EIA STUDY FOR PROJECT WAVE: COMPONENTS 1 & 2

ENVIRONMENTAL BASELINE SURVEYS AND HYDRODYNAMIC MODELING

SCOPE AND METHOD STATEMENT

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1 INTRODUCTION

1.1 Project Overview

ADNOC Onshore is implementing the Project Wave (the Project), which aims to utilize treated brine as an alternative for the injection requirements on all ADNOC Onshore fields (BAB, Bu Hasa, NEB and South East). This Project Wave represent ADNOC ++ initiatives for ensuring an additional and more sustainable source of water for injection in ADNOC Onshore fields. The Project will include the following components (see Figure 1.1):

- Component-1: construction of a Seawater Treatment Plant (SWTP) at two locations (Mirfa and Nouf). Each consists of Seawater Intake, Outfall, Filtration and Sulphur Reduction Plant (SRP).
- Component-2: build a network of pipelines to transport treated, filtered, low-Sulphate seawater to all Onshore Fields (nine separate battery limits).
- Component-3: build a centralized pumping station and in-field distribution network to distribute treated water up to water injection wells.

The scope of the current Project is limited to Components 1 and 2 (i.e. Component 3 is located within existing oilfields and being implemented separately by ADNOC Onshore). ILF Consulting Engineers Abu Dhabi has been awarded by ADNOC with the Technical Advisor Services for the Project.

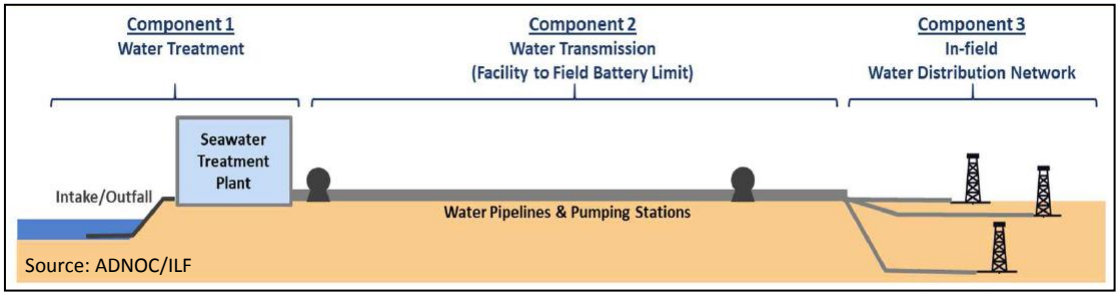


Figure 1.1 – Proposed Al Nouf Pipeline Route and Associated Facilities

1.2 EAD Environmental Permit Application (EPA) Scope

It is to be noted that, ADNOC and ADNOC Group Companies, by virtue of Article 94 of UAE Federal Law No. 24 of 1999 for the Protection and Development of the Environment, have been given self-regulatory status with regard to environmental permitting. Nonetheless, considering the Project will cover some areas that are within the EAD Terrestrial Protected Areas, a permit application with the Environment Agency Abu Dhabi (EAD) has been initiated (Figure 1.2 and Figure 1.3 for locations):

- Marawah Marine Biosphere Reserve (MMBR) – the Mirfa SWTP will be located within the transition zone of MMBR (onshore part of the biosphere reserve), including 3.82 km water pipeline.
- Al Ghada Protected Area – about 32.5 km water pipeline of the Project will be located within the protected area.
- Arabian Oryx Marine Protected Area – about 77 km water pipeline of the Project will be located within the protected area.

It is understood that there is already a mutual agreement between ADNOC and EAD (based on letter issued in November 2020), which specifies that any ADNOC project requiring EAD permit shall include: EPA and EBS and EIA Report. Further, it is understood that separate TOR submission is no longer required, since baseline surveys scope are already stipulated in the EAD-approved environmental baseline protocols for ADNOC Projects.

Nonetheless, based on consultations between ADNOC and EAD (meeting on 21st April 2021), the submission of this Scope and Method Statement for Environmental Baseline Surveys (EBS) and Hydrodynamic Modeling has been requested. The EBS and hydrodynamic modeling will specifically be undertaken for the portions of the Project that area within the EAD protected area as discussed above. The remaining portions of the Project will be covered under the HSE regulatory process of ADNOC.

The EBS to be conducted for the portions of the Project that are within the EAD protected areas will include the following (see detailed methodology in Section 2 of this document):

- Ecology surveys, including marine (to cover the proposed intake and outfall structures) and terrestrial/coastal (to cover SWTP area and pipeline routes);
- Soil sampling and laboratory analysis at SWTP sites and pipeline routes; and
- Noise surveys, to cover SWTP area and pipeline routes.

Furthermore, a hydrodynamic modeling study will be undertaken in order to assess the potential water quality impacts of the proposed effluent discharge from the Mirfa SWTP (see detailed methodology in Section 3 of this document).

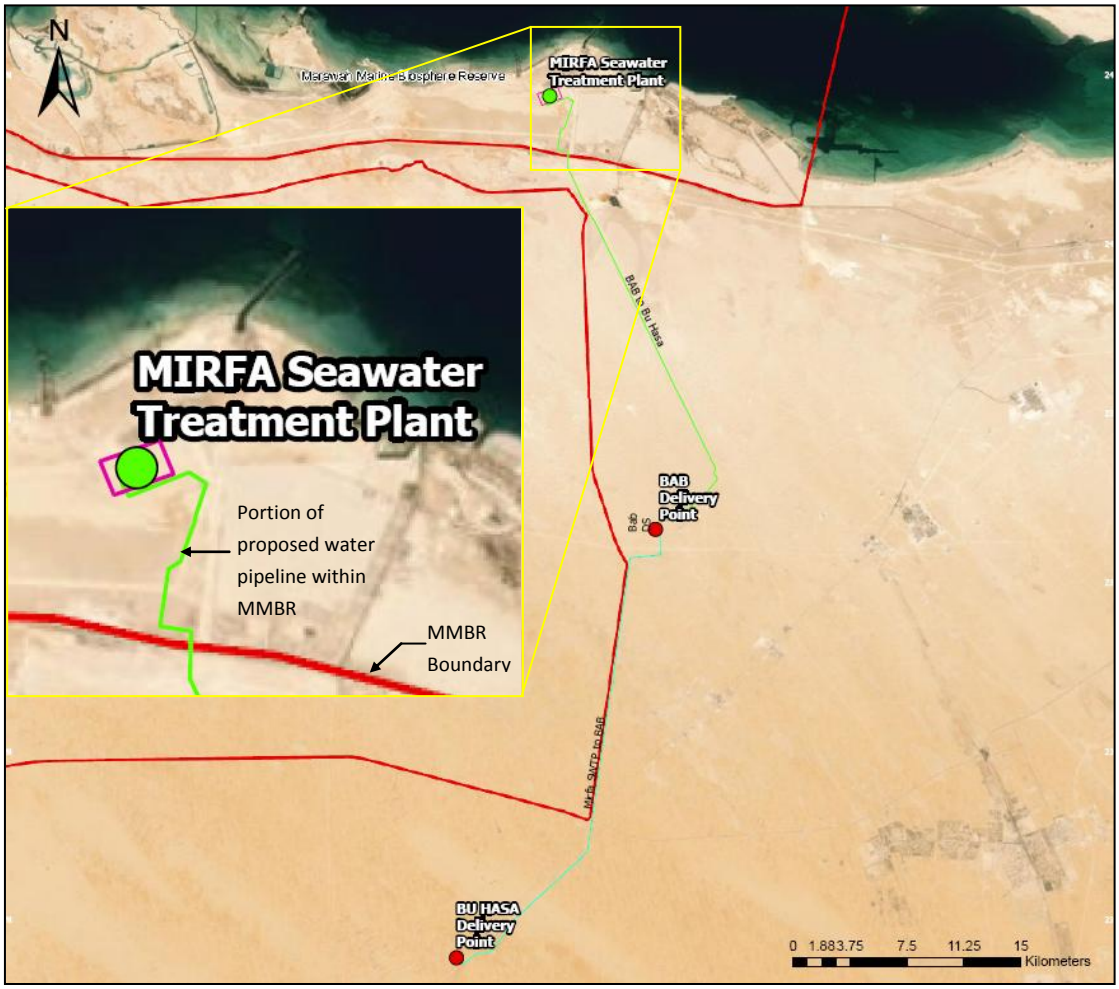


Figure 1.2 – Proposed Mirfa SWTP and Water Pipeline Route

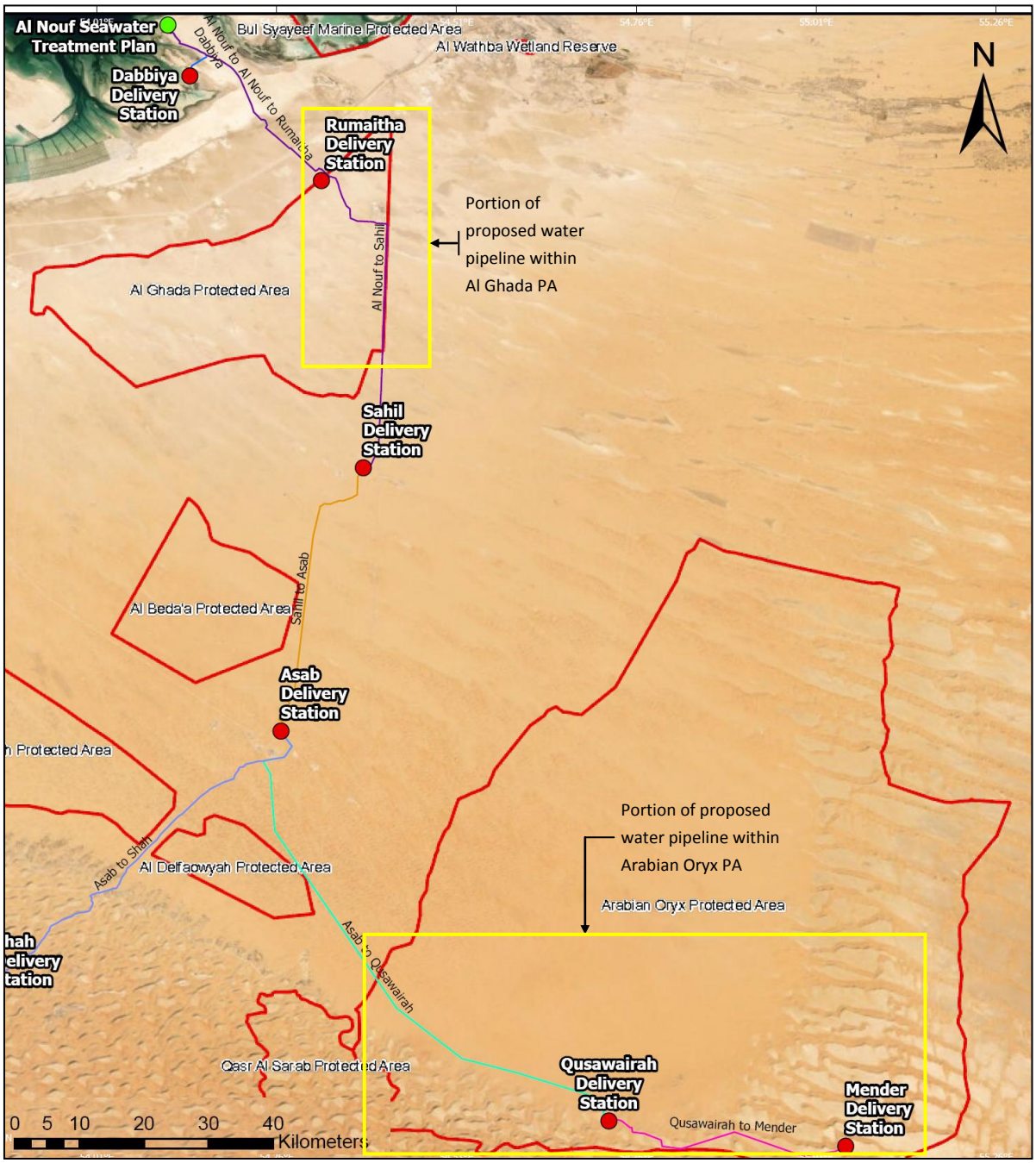


Figure 1.3 – Proposed Al Nouf SWTP and Water Pipeline Route

2 EBS METHOD STATEMENT

2.1 Marine Ecology Survey

Marine environmental baseline survey (MEBS) involving in-situ water quality measurement, water and sediment sampling and analysis, marine fauna and habitat mapping will be undertaken within the immediate surrounding marine waters of the Mirfa SWTP (primarily covering the proposed intake and outfall locations, see Figure 2.1). The marine ecological baseline survey will primarily involve dropdown video (DDV) assessment. Table 2.1 provides a summary of scope and number of monitoring stations. The description of each sampling location is provided in Table 2.2.

The results of the Project-specific survey will be supplemented by the previously collected environmental baseline data for the Mirfa area for other projects of ADNOC. Specifically, ADNOC recently commissioned a marine baseline survey for the proposed seismic survey in Mirfa area (which was conducted in January 2021, covering winter survey). The proposed Project-specific survey will be undertaken in May or June 2021, which shall cover the summer season.

Table 2.1 – Summary of Marine Ecology Survey Scope

Survey Scope	No. of Stations	Frequency
Drop-down Video (DDV) Habitat Investigations	10	Once
Marine Mammals, Reptiles and Birds (MMBR)	Incidental Observations	Once
Seawater sampling for ex-situ analysis	4	Once
Marine Sediment Sampling	4	Once

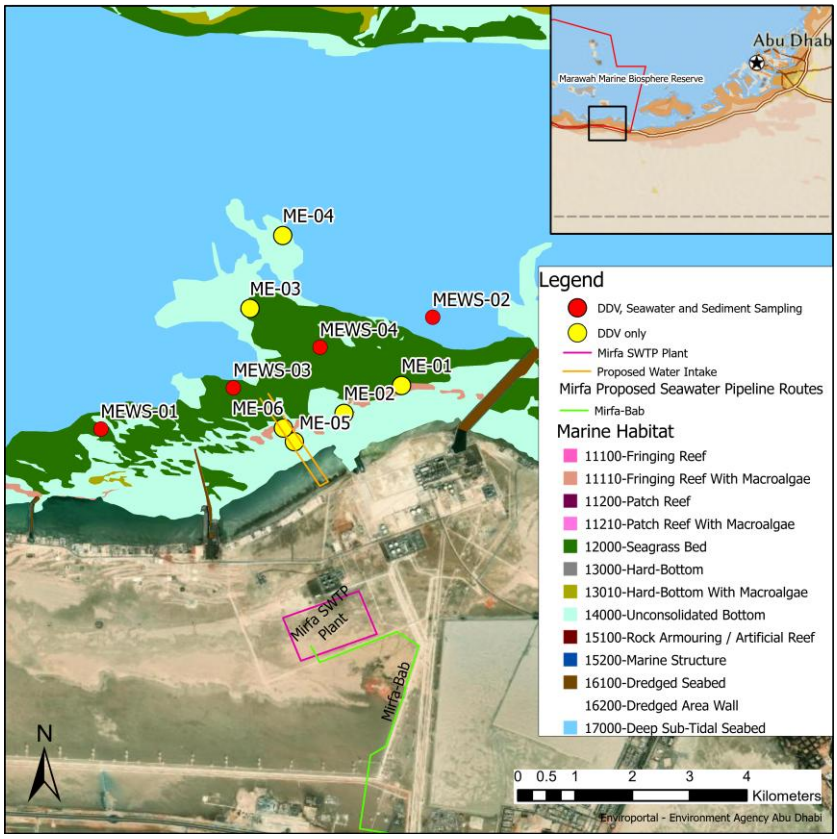


Figure 2.1 – Proposed Locations for Marine Ecology Survey in Mirfa SWTP

Table 2.2 – Description of Marine Ecology Survey Locations

Location	EAD Code	Description	Latitude	Longitude	Sampling Type
MEWS-01	12000	Seagrass Bed	24.12665862	53.38897925	DDV and Water & Sediment Sampling
MEWS-02	12000	Seagrass Bed	24.1441779	53.4410575	DDV and Water & Sediment Sampling
MEWS-03	12000	Seagrass Bed	24.13310426	53.40978706	DDV and Water & Sediment Sampling
MEWS-04	12000	Seagrass Bed	24.13945902	53.42337743	DDV and Water & Sediment Sampling
ME-01	11110	Fringing Reef With Macroalgae	24.13347372	53.4361695	DDV
ME-02	11110	Fringing Reef With Macroalgae	24.12909258	53.4271352	DDV
ME-03	12000	Seagrass Bed	24.14555763	53.41238825	DDV
ME-04	14000	Unconsolidated Bottom	24.15699227	53.41754	DDV
ME-05	13010	Hard-Bottom With Macroalgae	24.12465991	53.41936656	DDV
ME-06	11110	Fringing Reef With Macroalgae	24.12679893	53.41761411	DDV

2.1.1 Desktop Study Marine Ecology

A desktop review of available literature relating to the area under study will be undertaken prior to the in-field survey, together with more general knowledge from available publications. Existing in-house will be utilized as much as possible in order to define existing conditions and plan the survey accordingly.

2.1.2 Subtidal Habitats

A subtidal habitat validation will be undertaken using remote drop-down video techniques (DDV; for qualitative evaluations) at each selected location. The objectives encompass the following dataset collection elements, discussed in subsequent sections:

- Photographic and video graphic documentation, GPS position, date & time;
- Environmental conditions (benthic condition, sea states, pollution etc.);
- Habitat description (slope, rugosity); and
- Marine flora and fauna (benthic and pelagic [including fish]).

The methodology is based on replicable, statistically robust and scientifically valid techniques that are well documented in scientific literature and have been established in the region through repeated use. Site investigations will be conducted by experienced marine scientists using a Drop-Down Video (DDV) assemblage (see Figure 2.2).

This remote method of data collection enables a quicker but reliable site assessment than the use of divers and is used for habitat validations and to inform the mapping validation process. The assemblage includes three underwater video cameras attached to a frame with a square 50cm x 50cm base, which functions as a quadrat. The frame is lowered to the seabed, with two cameras recording footage laterally, and a third camera taking top down pictures of the quadrat base. The quadrat pictures can enable for a more detailed spatial assessment of habitat cover, if deemed necessary.

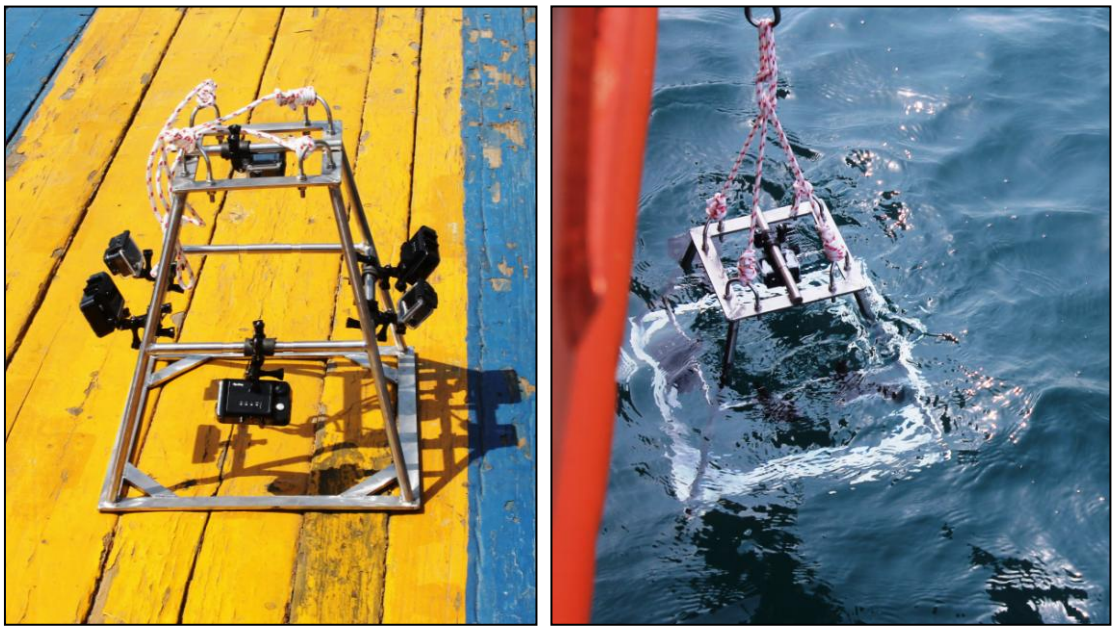


Figure 2.2 – Typical Drop Down Video Assemblage Deployment

2.1.3 Marine Mammals, Reptiles and Birds

Incidental observations of marine mammals (cetaceans and dugongs) and reptiles (sea turtles and sea snakes) will be made during field surveys, where feasible, to include location, group size, relative abundance, behavior etc.

2.1.4 Physical Characteristics and Habitat Mapping

Several physical characteristics of the seabed will additionally be recorded, estimated or classified (as appropriate), including: minimum and maximum depth, underwater visibility, slope, rugosity (physical habitat complexity), percentage substrate cover and sediment depth. Seabed slope and rugosity will be categorized on a five-point scale of increasing complexity based on Polunin and Roberts (1993; Table A1).

A habitat mapping validation exercise will be conducted for the area, to validate and/or update existing map(s) from previous studies and the EAD classification (EAD 2014). These surveys will involve the confirmation of habitat type, and will note key species as well as identifying ecologically important, threatened and degraded areas.

Table 2.3 – Physical Descriptor Scales for Marine Habitats

Scale	Slope		Rugosity
	Incline (%)	Descriptor	Descriptor
0	0 - 5	Flat	Flat
1	5 - 35	Gentle slope	Low relief
2	35 - 70	Steep slope	Moderate relief
3	70 - 90	Wall	Complex
4	90 - 125	Overhang	Highly complex
5	< 125	Cave	Rock Armouring

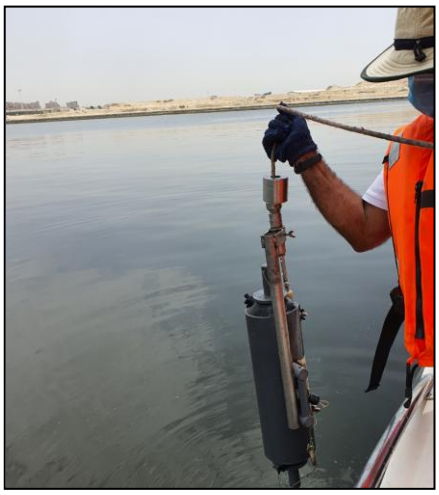
2.1.5 Seawater and Sediment Quality Analysis

Sampling Protocols, Storage and Transferral

In order to determine the baseline marine water and sediment quality conditions within the Project site, marine water and sediment quality survey was undertaken as part of the marine environmental baseline survey. The survey activities will be undertaken at four (4) locations within the vicinity of the site (see Figure 2.1).

Sampling and analysis will occur at selected stations as defined, with in-field sampling procedures following protocols provided by the Manual of Oceanographic Observations and Pollutants Analysis Methods (MOOPAM), forming part of the Regional Organization for the Protection of the Marine Environment (ROPME). Collected samples will be stored in appropriate containers (pre-prepared by the analytical laboratory) and conditions (cool storage at ~4^{o}C) on board the support vessel, prior to collection by laboratory, with Chain of Custody documentation in place.

Seawater Samples for Ex-situ Laboratory Analysis



Marine water samples for physico-chemical analysis will be collected at each sampling location using Niskin water sampler (or equivalent). Collected samples will be decanted into clean, sterilized sample containers supplied by the analytical laboratory.

Each sample container will be labelled with a unique reference number and details of sample location, date of collection and depth. Collected samples will be stored in cool boxes on board the survey vessel and will be submitted to the analytical laboratory at the end of each survey day. Transfer of samples to the laboratory will be properly documented using chain of custody forms.

