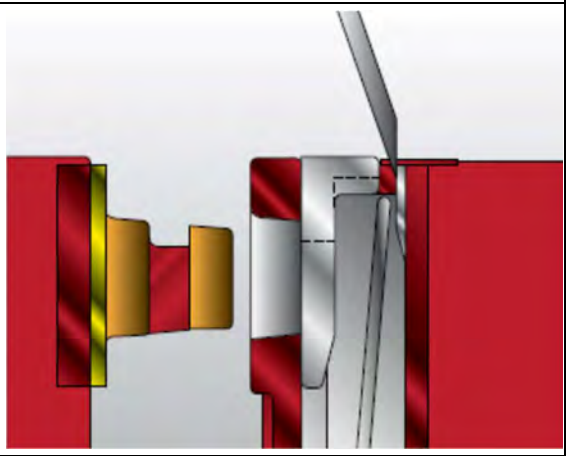


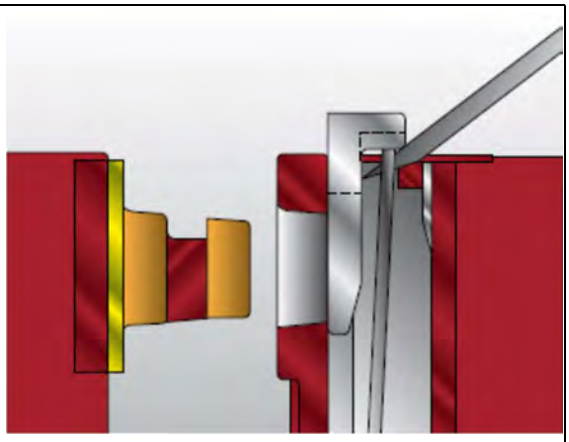
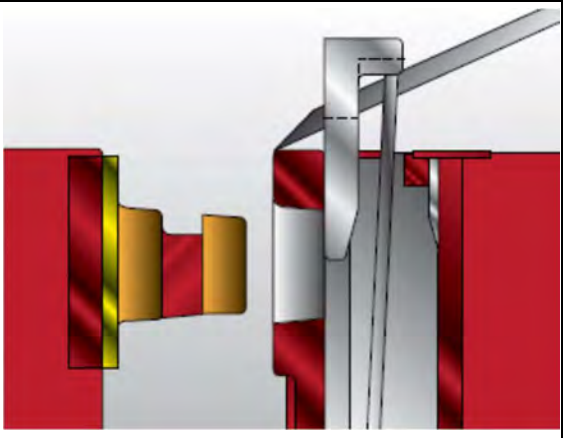
The images above shows the method of access onto the floats

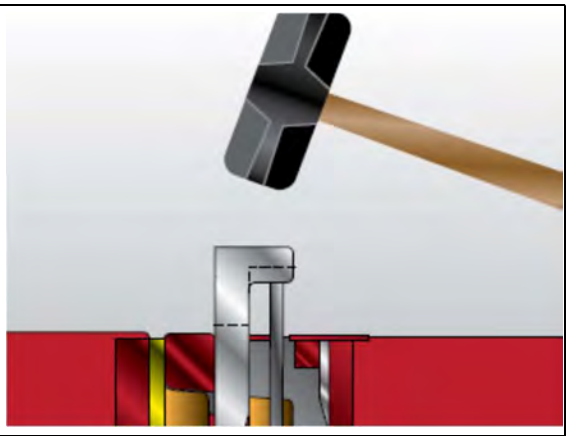
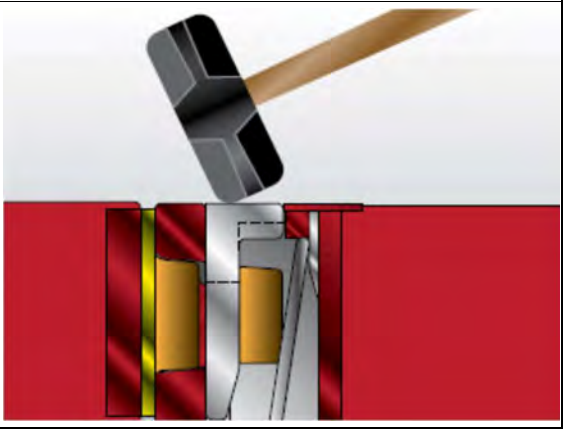
5.1.5 Float Assembly

The floats of the jack up barge, will be lifted directly into the water utilising appropriate lifting tackle connected to the central integrated lift point of the float and under the guidance of the supervisor. Only one float is to be lifted into the water at a time following the guidelines indicated in this section.

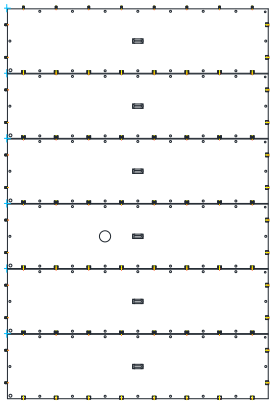
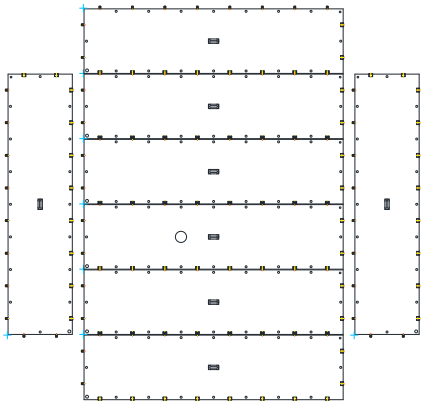
No.	Method/ Sequence of Operation	Image
1.	**LIFTING:** Using a competent qualified team and suitable certificated crane and lifting tackle the floats are to be lowered into the water. Before the lifting operation is to occur, suitable tag lines should be attached to the float to aid in its control during the lift. It is preferred to always have the initial floats male connectors facing away from the quay wall.	
2.	**TEMPORARY MOORING:** The float should be secured using a minimum of 36mm polysteel mooring rope tied off using appropriate mooring techniques to a secure mooring point or bollard. Access to the floats will be gained via a workboat which will be boarded from the pontoon.	
3.	**PREPARATION & SECOND FLOAT PLACEMENT:** Having secured the initial float a second float will be lifted using an identical technique to that described in *stage 1*. Wooden chucks should be positioned behind all male connectors on the initial float, as illustrated right, for use as supports (*see stage 9*) and for a clear visual guide to the location of the male connectors. Tag lines will remain on the second float to control its movements in the water and an	

	additional tether is threaded through the second floats thimble (*stage 4*).	
4.	**TETHERING OF FLOATS:** A bowline is to be tied in the free end of the rope creating a loop which the remaining free end can then be passed through, having been threaded through the initial floats corresponding thimble, as illustrated right. This system creates a "choke" system which can be used to draw the barges together when required. Operatives must not place hands between the floats due to the risk of entrapment.	
5.	**ALIGNMENT OF FLOATS:** Having brought the floats closer together the floats can be aligned utilising the tag line that should still be attached to the second float. Having correctly positioned the floats the tether rope is then locked off to prevent the float from drifting away.	
6.	**INSERTION OF BAR TO RELEASE CONNECTOR LOCKING MECHANISM:** Having aligned the floats the connector locking mechanism must be released. The first stage of this is to insert a prying bar/crow bar into the top of the connector.	

7.	**LIFTING CONNECTOR LOCKING MECHANISM:** The free end of the bar is then to be pushed towards the deck which in turn raises the mechanism from its housing.	
8.	**LOCKING MECHANISM FULLY RAISED IN READINESS FOR MALE CONNECTOR:** The mechanism is to be raised until the locking clip is free. The mechanism should then stay in this location under its own power however it is standard practise to insert a wooden chock, *see stage 9*.	
9.	**CHOCKING OF CONNECTOR LOCKING MECHANISM:** These wooden chocks are designed to ensure that the lock does not shut before it is required to. They are inserted manually when the lock is in its raised position and removed when the lock is ready to be closed.	

10.	**LOCKING OF THE FLOATS:** Having aligned the floats and slotted the male connector into the female connector, utilising the tethered choke system, the wooden chock is removed, and the pin is forced into its locked position utilising a hammer. Care must be taken when removing the wooden chock in case the pin suddenly drops. The wooden chock is to be removed by using either a hammer or crowbar.	
11.	**COMPLETED CONNECTION:** Once all pins have been closed, ensuring that they are locked in place, the two floats are now connected.	
12.	**REPEAT PROCESS:** Having successfully connected the floats together the process is repeated until the entire barge is constructed. It is important that no lifts occur over an operative, all operatives are to remain a safe distance from the slewing floats. Having established 2 floats the unit is then pushed away from the quay side by hand to install the next floats between the quay and existing connected floats. As the units are moved away from the quayside, the mooring rope is to remain fastened to a secure point but slackened in accordance with the movement. This ensures that the crane is working at a minimal radius. See *section 5.4.1* for assembly drawings.	

5.1.6 Float Assembly Configuration

No.	Method/ Sequence of Operation	Image
1.	Initially 6 no. floats should be connected as illustrated on the right.	
2.	The remaining two floats should then be secured to the main unit using suitable ropes. These should not be tied to tight in order to allow for the required movement for final installation.	

5.1.7 Hydraulics

Once the barge has been assembled the hydraulic power pack can then be lifted and positioned onto the deck. The hydraulic system will then be connected, and the hoses ran to reach the spudwell jacks. The system is then tested, and adjustments are made accordingly. Once it is confirmed that all jacks are working the hoses are to be further positioned around the perimeter ready for the restraint against the handrail. The hoses may be cable tied together to assist in there positioning.

5.1.8 Deck Equipment

Having established the general arrangement of the barge additional deck equipment, such as the welfare cabin, generator etc. can then be loaded such as the generators and cabin. These items are to be positioned on deck in accordance with the barge deck plan (Please refer to project specific drawings). This equipment will eventually be seafastened into place to ensure that it is stable.

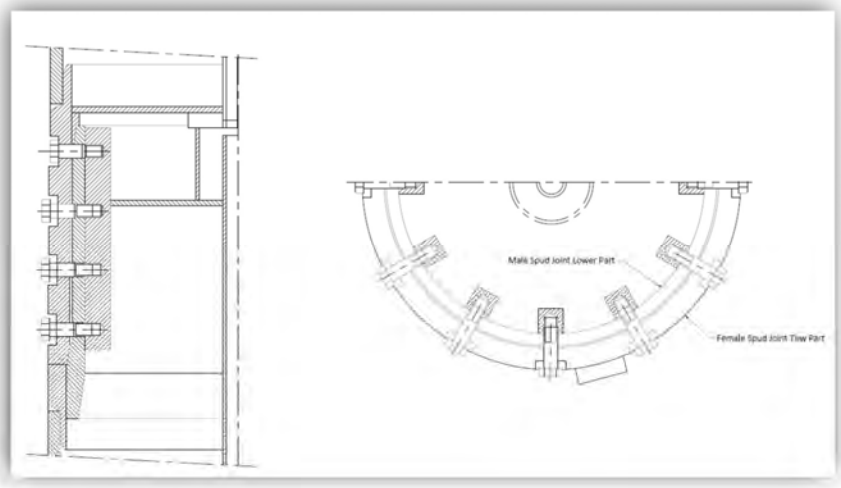
5.1.9 Legs

The legs are comprised of 2no. sections which assemble together to allow a total leg length of 27m. To connect the leg extensions horizontally, sufficient space on the quayside will be required. Rigging will be secured to the spud legs by a competent slinger at which stage a test lift will be conducted to ensure that the rigging is secure. Tag lines will be utilised for lifting the legs in a horizontal position, however when lifting the leg in a vertical position into the wells they are not required.

Under the direction of a competent signaller the crane will hoist and slew the spud leg around into a suitable area for the splicing operation, where it will be lowered onto timber rests. It must be checked that the crane will still be within its safe working radius to pick up combined length of leg. When unloading the legs from the wagon, sufficient space must be left in between each leg to enable operatives to be able to install the bolts.

Chocking is to be installed under each leg in order to prevent any movement when installing the extensions to safeguard operatives working in proximity to the legs. No access is permitted in between the legs during lifting operations when laid horizontally next to each other on the quay side.

The male spud joint lower part is to be lifted horizontally towards the stationary female spud joint top part and guided into position by the slinger/ signaller ensuring that the pads and markings are aligned. Once inserted a hole alignment bar will be used to help manoeuvre into position and to align the holes, operatives will insert all greased bolts before beginning to hand tighten. An 110V, 1-inch drive torque impact wrench with a maximum torque capacity of 1000Nm will be utilised to tighten the leg bolts. All bolts will be tightened to the capacity of the impact wrench, ensuring that they do not protrude past the outside wall of the leg. This process will then be repeated for the remaining three legs



Once all leg extensions have installed, the crane will be rigged with a 20-tonne ground release hook block. This will be connected to the wire lifting sling attached to the top of the leg section.

It will be ensured that all lifting equipment is inspected for signs of damage before their use and that they fully comply with the Lifting Operations and Lifting Equipment Regulations 1998, regulation 9(3).

Prior to lifting the complete leg section all non-essential personnel will be cleared of the lifting area.



The leg section will be carefully pitched into its vertical position and then slewed round over to the designated spud well. Once in place and the teeth have been aligned with the groves, the leg will be lowered into the Spudwell and then locked into place by the Bargemaster. It is to be ensured that the markings on the leg face inwards towards the centre of the barge. Once installed the slinger/ signaller will pull the rope attached to the hook block in order to release it from the wire sling. The remaining three legs will then be lifted into position following the same process.

5.1.10 Lifting Operations

All lifting operations will be in accordance with the lift plan supplied by the client which is to be included within Appendix A of this document.

All lifting operations will comply with the Lifting Operations and Lifting Equipment Regulations (LOLER) 1998 and will be conducted in accordance with a site-specific lift plan. Please refer to site specific lift plan for further details.

Communications for lifts will be through the use of radio or standard hand signals pending crane operators' preference as identified in the lift plan.

Once the correct lifting accessories have been identified by the supervisor, ensuring that it has been inspected and has an in-date certificate, the leg extension can then be prepared to be lifted in the required area in accordance with the site-specific lift plan.

All lifting operations are to be planned and managed by the client

5.1.11 General Methodology

No.	Method / Sequence of Operations – Description of the Task	✓
	**EVERY PERSON ON SITE HAS A DUTY TO ENSURE THAT THEY DO NOT PUT THEMSELVES OR OTHERS AT RISK.**	
	All persons involved in the operation are to have a prestart briefing where the operation and method statement will be explained along with all persons' roles within the operation. Having accepted the procedure and clarified any queries, all parties will sign up to this general methodology for the operation.	
1.	**GENERAL NOTE**: All site and day specific risks as identified by the site manager are to be accounted for i.e. lifting operations should not slew over the works area.	
2.	At this stage of operations the Barge is positioned adjacent to the designated quay face. All the required plant equipment including the fully rigged crane and lifting accessories will have already been delivered to site by the relevent parties.	
3.	The barge is to be jacked and preloaded in accordance with the Vessel Operations Manual by the Barge Master.	
4.	Access and egress to the barge via a walkway or quayside ladder depending on the circumstances and conditions on the of the operation.	
5.	Ensure no unauthorised personnel are present on the barge throughout the operation and all reasonably practicable means are being followed to enforcce this.	
6.	If not done so already, the bottom sections of the Barge's legs will be rigged to the crane and lifted and installed into the requried jacking tower. Ensure all standard lifting operations are followed in accordance with R7M lifting standards and procedures.	
7.	The Barge Master will then position the barge so that the leg joint is at the top of the jacking tower. This is performed by jacking the barge in accordance with the Vessel Operations Manual. NOTE: The barge must not be jacked up no higher than the flange of the lower leg section.	
8.	The relevant personnel will access one of the Spudwells using a harness and landyard	
9.	The crane will connect to the leg accordingly. All lifting operations are to be planned, managed and supervised by the client. The ground release hook block, which is rigged to the crane, will be connected to the relevant leg section.	

10.	The 9m leg extension will then be lifted and placed onto the 19m bottom section already installed into the barge	
11.	The relevant personnel via the spudwell will then commence the installation of the leg bolts.	
12.	If the bolts cannot be acessed safely then the use of a man cage via the crane maybe use, once the leg extention is safely placed onto the leg and released from the crane.	
14.	Once all bolts have been installed and the operatives are clear from working in proximity of the leg and once deemed safe to do so, the slinger / signaller will pull the rope attached to the ground release hook block to release crane from the leg extensions wire sling.	
15.	This procedure is to be repeated for the remaining leg extensions and the same procedure is to be applied.	

5.1.12 Deck Furniture

Having established the main barge all deck furniture such as hand railing and the ladder frame can be installed. These utilise various fastening techniques including welding and integrated hand rail bases.

All welding operations will be conducted by a trained and competent operative and conducted in accordance with project specific weld designs.

Prior to conducting any hot works, a permit is to be obtained from the appropriate authority. Any necessary criteria advised by the dock authority are to be complied with when conducting these operations.

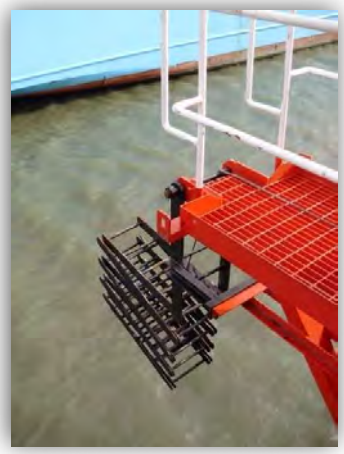
The operative conducting the grinding and welding operations must ensure that they have donned the necessary PPE stated in the project method statement and a PUWER assessment has been conducted on the equipment to ensure everything has been correctly maintained and in a safe working order.

The working area will be checked for fire hazards/ combustible materials and all non-essential personnel will be removed from the hot works area. Welding screens will be erected within the immediate vicinity of the welding area in order to protect other personnel passing by.

When grinding and welding operations are being conducted, mooring ropes are to be angled away from the vicinity of the hot works area. If this is not practical in certain areas, then welding blankets will be utilised to protect the ropes from sparks.