The water samples will be analyzed for the parameters outlined in the Abu Dhabi Ambient Marine Water and Sediments Specifications (ADS19/2017, see Table 2.4). The analysis of water samples will be carried out in accordance with US EPA accepted test methods (or equivalent internationally accepted standards).

Table 2.4 – Marine Water Quality Parameters for Laboratory Analysis

Parameter	Unit	Marine Protected Use Areas
Cadmium (Cd)	µg/l	0.3
Chromium (Cr VI)	µg/l	0.2
Copper (Cu)	µg/l	3.0
Lead (Pb)	µg/l	2.2
Mercury (Hg)	µg/l	0.1
Nickel (Ni)	µg/l	3.0
Zinc (Zn)	µg/l	15.0
TPH	µg/l	7.0
Total PCBs	µg/l	0.03
Chlorophyll (a)	µg/l	0.7
DO	mg/l	4.0
Enterococci	CFU or MPN/100 ml	35
TDS	mg/l	-

Sediment Samples for Ex-situ Laboratory Analysis


Van Veen Grab Sampler

Sediment samples will be collected at each sampling location using a Van Veen Grab sediment sampler. The grab sampler, in open position, will be lowered to the seabed at each sampling location from the survey vessel. The grab sampler closes upon impact on the seabed, which consequently collects sediment sample. The grab will then be retrieved and samples will be collected onboard the vessel and will be transferred into different containers provided by analytical laboratory).

Each sample container will be labelled with a unique reference number and details of sample location, date of collection and depth. Collected samples will be stored in cool boxes on board the survey vessel and will be submitted to the analytical laboratory at the end of each survey day. Transfer of samples to the laboratory will be properly documented using chain of custody forms.

Table 2.5 lists the parameters to be analyzed for sediment samples as outlined in the Abu Dhabi Ambient Marine Water and Sediments Specifications (ADS19/2017). The analysis of soil samples will be undertaken by an EAD-accredited laboratory. All analysis will be undertaken in accordance with internationally accepted methods and procedures (i.e. USEPA, ICP, etc.).

Table 2.5 – Marine Sediment Analytical Parameters

Parameter	Unit (DW)	Marine Protected Use Areas
Arsenic (As)	mg/kg	7.0
Cadmium (Cd)	mg/kg	0.2
Chromium (Cr)	mg/kg	11
Copper (Cu)	mg/kg	20.0
Lead (Pb)	mg/kg	5.0
Mercury (Hg)	mg/kg	0.2
Nickel (Ni)	mg/kg	7.0
Zinc (Zn)	mg/kg	70.0
Total PCBs	µg/kg	22.0
Total PAHs	mg/kg	1.7

2.2 Terrestrial Ecology Survey

A detailed terrestrial ecology survey will be undertaken for the parts of the proposed Project that are within the EAD protected areas. The terrestrial ecology survey will be conducted to identify the biodiversity and habitat, and define the conditions of the terrestrial within the Project areas. The terrestrial ecology survey will be undertaken through the in-house terrestrial ecology team of Dome with extensive experience in conducting surveys in Abu Dhabi in accordance with ADNOC and EAD guidelines.

2.2.1 Desktop Study

A desktop review of available literature relating to the area under study will be undertaken prior to the in-field survey, together with more general knowledge from available publications. Existing in-house data will be utilized as much as possible in order to define existing conditions and plan the survey accordingly.

2.2.2 Habitat Identifications

Habitat types will be identified based on the geological content of the substrate and floristic composition. Where specifically sensitive habitats are identified, a combination of drive-through and walkover survey will be conducted for the Mirfa SWTP and entire pipeline route within the protected areas (see Figure 1.2 and Figure 1.3) to ascertain floristic species composition.

The survey will aim to describe the structure and composition of the broad habitat types and the floristic diversity with ascertaining levels of impact from anthropogenic activities. Further, the methodology to be employed will aim to identify threatened / endemic / protected / invasive plant species, taking the season the survey will be conducted into consideration. The vegetation of the survey area will be recorded by identifying the main habitat types and their plant communities in accordance with the recently revised EAD Terrestrial Habitat Classification Guidelines.

The vegetation of the survey area will be assessed using selected quadrats, approximately 10m x 10m. Within each quadrat, the habitat type, floristic communities and other activities will be recorded. All plants within each quadrat will be recorded in accordance with the DAFOR (Dominant, Abundant, Frequent, Occasional, and Rare) vegetation index and percentage coverage recorded. The identified habitats will be mapped using ArcGIS, which will clearly delineate each habitat type identified during the survey. The survey shall be carried out for two seasons.

2.2.3 Mammals

Mammal activity will be recorded during quadrat and transects surveys throughout the survey areas. The presence of mammal activity will be recorded through visual sightings, along with signs inclusive of tracks, burrows, scats, and other signs such as carcases, if identifiable. In addition, camera traps will also be deployed in each survey point. Based on initial assessment, there will be at least 15 cameras installed along the pipeline route and SWTP at Mirfa (see Figure 2.4 to Figure 2.6) and will be left for at least 7 days, this will be adjusted accordingly based on actual conditions observed during the survey. Each camera trap will be installed between 0.5 m and 1m from ground height. Camera traps will be baited with tinned sardines to act as an attractant. The deployment of the camera traps will aid in determining the presence of nocturnal species.

Further, to provide support to the context of the mammals within the area, Sherman traps for small non-volant mammals (catch and release) will be undertaken. Location of these traps shall be determined *in-situ*, taking into consideration food/water source and pre-identified animal tracks (minimum of 15 locations, similar to camera traps). The traps will be installed after 4:00 pm and retrieved before 7:00 am the following day.



Figure 2.3 – Typical Camera Traps and Sherman Traps Deployment



Figure 2.4 – Proposed Survey Points Locations within MMBR

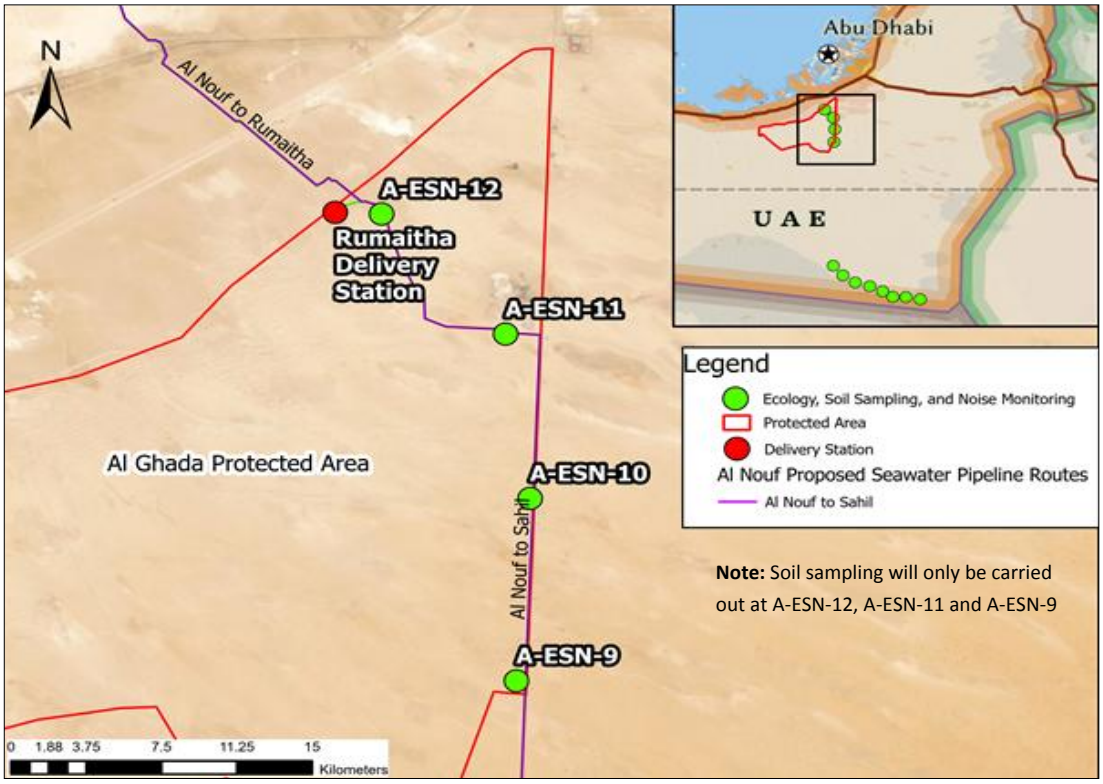


Figure 2.5 – Proposed Survey Points Locations within Al Ghada Protected Area

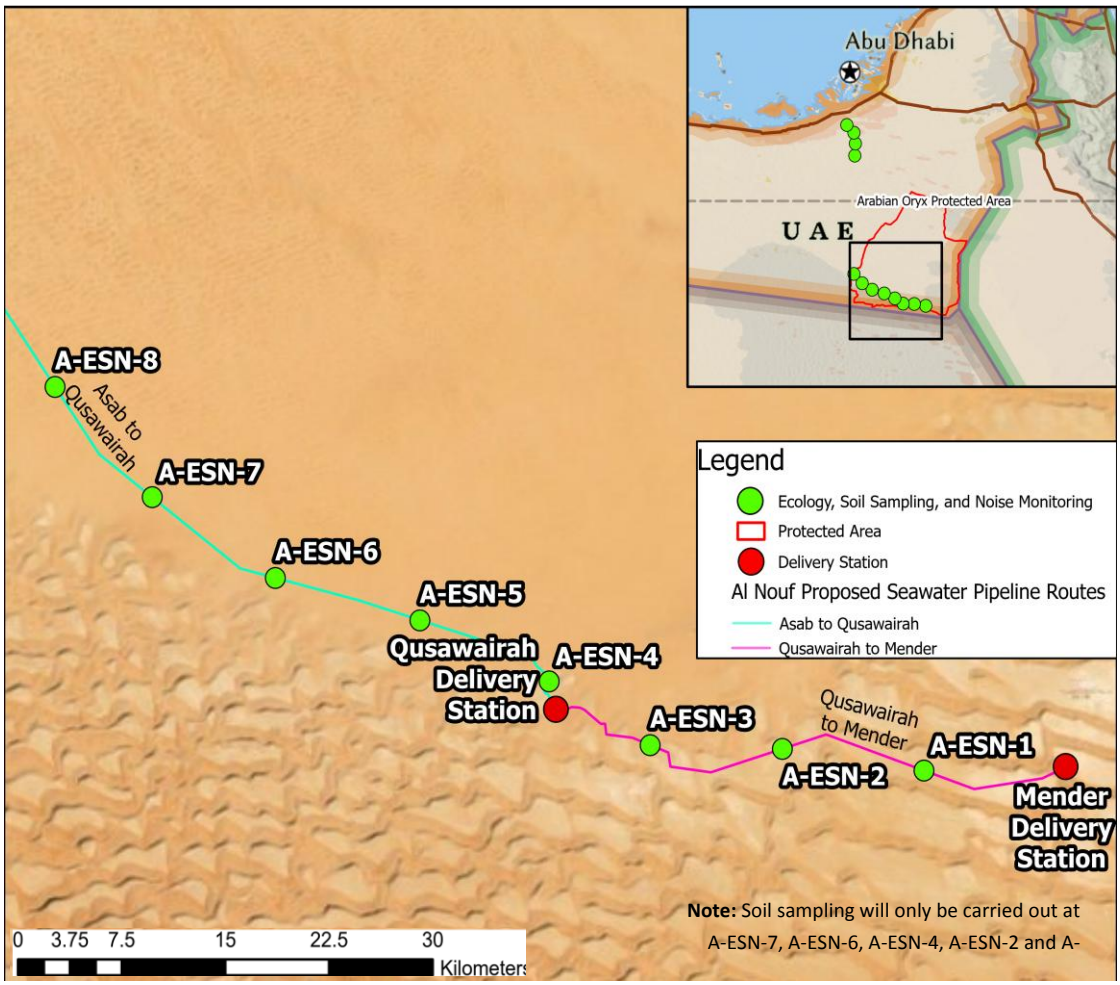


Figure 2.6 – Proposed Survey Points Locations within Arabian Oryx Area

2.2.4 Reptiles

Reptile surveys will be undertaken concurrently with the mammal surveys during quadrat assessments. An effort will be made to search under discarded plywood sheets and other anthropogenic debris as well as under more natural shelters such as rocks and dead wood. Evidence of priority Red List species will be recorded, a GPS location noted, and photographs will be taken. The survey will also note any evidence of breeding / hatching areas of marine turtles within each island.

2.2.5 Avifauna

Avifaunal survey using point count method will be employed for this Project and will involve the following:

- A transect line will be identified within each survey area, the location of the transect line shall be based on actual observation and likelihood of bird presence (i.e. forestry areas, etc.).
- The observers will stay for at least 10 minutes to record bird calls through visual/photo documentation of birds.
- Bird species population will be counted, and no two birds will be counted twice.
- Should the indicative area be inaccessible, the consultant will offset the location of the transect area. In that case, the avi-faunal survey will be carried out from the nearest point near the indicative location.

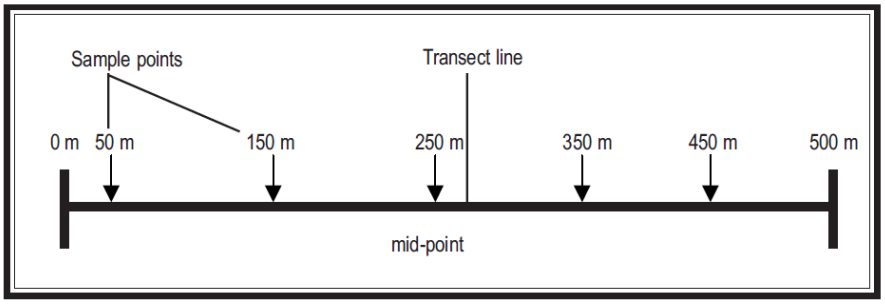


Figure 2.7 – Example of 500 meter transect

2.3 Soil Sampling and Analysis

Soil sampling will be undertaken at the location of each Mirfa SWTP and at the pipeline routes (a total of 10 soil samples will be collected, see Figure 2.4 to Figure 2.6). The locations for soil sampling will be defined based on the results of the initial site assessment to be undertaken (i.e. locations will be adjusted to cover any areas with potential contaminations). Soil samples will be collected by excavating trial pits with a depth range of 10 cm to 100 cm at every location, depending on the site conditions. One (1) homogenized sample will be taken from each sampling point.

Samples will be taken using a de-contaminated hand shovel and will be placed in clean laboratory supplied containers. During field storage and transportation, all samples were stored in a cool box with ice packs. Transfer of samples to the laboratory will be properly documented using a chain of custody forms. The collected samples will be analyzed for full suite of parameters specified in the ADQCC Environmental Specification for Soil Contamination (ADS 19/2017, see Table 2.6). The analysis of soil samples will be analysed by an ENAS registered laboratory in accordance with internationally accepted methods and procedures (i.e. USEPA, ASTM, etc.).

Table 2.6 – Soil Testing Analytical Parameters

Parameter	Unit	Screening level	Clean-up level
Antimony (Sb)	mg/kg (DW)	470	4700
Arsenic (As)	mg/kg (DW)	30	300
Beryllium (Be)	gm/kg (DW)	2.3	23.0
Cadmium (Cd)	mg/kg (DW)	980	9800
Chromium (Cr VI)	mg/kg (DW)	63	630
Cobalt (Co)	mg/kg (DW)	350	3500
Lead (Pb)	gm/kg (DW)	8.0	80
Mercury (Hg)	mg/kg (DW)	46	460
Nickel (Ni)	gm/kg (DW)	22	220
Selenium (Se)	gm/kg (DW)	5.8	58
Asbestos	gm/10 kg (DW)	5.0	5.0
Benzene	mg/kg (DW)	51	510
Toluene	gm/kg (DW)	47	470
Ethylbenzene	mg/kg (DW)	250	2500
Xylene	gm/kg (DW)	2.5	25.0
Benzo (a) pyrene (BaP)	mg/kg (DW)	2.9	29
Polychlorinated Biphenyls	mg/kg (DW)	330	3300

2.4 Ambient Noise Survey

Noise monitoring will be carried out within the Project site and any potential noise sensitive receptors that will be identified (see Figure 2.4 to Figure 2.6 for locations). The actual noise locations will be adjusted based on the locations of potential sensitive receptors as observed during the actual monitoring.

Noise monitoring will be undertaken for a period of 15-minutes during the daytime (along the pipeline route and at the identified NSR locations. Noise measurements will be undertaken using a RION make NA-32 Type-1 Integrating Precision sound level meter (or equivalent unit), fitted with A and C filter networks in accordance with IEC 60651: 1979 Type 1, IEC 60804: 2000 Type, IEC/FDIC 61672 Class 1 and JIS C1505: 1988. The microphone was positioned at 1.5 meters above ground level. The following parameters were recorded at each location:

- LA_{eq} – Equivalent continuous A-weighted sound pressure level;
- LA_{max} – Maximum A-weighted sound pressure level;
- LA_{min} – Minimum A-weighted sound pressure level; and
- LA_{10}/ LA_{90}/ LA_{50} – Percentile A-weighted sound pressure level.

In addition, the measurement date and time, GPS position (UTM coordinates), surrounding noise sources (notable sources in the area) and wind speed and direction will be provided.

3 HYDRODYNAMIC MODELING METHOD STATEMENT

In accordance with ADNOC/EAD guidelines, hydrodynamic modeling will be undertaken in order to assess the potential water quality impacts of the proposed effluent discharge from the Mirfa SWTP. The hydrodynamic modeling will be undertaken using Global Environmental Modelling and Monitoring Systems (GEMMS) software and CORMIX. It should be noted that GEMMS, has been working with DOME for a long time and were the first group to use 3D hydrodynamic models (GCOM3D) in the UAE back in the early 2000s. GCOM3D and PLUME3D have been used for a large number of outfall studies in the UAE and Oman over the past 20 years.

3.1 Applicable Regulatory Guidelines

The results of the plume dispersion modeling need to be assessed against the local regulatory requirements relating to any increased salinity due to discharges into the marine environment. For this Project, the regulatory guideline specified in the ADNOC Pollution Prevention and Control (PPC) Standard (HSE-EN-ST02) will be adopted. This Standard outlines the following requirements:

- The salinity of discharges shall not exceed ± 3% difference from the background concentration at the discharge location.
- Mixing brine with cooling water or sewage water discharge, if technically feasible, is highly recommended.
- The discharge location should be carefully selected with respect to potential environmental impacts demonstrated via dispersion modelling.
- The mixing zone shall be set at 100 meters from discharge point.

Accordingly the number of dilutions required to meet these guidelines are calculated and the results are presented in terms of spatial dilutions.

3.2 Simulation Models and Modeling Process

The effluent discharge is to be simulated using five sophisticated atmospheric and marine models:

- The European Centre for Medium Range Weather Forecast (ECMWF) reanalysed forecast data (ERA5) to obtain wind and atmospheric pressure fields over the Arabian Gulf region;
- The United States Navy Global Ocean Model (HYCOM) to obtain boundary conditions and temperature and salinity forcing for GCOM3D;
- The GEMMS 3D Coastal Ocean Model (GCOM3D) which predicts the variation horizontally and vertically of the currents, sea levels, temperature and salinity in the Project area;
- The Cornell Mixing Zone Model (CORMIX), which simulates the near field dispersion of the discharge; and
- The GEMMS 3D Plume Dispersion Model (PLUME3D), which simulates the far-field dispersion of the discharge.

The major stages of the modeling methodology are:

- Setup an accurate bathymetric representation of the study region from data provided by the client (site specific data to be collected by client), blended into the existing GEMMS bathymetric database for the Arabian Gulf.
- Establish GCOM3D (the 3D hydrodynamic model) for the area of interest;

- Extract hourly wind fields from the ECMWF Global Atmospheric Prediction Model for a winter month and a summer month to simulate seasonal variations;
- Derive boundary conditions and temperature and salinity forcing from HYCOM;
- Predict 3D currents with GCOM3D, driven by winds, atmospheric pressure, tides, large scale Gulf currents, temperature and salinity, for the chosen simulation periods;
- Investigate the dispersion of the brine plume discharged from the outfall using CORMIX and the PLUME3D model driven by the currents predicted by GCOM3D.
- Analyse all results and formulate a scientific report.

3.3 Meteorology and Oceanography in the Arabian Gulf

3.3.1 Meteorology

The meteorological analysis is critical to the outcomes of the study. The best plume model in the world will produce the wrong results if the ocean currents and winds are not accurate. In earlier studies of the fate of oil spills and other discharge plumes, consultants used meteorological station winds to drive ocean models. However it has now been shown that when using coastal winds, or even winds measured on site, the errors are quite large due to the fact that:

- These winds are only accurate at the site;
- As a plume drifts on the currents it moves into areas influenced by winds, which are different to those at the release site;
- Even at the release site the currents are not just driven by the local wind but are also a result of currents flowing into the area which are driven by different winds to those experienced at the release site.

To overcome this problem, gridded wind fields from the reanalyzed ECMWF global atmospheric forecast model are used (ERA5), augmented by local station data if available, to drive GCOM3D and associated marine discharge models. Local wind observations are still important however because they are essential for verifying the model winds and, if necessary, scaling them. An example wind field over the Arabian Gulf is shown in Figure 3.1. The local winds in the region of Sir Baniyas Island, derived from multiple years of ECMWF model output, are illustrated in the wind rose shown in Figure 3.2. The wind rose shows a dominant (but not exclusive) north westerly wind flow over the region.

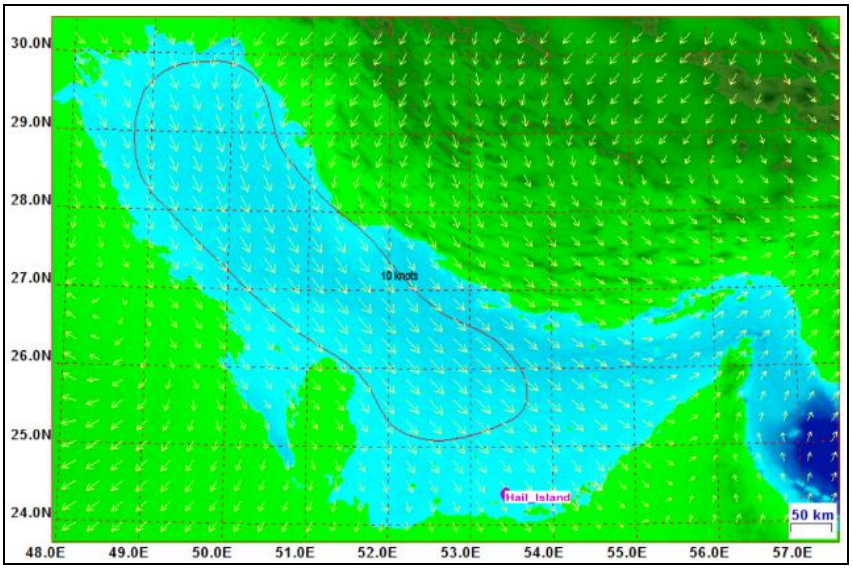


Figure 3.1 – Sample Wind Field over the Arabian Gulf from ECMWF

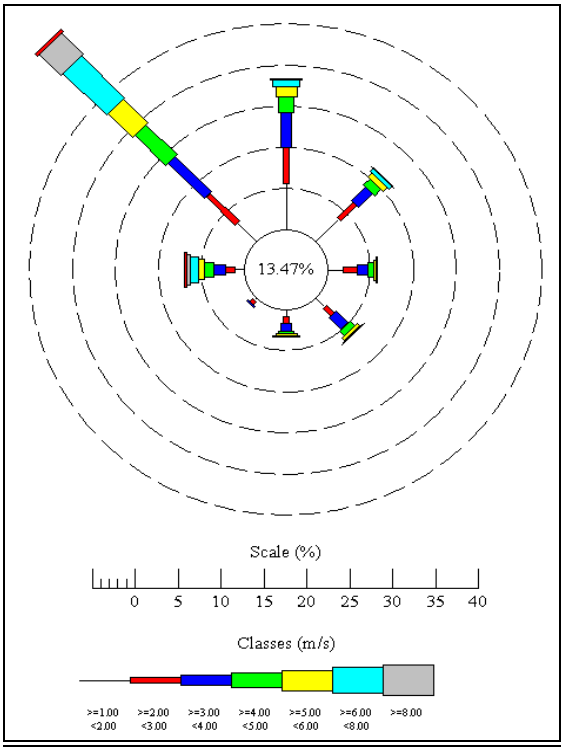


Figure 3.2 – Wind Rose in the study region from the ECMWF Atmospheric Model

3.3.2 Oceanography

As for all coastal developments in the UAE, there is an important interaction with the currents and tides of the Arabian Gulf. It is therefore important to establish an ocean model capable of simulating the Gulf oceanography as well as the proposed development.

The tidal heights and phases in the Arabian Gulf vary significantly from east to west. This phenomenon is due to the narrow entrance to the Arabian Gulf, through the Straits of Hormuz, the flood tide is unable to propagate fully to the western end of the Gulf before the tide starts to ebb in the Gulf of Oman. This causes the Arabian Gulf to act more like an embayment than an open sea resulting in varying tidal amplitudes and phases. In addition, there can be significant temperature and density driven circulations within the Arabian Gulf adding to the complexity of the circulation. Sample output from the Arabian Gulf modeling with GCOM3D illustrating the various stages of the tidal propagation within the Gulf are shown in Figure 3.3 to Figure 3.5.

Currents within the study region may be related to four main sources:

- The bathymetry of the Arabian Gulf;
- Tidal forces;
- Wind forces; and
- Temperature and salinity variations in the Gulf waters.

Each of the major forcing processes has associated with it varying amounts of energy and different time scales. Tides change over a few hours at diurnal (daily) or semi-diurnal (twice daily) periods and typically contain significantly more energy than density driven currents. Wind-driven currents develop and subside over a time scale of days and also generally contain more energy than density currents. The tidal regime in the study region of the Gulf is mixed, semi-diurnal, which means that there are two high and two low tides daily, with a large diurnal inequality in high and low water levels. At spring tides, the tide is more semi-diurnal character while during neap tides the pattern is more diurnal.

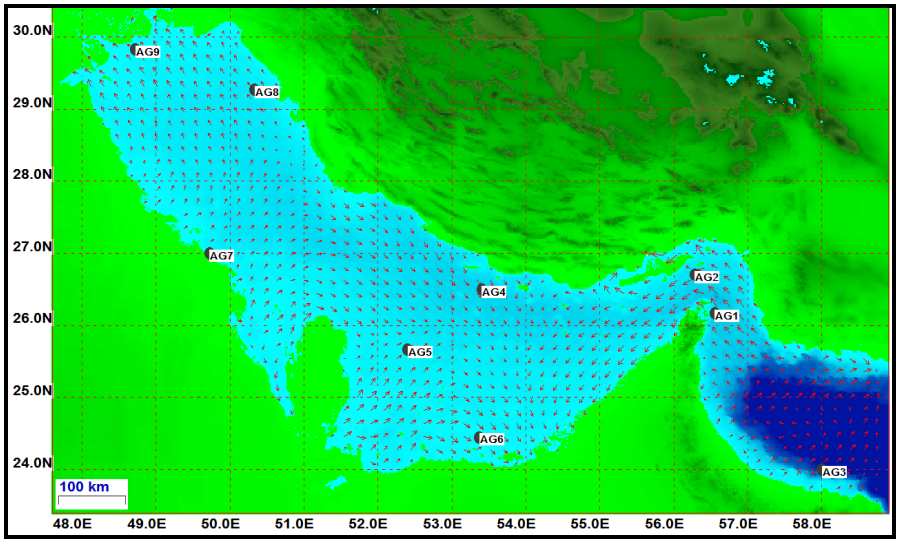


Figure 3.3 – Surface currents as the tide starts to flood at the Straits of Hormuz

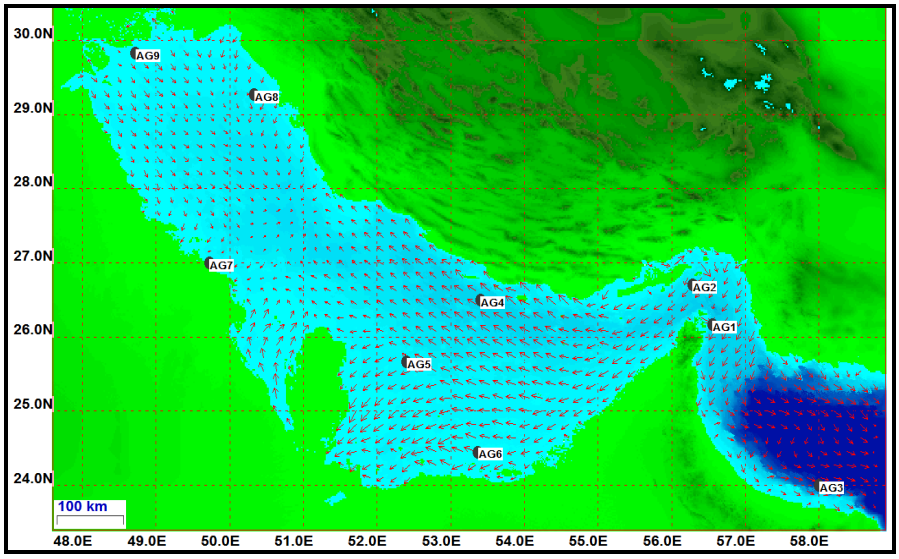


Figure 3.4 – Surface currents at peak flood tide through the Straits of Hormuz

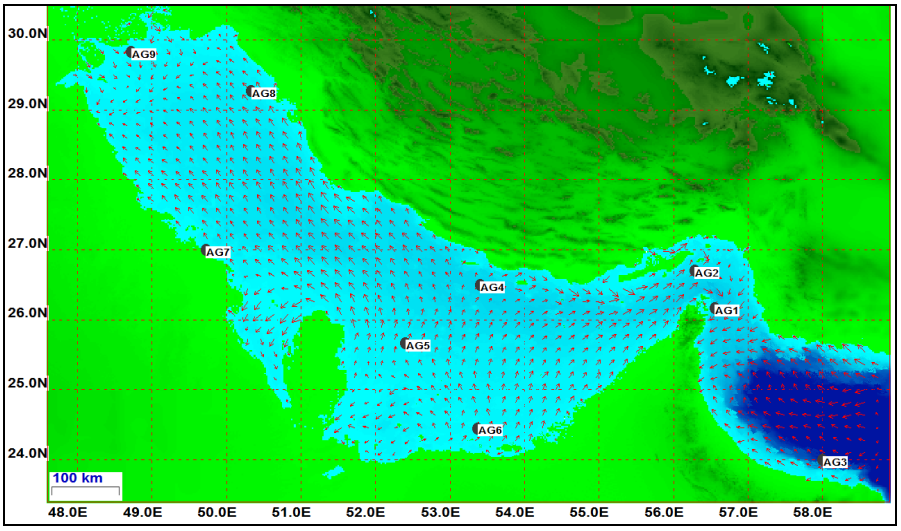


Figure 3.5 – Surface currents as the tide begins to ebb at the Straits of Hormuz

3.4 Ocean Current Modeling

As for all coastal projects in the UAE, the fate of ocean discharges is strongly affected by the complex currents and tides. It is therefore important to establish an ocean model capable of accurately simulating the Gulf oceanography to provide reliable predictions of water movements within the Arabian Gulf as well as simulating the flows in the region of interest.

The hydrodynamics was simulated by GCOM3D driven by large scale Gulf currents, Arabian Gulf tidal predictions, ECMWF meteorological data and the bathymetry of the project area. The effluent discharge was modelled utilizing PLUME3D for far-field simulations, and CORMIX for near-field simulations. An overview of the modeling approach is presented in Figure 3.6.

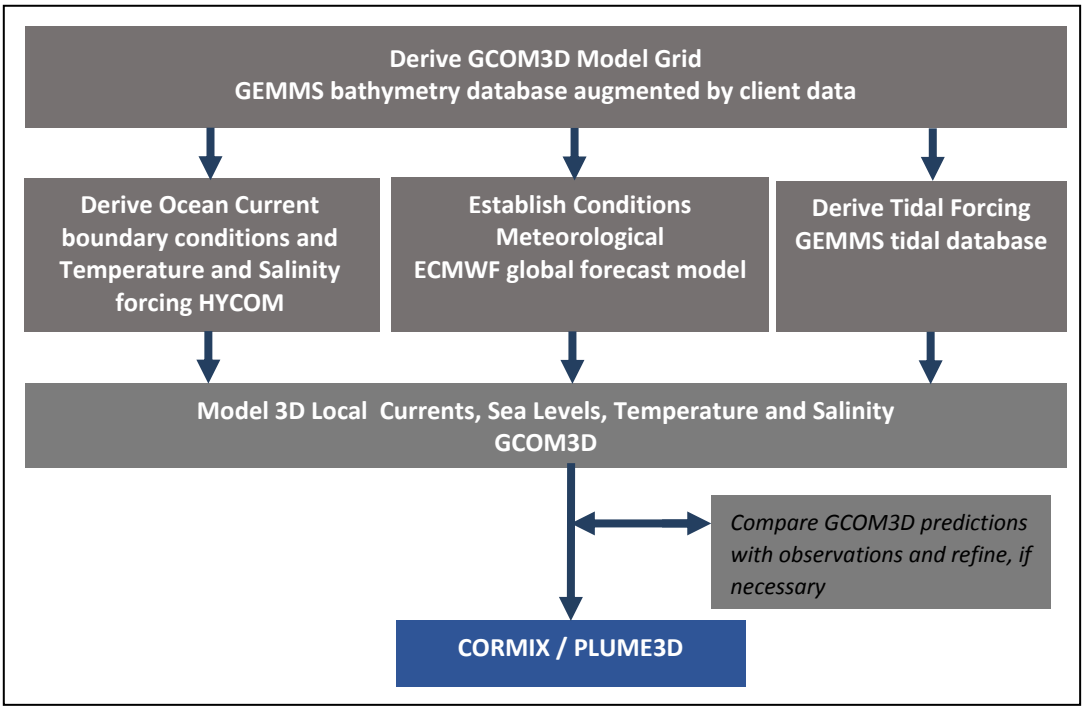


Figure 3.6 – Modeling Flow Chart

3.4.1 HYCOM

HYCOM is a hydrostatic, primitive equation general circulation model run globally by the United States Navy Research Laboratories. Flexible options for the vertical grid enable HYCOM to conserve water mass properties using isopycnal coordinates when there is strong vertical stratification and still provide adequate vertical resolution in regions with weak stratification, such as the surface mixed layer.

In HYCOM, different mixing schemes are incorporated but the NASA Goddard Institute for Space Studies level 2 turbulence closure [Canuto et al., 2001, 2002] scheme is the most sophisticated, being an extension of the original Yamada-Mellor turbulence closure scheme.

GCOM3D routinely uses HYCOM to provide boundary conditions for ocean currents and domain nudging of salinity and temperature fields. A sample of the ocean currents in the Arabian Gulf from HYCOM used in this study is shown in Figure 3.7.

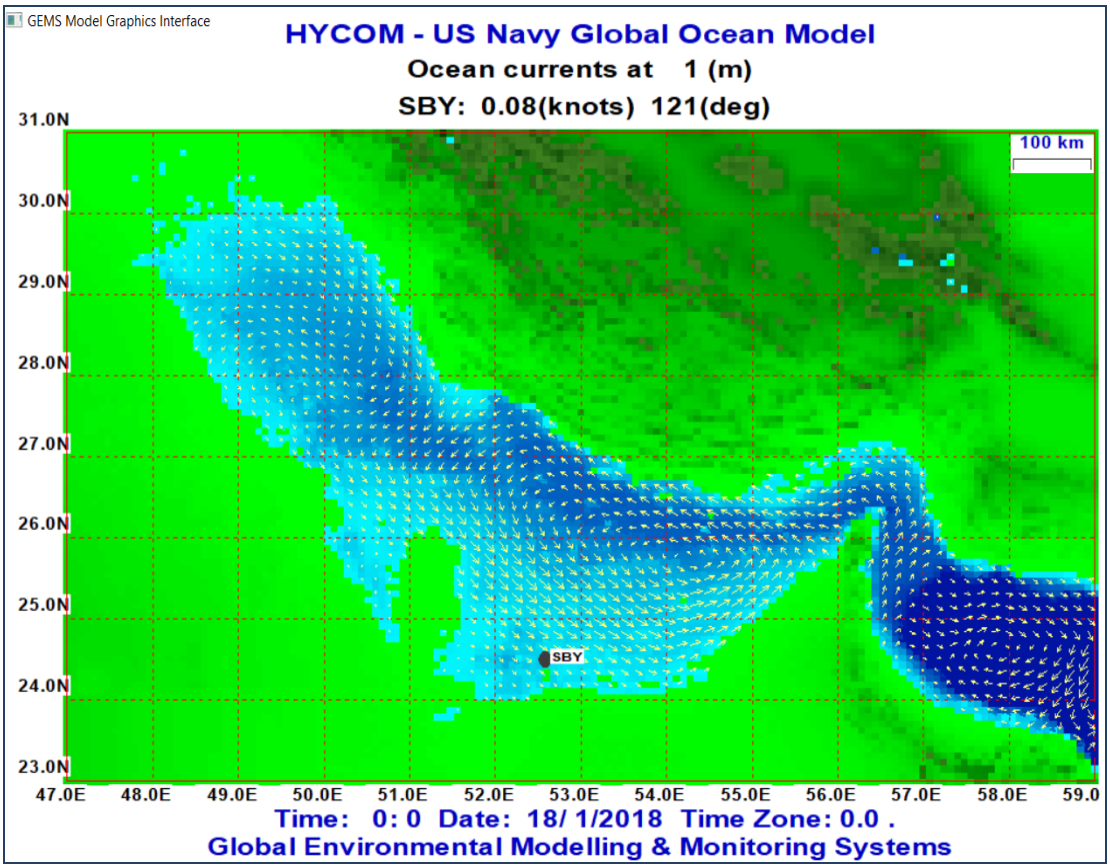


Figure 3.7 – Surface Ocean currents in the Sea of Oman and the Arabian Gulf from HYCOM

3.4.2 GCOM3D

GCOM3D was first developed in 1984 and has a proven record for modeling ocean currents in the Red Sea and Arabian Gulf, and has been validated extensively in many locations around the world.

GCOM3D is a freely scalable and re-locatable model, which has a proven track record for modeling currents, saline, thermal plume, oil spill and dredging discharges in the Arabian Gulf and has been validated extensively in that region, and in many other locations around the world.

GCOM3D is the Australian Government real-time coastal ocean prediction model, which has a major role in predicting ocean currents for Search and Rescue operations around Australia and the Pacific Islands. GCOM3D has also been used in a wide range of ocean environmental studies including prediction of the fate of oil spills, sediments, drill cuttings, produced formation water and cooling waters as well as in other coastal ocean modeling studies such as storm surges and coastal engineering projects.

GCOM3D (Hubbert 1993, 1999) calculates water currents in both the horizontal and vertical planes. The model operates on a regular horizontal grid and uses a z-coordinate vertical-layering scheme (there is a varying number of layers, depending on the depth of water, and each layer has a constant thickness). This scheme avoids errors in current predictions at a particular depth caused by averaging of currents over varying depths, as used in sigma co-ordinate and “depth-averaged” model schemes.

GCOM3D was the first 3D hydrodynamic model to be used for consulting studies in the Arabian Gulf (DOME, 1999) and since then has been used in over 50 environmental studies in the region, many of which have been for ADNOC.

To model the 3D currents in the vicinity of Sir Bani Yas Island it is necessary to start by modeling the currents throughout the entire Arabian Gulf, driven by winds and tides, with open boundaries east of the Straits of Hormuz. The open boundary conditions for this large domain are easily defined from global tidal data. Higher resolution modeling is then nested inside the Arabian Gulf model. Using this method, GCOM3D has been able to simulate the currents in the Arabian Gulf to a higher degree of accuracy than most other models. An overview of the hydrodynamic modeling undertaken in this study is summarized in Table 3.1.

3.4.3 Model Grids and Bathymetry

Bathymetry for work in the Arabian Gulf is derived from the GEMS 1 minute resolution database of the region - which was originally derived from U.S. Navy data and marine charts and has since been augmented for the many projects undertaken in the UAE..

The circulation in the region surrounding the outfall was simulated on a high resolution grid, nested inside the Arabian Gulf grid. Bathymetry for this grid was established from the existing data in the GEMMS bathymetric database, augmented by data from a bathymetric survey undertaken by the client and aligning the coastline with the help of Google Earth images (see Annex A for the bathymetry survey methodology prepared by ADNOC contractor).

3.4.4 Verification of GCOM3D Sea Levels

Verification of the accuracy of the tidal levels predicted by GCOM3D will be carried out by comparison with tidal predictions at a number of locations, including the Port of Ruwais which is west of Mirfa (verification from previous studies in the region is shown in Figure 3.8). It should also be noted that ADNOC will commission deployment of Acoustic Doppler Current Profiler (ADCP) in Mirfa area (see Annex A for scope and methodology document prepared by the ADCP contractor of ADNOC).

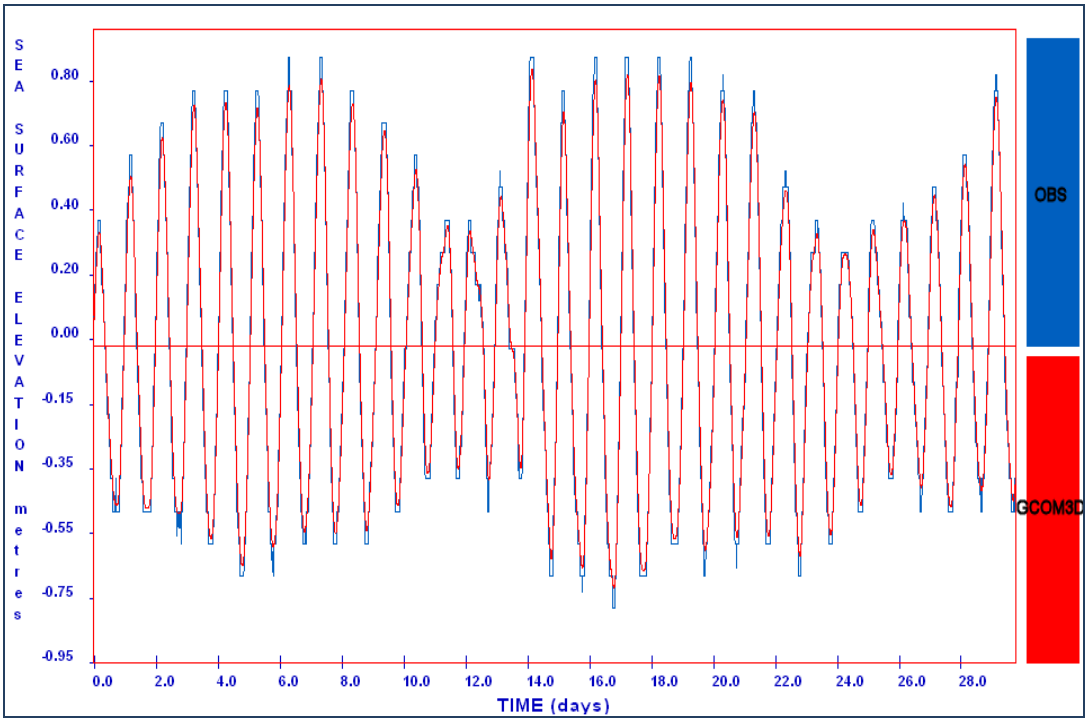


Figure 3.8 – Sea level predictions from GCOM3D (red) compared with tidal predictions for the Port of Ruwais.

3.5 Plume Discharge Modeling

The mixing and dilution of reject waters from a marine outfall can be considered in two distinct spatial zones, near-field and far-field dilution. The initial, near-field dilution of the reject waters is a function of several parameters including:

- The physical properties of the discharge;
- The momentum flux of the discharge velocity, which induces entrainment of the surrounding ambient fluid;
- The speed (and direction) of the receiving waters; and
- The design of the diffuser (if any).

Far-field horizontal and vertical mixing and dilution rely on the ambient conditions of the receiving waters (tidal and wind driven currents, wave induced turbulence and density gradients).

Some plumes are positively buoyant and will rise to the surface (e.g. oil) whilst negatively buoyant plumes (e.g. brine) will sink to the bottom of the water column. In both cases similar near-field mixing processes of entrainment induced by momentum flux occur, but buoyant plumes experience more mixing in the far-field than dense plumes, as buoyant plumes ultimately reside near the surface where turbulent mixing due to winds and waves is more pronounced.

In the far-field, dense plumes tend to move in the lower part of the water column where mixing occurs predominantly due to bed velocities, baroclinic flows and turbulent mixing down from the surface, which are typically less energetic, depending on the depth of the water, than the processes closer to the surface. Simulation of these processes can be carried out in three ways:

- The use of near field dilution algorithms which define the near-field dilution achieved by different discharge/diffuser configurations;
- The use of specific near-field CFD (computational fluid dynamics) sub-models such as the US EPA CORMIX model to define the behaviour of the reject flow in the first few metres from the outlet; or
- Undertake laboratory studies with scaled down models of diffusers to measure initial dilution under a range of receiving water conditions. A relationship can then be determined which can be used in far-field modelling to define the initial dilution.

GEMMS has written software to derive the key near-field mixing results from CORMIX and inject these data directly into PLUME3D which then simulates the far-field mixing of the plume. This is now the preferred method adopted by GEMMS in all outfall dispersion studies.

3.5.1 Near Field Modelling with CORMIX

The link between the near-field and far-field simulations is not an exact science. However, the estimation of near-field behavior utilizing near-field modeling software such as CORMIX is preferable to utilizing simplified algorithms for this behavior within the far-field modeling.

CORMIX is a straight line, scenario model that cannot take into account differences in ambient conditions over time. However it is useful for estimating the initial dispersion of the effluent discharge caused by turbulence associated with the initial momentum and buoyancy of the discharge due to the exit velocity and the initial differential in density between the discharge and ambient waters.

3.5.2 Far Field Dispersion Modelling with PLUME3D

PLUME3D is a lagrangian random walk far-field plume dispersion model which obtains oceanic conditions from GCOM3D and includes 3D plume dispersion algorithms for modeling the far-field behavior of a wide variety of discharge materials including sediments, sewerage, thermal discharges, oils and chemicals, accounting for processes such as dispersion, diffusion and dissolution, under defined release conditions (quantity, rate etc.).

PLUME3D uses predictions from GCOM3D to provide the ocean conditions into which the discharge is released. The lagrangian nature of the model allows the discharge plume to be simulated throughout the water column taking into account the effects of natural processes such as surface waves, horizontal diffusion and dispersion. The model is free from numerical diffusion problems (such as experienced by Eulerian models) because it is not run on a grid.

The plume model can be used stochastically if required, to simulate a large number of random events over time or can be used for specific case studies in a deterministic mode.

PLUME3D can model the behavior of a variety of constituents within a single release volume given information on the density and other physical and chemical parameters. The model reports mass and concentration levels on the water surface, on shorelines, in the sediments or through the water column. Where multiple constituents are involved, the model can report the distribution of each constituent individually. Horizontal and vertical cross-sections are also available to better illustrate the three dimensional distributions.