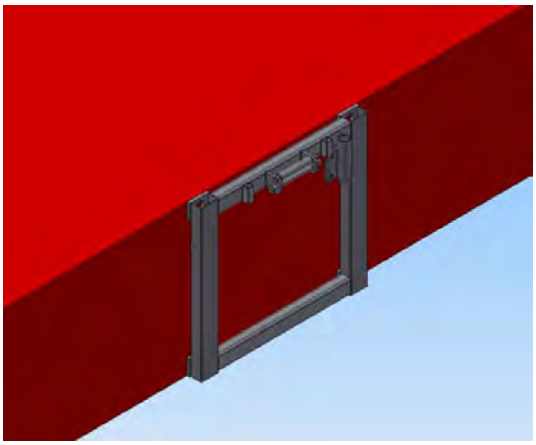
A tested dry powder fire extinguisher will be present within the hot works area at all times and a fire watch is to be maintained for 30 minutes after hot works operations have stopped. When

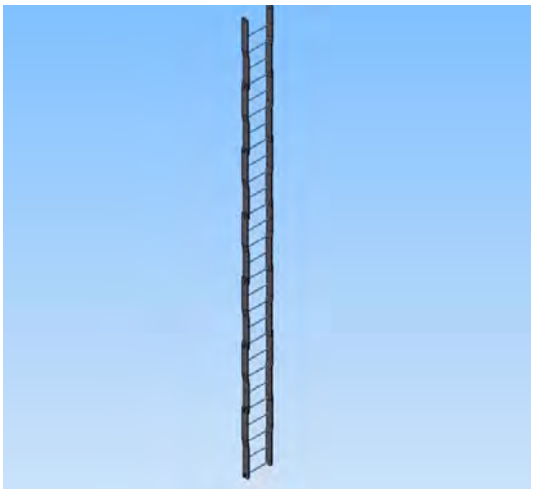
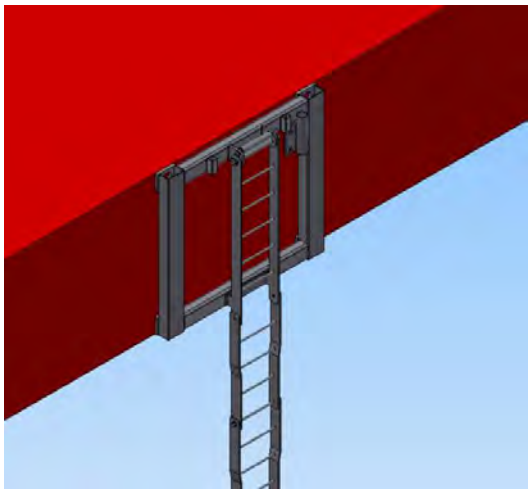
machines are not in use, power supply will be switched off and equipment stored back in mobilisation van

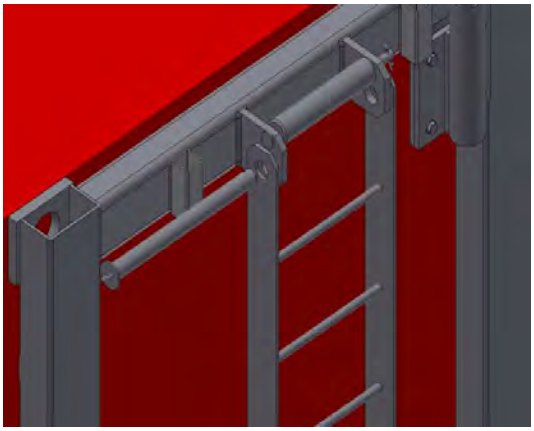
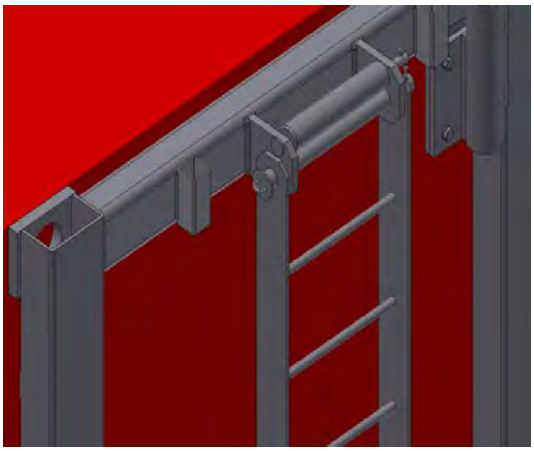
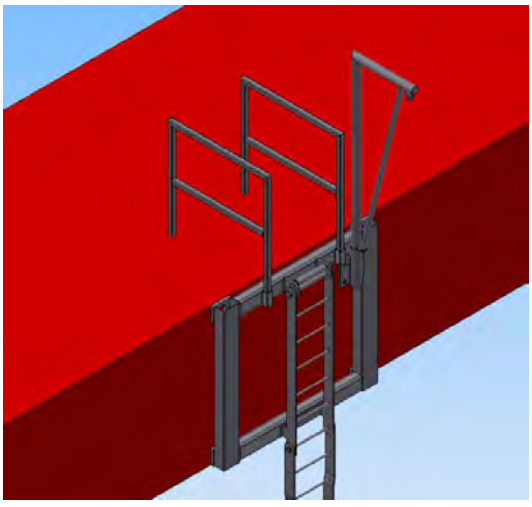


Once the barge is complete then the barge master will perform all pre checks on the barge to ensure it is safe for operations and loading.

5.1.13 Concertina Ladder Installation

No.	Method/ Sequence of Operation	Image
1.	Utilising the barge's pin connections on the external face, the base frame for the ladder is to be lifted by the mobilisation crane and connected to the side of the barge.	

2.	A tirfor is to be secured to a fixed point on the deck of the barge. The tirfor wire is to firstly be secured to the bottom section of the concertina ladder section and fed through each ladder section. This is to allow the tirfor to be able to lower and raise the ladder as and when required. Once the wire is fed through it is to be connected to the tirfor.	
3.	The preassembled concertina ladder is to be lifted vertically ensuring that all sections unfold correctly and no damage has been sustained during transit.	
4.	The ladder assembly will be lifted over the side of the barge and lowered down to align the top section with the base frame.	

5.	A securing pin will then be installed as shown, to fix the ladder sections in position.	
6.	Once the pin is secured, the crane can be disconnected from the ladder sections.	
7.	The handrail sections are to then be installed along with the davit arm.	

5.1.14 Loading Equipment

The barge is to be loaded in compliance with the site-specific barge drawings/ calculations which have been prepared to assess the loads on deck to ensure a stable platform is present when operating in floating mode (Deck plan available on request).

An R7M Barge Master/ project engineer will check to ensure that the barge has been loaded correctly and upon completion a barge handover will be signed by both parties to confirm that the barge has been fully commissioned and considered ready for the charterers use.

5.1.15 Signature of Compliance for Mobilisation

The following persons have read and been briefed on this Method Statement. By signing below they have agreed that the sequence of operations and methodology to be employed in carrying out the works have been clearly explained and confirm that they abide by these procedure's, understanding all of the information enclosed within this document. They confirm that they have also had the hazards, and how these are to be managed, explained to them.

"I, the undersigned, understand the above & feel able to carry out my duties in a safe manner."

Name	Position	Signature of Compliance	Date

5.2 Barge Movement

Operation Procedure / Method Statement		
Step	Description of Task	✓
	**EVERY PERSON ON SITE HAS A DUTY TO ENSURE THAT THEY DO NOT PUT THEMSELVES OR OTHERS AT RISK.**	
	All persons involved in the operation are to have a prestart briefing where the operation and method statement will be explained along with all person's role within the operation. Having accepted the procedure and clarified any queries, all parties will sign up to this general methodology for the operation.	
	All appropriate PPE including Hi-Vis, safety boots, hard hats and life jackets (when working near the quay edge or on the barge) are to be worn at all times during the operation.	
1.	Under the right conditions and circumstances and conditions on the day of manoeuvring the Barge Master will commence the move.	
2.	Once all drilling operations are complete and received, all equipment including the client's will be placed back to deck, secured and returned to position as per the relevant deck plan.	
3.	Ensure that this is completed at least 1 hour prior to slack water.	
4.	Ensure the assisting vessel has arrived in good time least 1 hour prior to slack water.	
5.	When the Barge Master deems it safe to continue, the Barge Master will jack down into the water. Before the barge is at floating draft and when deemed suitable, the assisting vessel can be secured to the barge ready for the relocation.	
6.	Once all relevant parties are satisfied to continue and all environmental conditions are deemed suitable, the Barge Master can now commence with the leg pulling ready for transit.	
7.	Ensure there is a clear channel of communication between the Barge Master and the VTS to confirm movement is still permitted within the River Dee jurisdiction.	
8.	Once the legs are clear of the seabed and lifted to a suitable clearance, the barge move to the next intended borehole location can commence under the instructions and guidance of Solmek's provided site engineer.	
9.	Once the barge is at the new intended location, communication between Solmek's site engineer, Barge Master and the Tug Captain will confirm the final position at which point the Barge Master will pin the legs accordingly.	
10.	The legs will be lowered until the barge is secured and the hull begins to lift out of the water.	
11.	When all relevant parties are satisfied to continue, the assisting vessel can be disconnected and the Barge Master will continue with the preloading operations in accordance with Red7Marine standards and procedure. Refer to the VOM for preloading details.	

12.	After preloading operations have been completed and the Barge Master is happy to continue, the barge will be elevated from the water to the safe working deck elevation.	
13.	When the Barge Master has completed all jacking operations and established safe means of access and egress, the deck will become available for further planned works.	

Communications				
A briefing/ tool box talk will be performed before the operation commences. All members will sign up to this document to confirm they understand the methodology and associated risks.				
Communication Method(s)	☒ Radio	☒ Hand Signals	☒ Verbal	☐ Other:

5.3 Tracking on Drill Rig

Operation Procedure / Method Statement		
Step	Description of Task	✓
	**EVERY PERSON ON SITE HAS A DUTY TO ENSURE THAT THEY DO NOT PUT THEMSELVES OR OTHERS AT RISK.**	
	All persons involved in the operation are to have a prestart briefing where the operation and method statement will be explained along with all persons' role within the operation. Having accepted the procedure and clarified any queries, all parties will sign up to this general methodology for the operation.	
1.	All appropriate PPE including Hi-Vis, safety boots, hard hats and life jackets (when working near the quay edge or on the jack up) are to be worn at all times during the tracking on process.	
2.	The quay structure has been inspected for services and voids. A suitable area has been identified for operations to occur. However, the Barge Master and Rig Operator are to inspect the area prior to the operation commencing to ensure they are satisfied.	
3.	The jack up barge is to be positioned onsite, at the pre-agreed location, and jacked up approximately 1000mm from the quay face.	
4.	A thorough preloading session is to take place in order to prove the foundations adjacent to the quay and minimise the possibility of the quay to deck heights significantly increasing. This is to be performed on the day prior to the operation occurring in order to minimise the risk of foundation failure. All preloading operations are to occur in accordance with the Vessels Operations Manual.	
	During all operations an operative is to monitor the leg pressures. Should any sign of failure be present as the rig is tracked then the operative is to inform the Barge Master who will take appropriate actions.	
5.	Having performed a thorough preload session and proved the foundation, the barge will be jacked so that the deck and quay are level, minimising any angle for the rig to track onto the barge.	
6.	Once all jacking operations are complete, and ONLY after the jacking procedure is complete, operatives again wearing full PPE, will begin to remove any hand rails or obstacles which may obstruct the rigs tracking path. These are to be reinstalled after operations are complete.	
7.	The bridging mats will then be positioned central to the barge and track width apart. They are to be placed central over the void between barge and quay so that the optimum length of support is achieved at both ends.	
8.	The Rig Operator will then position the rig in line with the established track mats, spanning between barge and quay.	
9.	Upon confirmation that all parties are satisfied, the Barge Master will then begin to instruct the rig operator to track the rig forward, towards the barge, at a slow, constant	

	and steady pace. Ensuring all reasonable control measures are put in place throughout the operation.	
	Only required personnel, as dictated by the Barge Master, are to be on the jack up during this operation i.e. only persons with a designated task are to be in the vicinity during this operation. Note: The Barge Master's word is final.	
10.	At all times during the tracking operation the Barge Master is to either himself or have a competent experienced jacking assistant/second Barge Master, at the controls on the jacking system. This will allow for slight adjustments to the legs to occur to maintain the pressures and barge level, should any movement occur in the deck level as a result of the load of the rig as it tracks onto the barge. It is anticipated that the two quay side legs are likely to experience further penetration under the weight of the rig, which again is to be counteracted by the Barge Master's adjustments as required.	
11.	The rig will continue to be tracked at a steady constant pace under the guidance of the Barge Master until the barge takes the full support of the rig. The Barge Master will continue to direct the operator to rigs derigging position.	
12.	All handrails are to be re-established.	
13.	All leg positions will again be checked and adjusted. The barge will then be jacked as required.	

Communications				
A briefing/ tool box talk will be performed before the operation commences. All members will sign up to this document to confirm they understand the methodology and associated risks.				
Communication Method(s)	☒ Radio	☒ Hand Signals	☒ Verbal	☐ Other:
Communications Plan including how to Identify Designated Signaller				
Designated Signaller/Banker will be identified in a pre-start meeting and will use standard hand signals. These standard hand signals will also be used to identify when the rig operator is to follow the signaller's instructions and when to cease.				

6 Required Personal Protective Equipment

The operation specific risk assessments have identified that the following items of PPE must be worn during the duration of mobilisation activities:

PPE Requirements				
 Hard Hat ☒	 Eye ☐	 Footwear ☒	 Gloves ☒	 Coveralls ☐
 Ear ☐	 Lifejacket ☒	 Hi Vis ☒	 Dust Mask ☐	 Other ☐
If other please specify:	1. All operatives working on the deck of the barge are to wear a life jacket at all times whilst on-board or working near the quay edge.			

For more information on the Red7Marines PPE policies and standards, please refer to R7M-HSM-MAN-002, Chapter 18 – Personal Protective Equipment in the Health & Safety Procedures Manual.

For more information for Red7Marine policy on Lifejackets please refer to R7M-HSM-DOC-011 – Lifejacket Policy.

7 Emergency Procedures

In the event of any incident or accident (including near miss, first aid and environmental) occurring on the barge whilst undertaking work associated with the operations, the Red7Marine Reporting and Investigation of Accidents & Incidents Procedures shall be followed. All reports will be completed the using the Red7Marine Incident Report form.

Please refer to Chapter 8 of the Health & Safety Procedures Manual *R7M-HSM-MAN-002 – Reporting and Investigation of Accidents and Incidents* for more information.

7.1 First Aid

The primary first aid station will be pointed out before any works commence. All accidents / injuries are to be reported to site management immediately so the casualty can be treated if required and the event can be recorded in accordance with Red7Marine company policies.

7.1.1 On Site First Aider

R7M will ensure that a member of the relevant team will be trained to First Aid at Work standards and appointed as a company first aider. The names of the trained first aid personnel are to be communicated to all persons during the briefing.

7.1.2 General First Aid Procedure

If you sustain an injury you must:

Item	Task
1.	Stop work immediately and contact the appointed first aider on site.
2.	The first aider will determine extent of the injury and administer appropriate first aid.
3.	If deemed necessary by the first aider transfer casualty to the nearest Hospital A&E Department to seek medical aid.
4.	Complete an R7M incident report form in addition to the legislative accident book.

7.2 Hospital Route

7.2.1 Hospital Address

The Nearest A&E Department from the location of operations is:

Glan Clwyd Hospital
Sarn Lane
Bodelwyddan
Rhyl
LL18 5UJ

Driving Directions to Nearest Hospital

7.3 Man Over-Board Procedure

On seeing a person fall overboard, or a person in the water:

Item	Task
1.	Shout **"MAN OVERBOARD"** to alert fellow site personnel.
2.	Point at the person in the water and never take your eyes off them.
3.	Throw a flotation device to the person in the water immediately.
	*To gain maximum benefit, throw the device underarm. If possible throw 3, 4 or 5 flotation devices such as life jackets, fenders, Perri-buoys etc. towards the person in the water which will form a trail back towards them.*
4.	Sound the general alarm and contact the site manager.
5.	A spotter positioned in a suitable location shall point at the man in the water, never taking their eyes off them.
6.	The marine personnel will assess the situation and implement the recovery plan.
	*ONLY as a last resort, send a rescuer into the water. Ensure the rescuer is wearing an appropriate lifejacket and is secured to the boat by a fixed line at all times.*
7.	Pull the casualty to the side of the boat / barge and prepare for extraction from the water.
8.	The following should be adhered to when lifting the casualty on-board the vessel by hand.
9.	Ensure the casualty's head remains out of the water.
10.	Raise the casualty's arms onto the side of the vessel.
11.	Place the casualty's hands on top of one another.
12.	Gain assistance from fellow employees and stand either side of the casualty.
13.	Place one of your hands beneath the casualty's upper arm and the other on the casualty's forehead.
14.	Ask your fellow employees to place one of their hands on the casualty's other upper arm and the other on the casualty's forehead.
15.	Put a slight bend in your knees, keep your back straight and gently raise the casualty out of the water.
16.	Lower the casualty onto the deck.
17.	A qualified first aider will assess the casualty for signs of internal injuries such as broken bones, hypothermia and shock.
18.	The recovered man overboard will be transported to hospital for treatment, if required.

7.4 Fire Procedure

On discovering a fire, the following procedure will be followed:

Item	Task
1.	Raise the alarm immediately.
2.	If you have been trained and feel that it is safe to do so attempt to fight the fire using the correct fire extinguishing media.
3.	If this fails ensure all personnel evacuate the barge/ areas immediately and proceed to the designated muster point.
4.	Contact the fire brigade via mobile telephone (Dial 999 or 112) and request assistance.
5.	Following a fire, the affected areas will be inspected for damage by R7M and fire marshal. Signs of structural deformations are to be reported to Red7Marine management immediately and the barge quarantined in order to facilitate a full investigation.
6.	The barge will remain inoperable until the barge master has received the all clear from Red7marine management following the results of the detailed investigation.

7.5 Spill Procedure

In the event of a spillage, the following procedure shall be followed (The location of spill kits is to be communicated to all persons during the start of shift briefing):

Item	Task
	Spillages of fuel or oil into watercourses or the sea or on land may constitute an offence under Environmental legislation, which attracts large fines. Our Company has to make suitable contingency arrangements in the event of a spillage.
1.	**All site personnel** – decide whether the spill is within their control or outside of their immediate control.
2.	If spill is within control, contain the flow and prevent it from reaching a watercourse or entering a drain. Cover spill with absorbent material or sand. Proceed with clean up (ensuring the correct PPE is worn), and then notify foreman/agent.
3.	Dispose of clean up materials as hazardous waste.
4.	**If outside of immediate control, then;** raise alarm – advise foreman/agent, and call the environment agency on 0800 80 70 60.
5.	Assist in clean-up process as directed by emergency services.
6.	In the event of major spills, foreman/agent will contact specialist pollution control experts.
7.	Foreman/agent - notify contracts manager and ensure an incident report form is completed.
	Whenever possible plant will be using biodegradable hydraulic oil.

8 Signature of Compliance

The following persons have read and been briefed on this Method Statement. By signing below, they have agreed that the sequence of operations and methodology to be employed in carrying out the works have been clearly explained and confirm that they will abide by these procedures, understanding all of the information enclosed within this document. They confirm that they have also had the hazards, and how these are to be managed, explained to them.

"I, the undersigned, understand the above & feel able to carry out my duties in a safe manner."