Like GCOM3D, PLUME3D has been used in a large number of studies since 1999 in the Arabian Gulf, many of which were for ADNOC. Table 3.1 summarizes the plume dispersion modelling approach.

Table 3.1 – Plume Discharge Modelling Overview

Stage	Near-field Plume Modelling	Far-field Plume Modelling
Model	CORMIX	PLUME3D
Task Pre-requisite	GCOM3D Hydrodynamic Modeling	GCOM3D Hydrodynamic Modeling
Model Features	Mixing zone model for near-field applications	Lagrangian random walk far-field plume dispersion model
No. of Sources	One discharge location	One discharge location
Parameters Simulated	Temperature, dilution	Temperature, dilution
Grid Resolution	CORMIX does not run on a grid	PLUME3D is a lagrangian particle model and therefore does not run on a grid

ANNEX A

BATHYMETRIC, GEOPHYSICAL SURVEYS AND METOCEAN MEASUREMENTS AT MIRFA AND NOUF AL DABBYAH AREAS

PROJECT EXECUTION PLAN

ADNOC OFFSHORE PROJECT NO.	TBA
CONTRACTOR DOC TITLE	BATHYMETRIC, GEOPHYSICAL SURVEYS AND METOCEAN MEASUREMENTS AT MIRFA AND NOUF AL DABBYAH AREAS
CONTRACTOR	FUGRO
FUGRO PROJECT NO.	MRU096

CONTRACTOR DOC NO: MRU096-PEP

Rev	Date	Status	Status Description	Prepared	Reviewed	Approved	Company Approval
02	26/04/2021	IFA	Issued for Approval	V. Nambiar	D. Duguid	G. Ferreira	
01	15/04/2021	IFR	Issued for Review	V. Nambiar	D. Duguid	G. Ferreira	

This Document is intended for use by ADNOC and its nominated Consultants, Contractors, Manufacturers and Suppliers.

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FUGRO	Data Centre Manager	David Duguid
FUGRO	Regional Business Line Director Marine Site Characterisation	Remmelt de Jong

PROJECT DEFINITIONS AND REFERENCES

PROJECT DEFINITIONS

PROJECT	BATHYMETRIC SURVEYS FOR WAVE PROJECT
COMPANY	Abu Dhabi National Oil Company for Onshore Oil Operations (ADNOC Onshore)
CLIENT	ILF Consulting Engineers - Abu Dhabi
CONTRACTOR	FUGRO
ADNOC JOB NO:	TBA
SCOPE OF WORK	Appendix 4.1 - Scope of Work Offshore Bathy.docx
CALL OFF ORDER NO:	TBC
FUGRO REFERENCE	Fugro Technical Proposal_184930

ABBREVIATIONS	
BSF	Below Sea Floor
CD	Chart Datum
CTDS	Conductivity, Temperature, Depth and Salinity
DGPS	Differential Global Positioning System
DPR	Daily Progress Report
DP	Dynamic Positioning
ERP	Emergency Response Plan
ES	Echo Sounder
GPS	Global Positioning System
GNSS	Global Navigation Satellite System
HSSE	Health, Safety, Security and Environment
ILF	ILF Consulting Engineers
JRA	Job Risk Assessment
LAT	Lowest Astronomical Tide
M	Meters
m/s	Meters per Second
MBES	Multibeam Echo Sounder
MSL	Mean Sea Level
PPE	Personnel Protective Equipment
QA	Quality Assurance
QHSSE	Quality, Health, Safety, Security and Environment
REP	Representative
UTM	Universal Transverse Mercator
WD	Water Depth
WGS84	World Geodetic System (1984)

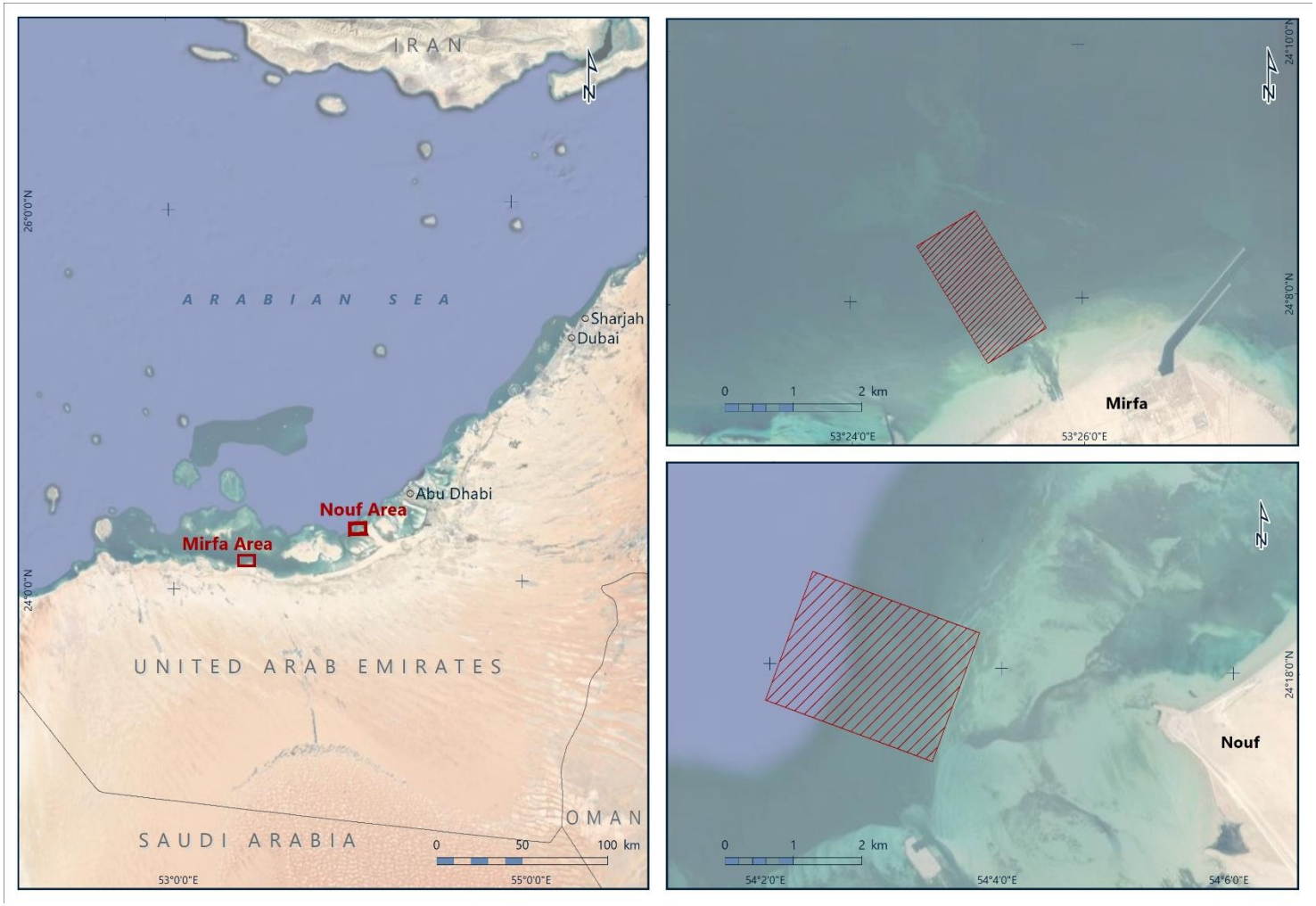
ACKNOWLEDGEMENT OF UNDERSTANDING

To ensure that the survey crew fully understand the requirements of the project, each member of the assigned survey crew shall sign the Acknowledgement of Understanding, which confirms that procedural documentation has been read and understood. Any referenced documents such as work practices and work instructions must also be read and understood. This page of the procedure document shall be sent back to the Fugro QA Manager and copied to the Project Manager for filing in the Operations Project File.

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If during the assessment of this document, or prior to undertaking field operations once site conditions have been reviewed, there is a conflict between the procedures and operational possibilities, then the Party Chief must contact the office and discuss the situation with the Project Manager, prior to undertaking alternative action that contradicts the procedures.

In order to formulate any variation of work in the field discussed with the client, then a written description of this variation will be compiled by the Party Chief and signed off by the Client Representative, following which a copy will be forwarded to the Project Manager. Refer to IMS Form 630.19.



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1. HEALTH AND SAFETY

A complete copy of Fugro's formalised Integrated Management System manual, available to all personnel, can be found in the IMS.

1.1 Health and Safety References

ALL Fugro NV Corporate QHSSE standards apply:

Table 1.1: Fugro NV Health and Safety References

Description	Document Number/Reference
Golden Rules of HSSE	Version 04
HSSE Definitions	FNV/HSSE/STD/01
Risk Assessment	FNV/HSSE/STD/02
Incident Notification, Investigation & Reporting	FNV/HSSE/STD/03
Visitor Management	FNV/HSSE/STD/04
Contractor QHSSE Management	FNV/HSSE/STD/05
Transportation & Driving	FNV/HSSE/STD/07
Working at Height	FNV/HSSE/STD/08
Lifting Operations	FNV/HSSE/STD/09
Manual Handling	FNV/HSSE/STD/10
Personal Protective Equipment	FNV/HSSE/STD/11
Substance Abuse	FNV/HSSE/STD/12
HSSE Competence	FNV/HSSE/STD/13
Management of Change	FNV/HSSE/STD/14
HSSE Communication	FNV/HSSE/STD/16
Occupational Health	FNV/HSSE/STD/17
Emergency Preparedness & Response	FNV/HSSE/STD/18
Refer to Integrated Management System for the documents.	

Table 1.2: Health and Safety References

Description	Document No/Ref
Emergency Response Plan	MRU096 – ERP
Health, Safety and Environment (HSSE) Plan	MRU096 – HSE
Risk Assessment	MRU096 – RA
QHSSE IMS Manual	200.01
Safety Meetings	1230.38
Toolbox Talks	1230.98
Monthly Statistics	1230.16

Refer to Integrated Management System for the documents.

1.2 Project-specific Considerations

Other structures/construction activities may pose significant obstruction to the survey and the manoeuvrability of the survey vessels. Caution is therefore advised in the area. The Party Chief is advised to scout the area to identify any significant debris/obstructions close to the structures or areas of operations before progressing with the survey..

1.3 Health and Safety Responsibilities

The Party Chief (or their designated deputy such as the lead surveyor) will take responsibility for all health and safety matters relating to the performance of the survey activities during all phases of this project, although all personnel have a duty to perform tasks in a safe and appropriate manner.

The Coxswain has the ultimate authority on all matters affecting the safety of the vessel, crew the cargo and the environment.

Nothing in the project documentation and/or HSSE Management Systems removes from the vessel Master their overriding authority and responsibility to make decisions, take any steps and issue any orders, whether or not they are in accordance with other requirements, which they consider are necessary for the preservation of life, prevention of pollution or for the safety of the vessel.

The QHSSE Manager at Fugro’s base in Abu Dhabi is ultimately responsible to ensure that all HSSE requirements are implemented for the project as required.

A briefing will be completed for all members of the project team prior to departure. This will include HSSE expectations and requirements and delegation of responsibilities. This briefing will be recorded using the standard Fugro Project Briefing Template (630.14). Attendees will sign to confirm attendance. A further comprehensive safety briefing will be carried out soon after sailing for all field personnel. This will be recorded using the Safety Meeting Record Form (1230.38) and signed by all attendees.

Regular safety drills such as abandoned ship, man over board, fire, H2S emergency and emergency response (fuel or oil spill) will be performed in accordance with the vessel safety system and operational limitations. All project personnel are required to attend these drills. These will be recorded in the vessel log book.

1.4 Personal Protective Equipment

Task-appropriate Personnel Protective Equipment (PPE) shall be worn by personnel as identified in the project or Task Risk Assessment (TRA) and in accordance with the worksite policy.

The minimum mandatory PPE for all personnel is:

1. Body Protection;
2. Head Protection;
3. Eye Protection;
4. Foot Protection.

Other PPE is to be used additionally, as required by the task.

Table 1.3: Use of Personnel Protective Equipment

Type of PPE	Activity location
Safety Helmet	All Back Deck Operations
Safety Boots	All Back Deck Operations
Safety Glasses	All Back Deck Operations
Gloves	All Back Deck Operations
Life Jackets	All Back Deck Operations
Safety Harnesses	Working at Height and deploying equipment over the side
Welding Goggles	Designated Areas or Welding Operations
Ear Defender	Designated Areas or Noisy Environment
Refer to 1210.18 Use and Control of Personnel Protective Equipment	

1.5 Safety Documentation and Statistics

A Risk Assessment document is prepared for every project. All personnel are required to review and sign the Risk Assessment documentation prior to commencement of any field operations as part of the project briefing. This review will be recorded on the Risk Assessment document itself and reviewers will sign to confirm participation.

The Risk Assessment document is a ‘live’ document and may not be exhaustive in its identification of hazards and assessment of risk. Any omitted hazards should be assessed on site for risk and necessary control measures put in place by the Party Chief or their nominee prior to commencement of work. These improvements shall be documented and forwarded to the Project Manager and QHSSE Manager onshore.

All offshore Accidents, Incidents, Near Misses etc. witnessed by members of the offshore team must be reported no matter how insignificant they may seem. In this regard all vessels operated by Fugro carry Hazard Observation Cards and more detailed formal online Incident Report system. Both of these systems facilitate the reporting of unsafe actions and circumstances. All reported incidents and unsafe acts, as well as safe acts will be discussed and addressed as applicable.

All project-related incidents will be reported to the Client immediately and a written report will be submitted within twenty-four hours. Incidents shall also be reported to appropriate governmental agencies and authorities.

Hazard Observation Cards (HOC) received as part of the project will be entered in to Fugro Impact and monitored until closed out all action items. All HOCs shall be reported to the Client/Company.

Following completion of the survey work, a formal debriefing will be performed by the Project Manager for all members of the survey team. This will be recorded using the Project Debriefing Form (630.15).

Weekly Safety Meetings, Toolbox Talks (TBT) and drills shall be carried out in accordance with the references above. Safety meetings with all technical crew will take place once weekly TBTs held at least twice daily prior to the commencement of each shift. TBTs are also required upon commencement of any new task, or recommencement of a task which has been stopped or postponed for safety reasons.

2. PROJECT ORGANISATION AND MANAGEMENT

Led by the Fugro Project Managers, the project team is responsible for execution of the project according to the scope of work described; this includes execution of any changes to the Scope of Work as may be agreed, in writing, with ADNOC.

2.1 Project Team Organisation

Figure 2.1 details the project team organisation.

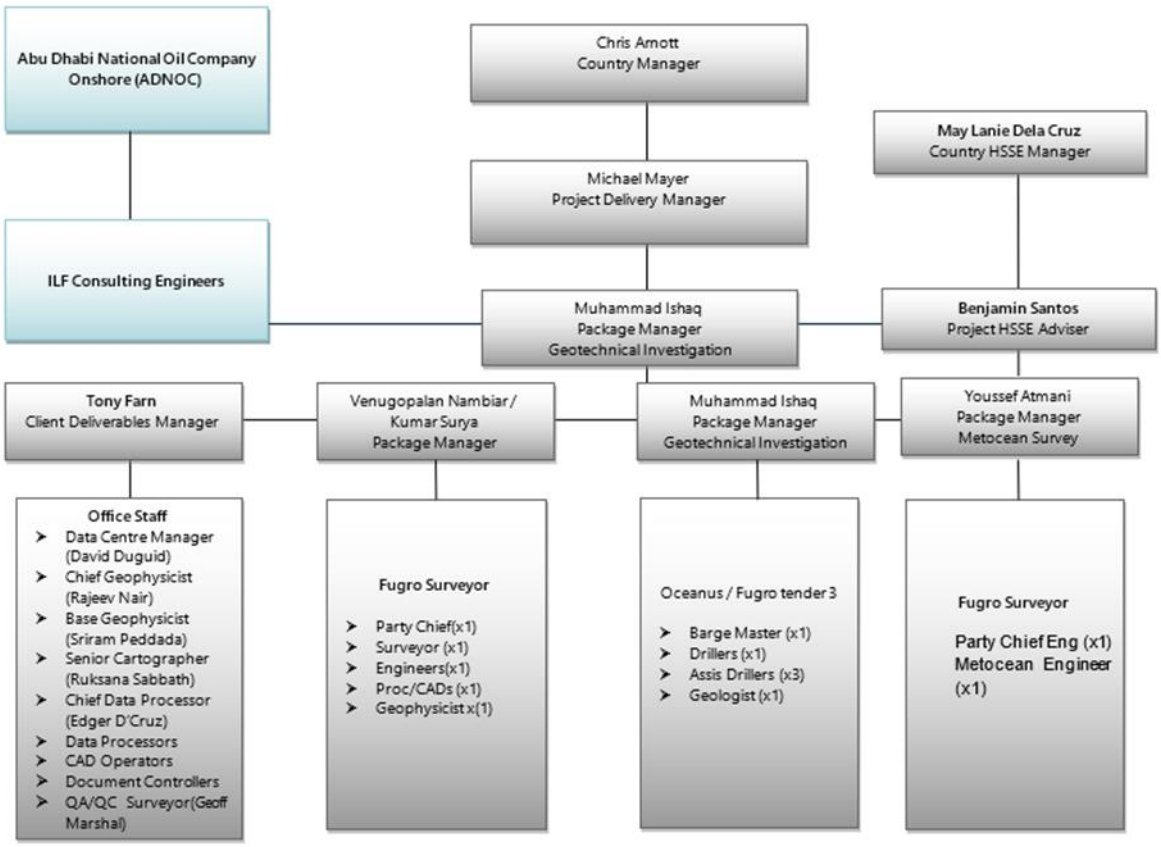


Figure 2.1: Project team organogram

Table 2.1 provides contact information, project role and responsibilities of the personnel detailed in the project organisation chart (see Figure 2.1).

Additional information is available within the management systems where the individuals are employed.

Table 2.1: Key Fugro Project Personnel and Contact Details

Name	Project Role	Contact Number	Email
Michael Philip Meyer	Project Director	+971 561775393	michael.meyer@fugro.com
Muhammad Ishaq	Project Manager Geotechnical	+971 5558550029	m.ishaq@fugro.com
Venugopalan Nambiar	Project Manager – Geophysical	+971 508180661	v.nambiar@fugro.com
Gerard Ferreira	Director – Geophysical	+971 506681072	g.ferreira@fugro.com
Tony Farn	Client Deliverables Manager	+971 506125137	t.farn@fugro.com
Richard Harding	Operation Manager	+971 502461451	r.harding@fugro.com
May De la Cruz	Country HSSE Manager	+971 521148837	m.delacruz@fugro.com
Youssef Atmani	Regional Service Line Manager- Metocean	+971 564175015	y.atmani@fugro.com
Remmelt de Jong	Director Marine Site Characterisation	+971 588021415	r.dejong@fugro.com
Pasupathy B	Party Chief (Geophysical Spread)	+971 508102956	p.balasubramanian@fugro.com

Table 2.2: Fugro Project Personnel Roles and Responsibilities

Name or Role	Responsibilities
Project Director	■ The Director has the overall and final responsibility for project health and safety and all project activities. Their responsibilities will be: ■ Main point of contact of CONTRACTOR with regards to all project related activities, health and safety; ■ Demonstrates visible, strong and proactive leadership and commitment towards health and safety and does lead by example; ■ Ensures, throughout the project activities, that a safe working culture, where EVERYONE has both the authority and responsibility to STOP THE JOB if there is any doubt about the safety of the operation, is in place and adhered to at all times by all personnel; ■ Allocates adequate human, technical and financial recourses for the correct implementation of this Plan; ■ Monitor and review the overall project health and safety performance through the Daily Progress Reports and implement timely mitigation and corrective action(s) to ensure that this Plan is continually implemented throughout the work activities; ■ Defines the project team, discussing with relevant responsible persons the resources available/required for the project; ■ Endorse specific and measurable health and safety goals and targets for this project; ■ Ensures all relevant personnel are aware of Fugro and COMPANY/CONTRACTOR HSSE policies, standards and commitment to providing a safe, healthy and environmentally sound workplace for all employees; ■ Makes continuous efforts towards motivating personnel to take an active part in health and safety issues.
Business Line Manager	The Business Line Manager is normally involved in an active senior management capacity within Fugro. He ensures the project remains a viable proposition and that the benefits are realised by resolving any issues outside the control of the Project Manager. The Business Line Manager will chair any Fugro project steering groups that may be established. The Business Line manager and the Project Manager work alongside one another in continuous dialogue, with a common understanding of the project context. The Business Line Manager fulfils the following criteria: ■ Business leader and decision maker who is able to work across functional and divisional boundaries within an organisation; ■ Advocate for the project; ■ Prepared to commit sufficient time and support to undertake the role; ■ Sufficiently experienced in project management to judge if the project is being managed effectively.

Name or Role	Responsibilities
	■ Ensures that plant and equipment are properly selected and that procedures are in place to ensure that plant and equipment are maintained in good working order; ■ Develops and maintains the Project Execution Plan documents.
Project Manager	The Project Manager has overall responsibility for coordination of QHSSE at contract level, technical and logistical aspects of the contract, and ensuring that resources are available to meet the contract requirements. The Project Manager: ■ Has an appreciation of the application of QHSSE legislation affecting onshore/offshore operations; ■ Ensures that all hazards and associate risks have been identified and suitable control measures implemented; ■ Develops and maintains the Project Execution Plan documents; ■ Nominates a senior member of the project team to be responsible for the day-to-day QHSSE on site; ■ Ensures that project personnel are competent and understand their role in achieving a safe working environment; ■ Ensures that any contractors selected to carry out work have satisfied company contractor selection process; ■ Ensures that all site welfare arrangements are in place and in order.
QHSSE Manager	The Project QHSSE Manager is the designated management representative on occupational health, safety and environment. The Project QHSSE Manager is responsible to liaise with the Business Line Manager, Project Manager, and QHSSE Advisor to ensure: ■ Providing specialist support and advice to project team in driving the HSSE management process; ■ Recording all reported incidents/accidents and maintaining a Safety Statistics Register. All fieldwork HSSE statistics are collated and reported to the Client, via the Project Manager, on a monthly basis; ■ Assisting the Operations Manager and Project Manager in the investigation of all major incidents and accidents and to follow up on any corrective actions to be implemented; ■ Representing Fugro in HSSE matters when dealing with Clients, external parties, professional and statutory bodies. ■ Ensuring that Fugro complies with the Quality Management policy and standards, strategic Quality objectives and client quality policies.
Emergency Response Duty Officer	An Emergency Response Duty Officer is appointed on a rota basis. The Emergency Response Duty Officer must:

Name or Role	Responsibilities
	■ Be available at all times out of office hours to receive emergency communication from any work sites or vessels engaged in the project; ■ Understand the project Emergency Response Plan and who to contact should an emergency occur; ■ Be available to initiate an Emergency Response Team at the designated office if required; ■ Carry out the duties outlined in the project Emergency Response Plan.
Offshore Vessel Manager/Party Chief	The project Offshore Vessel Manager/Party Chief in conjunction with the department and operation supervisors, is responsible for the day-to-day management of the operations, including all QHSSE whilst offshore. The Offshore Vessel Manager/Party Chief/Superintendent: ■ Is familiar with the requirements of the PEP and associated documents; ■ Organises the site/offshore activities such that work is carried out to the appropriate standard and in accordance with established Fugro procedures and the PEP with minimum risk to personnel, equipment, materials and third-party property; ■ Ensures that those under their control are competent and understand their role in achieving a safe working environment; ■ With assistance of others, inspects and maintains all fixed plant and equipment including safety equipment; ■ Maintains all statutory test and inspection documentation for the marine plant and drilling equipment; ■ Ensures that any incidents, unsafe actions and conditions are reported; ■ Ensures that plant and equipment used on site is inspected before use and as required during the work on site; ■ Ensures that no person affected by alcohol or drug abuse is allowed on site; ■ Sets a personal example.
Project Team Members	Each member of the team understand that they are responsible for their own, as well as each other's safety and well-being while onboard the vessel and that this is integrated into their job responsibilities and job descriptions. All personnel onboard the vessel must: ■ Understand that QHSSE matters are an element integrated into their job responsibilities. All personnel are required to conduct themselves in a safe and proper manner, practice high levels of personal hygiene and care, and refrain from engaging in activities known to be hazardous to the environment; ■ Are required to comply with all rules, regulations, policies and procedures as defined within the vessel's or company's QHSSE Manuals. Where applicable personnel may be required to adhere to rules, regulations, policies and procedures as defined

Name or Role	Responsibilities
	by the Client, where this is required, written clarification and training will be issued; ■ Have the right to refer any QHSSE matter to the Vessel Master/Coxswain (where appropriate) or Site Manager/Drilling Superintendent.
Client Representatives	The Client Representatives are to represent the Client in all matters, which affect the Client's commitment to health, safety and environmental performance and ensure that the HSSE and Technical Expectations are met and should be suitably experienced and well-briefed to undertake these functions. They will also have the responsibility of sharing any changes with the Offshore Vessel Manager, and the rest of the Fugro project team: ■ The Client Representatives will participate in safety meetings and will be a member of the investigation team activated as the result of an accident or incident. If they are unable to attend Safety Meetings or Toolbox Talks, they should ensure they familiarise themselves with meeting minutes at the earliest opportunity; ■ The Client Representatives are also responsible for advising the Client onshore management of any incidents; ■ Where operating at sea, the Client Representatives are required to comply with all vessel rules, regulations, policies and procedures as defined within the vessel's HSSE Manual and the PEP; ■ The Client Representatives will adhere to rules, regulations, policies and procedures as defined by the Client;

2.2 Company Details

The ILF Consulting Engineers/ADNOC Onshore key point of contact for this work package is detailed in Table 2.3.