Name	Position	Signature of Compliance	Date

Appendix A – Specifications

No.	Description	Revision
1	Drilling Rig Specification	
2	Jack Up Barge Specification	

Appendix B – Risk Assessment

No.	Description	Revision
1	Working On / Near Water	
2	Tracking of Drilling Rig onto and off Barge	
3	Lifting Operations	
4	Drilling Operations	
5	Manual Handling	
6	Towing Operations	
7	Floating Operations (Prior to Jacking Operations)	
8	Barge Positioning Operations (Prior to Jacking Operations)	
9	Final Positioning	
10	Punch Through	
11	Unexploded Ordnance	
12	Scour	
13	Sliding Failure	
14	Previous Jack Up Locations	
15	Gas Pockets	
16	Submerged Obstructions	
17	Spillages	
18	Climbing Concertina Ladder	
19	Fire	

Working On / Near Water

SEVERITY CLASSIFICATION						PROBABILITY				
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m³	L	M	M	H	H
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m³	M	M	H	H	H

PROBABILITY CLASSIFICATION		
A	Highly Improbable	A possibility but extremely remote chance of occurrence
B	Improbable	Unlikely to occur (very infrequent) during the operation
C	Possible	May occur (infrequent) during the operation
D	Probable	Is likely to occur often during regular operations
E	Frequent	Is likely (common occurrence) to occur once or more during every operation

RISK CLASSIFICATION	
LOW RISK	Operations may proceed with care
MEDIUM RISK	Operations may proceed with extreme caution
HIGH RISK	Operation must **NOT** Proceed

Potential Hazards	Hazard Effects	Initial Risk S	Initial Risk P	Initial Risk R	Control and Mitigating Factors	Residual Risk S	Residual Risk P	Residual Risk R	Responsibility	Reference Document(s)
Entry into water Contact with water Contaminated water Slips, trips and falls Biological hazards	Hypothermia Drowning Illness Personal injury Fatality Contact with rat urine – Weils Disease	5	C	H	Suitable means of access / egress onto the barge Ensure there are reasonable practicable means of signage or warnings in place for other personnel Operatives are to work in pairs, so one can raise the alarm if the other was to fall in All persons working on, above or near water are to wear a minimum of a 150N lifejacket at all times with personal locator beacon (PLB) if required Lifejackets to be regularly inspected and tested Sufficient lifebuoys and rescue lines to be available Rescue facilities to be available e.g. a safety boat to be present at all times during operations near / on water Access routes to the place of work and alongside the water should be kept clear from obstructions and slip hazards at all times Suitable lighting should be provided for the area of works, particularly adjacent to the water Ensure recovery procedure is in place Man over board (MOB) vessel in place and competent crew on board to operate the vessel Relevant personal protective equipment to be carried out to ensure suitability of equipment provided	4	B	M	Barge Master All Personnel	

Working On / Near Water

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

If working during hours of darkness or when water temperature is less than 10 degrees an immersion suit is to be worn

Tracking of Drilling Rig onto and off Barge

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

Potential Hazards	Hazard Effects	Initial Risk			Control and Mitigating Factors	Residual Risk			Responsibility	Reference Document(s)
		S	P	R		S	P	R		
Inexperienced operator / personnel Unlicensed operator Uncertified rig Use of mobile telephone Barge movement / foundation failure Track mat failure Unexpected weather changes Adverse weather / sea / environment conditions Poor visibility	Collision with jack up structure Injury to driver and other Personnel Damage to rig / crane Loss of rig / crane Loss of control of rig/ crane Damage to plant, equipment or materials Catastrophic damage Fatality Vessel / structure damage	5	C	H	Check and inspect surrounding work areas to ensure there are no conflicting work activities Competent, certified and authorised operator and team Ensure there is adequate personal awareness for all personnel Suitable lighting should be provided for the area of works, particularly adjacent to the water Ensure there are rescue facilities available e.g. safety boat, life rings etc Ensure there are sufficient lifebuoys and rescue lines available All personnel should wear a life jacket. All persons working on, above or near water should wear buoyancy aids Operatives are to work in pairs, so one can raise the alarm if edge protection is not present Never leave equipment or plant near the edge of the deck Ensure adequate housekeeping is implemented thoroughly on a daily basis Personal protective equipment (PPE) assessments should be carried out to ensure suitability for the type of works Handholds and guardrails should be provided where appropriate Access routes should be kept clear from obstruction and slip hazards at all times	5	B	M	Plant Operator Barge Master	

Tracking of Drilling Rig onto and off Barge

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

	Equipment and plant falling into water				Ensure all relevant parties have been informed this high-risk operation is taking place and if reasonably practicable erect warning signs near the water edge Mobile telephones not to be used whilst operating Barge to be sufficiently preloaded to strengthen foundations before proceeding with tracking operations Rig/ Crane banked on and off by competent operatives. Provide adequate number of banksmen Pre-start briefing to be conducted to ensure all personnel are aware of their responsibilities Slew path always checked and operatives maintain 600mm clearance Minimal unsupported void between quay and barge – 1000mm Suitable spans of track mat remain on supports i.e. quay edge and deck Controlled and steady tracking speeds employed Ensure there is a constant good channel of communication, cooperation, coordination and control Jack Up Legs to be monitored at all times and corrected when required Barge Master to be present at all times during operation ensuring constant supervision Deck to be level with quay / docks / land as reasonably practicable when tracking on and off rig / crane								

Tracking of Drilling Rig onto and off Barge

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

Ensure everyone has received adequate Information, Instruction and Training and all relevant personnel has comprehensive knowledge of marine rules and regulations

Lifting Operation

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m³	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m³	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

Potential Hazards	Hazard Effects	Initial Risk			Control and Mitigating Factors	Residual Risk			Responsibility	Reference Document(s)
		S	P	R		S	P	R		
Unsuitable or inadequate base for lifting equipment Overloading of lifting appliance Incorrect use or positioning of lifting equipment Catastrophic failure or overturning of the lifting equipment Adverse weather conditions Collision with structures / Buildings etc Operator error	Overturning of the lifting equipment Failure of load bearing parts of lifting equipment Interference damage Serious consequences to people and equipment Crushing injuries Unstable equipment and load Personnel / Member of public struck by load / Falling debris	5	D	H	All lifting operations are to be properly planned in accordance with LOLER 98 lifting plan that has been produced by a qualified AP. Crane is to be positioned as per lift plan ensuring that the area is levelled, consolidated, inspected for underground ducts, services and a safe distance from excavations etc. (i.e. the crane is set up on a suitable stable base) Ensure all lifting appliances are clearly marked with their maximum SWL Ensure the weight of the load is known Do not operate the crane outside of its configuration specific crane duties. Ensure a competent person directs the lifting operations Ensure operatives remain clear of the load at all times Competent lifting crew assigned e.g. Supervisor, signaller, and plant operator Communications are to be maintained between signaller and driver Tool box talks will be used to reinforce the lifting arrangements outlined in the lifting plan. The slinger or driver to check the lifting accessories before use to ensure they are not damaged or worn	5	B	M	Appointed Person Lift Supervisor Slinger/ Signaller All Personnel	

Lifting Operation

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

Rigging failure Crane wire / Winch failure Lack of communication Persons in lifting area Other plant/vehicles	Injury to personnel / Member of public Equipment/Machinery damage Loss of load Vehicle collision with crane				All plant and accessories are inspected prior to use and relevant test certificates are up to date Check weather forecasts before any lifting operations Lifting operations will not be conducted in high winds as detailed in the lift plan. All equipment is to have passed its daily checks before use. An operative is to maintain a look out for other vehicles or plant that may enter into the lifting area unknowingly. If this occurs the load is to be safe and the vehicle is to be removed from the area. No load to be left suspended No unauthorised people allowed within the lift area, no one working below the lift. No loads are to be lifted over person or over containers/vehicles that a person is in Use of Appropriate PPE (Gloves Etc.)					

Drilling Operations

SEVERITY CLASSIFICATION						PROBABILITY				
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H

PROBABILITY CLASSIFICATION		
A	Highly Improbable	A possibility but extremely remote chance of occurrence
B	Improbable	Unlikely to occur (very infrequent) during the operation
C	Possible	May occur (infrequent) during the operation
D	Probable	Is likely to occur often during regular operations
E	Frequent	Is likely (common occurrence) to occur once or more during every operation

RISK CLASSIFICATION	
LOW RISK	Operations may proceed with care
MEDIUM RISK	Operations may proceed with extreme caution
HIGH RISK	Operation must **NOT** Proceed

Potential Hazards	Hazard Effects	Initial Risk			Control and Mitigating Factors	Residual Risk			Responsibility	Reference Document(s)
		S	P	R		S	P	R		
Unsuitable or inadequate base for drilling rig Drill rig not secured adequately in accordance with manufacturer's instructions Incorrect use or positioning of drilling rig Catastrophic failure or overturning of the drilling rig Adverse weather conditions Movement in working area	Injury to personnel Equipment / Machinery damage Loss of load Slips, trips and falls Cuts, bruises and abrasions Fracture / broken bones Crushing injuries Loss of control Damage to drilling rig and equipment on barge	5	D	H	All operatives are to be trained and competent with the accompanying certification and experienced in the proper and correct use of tools, equipment and instruments Drilling rig is to be positioned as per deck plan ensuring that the area and rig is levelled All plant and accessories are inspected prior to use and relevant test certificates are up to date Check weather forecasts before any drilling operations commence Use of Appropriate PPE (Gloves Etc.) Keep work place tidy and free from any tripping hazard Take care walking on wet surfaces. Wear suitable safety footwear. All crew to be mindful of risks created with any items left or stored on deck and adjacent to the work areal that can create a slip trip or fall issue Good Housekeeping, Maintenance of Passageways, Good Lighting, Guard or Close all Floor Openings if any are present Do not carry items that prevent you keeping both hands free for climbing Staff will operate tools and equipment correctly All defects will be reported to the manager	5	B	M	Barge Master Supervisor Lead Driller All Personnel	

Drilling Operations

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

Operator error Preparation/ setup failure Wire / Cable / Winch failure Lack of communication Persons in close proximity Hand tools and bore hole equipment Site access / marine traffic Working with soils and water Ground breaking activities Borehole advancement	Potential illness and diseases Underground utilities and services Drowning / hypothermia Noise Contact with moving parts Electrocution Oil or fuel spillages Encountering contaminated land Potential fire				Specialist tools will have a valid calibration test certificate; work will have to be redone if a valid certificate is not apparent Monitor weather forecast and prevailing weather. Be prepared to cease operation if weather deteriorates Ensure that all waste materials are disposed of in the correct manner to prevent wind blowing debris around the live compound Restrictions of use as stated on COSHH assessments to be adhered to Inspect utility records prior to locating exploratory positions. Pre scanning of the borehole positions may be required before siting the barge and boreholes Work programme to be logged with office, departure time, expected return time and area of operations Stop work immediately if suspect or metallic object or buried service is encountered Ensure fire fighting equipment is close at hand for use Refer to SOLMEK's Risk Assessment for more details								

Manual Handling

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

Potential Hazards	Hazard Effects	Initial Risk			Control and Mitigating Factors	Residual Risk			Responsibility	Reference Document(s)
		S	P	R		S	P	R		
Heavy objects Large objects (obscure vision or difficult to grip securely) Unstable object Sharp edges / protrusions (such as staples in boxes) Lack of suitable hand holds Damaged flooring surface or covering Changes in level Narrow access / egress areas Other persons	Strains and sprains Ligament damage Back injury such as slipped disc Cuts and puncture wounds (mainly to hands and fingers) Exhaustion Slips, trips and falls Bruising Broken bone Damage to equipment from dropping Falling into water	4	C	M	Provide toolbox talks on manual handling Ensure adequate information and training to all personnel where reasonably practicable Heavy items to be marked to indicate weight Always use alternative mechanical method where possible and reasonably practicable, i.e. the crane, trolley, forklift truck etc Assess load, destination and route prior to conducting manual handling Be aware of individual capabilities and never exceed them – always ask for help if needed Multiple persons to move large items Empty items such containers prior to moving for a lighter lift (where possible) Use personal protective equipment (PPE) where necessary Employ good manual handling technique at all times Good housekeeping to ensure walkways and relevant routes are clear of all obstructions Refer to working near water	4	A	L	Supervisors All Personnel	

Manual Handling

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

Long distance to carry item Adverse weather conditions Wet surfaces "Slipping" items (e.g. chains on chain blocks) Horseplay	Falling from height														

Towing Operations

SEVERITY CLASSIFICATION						PROBABILITY				
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H

PROBABILITY CLASSIFICATION		
A	Highly Improbable	A possibility but extremely remote chance of occurrence
B	Improbable	Unlikely to occur (very infrequent) during the operation
C	Possible	May occur (infrequent) during the operation
D	Probable	Is likely to occur often during regular operations
E	Frequent	Is likely (common occurrence) to occur once or more during every operation

RISK CLASSIFICATION	
LOW RISK	Operations may proceed with care
MEDIUM RISK	Operations may proceed with extreme caution
HIGH RISK	Operation must **NOT** Proceed

Potential Hazards	Hazard Effects	Initial Risk			Control and Mitigating Factors	Residual Risk			Responsibility	Reference Document(s)
		S	P	R		S	P	R		
Environmental Conditions Loss of Tug Power / Underpowered Tug Collision – with other vessel / structure Barge Instability Navigation Equipment Failure Mooring System Failure	Loss of control Poor visibility – leading to collision / running aground – see below Collision / running aground - see below Damage to barge / tug / other vessels / existing structures Potential Capsize – rescue scenario. Personal Injury Loss of Cargo Poor towing set-up	5	C	H	No movements occur outside of safe working limits Weather forecasts to be monitored leading up to day of tow to ensure a safe weather window Towing operations being conducted within sheltered harbor Suitable tug selected for tow. Inspection of towing equipment for signs of damage– up to date certs for equipment is to be examined prior to tow Emergency Procedures in place: Suitable life-rafts are to be available on deck of tug and barge All personnel are to be wearing lifejackets during tow Notifications of intentions and movements to port authority Notice to Mariners in force. Barge to be illuminated during night working, if any Works being undertaken within sheltered Estuary Sufficient life-rafts supplied on deck in case of taking on water Barge Stability Calculation produced before loading to ensure that Deck Layout is suitable Tow survey carried out – use of pre-planned route taking tide, water depth and bottom type into consideration as well as hard-copy knowledge of Safe Havens	5	A	M	Supervisors All Personnel	

Towing Operations

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

	Barge taking on water Running aground Loss of knowledge of Safe Havens Damage to vessels				Check for suitable navigation markings along route For positioning the barge, a subcontractor is put to work for accurate monitoring of the barge Inspection of towing equipment for signs of damage – up to date certs for equipment is to be examined prior to tow Competent personnel Movement of barge to be approved routes agreed with the Harbour Master										

Floating Operations (Prior to Jacking Operations)

SEVERITY CLASSIFICATION						PROBABILITY				
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H

PROBABILITY CLASSIFICATION		
A	Highly Improbable	A possibility but extremely remote chance of occurrence
B	Improbable	Unlikely to occur (very infrequent) during the operation
C	Possible	May occur (infrequent) during the operation
D	Probable	Is likely to occur often during regular operations
E	Frequent	Is likely (common occurrence) to occur once or more during every operation

RISK CLASSIFICATION	
LOW RISK	Operations may proceed with care
MEDIUM RISK	Operations may proceed with extreme caution
HIGH RISK	Operation must **NOT** Proceed

Potential Hazards	Hazard Effects	Initial Risk			Control and Mitigating Factors	Residual Risk			Responsibility	Reference Document(s)
		S	P	R		S	P	R		
Barge instability Change in stability Adverse weather / sea state / environmental conditions Low freeboard Loose items on deck Unplanned movement of equipment on deck Loss of control of platform Entry into water Fall from height	Capsizing Structural damage Damaged plant / equipment Drowning Loss of barge / equipment Fatalities Crushing injuries	5	C	H	Handrails to be erected around barge to prevent unplanned entry into water Lifejackets to be worn whilst aboard the Jack-Up Barge Barge floating stability calculations to be conducted prior to lowering barge into floating condition to determine platform stability Barge Master to check that positions and loads comply with project deck plan Accurate tank soundings to be taken into consideration Maximum allowable elevated weight for jacking is not exceeded Maximum allowable weight for floating condition is not exceeded All items on deck are suitably stowed away or seafastened securely to the deck All movements of equipment have been planned and the change on the platform freeboard is deemed within safe limits to proceed Platform is suitably secured in place during works by means of spud legs or mooring ropes Fenders fitted to minimise damage in the case of a collision Loadline draft is not exceeded Where reasonably practicable the centre of gravity is aligned with centre of buoyancy for an even trim	5	B	M	Barge Master	

Floating Operations (Prior to Jacking Operations)

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

No lifting operations are to occur while afloat

Access to platform is always via designated entry point via ladder, youngman walkway or similar

All watertight openings are closed and secure

Check all compartments for water ingress at the floating draft before raising the legs from the seabed

Legs are raised and locking pins are secure

Check the barge hull trim and draft corresponds with the floating stability calculations and are maintained during the tow

Barge Positioning Operations (Prior to Jacking Operations)

SEVERITY CLASSIFICATION						PROBABILITY				
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H

PROBABILITY CLASSIFICATION		
A	Highly Improbable	A possibility but extremely remote chance of occurrence
B	Improbable	Unlikely to occur (very infrequent) during the operation
C	Possible	May occur (infrequent) during the operation
D	Probable	Is likely to occur often during regular operations
E	Frequent	Is likely (common occurrence) to occur once or more during every operation

RISK CLASSIFICATION	
LOW RISK	Operations may proceed with care
MEDIUM RISK	Operations may proceed with extreme caution
HIGH RISK	Operation must **NOT** Proceed

Potential Hazards	Hazard Effects	Initial Risk			Control and Mitigating Factors	Residual Risk			Responsibility	Reference Document(s)
		S	P	R		S	P	R		
Tug loss of power Weather conditions Poor visibility Insufficient water Miscommunication Uneven seabed Exposed location Marine traffic Unavoidable collision Underground / underwater obstructions Conflict with small craft	Inability to stand Jack Up safely, possibility of leg sliding or moving on seabed Wind and Sea loadings on jack up causing overturning Collisions between jack up and other craft Collision between Jack up and uncontrolled vessels / objects unable to steer or manoeuvre due to lack of power Jacking on underwater hazards such as	5	D	H	Location move is weather restricted and to be conducted in sea state that does not exceed the vessels design limits for jacking on location Sufficient clearance is to be maintained between the jack up and adjacent structures or other vessels during positioning All personnel to be briefed on intended operations so everyone knows their role and where the barge is being positioned Sufficient water depth to be present for positioning operation to occur Barge Master / Project Team will check all available records for site conditions, wind strength, tides. Wave strength during the period of proposed works. They will also obtain local knowledge of the area Assess Jack up position with regards to other vessels movements i.e. near shipping channels, berths, fishing grounds etc. Plan position with Harbour Master, and issue notice to mariners. Fog horns and lights facilities are available on the Jack up for identification The Barge Master will monitor the situation regarding other vessels. If there is a danger of collision, then the Barge Master will instruct the crew to evacuate the Jack up Client will ensure that information is obtained from utility providers. In addition, during the visual survey any obvious underwater hazards will be noted and mapped Project management will ensure that SI information is assessed prior to positioning. Positioning will only occur during permitted operational weather conditions	5	B	M	Barge Master Vessel Master Personnel on Deck	