Table 2.3: ILF and ADNOC Key Personnel Details

Name	Role	Contact Numbers	Email
Simone Puzzo	Head of Water & Environment Projects	Tel: +971 (0)2 /41 89 400 - 469 Mob: +971 (0)50 /3170950	simone.puzzo@ilf.com

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2.3 Project Communication Plan

Operational reporting is regular and constant. Direct lines of communication run from field operations to onshore operational support staff; in addition, there is communication to suppliers, subcontractors and, in some cases, project stakeholders (with Client instruction).

Table 2.4 presents the method of formal project communication and reporting.

Table 2.4: Formal Reporting Communication

ID	Type	Objective	Fugro Originator	Attendees	Med*	Freq*
1	Project Execution Plan (PEP)	Prior to fieldwork commencement all key members of the project team will be provided with access to copies of the PEP documentation either electronically or in hard-copy. These documents are considered 'live' documents and are therefore updated and re-distributed to the project team throughout the duration of the project as required.	Business Line/ Project Manager	Client Onshore Fugro: Business Line Manager Project Manager Offshore Vessel Manager QHSSE Manager	E	As required
2	Daily Progress Report (DPR)	To provide the Project Team with a daily progress update for each of the field Work Elements. DDPR to include a breakdown of the geotechnical activities, production summary, weather conditions (experienced and forecast), QHSSE summary and details of additional chargeable items. The DPR also provides a snapshot for the planned work and locations for the next twenty-four hours..	Site Manager / Party Chief	Client Onshore and Offshore Reps Fugro: Managing Director Business Line Manager Service Line Manager Operation Manager Project Manager QHSSE Manager	E	D

ID	Type	Objective	Fugro Originator	Attendees	Med*	Freq*
3	Weekly Progress Report	To provide the Project Team with a weekly update on tasks performed during the previous week, a list of current actions, planned tasks, raised contractual variations, project delays and reporting progress.	Site Manager	Client Onshore and Offshore Reps Fugro: Managing Director Business Line Manager Service Line Manager Operation Manager Project Manager	E	W
4	Contract Modification (Variation Order)	To provide the client with details of any requested contractual variation and the schedule and cost for undertaking the variation	Offshore Site Manager Operations Manager Project Manager, Commercial Manager	Client Onshore and Offshore Reps Fugro: Managing Director Business Line Manager Project Manager Site Manager QHSSE Manager Commercial Manager	E L	As required

ID	Type	Objective	Fugro Originator	Attendees	Med*	Freq*
5	Management of Change	To provide the Project Team with details of any required changes as defined in Section 2.3 below.		Client Onshore and Offshore Reps Fugro: Managing Director Business Line Manager Project Manager Site Manager QHSSE Manager Commercial Manager	E	As required

Notes:
* Medium: E = Email; L = Letter (hard copy); R = Report (can be electronic and/or hard copy), F= Form; M = Meeting / Workshop
* Frequency: D = Daily; W = Weekly; M = Monthly; PS = Defined on Project Schedule; A = Ad hoc

Table 2.5 details the method for meetings, drills and briefings.

Table 2.5: Communication Plan for Meetings, Drills and Briefings

ID	Type	Objective	Fugro Originator	Attendees	Frequency
1	Project HAZID/HAZOP/HIRA Meeting	Formal hazard and risk identification workshop. A HAZID meeting and document is only required (according to normal practice) when there is a new work site or method of working, i.e. a new vessel mobilisation, a new or novel type of activity, significant change in equipment from the norm, and new environment etc.	Operations Manager/Project Manager	Client Offshore Reps Fugro: Party Chief Surveyor QHSSE Manager Operations Manager	Pre-project
2	Project Kick-off Meeting	To brief scope of work, identify key safety messages. This will be repeated at any change of crew/project team.	Party Chief Client Offshore Rep	Client Offshore Reps Fugro: Offshore Vessel Manager Project Team Survey Team (any other project personnel)	At commencement of fieldwork
3	Vessel/Site Induction	The purpose of the induction is to explain the emergency procedures and the operation of safety equipment. The induction includes a site/vessel familiarisation tour to point out the muster stations, escape routes and safety equipment locations. The safety officer and emergency response responsibilities are identified.	Party Chief/ HSSE Officer	Project Team Party Chief Survey Team (any other project personnel)	Upon arrival

ID	Type	Objective	Fugro Originator	Attendees	Frequency
4	Safety Drills	To practice and test emergency response. All personnel are required to attend and take an active part as directed.	Party Chief HSSE Officer Vessel Master/Coxswain	Party Chief Project Team Survey Team (any other project personnel)	Not more than weekly intervals. The first drill is conducted immediately prior to commencing survey work
5	Toolbox Talks	A toolbox talk is held as part of the shift changeover briefing at the start of each shift. In addition, toolbox talks are held for any significant or abnormal task, or change in operations. These meetings address the exact nature of the task and QHSSE issues specific to the task performed during a shift or task change. A list of attendees is recorded at each toolbox meeting.	Shift Lead/Party Chief/ HSSE Officer	As required	As required
6	Weekly QHSSE Meeting On-site / Vessel	Review of any QHSSE issues that have arisen since the last meeting; Reports on any incidents or near misses Reports/lessons learned following any incident investigations; Any QHSSE Alerts issued; Review of the proposed scope of work and the need for risk assessment reviews.;	Offshore Project Team	Confirm attendees	Weekly

ID	Type	Objective	Fugro Originator	Attendees	Frequency
7	Fieldwork Debriefing	Review of fieldwork, capture lessons learned.	Operations Manager, Project Manager, Party Chief	Party Chief Project Team Survey Team (any other project personnel)	At fieldwork completion
8	Project Closure Meeting	Review project performance, capture lessons learnt and assign actions required.	Operations Manager, Project Manager, Party Chief	Business Line Manager Operations Manager Project Manager QHSSE Manager Commercial Manager	At project completion

3. SCOPE OF WORK

3.1 General

Table 3.1: General Scope of Work Summary

Item	Description
Company	Abu Dhabi National Oil Company for Onshore Oil Operations (ADNOC Onshore)
Client	ILF Consulting Engineers - Abu Dhabi
Client SOW Ref	Document No. Appendix4.1-Scope of Work Offshore Bathy.docx
Type of Survey	Bathymetric and Geophysical Surveys
Fugro Project Number	MRU096
Project	Provision for Bathymetric, Metocean and Nearshore Geotechnical Services For Wave Project (Package C)
Final Deliverables	Digital copies only

Fugro, has been contracted by ILF Consulting Engineers - Abu Dhabi (Client) on behalf of Abu Dhabi National Oil Company for Onshore Oil Operations (ADNOC Onshore) (Company) for the Wave Marine Project to conduct Provision for Bathymetric, Metocean and Nearshore Geotechnical Services For Wave Project (Package C), Offshore Abu Dhabi, United Arab Emirates.

The objective of the Project Wave represent ADNOC's initiatives for ensuring an additional source of water for injection in ADNOC onshore and offshore oil and gas fields. The scope of the project looks to utilise treated seawater as an alternative for all ADNOC onshore fields.

This document, MRU096-PEP details the methods to be deployed in conducting the Bathymetric and Geophysical Surveys for Package C.

The surveys will be conducted by the survey launch Fugro Surveyor.

All survey-related work will be carried out in accordance with the SP-1043 (Rev.1) Specification for Offshore Subsea Pipeline Survey and Fugro's standing work practices.

3.2 Scope of Work – Bathymetric and Geophysical Surveys

The Scope of Work can be summarised as:

- Establish bathymetry;
- Identification of existing pipelines, cables or other services;
- Identify and locate any seabed obstacles, including rock outcrops, low-lying islands etc. along the proposed pipeline routes;
- Sub-bottom profiling the uppermost maximum penetration to determine the shallow geology of each area of survey;

- All survey sensors will be run on all lines with 20 m line spacing to provide full coverage of MBES and SSS, with 100 % coverage between each two adjacent lines;
- Field investigation containing sampling from offshore locations by grab sampling, seawater sampling etc. and laboratory testing;
- All soundings to be reduced to Lowest Astronomical Tide (LAT) using observed tides;
- Minimum standards for the survey work are set by IHO S-44 5th Edition;
- Prepare and submit a detailed report/charts describing survey results;

To achieve these objectives, the following will be carried out:

- High precision primary (StarPack G2+ DGNSS, SBES, MBES, SSS and magnetometer to be deployed as a minimum;
- Provision of positioning and navigation on a suitably equipped vessel to obtain survey data using DGNSS;
- Acquire bathymetric data using single beam echo sounder and MBES system in conjunction with heave/motion sensor units;
- Obtain seabed imagery using EdgeTech sidescan sonar system to map soil types, seabed conditions and identify, report all debris/obstructions within the surveyed areas;
- Assess the seabed and shallow sub-seabed soils and conditions by using pinger sub-bottom profiling devices;
- Record magnetic anomalies to identify any potential ferrous items on or below the seabed (wrecks, ferrous debris, pipelines and cables) using a towed magnetometer.

Note: Separate PEP will issue for nearshore Geotech investigations.

3.3 Scope of Work – Metocean measurements

The Metocean data which would be collected can be summarised below:

- Stationery / Fixed (Bed-Mounted) Current, wave and tide measurement for 30 days at two nearshore location. Data will be collected in series for two locations. One after another. This will be based on sequential deployment. i.e. Mirfa first and after 30 days equipment will be moved to the second location, Nouf.
- Meteorological data measurement (wind speed and direction, atmospheric pressure, air temperature and relative humidity) for 30 days at one onshore location.
- Subsea temperature measurement (at sea bed, 1m from seabed, 2m from sea bed)

Fugro will supply;

- Nortek AWAC 1MHz/ RDI ADCP 1200 for Wave and Current profile measurement;
- Valeport WLR for water level measurement;
- Seabed frame and subsea mooring components;
- Weather Station for Wind, humidity, atmospheric temperature and atmospheric pressure measurements;
- Seaguard RCM for temperature measurements;

Refer to Section 7, Survey operation – MetOcean observations for detailed methodology

Notes: Storm surge would be provided only if same is recorded during the observation period:

Meteorological data would be collected from nearest shore base.

3.3.1 Proposed Survey Locations

The proposed survey locations are defined by the coordinates presented in Table 3.2 to Table 3.5. These coordinates have been extracted from a client-supplied drawing.

Table 3.2: Mirfa Plant Survey Area Coordinates (WGS84 Datum)

WGS84, UTM Projection, Zone 39 North, CM 51° East		
Location	**Eastings [m]**	**Northings [m]**
Mirfa P1	745 722.721	2 672 407.062
Mirfa P2	746 758.489	2 670 696.161
Mirfa P3	745 903.039	2 670 178.277
Mirfa P4	744 867.270	2 671 889.178
Source: 12389-ILF-UEO-OD-0015-A1_D.pdf		

Table 3.3: Mirfa Plant Survey Area Coordinates (Nahrwan Datum)

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East		
Location	**Eastings [m]**	**Northings [m]**
Mirfa P1	745 625.393	2 671 986.382
Mirfa P2	746 661.150	2 670 275.489
Mirfa P3	745 805.704	2 669 757.610
Mirfa P4	744 769.946	2 671 468.503
Source: 12389-ILF-UEO-OD-0015-A1_D.pdf		

Table 3.4: Nouf Al Dabbyah Survey Area Coordinates (WGS84 Datum)

WGS84, UTM Projection, Zone 39 North, CM 51° East		
Location	**Eastings [m]**	**Northings [m]**
Nouf P1	198 807.209	2 690 115.933
Nouf P2	199 498.533	2 691 992.651
Nouf P3	201 938.266	2 691 093.931
Nouf P4	201 246.943	2 689 217.212
Source: 12389-ILF-UEO-OD-0016-A1_D.pdf		

Table 3.5: Nouf Al Dabbyah Survey Area Coordinates (Nahrwan Datum)

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 40 North, CM 57° East		
Location	**Eastings [m]**	**Northings [m]**
Nouf P1	198 684.738	2 689 699.749
Nouf P2	199 376.058	2 691 576.459
Nouf P3	201 815.781	2 690 677.744
Nouf P4	201 124.462	2 688 801.032
Source: 12389-ILF-UEO-OD-0016-A1_D.pdf		

3.3.2 Proposed Acoustic Doppler Current Profiler (ADCP) Locations

The proposed ADCP locations are defined by the coordinates presented in Table 3.6 to Table 3.9. These coordinates have been extracted from a client-supplied drawing.

Table 3.6: Proposed ADCP Locations at Mirfa Plant Site (WGS84 Datum)

WGS84, UTM Projection, Zone 39 North, CM 51° East		
Location	**Eastings [m]**	**Northings [m]**
Mirfa ADCP at 5m	744 498.4	2 673 463.9
Source: 12389-ILF-UEO-OD-0022-A1_B.pdf		

Table 3.7: Proposed ADCP Locations at Mirfa Plant Site (Nahrwan Datum)

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East		
Location	**Eastings [m]**	**Northings [m]**
Mirfa ADCP 5m	744 401.1	2 673 043.3
Source: 12389-ILF-UEO-OD-0022-A1_B.pdf		

Table 3.8: Proposed ADCP Locations at Nouf Al Dabbyah Site (WGS84 Datum)

WGS84, UTM Projection, Zone 39 North, CM 51° East		
Location	**Eastings [m]**	**Northings [m]**
Nouf ADCP 5m	199 959.2	2 691 501.9
Source: 12389-ILF-UEO-OD-0023-A1_B.pdf		

Table 3.9: Proposed ADCP Locations at Nouf Al Dabbyah Site (Nahrwan Datum)

Clarke 1880 (Mod) Spheroid, Nahrwan 1967 Datum, UTM Projection, Zone 39 North, CM 51° East		
Location	**Eastings [m]**	**Northings [m]**
Nouf ADCP 5m	199 836.7	2 691 085.7
Source: 12389-ILF-UEO-OD-0023-A1_B.pdf		

3.3.3 Survey Design – Bathymetric and Geophysical Survey

The bathymetric and geophysical surveys shall cover the areas illustrated in Figure 3.1 and Figure 3.2

Table 3.10: Bathymetric and Geophysical Survey Design

<table>
<tr><td>Survey Sensors :</td><td>■ Single beam echo sounder (SBES);
■ R2Sonic Multibeam System;
■ SonarTech Side Scan Sonar;
■ Sub-bottom profiler GeoAcoustics GeoPulse 5210A/Pinger;
■ Magnetometer;
■ Positioning (Starfix G2+ DGNSS).</td></tr>
<tr><td>Data coverage and Line spacing :</td><td>Survey lines shall be run with 20 m line spacing to provide 100 % MBES and SSS coverage between two adjacent lines in water depths greater than 3 m. Crossline intervals will be ran at 500 m.

Only single beam data will be collected in water depths less than 3 m.
Any data collection will be limited to water depth greater than 1m.

Note: The Bathy and geophysical survey will be extended along the shallow water area to be dredged to the limit of 1m water depth during high tide. The actual extent will be determined once in the field conducting the survey activities. Will try to cover maximum towards shore and the same amount of area will be deducted from offshore end.</td></tr>
<tr><td></td><td>Mirfa Plant Site:
<table>
<tr><th>Survey (All sensors)</th><th>Number of Lines</th><th>Line Kilometres</th></tr>
<tr><td>Mainline - Line spacing 20 m</td><td>51</td><td>102</td></tr>
<tr><td>Crossline - Line spacing 500 m</td><td>4</td><td>4</td></tr>
<tr><td colspan="3">Total Survey Line Kilometres: 106 km</td></tr>
<tr><td colspan="3">Nouf Al Dabbyah Site:</td></tr>
<tr><th>Survey (All sensors)</th><th>Number of Lines</th><th>Line Kilometres</th></tr>
<tr><td>Mainline - Line spacing 20 m</td><td>101</td><td>262.6</td></tr>
<tr><td>Crossline - Line spacing 500 m</td><td>5</td><td>10</td></tr>
<tr><td colspan="3">Total Survey Line Kilometres: 272.6 km</td></tr>
</table></td></tr>
<tr><td>Sounding Reduction :</td><td>Bathymetric data will be reduced to Lowest Astronomical Tide (LAT) using observed tides (in conjunction with Fugro’s Starfix.MSS). Observed tides collected as part of metocean measurements will be used during post-processing. Initial sounding reduction will be done using predicted tides.</td></tr>
</table>

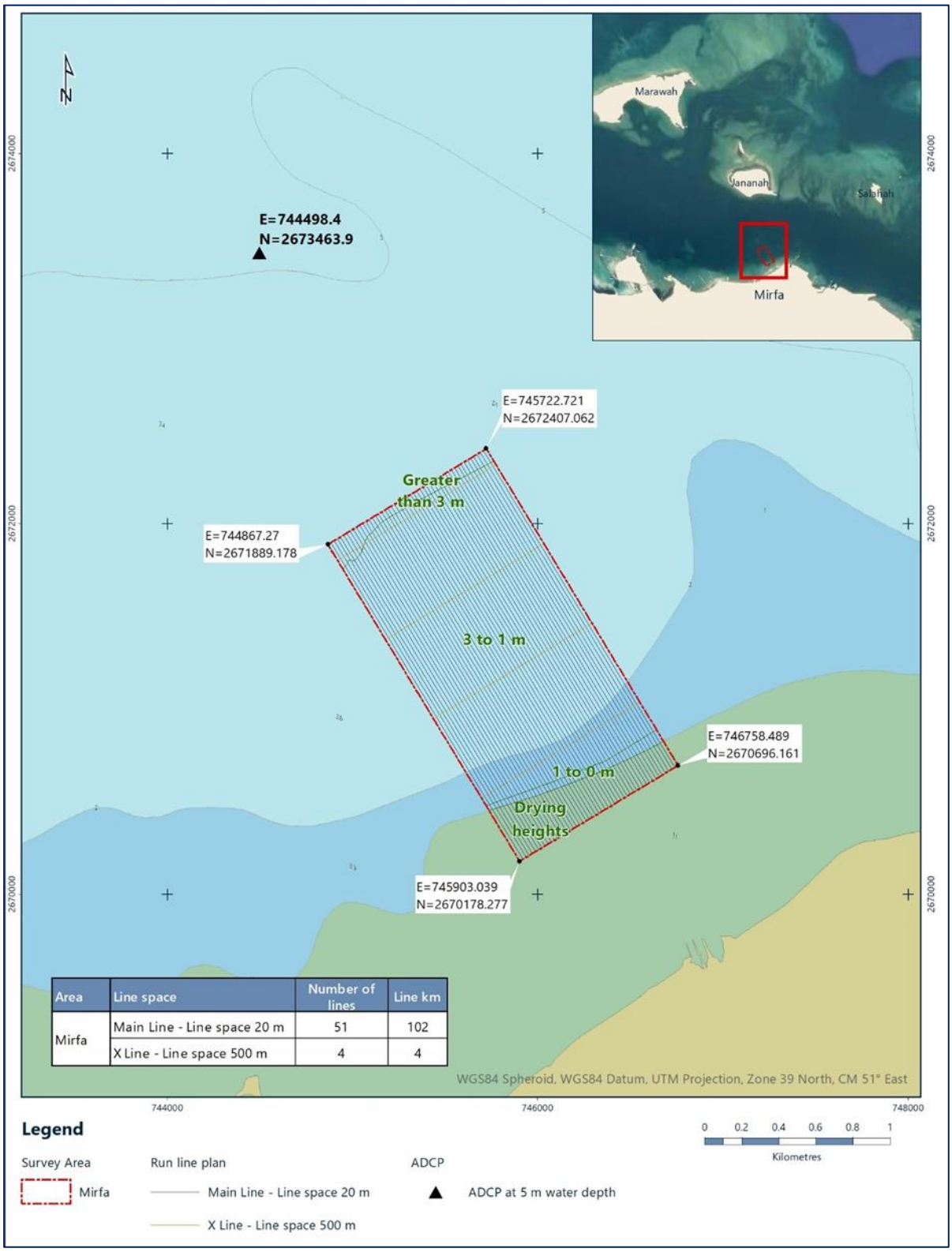
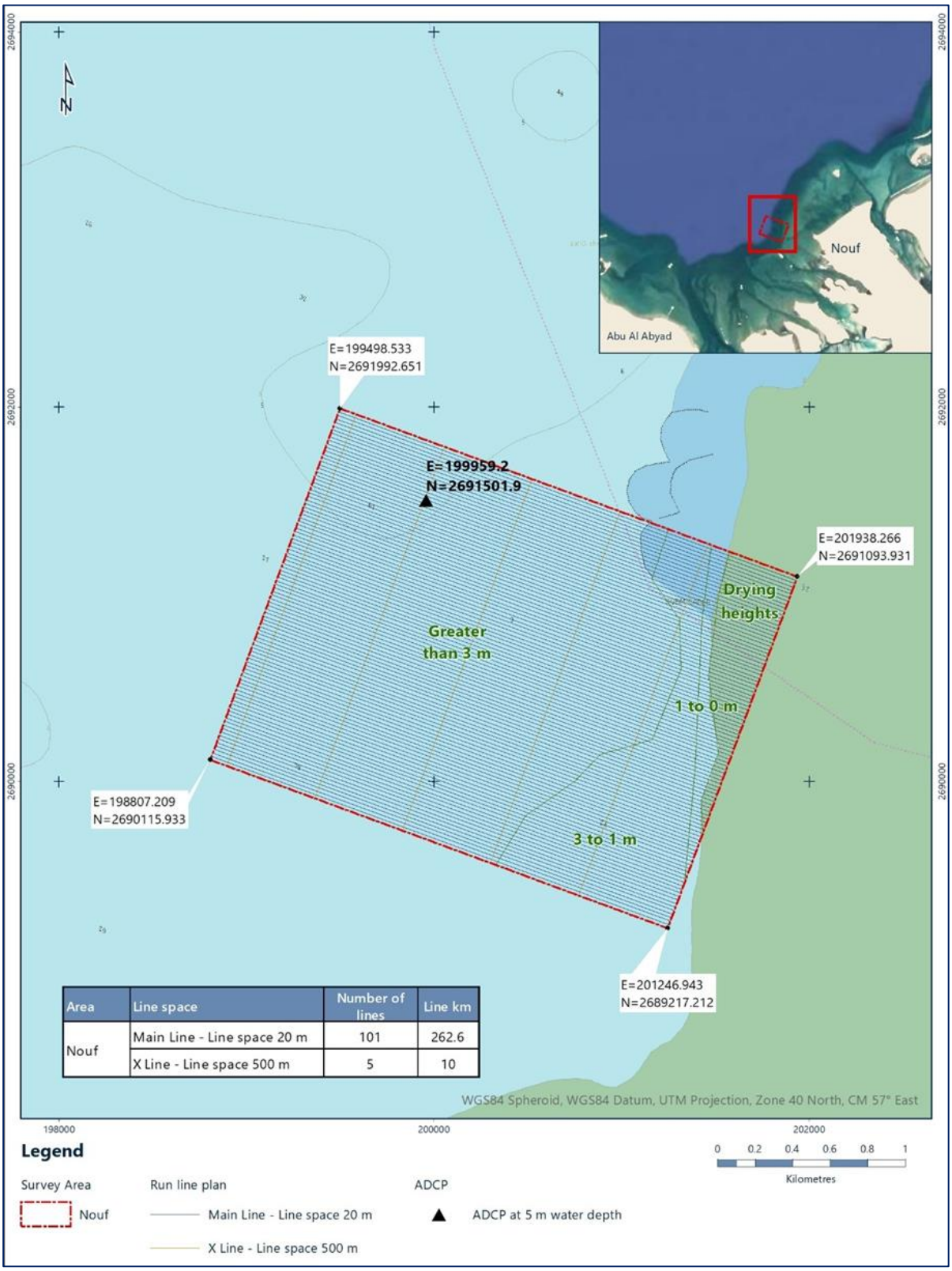


Figure 3.1: Survey runline diagram at Mirfa Plant Site



Area	Line space	Number of lines	Line km
Nouf	Main Line - Line space 20 m	101	262.6
	X Line - Line space 500 m	5	10

Figure 3.2: Survey runline diagram at Nouf-Al Dibbyah Site

3.4 Reference Documentation

Table 3.11 lists the documentation referenced during compilation of this document:

Table 3.11: Reference Documentation

No.	Document Name	Document Identity
1	Contract Ref No:	12389-ILF-UEO-OD-0006 Package C-Offshore Surveys Subcontract Agreement
2	Letter of Award	12389-ILF-UEO-OC-001
3	Scope of Work	Document No. Appendix4.1-Scope of Work Offshore Bath
4	Scope of Work Drawing	12389-ILF-UEO-OD-0015-A1_D
5	Scope of Work Drawing	12389-ILF-UEO-OD-0016-A1_D
6	Scope of Work Drawing	12389-ILF-UEO-OD-0022-A1_B
7	Scope of Work Drawing	12389-ILF-UEO-OD-0023-A1_B
Fugro Project Procedure Documents		
Technical and Commercial Documents		
1	Fugro Proposal	184930-01-ILF-ADNOC Wave
2	Bill of Quantities	Appendix 5.2-12389_Target rates_11032021
HSE Documents		
1	Project Health, Safety, Security and Environmental Plan	MRU096-HSSE
2	Project Emergency Plan	MRU096-ERP
3	Project Quality Plan	MRU096-QP
Project Execution Plan		
1	Project Execution Plan Bathymetric and Geophysical Survey - Offshore	MRU096-PEP
2	Bathymetric and Geophysical Survey - Offshore - Risk Assessment	MRU096-RA

4. SURVEY CONTROL PARAMETERS

4.1 Geodetic Parameters

CAUTION: The survey will be conducted using WGS84 geodetic parameters. The survey results can be presented in ADNOC Datum at a later stage if required.

The Client will be requested to confirm geodetic parameters prior to the commencement of survey operations.

Table 4.1: Geodetic Parameters at Mirfa Plant Site (WGS84)

Global Positioning Geodetic Coordinate Reference System Parameters [1)]		
Datum:	WGS84	ITRF 2000
Ellipsoid:	WGS84	Epoch: 2000.0
Semi-major Axis:	a = 6 378 137.000 0 m	
Semi-minor Axis:	b = 6 356 752.314 2 m	
Inverse Flattening:	1/f = 298.257 223 6	
Projection Parameters		
Map Projection:	Universal Transverse Mercator	EPSG Code 16039
Grid System:	UTM Zone 39 N	
Central Meridian:	51° 00′ 00″ East	
Latitude of Origin:	00° 00′ 00″ North	
False Easting:	500 000 m	
False Northing:	0 m	
Scale Factor on Central Meridian:	0.9996	
Units:	Metre	

Notes:
1. Fugro Starfix navigation software always uses WGS84 as the primary datum for any geodetic calculations.
2. Right-handed coordinate frame rotation convention used by Fugro Starfix navigation software.re.
3. Source: ADNOC document; Engineering Specification for Offshore Geophysical Surveys

Table 4.2: Geodetic Parameters at Nouf Al Dabbyah Site (WGS84)

Global Positioning Geodetic Coordinate Reference System Parameters [1)]		
Datum:	WGS84	ITRF: 2000
Ellipsoid:	WGS84	Epoch: 2000.0
Semi-major Axis:	a = 6 378 137.000 0 m	
Semi-minor Axis:	b = 6 356 752.314 2 m	
Inverse Flattening:	1/f = 298.257 223 6	
Projection Parameters		
Map Projection:	Universal Transverse Mercator	EPSG Code 16040
Grid System:	UTM Zone 40 N	
Central Meridian:	57° 00′ 00″ East	
Latitude of Origin:	00° 00′ 00″ North	
False Easting:	500 000 m	
False Northing:	0 m	
Scale Factor on Central Meridian:	0.9996	
Units:	Metre	

Notes:
1. Fugro Starfix navigation software always uses WGS84 as the primary datum for any geodetic calculations.
2. Right-handed coordinate frame rotation convention used by Fugro Starfix navigation software.re.
3. Source: ADNOC document; Engineering Specification for Offshore Geophysical Surveys

4.2 Units

- Coordinates are expressed in international metres [m];
- Linear measurements are expressed in metres [m];
- Angular units are expressed in degrees [°].

4.3 Vertical Control

Project vertical datum for both survey areas will be Lowest Astronomical Tide (LAT) using observed tides collected as part of metocean measurements.

In addition, onshore tide gauges shall be installed at Mirfa Jetty and private Jetty in Al Nouf area for the duration of survey. The tidal readings can be used for tie-up the bathy data in to shore datum later stages, if required.

In addition to this, height variations during the survey will be determined using Fugro StarPackG2+ DGNSS data and tidal assessments made using Fugro Starfix. MSS (Mean Sea Surface) software.

5. PERSONNEL, EQUIPMENT AND SURVEY VESSEL

5.1 Personnel

Table 5.1 details the personnel complement for survey operations.

Table 5.1: Project Survey Personnel

Name	Designation
B. Pasupathy	Party Chief/Engineer
Santosh Upadhyay	Surveyor
Mobeen Shah	Coxswain
Vijesh Vadakkinayil	Geophysicist (based remotely)
G. Meiyappan	Processor/CAD (based remotely)

5.2 Equipment List

Table 5.2 summarises equipment to be deployed on the Fugro Surveyor.

Technical specifications for the primary equipment are presented in Appendix B.1.

Table 5.2: Equipment List – Fugro Surveyor

Number	Description
Positioning Systems	
1 x	Fugro StarPack G2+ DGNSS – Primary and Secondary System
2 x	Dual Frequency Antenna Array
1 x	Starfix.QCPlot Software
Navigation and Data Logging System	
2 x	PC Computers
2 x	Starfix.NG software
1 x	External Video Display Unit – Helmsman
2 x	Gyrocompass
Single Beam Echo Sounder (SBES)	
1 x	Odom MKIII duel frequency single beam echosounder
1 x	33/200 kHz Transducers
1 x	Seatex MRU5 Motion Sensor
1 x	Valeport CTDS 602 Temp/Salinity Meter
Multibeam (MBES)	
1 x	R2Sonic MBES system
1 x	Valeport Swift SVP
1 x	Over-the-side Mounting Assembly

Number	Description
1 x	Seatex MRU Motion Sensor
Sidescan Sonar System	
1 x	SonarTech SonarTech system with towfish
1 x	Soft tow cable
Sub-bottom Profiler – 1 (Pinger)	
1 x	GeoAcoustics 5430A Transmitter
1 x	GeoAcoustics 5210A Receiver
1 x	GeoPulse 132B Towfish – 2 x 2 Towed
1 x	Winch with tow cable
Magnetometer	
1 x	Geometrics G882 Topside
2 x	Geometrics G882 Towfish
Metocean	
2 x	Nortek AWAC 1MHz or RDI ADCP 1200kHz
2 x	Valeport Midas WLR
2 x	Seabed Frame and mooring system
1x	Weather station and sensor
4x	Seaguard RCM and mooring components
Onshore Tide gauges	
1 x	Valeport 740
1 x	Tide Pole
1 x	Automatic Level
1 x	Tripod and Levelling Staff

5.3 Survey Vessel

Fugro will conduct the Bathymetric and Geophysical Surveys using the survey launch Fugro Surveyor.

Vessel specifications, in digital form, are presented in Appendix B.2.

Whilst in Abu Dhabi, prior to sailing to site, a safety audit shall be conducted on the vessel by the Party Chief. The objective of the audit was to confirm that all necessary safety apparatus and certificates were in order and that safe working conditions are in place on the vessel.

5.3.1 Survey Launch Fugro Surveyor

Table 5.3: Survey Launch Fugro Surveyor

Name of Vessel	Fugro Surveyor
Type	Service boat – Twin Diesel 36 HP
LOA	7.9 m
Beam	2.25 m
Draught	0.4 m
Passenger Capacity	4
Owner	Fugro



6. SURVEY OPERATIONS – BATHYMETRIC AND GEOPHYSICAL SURVEYS

6.1 Mobilisation

Personnel, equipment and vessel will mobilise at the Fugro Jetty in Mussafah, Abu Dhabi. Once mobilised, the vessel will conduct calibrations and verifications while alongside prior to sailing. Following clearances and permitting, other additional calibrations will be performed and following arrival at the survey location, final field calibrations will be performed prior to the commencement of work.

Prior to sailing all equipment will be checked as functioning independently and as units within all systems. Special attention will be given to all interfacing related to event annotation:

The following geophysical system calibrations and tests will be undertaken on arrival at site for all survey vessels. These are to be conducted over the same features using the same runline plan:

- Speed of sound (velocity) in the water column is vital to achieve accurate multibeam surveying as it affects both the position and depth of soundings. Velocity measurements will be made at regular intervals, as a minimum at least twice per day, or at new sites. Subject to the results obtained the frequency of velocity casts may be adjusted to increase the frequency;
- R2Sonic transducer alignment shall be determined by MBES patch test over a suitable seabed feature;
- Bar checks/draught measurements will be conducted at the beginning and end of each day;
- Magnetometer system will be checked by running the towfish over the same seabed feature to demonstrate both data acquisition, and verify towfish offset calculations;
- Pinger system will be checked by running over the same seabed feature to demonstrate both data acquisition, and verify the offset calculations.

At the end of the calibration and trials, a Field Mobilisation Report will be issued to the CONTRACTOR for acceptance of the spread.

6.2 Multibeam Echo Sounder Calibration

At the start of the survey, before multibeam data is collected, a patch test is run to obtain the time latency, roll, pitch, and yaw values. A velocity measurement is taken at the patch test site before collecting data. The multibeam calibration shall be undertaken over an existing pipeline close to survey area. Each patch test line must be given a line number to avoid confusion. The patch test values are calculated to the nearest centimetre. Once the patch test is complete, the calibration values are installed into the processing software. A series of lines are run to assure that the patch test values are correct. The patch test is not rerun during the survey unless the transducer head is recovered and redeployed or remounted.

The multibeam echo sounder is calibrated by sailing several lines in opposite directions, using different speeds over a distinct feature.

In order to calibrate the multibeam system for time delay, roll, pitch and yaw, a total of five survey lines are required as follows:

- Survey line over the feature at slow speed (i.e. 3 knots)
- Survey line over the feature at normal speed (i.e. 4 knots), in opposite direction to line one.
- Survey line over feature at high speed (i.e. 6 knots), in same direction as line one.
- Survey offset line at normal speed (i.e. 4 knots), in same direction as line an offset 11 metres right.
- Survey offset line at normal speed (i.e. 4 knots), in same direction as line an offset 11 metres left.

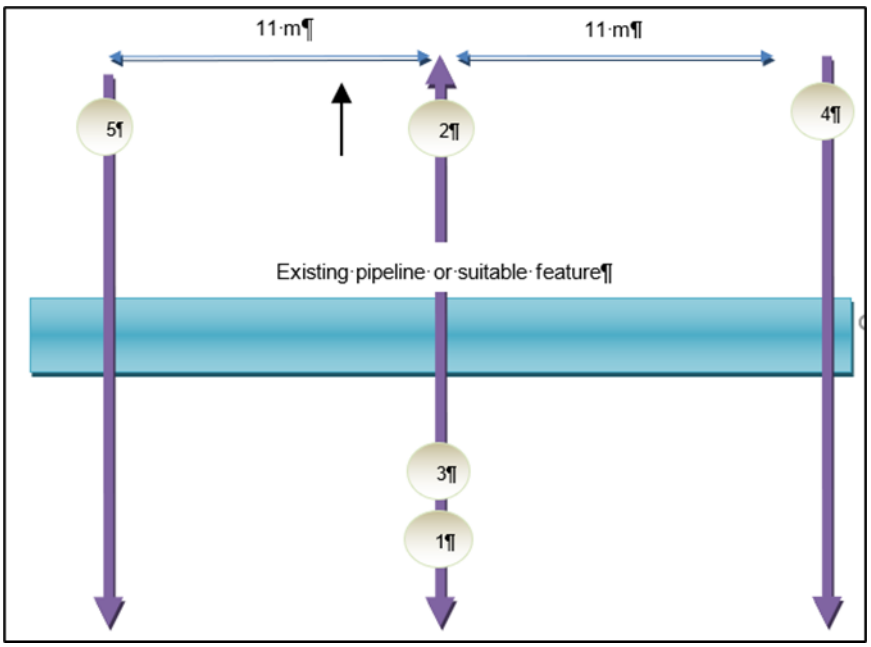


Figure 6.1: Multibeam calibration runline plan

The processing of the multibeam data is performed in a strict order to determine the correct values for all components.

This process is to be conducted for all survey vessels using the same feature and line plan.

6.3 Transit Fix Verification

No permanently fixed jacket or platforms are available in the vicinity of the site, so no transit fix verification shall be undertaken.

6.4 Operational Conduct

The survey operations shall be performed in daylight hours only and for a maximum of twelve hours per day.

Toolbox Talks and TRA's will be conducted prior to the commencement of survey operations.

6.5 Field Execution

- The approved RA, ERP and HSEP will be understood and followed by the survey team. Field operations will be discussed with the client in the site;
- Field coordination with other marine spreads and coast guard authorities are to be managed by the Party Chief together with the Coxswain of the vessel;
- Fugro will continue survey as far as is safe and practical and every effort will be made to maximise survey coverage. Fugro must have access to the worksite during performance of the work.

6.6 Weather Criteria Survey Operations

For survey launch operations are normally only conducted between sunrise and sunset and during periods of good weather. Operating restrictions are normally imposed by the acquired data quality and the vessel operational capability, and shall be at the final discretion of the Party Chief or Coxswain. Weather limitations are usually in the region of 2 to 3-foot seas and 15-knot wind speeds or greater.

Weather criteria for geophysical survey work shall be based on the Risk Assessment Document No. TRA-MRU096-01-2021, Page no 2.

6.7 Navigation and Data Logging

6.7.1 General

The navigation system comprises a desktop computer driving printer and remote helmsman monitor. The computer receives corrected GNSS derived latitude and longitude from the receiver. The antenna position is converted into local UTM coordinates. Navigation will be conducted with no smoothing applied to the position computation. Offsets will be surveyed and measured from the GNSS antenna to the echo sounder transducer pole and other tow points. Further offsets and lay-back measurements will be made to the sensor tow points as a means of checking for any gross errors. The offset measurements will be recorded in the deck log and a sketch made in the log book. A diagram of the offsets (print out of the .svs file) will be provided to the Client Representative upon arrival on the vessel.

Starfix.NG software provides display presentations suitable for sailing predetermined lines, straight and curved, and includes a visual aid for the helmsman.

The survey compass, interfaced to the navigation computer, will be aligned to vessel centreline. The compass will provide the navigation computer with real time orientation and as a result selected offset positions can be continually computed.

Time will be logged on the Gregorian calendar in terms of UTC hours.

6.7.2 Logging

Navigation data shall be logged via the Starfix.Logging module in all the following formats:

SPL and NEL – Fugro Standard Format

Logging shall be started and stopped for each significant event requiring positioning. This may include a set of data to be logged to define a survey runline. Where the significant event is a point position, such as when logging data for a position verification over a known point, further review of the data can be undertaken to compile histogram and statistical analysis in MS Excel.

6.7.3 QC Plot

The main functions of QCPlot are to provide:

- Time Series Plotting (TSP);
- Histogram Plotting;
- XY (scatter) Plotting;
- Statistical Analysis on Data Streams;
- Logging of Data Streams;
- Replay of Logged Data Stream;
- Generic Data Handling;
- User Configurable Plotting Display;
- Quality Control Information Data Plotting.

Positioning systems will be monitored in real-time using the QCPlot module using a direct comparison tool. Within the QCPlot configuration menu, the Nav Positioning Systems dll will be selected and configured for the Primary and Secondary positioning systems.

6.7.4 StarPack.GNSSQC

In order to monitor the quality aspects of the Starfix. GNSS service, this shall be monitored using the Starfix.GNSSQC software package.

6.8 Equipment Configuration – Geophysical Survey

6.8.1 Positioning System

Fugro Starfix.G2+ is a further advancement in the field of GNSS augmentation, which delivers ultra-high accuracy positioning.

Fugro Starfix.G2+ corrections are supplied via L-Band satellite links to give global coverage. The UPD corrections are generated for three geographical regions as these provide significantly better results when compared to a single global set of corrections. These regions are:

1. North and South America;
2. Europe, Africa and Middle East;
3. Asia Pacific Region.

Although the corrections are divided into regions, always choose the region closest to the work location.

6.8.2 Temperature Salinity Probe

The water sound-velocity versus depth shall be measured at start of the survey and at regular intervals (no greater than twelve hourly) during the operations by means of SVP probes (preferably also measuring the conductivity and temperature).

Typically, measurements (downward and upward) shall be performed. The interval of measurements may be decreased depending on the variability of the results.

6.8.3 Single Beam Echo Sounder

Bathymetry shall be acquired using an Odom Hydrotrac Single Frequency Single Beam Echo Sounder system, with digital output. The navigation computer shall continuously log the 33 kHz frequency digital outputs.

A heave compensator shall be interfaced to the echo sounder. Speed of sound shall be measured at the start and end of each day and entered into the unit. The draught will be checked daily by means of a bar check. Phase of the recorder shall be set as required. The echo sounder will be heave compensated using an Seatex MRU system, backed up by a TSS DMS 02-5 or similar unit.

A bar check will also be performed during start and at the end of the survey to verify changes in draught measurements.

6.8.4 Multibeam System

The Fugro Surveyor will be equipped with a R2Sonic multibeam sonar system for high resolution bathymetry.

Interpretation of the sidescan sonar imagery shall be performed on a dedicated computer by an experienced geophysicist.

6.8.5 Sidescan Sonar System

A SonarTech S-150Spi sidescan sonar will be towed astern Fugro Surveyor for obtain seabed morphological data. The system SonarTech will record data at switch/selectable frequency between 400 kHz/1250 kHz.

The sidescan sonar fish, shall be deployed in a variety of methods to facilitate the environmental conditions, where necessary either towing astern, over the bow of fixing the fish using a secured pole, and the data shall be recorded via the Fugro GLog/GPlot system. Digital data can be played back onboard the vessel for QC purposes on completion of data acquisition. The Edgetech towfish shall be connected to armoured cable and controlled via an electric winch. Winch control shall be from the survey room/bridge where records shall be monitored. The SonarTech fish will use soft-tow cable.

Interpretation of the sidescan sonar imagery shall be performed on a dedicated computer by an experienced geophysicist.

6.8.6 Sub-bottom Profiler (SBP)

A GeoAcoustics 1 x 1 array over-the-side mounting assembly from Fugro Surveyor will be used to delineate the top surficial sediments with resolution. Where the top seabed sediments or layer below inhibits the penetration by Pinger SBP.

The signal penetration should be approximately equal to water depth especially for shallow areas with a vertical resolution of 20 cm. It is understood that the penetration can be less in the event of consolidated soil conditions. The quality of the SBP is of primary importance with regards of the survey objectives and time is to be given to tuning for optimal performance.

The SBP interpretation shall be performed on a dedicated computer by an experienced geophysicist.

6.8.7 Magnetometer

The Geometrics G-882 magnetometer, with a high sensitivity (< 0.004 nT/√Hz rms), is provided to assist with the identification of any metallic objects within the site. These systems are very sensitive to magnetic noise and need to be isolated as best as possible from such interference (particularly the survey vessel). Apart from the depth sensor, the system is self-calibrating and should be operated in accordance with the manufacturer instructions. The unit is deployed independently behind the survey vessel and positioning of the towfish shall be from layback calculations giving a position within ± 2 m.

The system shall be flown approximately no higher than ten metres above the seabed and hence particular attention must be made to the pressure sensor readings in the towfish to ensure that it remains this distance above the seabed. A COPed display shall be compiled for the Starfix.Seis display which shall amalgamate the bathymetric depth with the magnetometers depth to indicate both the depth below sea surface and height above seabed.

6.8.8 Survey Equipment Safety and Tow Height

The following safety precautions will be adhered to when deploying the equipment with respect to third parties assets and subsea infrastructure:

- Contractor will at all times obey the instructions of the field operators with respect to access to the survey area, and will assume standby status if instructed not to commence, or to abandon, any survey work, at the field operators discretion;
- The magnetometer fish shall be towed independently behind the survey vessel and particular attention will be made to the pressure sensor readings in the towfish to ensure that it remains at a safe distance above the seabed.

6.9 Geophysical Data Logging and Processing

The Starfix.GLog and Starfix.GPlot applications are Fugro's in-house digital data handling systems. Starfix.GLog provides data logging capabilities at high sampling rates of up to 60 kilohertz onto hard disk and/or Exabyte tapes. It has the ability to log up to four channels of data simultaneously from a variety of sources through an interface box, including dual channel sidescan sonar, pinger, boomer and magnetometer.

Starfix.GPlot allows the logged data to be accessed from the logging PCs via a local area network for real-time QC and post processing of the data. Starfix.GPlot includes the capability to process data through various functions including TVG, noise filter, swell filter, seabed detection and visual display elements.

SBES and MBES data will be recorded digitally in the Starfix.NG navigation survey package. Digital bathymetry data shall be processed via the Starfix.Proc software with predicted tides for reduction purposes to LAT. Tidal corrections will be cross checked using Fugro's Starfix.MSS software module.

The geophysicist onboard the vessel will examine the data collated on site. An indicative initial analysis of the data acquired will be made in real-time during the survey. A dedicated geophysicist will quality control the data and report any particular hazard or problem areas, for potential re-runs or further investigation.

Edge Tech sidescan sonar data will be processed by Fugro's Sonarmap software.

Sub-bottom profiler data will be recorded by the Fugro GLog/GPlot system and processed using a combination of Starfix.Proc, Starfix.Interp and Starfix.SonarMap software modules.