Barge Positioning Operations (Prior to Jacking Operations)

SEVERITY CLASSIFICATION						PROBABILITY				
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H

PROBABILITY CLASSIFICATION		
A	Highly Improbable	A possibility but extremely remote chance of occurrence
B	Improbable	Unlikely to occur (very infrequent) during the operation
C	Possible	May occur (infrequent) during the operation
D	Probable	Is likely to occur often during regular operations
E	Frequent	Is likely (common occurrence) to occur once or more during every operation

RISK CLASSIFICATION	
LOW RISK	Operations may proceed with care
MEDIUM RISK	Operations may proceed with extreme caution
HIGH RISK	Operation must **NOT** Proceed

Loss of tow whilst positioning Unable to jack up clear of water due to soft overburden or depth of water Person falling overboard while rig is moving Loss of communication Fault with navigation system Remote operation of navigation system without surveyor onboard	cables, pipelines, moorings etc Jack up becoming unstable due to floatation of barge or possible swamping Drowning Hypothermia Damage to undetected cables				Hand railing in place; ensure all personnel are wearing a lifejacket Adequate search lighting to be made available to locate man over board MOB Ropes to be inspected prior to positioning to ensure they are fit for purpose If loss of tow occurs, Barge Master will make the call to lower the legs in a suitable area in order to prevent the barge from drifting and possibly striking other vessels / structures in the vicinity Visible markers installed prior to barge arrival for positioning requirements All vessels' draft reviewed, and tidal windows identified							

Final Positioning

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

Potential Hazards	Hazard Effects	Initial Risk			Control and Mitigating Factors	Residual Risk			Responsibility	Reference Document(s)
		S	P	R		S	P	R		
Jacking system malfunction during critical phase Weather conditions Poor visibility Insufficient water Miscommunication Uneven seabed Exposed location Other vessels / assets Unavoidable collision Underground / underwater obstructions	Barge becoming unstable / toppling Leg inoperable Grounding No means of mooring / pinning barge Damage to vessels Damage to bridge if within the vicinity Potential loss of tug and / or barge Crew forced into water with possible loss of life Project delays	5	D	H	Barge Master to study seabed topography, chart datums, tides and seabed geology prior to positioning Ensure all legs are lowered simultaneously as far as the system will allow, keeping all legs within 1m of each other when below the hull, or at an equal distance from the seabed if its known that there is a gradient Ensure that plenty of time is allowed for positioning, if working in areas of significant tidal range. Avoid being in a position of pinning legs on a rapid falling tide Consider the effect of a breakdown during leg pinning phase: • Can the barge be pulled to deeper water? • Are all legs at similar depths? • Is there time on the tide to assist? • What are the seabed conditions? • Can a standby position be used to set legs prior to final positioning? Operational site visit with stakeholders and vessel crews to assess barge positioning requirements Location move is weather restricted and to be conducted in sea state that does not exceed the vessels design limits for jacking on location All personnel to be briefed on intended operations so everyone knows their role and where the barge is being positioned	5	B	M	Barge Master Vessel Master Personnel on Deck	

Final Positioning

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

Person falling overboard while barge is moving Fault with DGPS system if used Loss of communication						Sufficient water depth to be present for positioning operation to occur Barge Master / Project Team will check all available records for site conditions, wind strength, tides. Tide strength during the period of proposed works. They will also obtain local knowledge of the area Client will ensure that information is obtained from utility providers. In addition, during the visual survey any obvious underwater hazards will be noted and mapped The Project management will ensure that survey information is assessed prior to positioning. Positioning will only occur during permitted operational weather conditions Hand railing in place; ensure all personnel are wearing a lifejacket. Adequate searching lighting to be made available to locate MOB								

Punch Through

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

Potential Hazards	Hazard Effects	Initial Risk			Control and Mitigating Factors	Residual Risk			Responsibility	Reference Document(s)
		S	P	R		S	P	R		
Soft soil layer below stronger surface stratum Storm overload Voids or pockets of soft material Existence of sand over soft clay strata Sudden uncontrolled movement of leg resulting in inclination of barge Deck equipment unplanned movement	Damage to barge, legs, jacking system Structural failure Foundation failure Loss of barge Damage to deck items Personal injury Fatality	5	D	H	Site assessment to be conducted prior to barge positioning on site including leg penetration assessment Preload the barge to pressures identified in the site assessment Preload at water level to ensure if punch through occurs the barge buoyancy supports it Barge Master briefed on the expected leg penetrations prior positioning barge on site Comparison of actual vs predicted leg penetration Frequently monitor all leg pressures Barge Master to assess barge at the start of each working shift prior to the commencement of any operations Leg foundations to be reviewed at low tide for obvious signs of change Predefined punch through recovery procedures in place Adequate length of weather window to complete thorough preload operation Seafastenings to remain in place until after preloading loading is complete and barge elevated to working height Weather assessments to be conducted to ensure environmental loadings will not exceed the preload force Barge is to be preloaded again after periods of significant adverse weather	5	B	M		

Punch Through

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

Collision with other structures or vessels Flooding / capsize Inability to evacuate the barge					Adoption of weather restricted operations i.e. no lifting operations are to occur in the survival mode Review soil data prior positioning on site If a punch through were to take place the barge will be jacked down to a height just above sea level					

Unexploded Ordnance

SEVERITY CLASSIFICATION						PROBABILITY				
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H

PROBABILITY CLASSIFICATION		
A	Highly Improbable	A possibility but extremely remote chance of occurrence
B	Improbable	Unlikely to occur (very infrequent) during the operation
C	Possible	May occur (infrequent) during the operation
D	Probable	Is likely to occur often during regular operations
E	Frequent	Is likely (common occurrence) to occur once or more during every operation

RISK CLASSIFICATION	
LOW RISK	Operations may proceed with care
MEDIUM RISK	Operations may proceed with extreme caution
HIGH RISK	Operation must **NOT** Proceed

Potential Hazards	Hazard Effects	Initial Risk			Control and Mitigating Factors	Residual Risk			Responsibility	Reference Document(s)
		S	P	R		S	P	R		
Grenades Artillery shells Drums containing chemical agents Bombs Mines Sea mines	Loss of barge Damage to legs Loss of barge Fatality Personal injury	5	D	H	If found, stay well clear and wait for bomb disposal unit to arrive and deal with the UXO Wait for UXO clearance confirmation from client and relevant parties In the event that UXO is encountered, personnel are not to attempt to touch or attempt to move any UXO at all All works are to be suspended until UXO has been dealt with Client to provide up to date data to ensure project team are aware of any UXOs in the area Ensure all relevant UXO and emergency response procedures are followed accordingly when deemed necessary	5	A	M	Barge Master	

Scour

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

Potential Hazards	Hazard Effects	Initial Risk			Control and Mitigating Factors	Residual Risk			Responsibility	Reference Document(s)
		S	P	R		S	P	R		
Scour pit Removal of seabed soils surrounding / beneath jack up leg by current and waves Uncontrolled settlement and inclination Stress caused by displacement of leg footing Leg misalignment	Damage to legs Major damage to barge Structural failure Foundation failure Loss of barge Inability to jack Jack Up punch through	5	D	H	Site assessments of the anticipate scour to occur Local / previous experience to be sourced to provide clear understanding of anticipated scour Continuous monitoring of leg loads and penetration Foundation inspection at low water to monitor scour Repeating preload after storm or delay Scour protection may be employed if scour significantly differs from the predicted, after further review of conditions	5	B	M	Barge Master	

Sliding Failure

SEVERITY CLASSIFICATION						PROBABILITY				
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H

PROBABILITY CLASSIFICATION		
A	Highly Improbable	A possibility but extremely remote chance of occurrence
B	Improbable	Unlikely to occur (very infrequent) during the operation
C	Possible	May occur (infrequent) during the operation
D	Probable	Is likely to occur often during regular operations
E	Frequent	Is likely (common occurrence) to occur once or more during every operation

RISK CLASSIFICATION	
LOW RISK	Operations may proceed with care
MEDIUM RISK	Operations may proceed with extreme caution
HIGH RISK	Operation must **NOT** Proceed

Potential Hazards	Hazard Effects	Initial Risk			Control and Mitigating Factors	Residual Risk			Responsibility	Reference Document(s)
		S	P	R		S	P	R		
Insufficient lateral restraint Sliding as footprint engages seabed Adverse weather Slope failure resulting in sliding	Leg damage Guide damage Jacking system damage Leg misalignment	5	C	H	Perform preload in controlled conditions Review the seabed topography before deployment Conduct geophysical survey of the area Obtain recent soil information and conduct geotechnical analysis	5	A	M	Barge Master	

Previous Jack Up Locations

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

Potential Hazards	Hazard Effects	Initial Risk			Control and Mitigating Factors	Residual Risk			Responsibility	Reference Document(s)
		S	P	R		S	P	R		
Leg misalignment	Leg damage Guide damage Jacking system failure	4	C	M	Evaluate site records to obtain previous data on location Conduct sea floor survey to obtain previous footprints Minimum of one leg footing diameter clearance should be allowed between the rim of the spudcan and the rim of the existing depression Competent site assessment	4	A	L	Barge Master	