The processing of all the survey data will be carried out onboard, covering navigation, bathymetry, sidescan sonar, sub-bottom profiling and magnetometer datasets.

The processing performed onboard should be done in the stages listed below.

- MBES processing: preliminary DTM reduced to LAT;
- SBP processing: preliminary;
- SSS processing: preliminary;
- Magnetometer: preliminary.

If at any time the data quality from any sensor is deemed unacceptable this shall be raised with the Party Chief and Data Centre staff in the office and such areas shall be re-surveyed.

Data Management:

Data collected throughout the survey will be logged and stored following the steps laid down within this section.

N.B. The digital version of the data structure is included on the Offshore Pack under directory "Template – Project Directory".

Please read 1110.10_Offshore Data Management Policy which can be found on your IMS CD as included in the Field Binder. This document has undergone revision in September 2009, and should be read in detail.

Please also read 1110.11_Onshore Data Management Policy which can be found on your IMS CD as included in Field Binder.

THE PROJECT DIRECTORY ON THE WORKING DRIVE WILL BE KEPT CLEAN OF ANY TEMP/SCRATCH FILES.

It is not permitted for any individual to save any project related files/documents in any other location than the project directory on the working drive.

7. SURVEY OPERATIONS – METOCEAN MEASUREMENTS

7.1 Metocean Mobilisation and Demobilisation Processes

For all operations all personnel and vessel crew in the vicinity of the monitoring system and lifting gear will have as a minimum the following personal protective equipment:

- Hard hat
- Lifejacket
- Protective footwear
- Gloves

Operations will only take place when both the Vessel Master/Coxswain of the Survey Launch and the Project Oceanographer (Party Chief) determined that conditions on site are suitable.

7.1.1 Mobilisation of Metocean Equipment

All instrumentation will be prepared and serviced as appropriate prior to arrival on site. During the mobilisation, a team of Fugro engineers will perform the following actions:

- Unpack and check all equipment delivered to site;
- Load vessel with all equipment necessary for mobilisation;
- Mobilise vessel, including fixing of winches and containers (if required);
- Transit to site;
- Complete deployment of equipment at each station;
- Return to base;
- Demobilise vessel;
- Arrange for storage of all ancillary equipment and spare at secure locations.

7.1.2 Demobilisation

During the demobilisation a team of Fugro Engineers will join vessel and sail to site. The following actions will be performed:

- Unpack and check all back up equipment in storage at site;
- Load vessel with equipment necessary for demobilisation;
- Transit to site;
- Complete recovery of equipment at each station;
- Review all data collected;
- Return to base;

- Demobilise vessel;
- Prepare and pack all equipment for return to base

7.2 Equipment Configuration – Metocean Measurements

7.2.1 RDI ADCP

The RDI Workhorse ADCP profiler uses acoustic signals produced from transceivers mounted on the head of the instrument. Transceivers are mounted at 20° to the vertical and use a patented 4-beam design, which improves data reliability by providing a redundant data source in the case of a blocked or damaged beam.

The signals are reflected back to the instrument by particulate material in the water column. The returned signal is binned (divided into separate sets) with respect to the return interval. This interval is calculated from the pre-set range and the speed of sound as calculated by the instrument.

The binned data are then processed using Doppler technology and the relative movement of the particulate material in the water can be ascertained with reference to each beam. The movement of this particulate material is assumed to be caused by the water flow through the field. This movement is converted first to a general flow through the three beam field referenced to an arbitrary zero direction on the instrument. This is then converted to a true speed and direction (to magnetic north) by reference to an integral flux gate compass. The average data once extracted are converted to directions to True North (°T) by applying the local magnetic to true north variation for the site.

Table 7.1: RDI ADCP

RDI ADCP	
Proposed TRDI Work Horse Sentinel ADCP Configuration	Instrument frequency:1200 kHz Current profile interval:600 sec Cell size:0.5 m Blanking distance: 0.4 m Wave measurement interval: 1800 seconds Number of Samples: 512 Sampling rate: 1Hz
Seabed Frame	Stainless steel anti-trawl seabed frame. Sacrificial anode, acoustic recovery system and locator beacon attached.

7.2.2 Nortek AWAC

The Nortek AWAC has been selected for this task as a result of Fugro's extensive positive experiences with the device especially for wave measurements and also due to the capacity to offer considerable cost savings by combining wave, current and tide measurements in one device. Furthermore, the system electronics integrates accurate Doppler velocity measurements with standard sensors such as temperature, pressure, tilt, and compass. It is low maintenance, has no moving parts, requires no recalibration, and has no zero-point drift over time.

The device measures the following parameters:

1. Wave measurements are collected via two methods:
   a) using the in-built pressure sensor at 1 Hz and;
   b) the acoustic surface track (AST) which will produce a highly accurate trace of surface elevations at 2 Hz. Both data types are utilised to calculate wave parameters independently to allow a higher degree of certainty over the resulting values;

2. Current speed and direction using the device's three acoustic transducers which are offset from the vertical at 25°. AWACs collect these data in depth 'cells' which are defined according to measurement requirements and instrument frequency. By dividing the water column into cells it is possible to derive current speed and direction at any depth above the sensor;

3. Pressure at the seabed as a measure of tidal height – this is measured through the use of the instrument's in-built pressure sensor. In addition the tide heights are calculated from the acoustic surface tracking data providing a quality check on the data and increasing its reliability.

Table 7.2: Nortek AWAC

Nortek AWAC	
Proposed Nortek AWAC Configuration	Instrument frequency:1 MHz Current profile interval:600 sec Cell size:0.5 m Blanking distance: 0.4 m Wave measurement interval: 1800 seconds Number of Samples: 512 Sampling rate: 1Hz
Seabed Frame	Stainless steel anti-trawl seabed frame. Sacrificial anode, acoustic recovery system and locator beacon attached.

7.2.3 Valeport MIDAS WLR

The MIDAS WLR is a seabed tide gauge, designed for long or short term deployments in offshore environments, or locations where a traditional shore based tide gauge is impractical. Fitted with a 0.01 % accuracy pressure sensor and accurate PRT temperature sensor as standard, the MIDAS WLR features a variety of operating modes from rapid 8 Hz continuous sampling to power saving burst modes for long term monitoring.

The sensor used is a piezo-resistive cell with internal temperature compensation, giving the accuracy and resolution levels normally associated with a resonant quartz sensor, but with increased durability, stability and recalibration intervals.

Table 7.3: Water Level Recorder

Water Level Recorder	
Typical MIDAS configuration	Sampling interval: 600 seconds Averaging period: 60 seconds
Seabed Frame	Stainless steel anti-trawl seabed frame. Sacrificial anode, acoustic recovery system and locator beacon attached.

7.2.4 SeaGuard RCM

SeaGuard RCM provides the possibility to perform long term monitoring of sea and inland water using the latest technology for measurement. They may be used as a multi-parameter instrument and feature a modular plug-and-play architecture. It will include sensors for water quality parameters such as Pressure, Conductivity and Temperature. This will supplement the environmental water profiling.

Table 7.4: SeaGuard RCM

SeaGuard RCM	
Typical SRCM configuration	Sampling interval: 600 seconds

7.2.5 Onshore Weather Station

The design must consider equipment siting and exposure; sensor assembly and mounting; mast material, height and mounting (if required);

- Sensor height, aspect and mounting;
- Position of input module, measurement and control module, data logger and computer system (where applicable);
- Power – battery;
- Data storage; and
- Wiring – type and length.

At the time of preparing this procedure a specific location has yet to be decided upon. Once on location, an initial site visit will be undertaken to fully assess suitable locations prior to the actual installation.

Table 7.5: Weather Station

Weather Station	
Typical Meteorological Station configuration	Sampling interval: 600 seconds Data collected: Wind speed (m/s), temperature (Celsius), pressure (mBar) and Relative Humidity (%), Sampling interval: 600 seconds Average interval: 60 seconds
Set up	Batteries and logger unit at base of pole, sensors pole mounted.

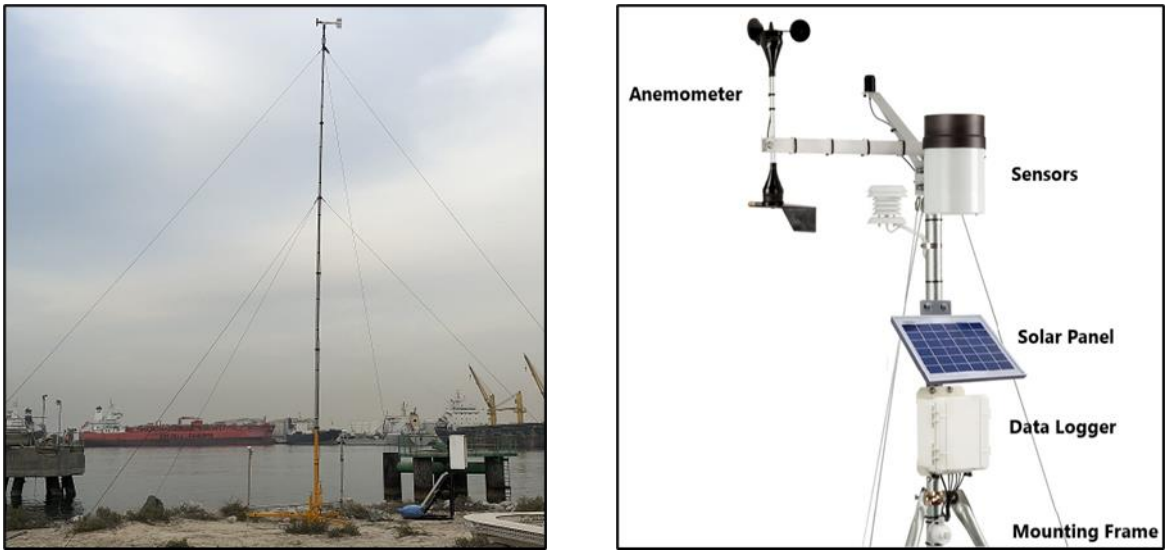


Figure 7.1: Typical onshore setup (For illustration purposes)

Provided there is access, the weather station would be installed at the nearest Ettouk Island in a safe location for the duration of the EBS survey period. Permission shall be taken from the Island prior to installation.

7.3 Mooring Deployment And Recovery

The Metocean instrumentation will be setup and tested on shore location prior to mobilisation.

Prior to each deployment, risk assessments will be reviewed and updated as necessary.

All these procedures are to be finalised during mobilisation following discussions between the Fugro Project Oceanographer, Vessel Master and all other stakeholders involved in the operation. The actual procedures used will be vessel and weather dependent and will be planned or amended by the Project Oceanographer on site accordingly.

7.3.1 Offshore Seabed Frame Stations – Current, and tide measurements

Two seabed frames (Primary and Backup) will be deployed at the given location site in order to collect current and tide measurements; a typical schematic for a pop-up system is presented in Figure 7.2.

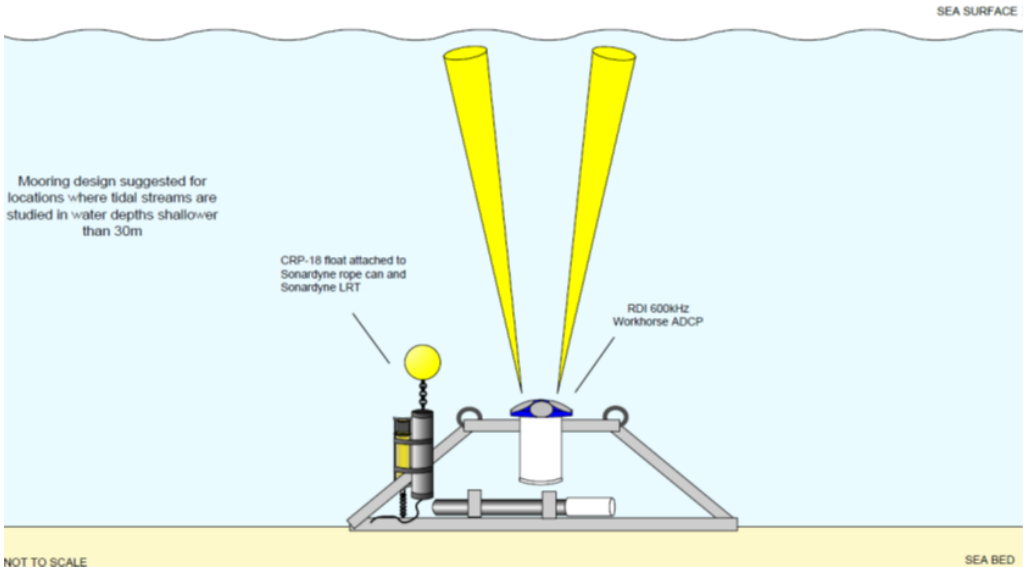


Figure 7.2: Example of a typical schematic for a pop-up system

Fugro seabed frames have been custom designed to provide a robust, stable platform from which high quality data can be collected. They are an open-sided design, minimising disturbance of the current flow over the top of the frame and ensuring quality data from as close to the seabed as possible. These frames are fabricated from marine grade 316 stainless steel, are designed to minimise the risk of trawling and incorporate an option to use an Oceanographic Release Transponder for deployment, thus giving flexibility for field operations. Fugro will also fit acoustic tilt sensors to the frames, allowing field staff to use a deck transponder to verify that the frame is upright following deployment. The large open based footprint also provides the frame with further stability as it bites into the seabed.

7.3.2 U Mooring of SRCM – Current, and water quality measurements

One U-mooring of SRCMs will be deployed at the client provided location in order to collect current and water quality parameters. The U-type mooring consist of four SRCM, four subsurface buoys and two small marker buoys laid out on a mooring riser chain as presented in Figure 7.3:

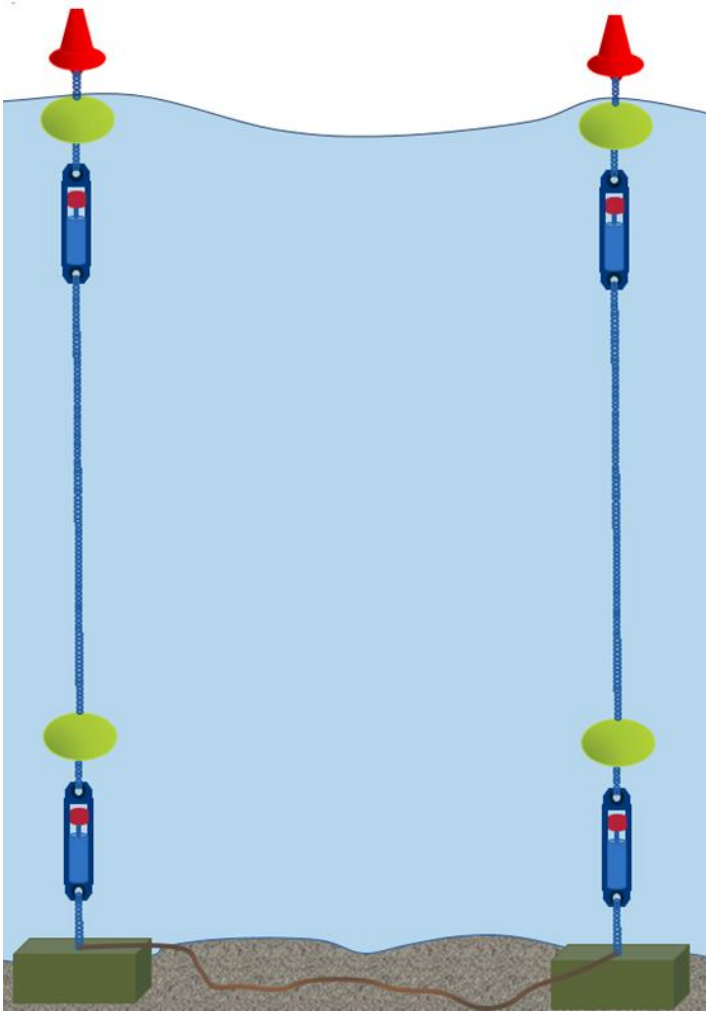


Figure 7.3: Example of a typical schematic for a U mooring

The standard main components required to construct U mooring are as follows:

1. Marker buoy with light – used to mark the location of the mooring and assist with the recovery;
2. Subsurface mooring buoy – used to keep the SRCMs upright;
3. Anchor weight – used to keep the mooring on location;
4. Mooring chain –used to connect the instrumentation and mooring components;
5. Weighted rope –used to connect the two mooring lines (Primary and Back-up).

7.3.3 Deployment

1. Pop-up Mooring

The following procedure for the pop-up mooring details a typical deployment using an acoustic release device.

- The survey team will assemble the seabed frame and LRT configuration on deck and ensure it is all laid out in a fashion that will prevent any snagging during deployment;
- On a winch line fitted with an Oceanographic Release Transponder (ORT), the survey team will lower the frame to the seabed at the deployment location and then use the Surface Command Unit (SCU) to disconnect the ORT from the frame. Alternatively the frame can be slipped to the seabed using a standard rope if the water depth is shallow;
- Once the frame is on the seabed, the survey team will move away from the seabed frame location;
- Before leaving the deployment location, the survey team will check that the frame is upright on the seabed.

2. U-type mooring of SRCM

The typical procedure for the U-type mooring includes:

- The survey team will assemble the mooring configuration on deck and ensure it is all laid out in a fashion that will prevent any snagging during deployment;
- Survey team will lower one of the marker buoys and the two SRCM's and buoy mooring line;
- Survey team will then slowly lower the weight connected to that line until it reaches the seabed;
- Once the weight is safely on the seabed, the survey vessel will slowly steam away from the location while the survey team carefully lowers the next weight and associated SRCM buoy mooring line;
- Once the second weight is secured on the seabed, the survey team will release the marker buoy and move away from the location;
- Before leaving the deployment location, the survey team will check the mooring.

7.3.4 Recovery

1. Pop-Up Mooring

- The vessel will manoeuvre to the deployed location;
- The command unit will be used to send a signal to the LRT to release the pellet floats and recovery line. Once the floats have risen to the surface, the survey team will attach a winch wire to the recovery line;
- Using the vessel's lifting equipment; the recovery line will be winched on board;
- Using tag lines, the survey team will guide the seabed frame carefully on to the deck.

2. U Mooring

- The vessel will manoeuvre to the deployed location;
- Survey team will attach a winch wire to the recovery line of one of the marker buoy;

Using the vessel's lifting equipment; the recovery line will be winched on board and slowly recover all SRCM's.

8. ADMINISTRATION

8.1 Quality Assurance

Fugro's comprehensive Integrated Management System covers Health and Safety, Quality and Environment and which is certified by Det Norske Veritas (DNV) to comply with OHSAS 18001:2007, ISO 9001:2015, and ISO 14001:2015 standards.

Adherence to the company policy is mandatory for all company personnel.

Quality Assurance is documented in the Project Quality Plan MRU096-QAP.

8.2 Offshore Administration

Digital Daily Progress Report (DDPR's) are to be maintained from the commencement of mobilisation until the completion of demobilisation.

The DDPR is to be countersigned by the Client Representative. DDPR's shall be emailed back to the Fugro office on a daily basis to provide up to date information to the Project Manager.

Monthly summary report sheets are to be compiled by Fugro and countersigned by the Client Representative. These will then be used for all contractual and invoicing purposes.

8.3 References

8.3.1 HSEP Documentation

For HSEP documentation please refer to the HSEP plan document number MRU096-HSEP.

8.3.2 Mobilisation Documentation

A copy of the configuration results and mobilisation/calibration report shall be forwarded to the Fugro office on completion of calibrations. They will also form part of the final report. Devices calibrated by external laboratories shall have a copy of the calibration certificate made available to the Client.

8.3.3 Survey

Table 8.1: Survey Work Instructions

Transit Checks	F-830.24, F-830.25
Bathymetric Surveys	OSD-WI-820.34
SBES Operations	OSD-WI-302
MBE Operation	OSD-WI-304, OSD_WI-304.1
SSS Operation	OSD-WI-307
SBP Operation	OSD-WI-308
Marine Magnetometer Surveys	OSD-WI-315
GLog, GPlot Operations	OSD-WI-314
Motion Sensor Operations	OSD-WI-303
Tidal Reduction	OSD-WI-504, WI-820.35
Positioning System	OSD-FO-113.1 Rev 1.0, OSD-FO-113.2 Rev 1.0
Data Logging	OSD-213
Handovers	WP-820.16, OSD-WI-508
Control of Equipment and Material	OSD-WI-602
Variation of Work Order	F-630.19
Small_Boat_Operations_Procedure_Rev_4	WP-1210.19
Small_Boat_Pre-launch_Checklist_Rev_21	F-1230.21
Small_Boat_PMS_Checklist_Rev_3	F-1230.22
Geophysical Survey Checklist_Rev 0	F-830.111
Echo_Sounder_Log_Sheet_Rev_1	F-830.13
Job Preparation Checklist_Rev 5	F-730.03

8.3.4 Processing and Reporting – Geophysical Survey

Table 8.2: Processing and Reporting Work Instructions

Management of Survey Data	OSD-WI-700
Single Channel Data Processing	OSD-WI-701
Generation of Tide Files	OSD-WI-707
MBES Processing	OSD-WI-705
Reporting	WP-820.17
Chart Presentation	WP-820.18

9. DELIVERABLES

9.1 Daily Status Reports

Daily Status Reports shall include a summary of survey progress covering the previous twenty-four hours and other significant operational events. It will also provide a look-ahead for the coming twenty-four hours. These will be relayed from site to the Project Manager and Company office.

It will also include a brief description of observed site conditions encountered during the survey.

9.2 Geophysical Reporting

Final data processing, reporting, interpretation and charting will be carried out at Fugro's offices in Abu Dhabi.

The following will be included in the Draft Bathymetric and Geophysical Reports (Rev 0):

Charting: Charts will be presented at a scale of 1:2500(best fit shall be used) , A0 size, comprising four separate panels in one single chart highlighting the following information. (Refer to proposed template attached).

- Bathymetry
- Multibeam shaded relief images;
- Seabed Features;
- SSS Mosaic;
- Seabed Profiles;
- SBP Profiles:
- Magnetic anomalies.

Report: Individual report for each site location:

- Introduction
- Survey Design;
- Vessel, Equipment and Personnel;
- Summary of Operations;
- Summary of vessel offsets and calibrations;
- Survey Results
- Charts with (bathymetry reduced using predicted tides).
- HSSE&Q;
- Appendices:

- Daily Progress Reports;
- Calibration data;
- Charts.

The following digital data also will be provided:

- MBE DTM XYZ Files;
- Unsmoothed X m Interval;
- MBES Profile XYZ File;
- Unsmoothed X m Interval;
- Backscatter Data;
- SEG Y Data;
- GIS Deliverable.

Notes:

- The draft geophysical report will provide preliminary findings from the survey; which includes. bathymetry reduced using predicted tides, seabed features and sub-bottom conditions with the prime purpose to assess the feasibility of the proposed well head tower locations;
- The survey results shall initially be correlated against the available past borehole data, which shall be used to calibrate the scans obtained as a part of the geophysical survey. This interpretation shall be included in the first draft interpretative report.