Gas Pockets

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

Potential Hazards	Hazard Effects	Initial Risk			Control and Mitigating Factors	Residual Risk			Responsibility	Reference Document(s)
		S	P	R		S	P	R		
Gas accumulations Blowouts Unpredictable foundation behaviour	Leg damage Structural failure Foundation failure Damage to barge	4	C	M	Conduct geophysical survey of the area Site assessment to be conducted prior to barge positioning on site Barge position to be relocated if concerns over gas pockets are present	4	A	L	Barge Master	

Submerged Obstruction

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

Potential Hazards	Hazard Effects	Initial Risk			Control and Mitigating Factors	Residual Risk			Responsibility	Reference Document(s)
		S	P	R		S	P	R		
Pipelines Wellheads Shipwrecks Anchors Cables Dropped objects UXO	Structural damage / failure Explosion Catastrophic damage to barge Personal injury / fatality Foundation failure	5	D	H	Competent site assessment to be conducted prior to barge positioning on site Bathymetric / sonar scan survey of area Magnetometer survey Dive / Remotely Operated Underwater Vehicle (ROV) survey to be employed where deemed necessary after site assessment Sonar scan Desktop study and UXO risk assessment Object investigation and removal procedure Site assessment to be conducted prior to barge positioning on site Identified objects to be considered during barge positioning technique i.e. stand off for initial positioning and walk into final position	4	B	M	Barge Master	

Spillages

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

Potential Hazards	Hazard Effects	Initial Risk			Control and Mitigating Factors	Residual Risk			Responsibility	Reference Document(s)
		S	P	R		S	P	R		
Leak from vessel Incompatible connections Equipment failure Operational damage to equipment Lack of operational awareness Over flow during fuel transfer	Pollution of seawater Environmental impact to marine life Spills retained to deck Potential fuel / oil fire Loss of time Personal injury / fatality	4	C	M	Designated refuel points to be used Drip trays to be used when necessary Scheduled equipment maintenance / regular inspection of hose/pipe fittings, ensure they're in good working order Bunkering operations tool box talks to be conducted Regular spill / SOPEP drills Inform Harbour Master in the event of a significant spill Predefined oil response plan / procedure to be followed Appropriate monitoring of tank levels during bunkering (one personnel at tank, second personnel at pump) Provision and communication of Bunkering procedure Provision of sufficient spill clean-up supplies	4	A	L	R7M Barge Master Supervisor All Personnel	

Climbing Concertina Ladder

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

Potential Hazards	Hazard Effects	Initial Risk			Control and Mitigating Factors	Residual Risk			Responsibility	Reference Document(s)
		S	P	R		S	P	R		
Slippery rungs Damaged equipment Fear of heights (afraid of discipline) Over reaching Carrying heavy objects Long duration at height Horseplay Personnel directly below Person / vehicle / boat collision with ladder	Hypothermia Drowning Illness Personal injury Crushing injuries Dropped / falling objects Potential fatality Spinal injury Broken bones / fractures Head injuries Personnel freezing in fear Potential drowning if transfer from boat	4	D	H	Access and egress should be clear from debris, slippery materials and substances Personnel wearing correct and certified Personal Protective Equipment (PPE) i.e lifejacket Maintain the correct inspection schedule for ladder and PPE Harness and inertia reel to be used at all times when climbing the ladder Harness to be worn under lifejacket Only one person to use the ladder at any one time When operative is climbing the ladder, transfer vessel is to move from beneath the ladder in case the operative accidently falls Personnel are not to climb the ladder if the base footstep is not easily accessible Sufficient light must be present when climbing the ladder Embarking and disembarking areas to be clear from slip / trip hazards Only personnel deemed competent and physically fit, not under the influence of alcohol / drugs and competent are to climb the ladder – Vessel Master and Barge Master are to assess personnel before transfer Personnel are not to carry any items while climbing the ladder/ do not carry tools in pockets Barge Master is to access barge first in order to be able to operate recovery winch on inertia reel in the event of an emergency	4	B	M	Vessel Master Barge Master	

Climbing Concertina Ladder

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

Adverse weather / environmental / sea conditions Failing from boat (if from sea transfer) Failure from ladder Falling into water and / or hitting other objects Limited or complete inability to climb ladder safely due to high wind Tripping, entanglement, slipping as accessing barge / climbing ladder Exposure to cold water conditions	Serious personal injury				No personnel are to access the ladder while jacking operations are occurring Inspect integrity of ladder, visually inspect ladder for damages and defects prior to use Check integrity of footwear, no slippery substances on soles Do not overreach No horseplay Person must inform supervisor if uncomfortable at heights Ensure adequate supervision is provided Ensure if any personnel below are at a safe adequate distance away when one person is using the ladder If transfer by boat, the Vessel Master, Barge Master and other relevant parties are to assess conditions beginning and during transfer Maintain dedicated and as reasonably practicable safe position for offloading personnel onto ladder Ensure there is clear communication between Vessel Master and Barge Master and all other relevant parties at all times Ensure personnel have a stable footing on ladder before continuing to use the concertina ladder								

Climbing Concertina Ladder

SEVERITY CLASSIFICATION						PROBABILITY					PROBABILITY CLASSIFICATION			RISK CLASSIFICATION	
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E					
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M	A	Highly Improbable	A possibility but extremely remote chance of occurrence	LOW RISK	Operations may proceed with care
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M	B	Improbable	Unlikely to occur (very infrequent) during the operation	MEDIUM RISK	Operations may proceed with extreme caution
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H	C	Possible	May occur (infrequent) during the operation		
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H	D	Probable	Is likely to occur often during regular operations	HIGH RISK	Operation must **NOT** Proceed
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H	E	Frequent	Is likely (common occurrence) to occur once or more during every operation		

Falling from height

Falling from ladder

Falling from transfer boat/ vessel/ vehicle

Slippery / uneven surfaces

Poor communication

Inexperienced personnel

Insufficient lighting

Inability of boat / barge to remain in position

Fire

SEVERITY CLASSIFICATION						PROBABILITY				
Value	Severity	Injury	Health	Damage	Pollution	A	B	C	D	E
1	Negligible	Minor first aid case or no specific treatment	No adverse health effects	No Cost	<1Ltr	L	L	L	L	M
2	Minor	First aid or basic medical aid case	Minor adverse health effect (e.g. mild rash)	<£5,000	1-10Ltr	L	L	L	M	M
3	Significant	Possible severe injury (medical aid case) leading to max 1 Day LTI	Moderate adverse health effects such as persistent dermatitis	£5,000-25000	10-100Ltr	L	L	M	M	H
4	Severe	Major injury leading to 3 day+ LTI	Harmful health effects such as a dangerous infection	£25,000-500,000	100Ltr-100m^3	L	M	M	H	H
5	Catastrophic	Fatality or multiple major injuries	Terminal or permanent health damage	>£500,000	>100m^3	M	M	H	H	H

PROBABILITY CLASSIFICATION		
A	Highly Improbable	A possibility but extremely remote chance of occurrence
B	Improbable	Unlikely to occur (very infrequent) during the operation
C	Possible	May occur (infrequent) during the operation
D	Probable	Is likely to occur often during regular operations
E	Frequent	Is likely (common occurrence) to occur once or more during every operation

RISK CLASSIFICATION	
LOW RISK	Operations may proceed with care
MEDIUM RISK	Operations may proceed with extreme caution
HIGH RISK	Operation must **NOT** Proceed

Potential Hazards	Hazard Effects	Initial Risk			Control and Mitigating Factors	Residual Risk			Responsibility	Reference Document(s)
		S	P	R		S	P	R		
Major fire on board, potentially spreading to adjacent structures / vessels Inadequate or lack of inspection and testing of emergency equipment Flying debris Poor communication between the barge and other assets	Personal injury / fatality Damage / loss of jack up barge / vessel Inability to recover casualty Fire / explosion Environmental impact Financial impact Loss of time	5	C	H	Ensure there is an emergency response plan Barge Master to follow predefined procedure Clear communication between relevant parties over VHF Radio Regular drills and exercises to ensure personnel are familiar with abandonment procedures Maintain records of fire equipment checks Appoint approved contractor to conduct regular tests and certification of firefighting media Diesel fuel used as less flammable option for plant Designated smoking areas – no smoking on deck, especially during bunkering operations Fire extinguishers and alarms fitted in accommodation units Limited use of highly flammable substances Man over board (MOB) boats in attendance Life rafts deployed when determined necessary by the Barge Master concertina ladders used for egress Survival suits to be worn prior to leaving the barge	4	B	M	Barge Master Rescue Craft Crew All Personnel	

Appendix C – SOLMEK RAMS

No.	Description	Revision
1		
2		
3		
4		

Appendix D – Variations Record Sheet

No.	Description	Revision
1		
2		

Variations to the Planned Procedure			
This form should be used to record any variations to the designated procedure. All variations must be approved by an appropriate person and communicated to all essential personnel before any operation is carried out. All Persons are to sign and agree to the variations in methodology.			
Project No		Client	
Task Description			

No	Task / Check Description	Confirmed

Supervisor Approval		
..... *Signed*	..... *Print Name*	..... *Date*

Site Variations Approval Signatures				
This form is to be signed <u>ONLY</u> after having read, understood and agreed to the procedures outlined above. This ensures everyone involved in the operation has a clear understanding of the required tasks and procedures helping to minimise Risks to all parties. All persons either directly or indirectly involved in the operation MUST sign the below. **<u>NO OPERATION IS TO BE PERFORMED UNTIL ALL RELEVANT PARTIES HAVE SIGNED AND AGREED THE METHODOLOGY</u>**				
Name	Operations Role	Company	Cert Expiry	Signature