9.2.1 Final Geophysical Reports (Rev 1)

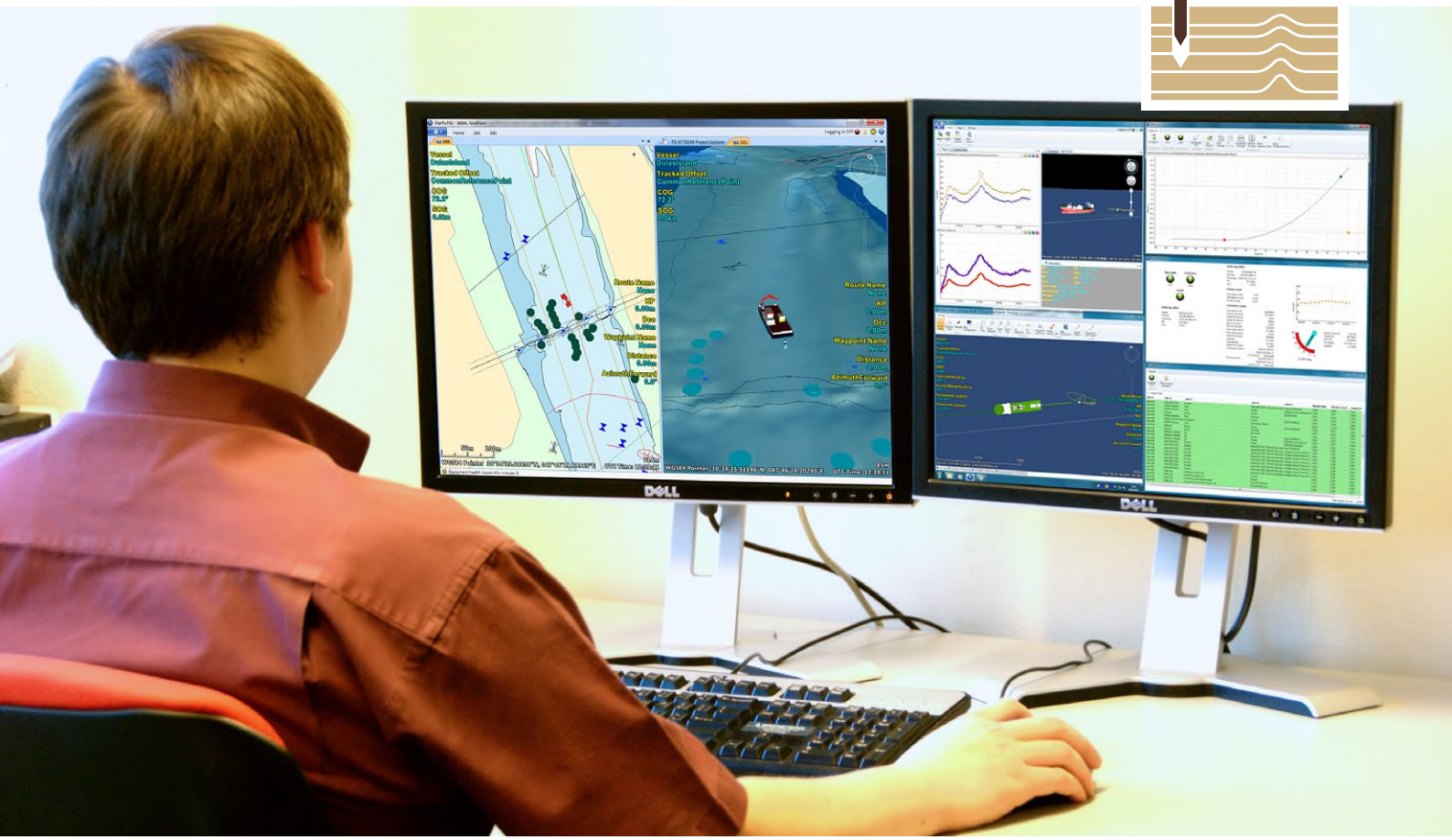
Final Geophysical Reports will be submitted after receipt and implementation of final comments made on the Draft Geophysical Reports (Rev 0).

A. WORK PRACTICES

Will be provided as soft copies only for the field team.

B. EQUIPMENT AND VESSEL SPECIFICATIONS

B.1 EQUIPMENT



FUGRO STARFIX**NG**

StarfixNG is Fugro's new software platform for offshore survey operations. It has been built using the latest development tools and techniques. Flexibility and scalability on top of a robust layer of common positioning, navigation and QC functions allow StarfixNG to be adapted to any type of job. With its unique 'solution' approach, specific functionality is available as building blocks to be used as needed.



OARS (Office-Assisted Remote Services).

Covers wide range of offshore survey job types

Dedicated solutions for specific tasks can be configured in any combination. This allows seamless transition between activities on the same job.

Extensive hardware support

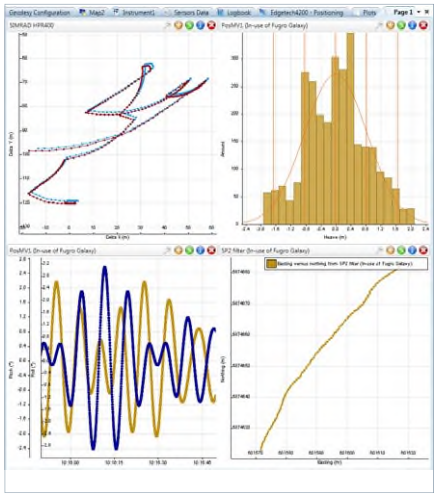
A large database with sensor codecs and vessels are included. Fugro hardware like StarPack and StarPort is automatically detected and can be configured once connected. The diagram style hardware configuration offers an intuitive user interface.

Easy integration with Starfix Classic

The internal message protocol is compatible with Starfix Classic. This provides the flexibility to exchange data with Starfix Classic modules and run them simultaneously.

Uses industry standards

StarfixNG uses various industry standards like the EPSG Geodesy database and ENC background maps. Also de-facto standards like Autocad DWG for exchange of CAD data are well supported.



Plots: Scatter plot, Histogram, Time series and Position plot

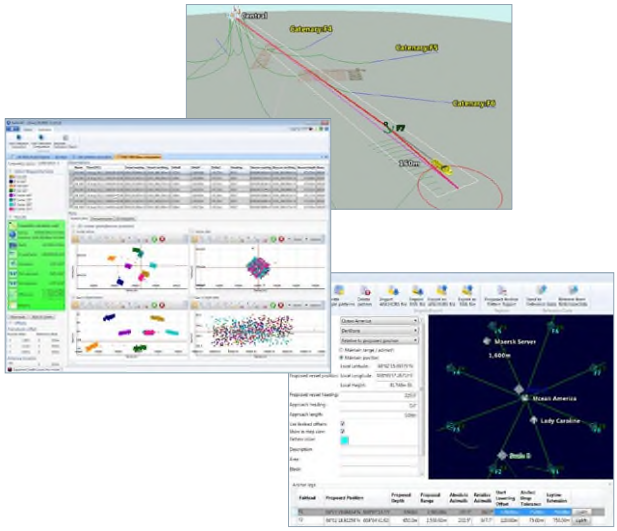
STARFIX**NG**

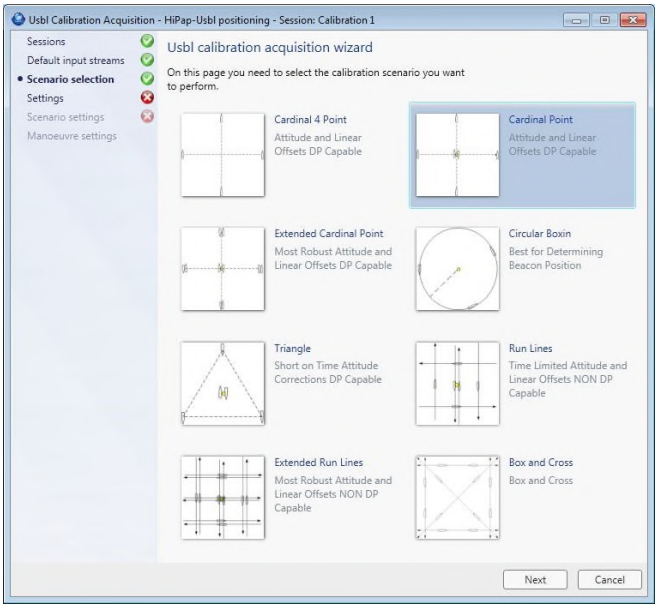
Extensive QC, Calibration and reporting tools

These include various types of plots, real time comparisons and solutions to check or determine latency, offsets and misalignments. There are built-in and custom reports.

Scalable across network

From a basic positioning task on a single computer to complex multi vessel jobs with a wide variety of sensors and solutions, StarflxNG can be distributed over multiple computers and displays.





Usbl calibration configuration

Comprehensive displays

- 3D and 2D map views with ENC backgrounds
- Dedicated map options for speciflc tasks
- Instrument panels
- Plots
- Dashboards

Dedicated solutions

- Anchor / Rig Move Solution
- Catenary
- Inclinocam™ Monopile Installation
- GNSS (MultiFix, Tides, StarTrack…)
- FineTrack
- Metrology
- Streamer modelling
- Towed objects
- Deep lay
- Survey scheduler
- OARS (Offlce-Assisted Remote Services)
- and more…

Device Calibrations

Task based calibration procedures with detailed client reporting for devices such as

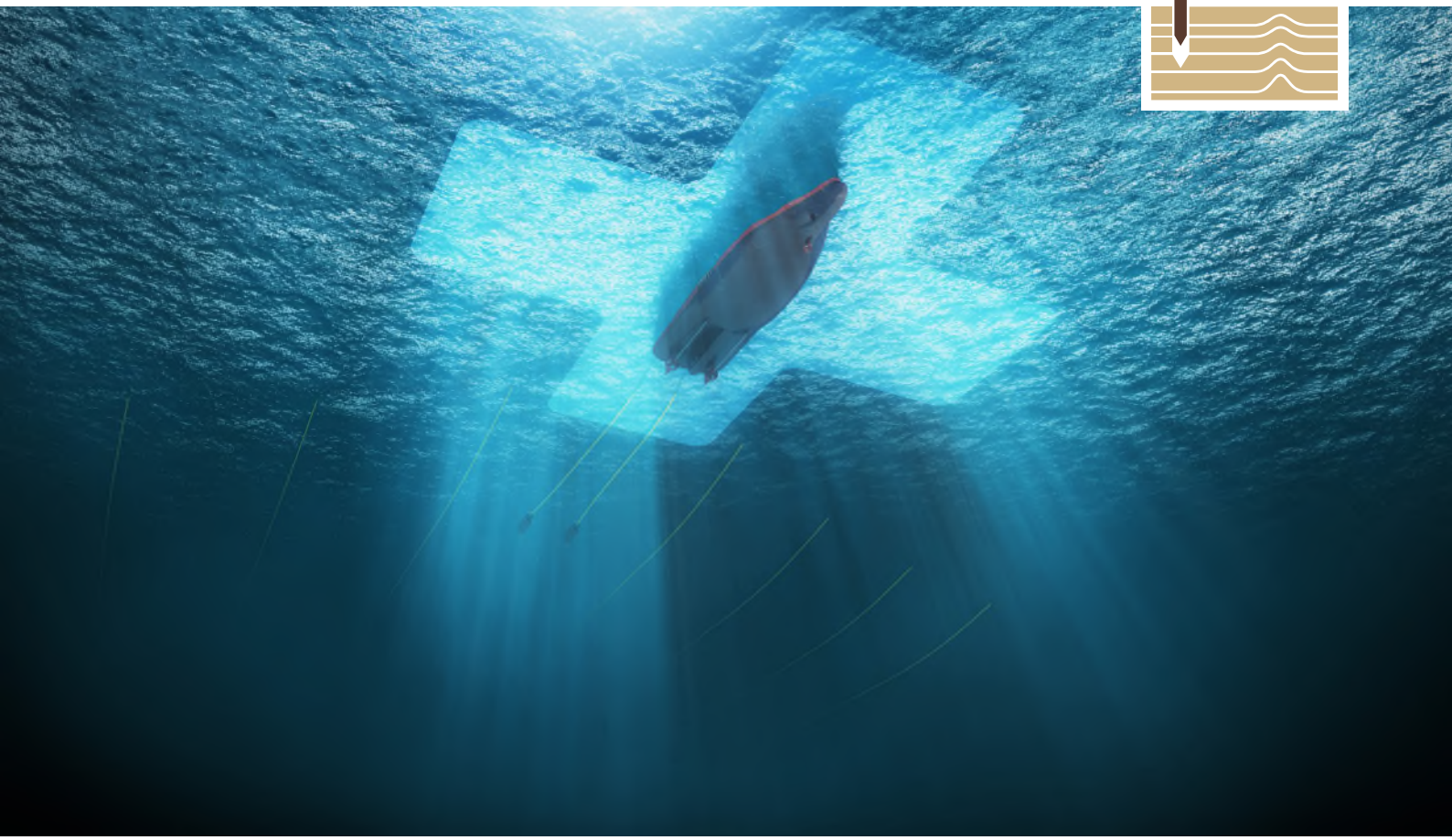
- USBL
- Heading sensors.
- GNSS veriflcations

Spatial Data Management

- Survey lines, Routes and Waypoints
- Avoidance zones and Proximity monitoring
- Eventing
- Proposed locations
- Symbology / Vector data
- AutoCAD DWG / DXF

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STARFIX. G2+

AN ULTRA HIGH ACCURACY SERVICE FOR OFFSHORE APPLICATIONS

Starfix.G2+ is a further advancement in the field of GNSS augmentation, which delivers ultra-high accuracy positioning to our customers.

The Starfix.G2+ is a further advancement in the field of GNSS augmentation, which delivers ultra-high accuracy positioning to our customers.

This new positioning service is based on advanced Integer Ambiguity Resolution (IAR) technology which is a further development of Precise Point Positioning (PPP). The basis of the IAR technique is the derivation an additional set of carrier-phase corrections from the Fugro reference station network (known as Uncalibrated Phase Delays or UPD).

The implementation of the UPD corrections in the Fugro StarPack software results in the carrier-phase ambiguities being resolved (fixed to integer values) resulting in a positioning accuracy at the centimetre level.

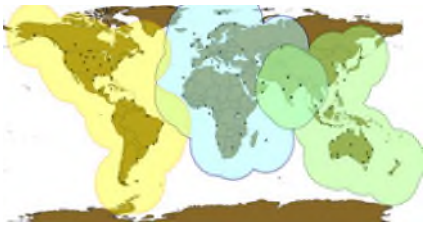
When the Starfix.G2+ service is enabled, the Fugro StarPack software will compute a centimetre Starfix.G2+ position. If for some reason the carrier-phase ambiguities cannot be resolved then the solution will fall back to a standard decimetre PPP solution.

The Starfix.G2+ corrections are supplied to our customers via L-Band satellite links to give global coverage.

The UPD Corrections are generated for 3 geographical regions as these provide significantly better results when compared to a single global set of corrections. These regions are:

1. North and South America
2. Europe, Africa and Middle East
3. Asia and Australia

Although the corrections are divided into regions, our customers do not need to be inside the region in order for the service to work, but should always choose the region closest to their work location.



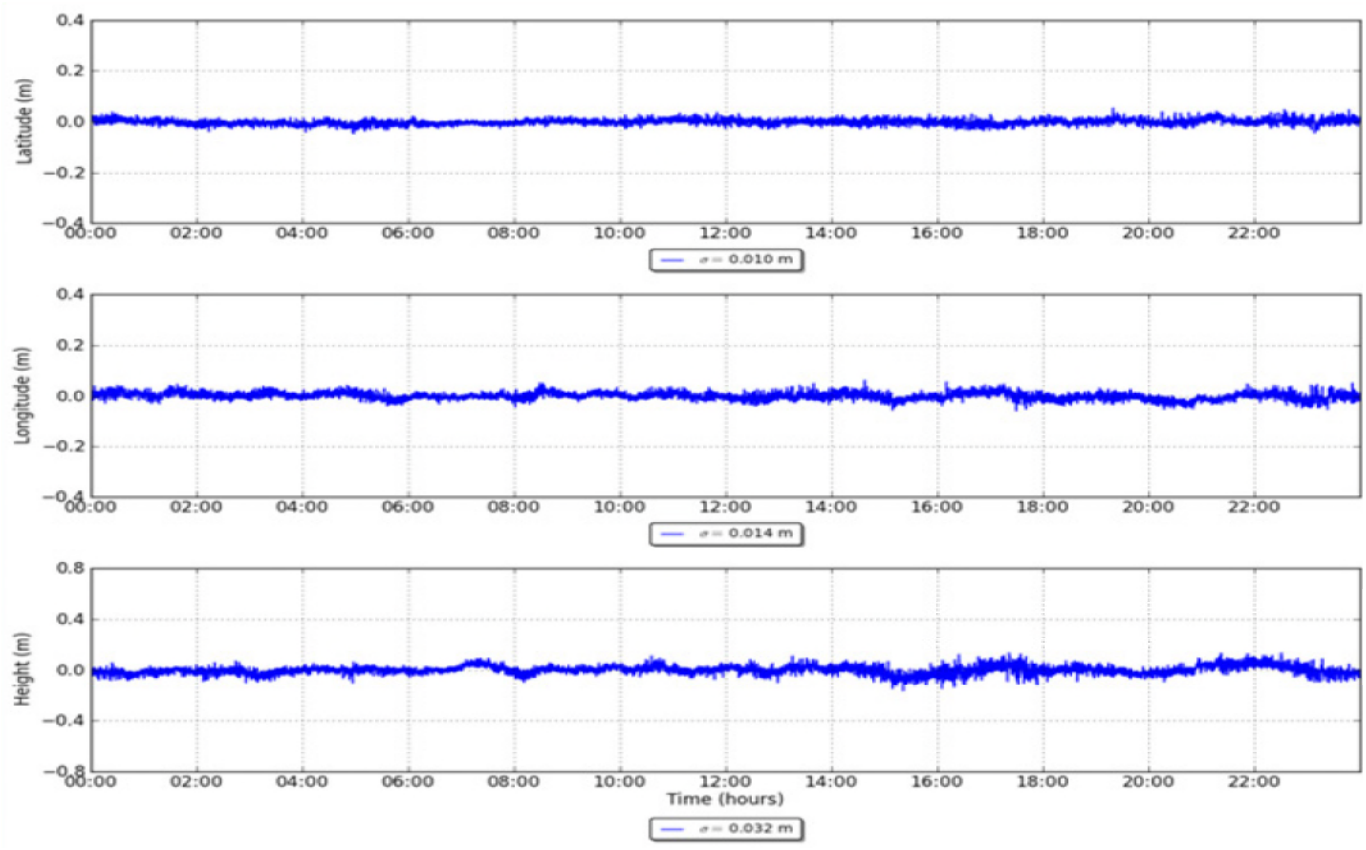
Solution accuracy; the following table illustrates Starfix.G2+ accuracy over 24 hours over 2 days from four locations

	E (SD)	N (SD)	H (SD)
Bergen (14/03/2015)	0.014 m	0.010 m	0.032 m
Bergen (15/03/2015)	0.016 m	0.013 m	0.034 m
Brownsville (14/03/2015)	0.012 m	0.011 m	0.037 m
Brownsville (15/03/2015)	0.011 m	0.010 m	0.027 m
Houston (14/03/2015)	0.013 m	0.011 m	0.032 m
Houston (15/03/2015)	0.011 m	0.010 m	0.029 m
Leidschendam (14/03/2015)	0.013 m	0.010 m	0.028 m
Leidschendam (15/03/2015)	0.014 m	0.012 m	0.032 m

The Starfix.G2+ service is currently available to customers using Fugro's StarPack GNSS systems.



Starfix.G2+ performance plots for Bergen, on 14th March 2015.



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STARFIX®

StarPack - High precision GNSS positions, heading and time from a single platform



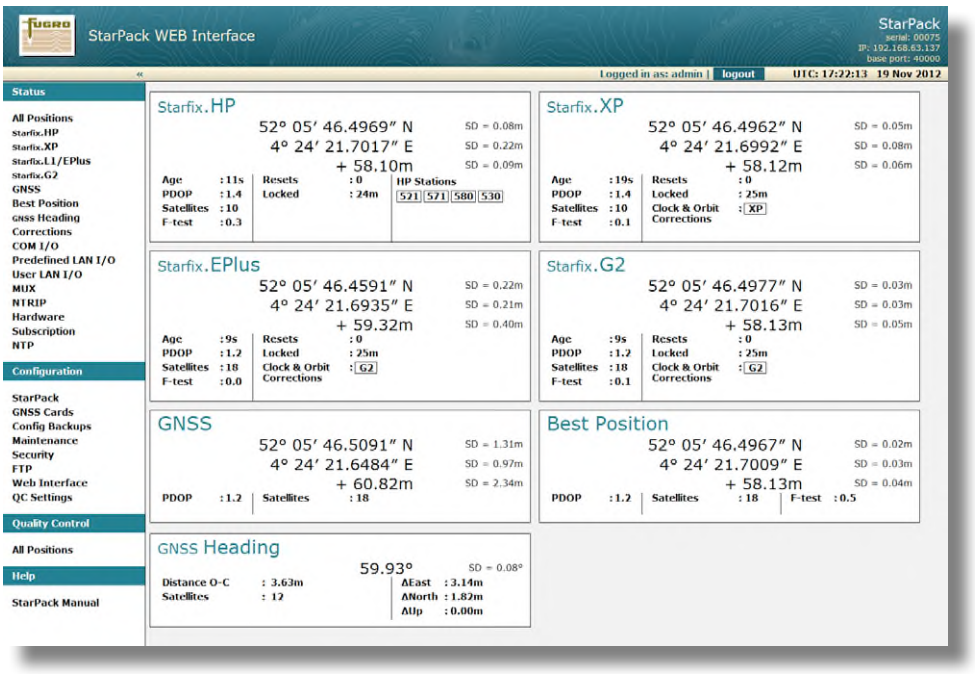
The StarPack is Fugro's answer to increasing market demand for precise, redundant GNSS positioning solutions, including extensive QC and accurate time, from a single, easy to use platform.

StarPack platform

The StarPack unit consists of a survey grade GNSS combined L-band receiver and powerful processor, running Linux multitasking operating system. The receiver is capable of tracking all current satellites (GPS, GLONASS) and is Galileo ready. StarPack can be extended with a second GNSS card (in the same unit), to provide accurate, GNSS derived heading. In addition to GNSS observations, the second card provides also L-band functionality, creating an independent source of corrections for backup.

The combination of receiver and processor provides robust multiple simultaneous precise position calculations and extensive QC. For maximum system reliability, the internal software is embedded on a flash memory. System can be controlled and configured via the front panel, web interface or a serial port.

The StarPack is equipped with four serial ports on the rear panel and LAN interface to provide a multitude of outputs to the user and to read multiple correction sources (in addition to those from the integrated receiver(s)). Raw GNSS data and corrections are continuously logged internally and can be exported to RINEX to enable high quality support and back-up. User can download this data and send it to Fugro's development centers for re-processing. Additional user defined output can be configured for automatic logging. Firmware can be upgraded using the web interface or using a USB stick at the front panel.



Positioning and Heading solutions

The embedded processing software of the StarPack GNSS receiver provides multiple configurable simultaneous precise positioning solutions, including G2.

- Four independent correction sources
  - o Starfix.G2
  - o Starfix.XP
  - o Starfix.HP
  - o Starfix.L1
- Five solutions: Starfix.G2, Starfix.XP, Starfix.HP, Starfix.EPlus and Starfix.L1
- New "Best Position" solution, combining all available solutions in to one, using proper weighting. "Best Position" provides increased availability and better accuracy.
- A Heading solution between two GNSS antennae, in combination with a second GNSS card (in the same or another receiver).

StarPack applications

- Accurate height for tidal corrections and heave compensation
- Accurate position for seabed mapping surveys
- Accurate vertical reference for out of straightness pipeline surveys
- Accurate (instantaneous) heading source (in combination with a second GNSS card)
- Stable position for station keeping on DP vessels
- Accurate relative positioning of structures
- Automated vessel guidance

NTP support

The StarPack contains an NTP (Network Time Protocol) server, providing a time accuracy of 500 µs or better with a convergence time after power-on within several minutes.

NTRIP client

The StarPack contains also NTRIP (Networked Transport of RTCM via Internet Protocol) client. When internet connection is available StarPack can be connected to Fugro's (or third-party) corrections servers providing additional, independent from L-Band, corrections backup.

Quality control

Extensive quality control is provided through StarPackQC, a stand alone PC based application, or on web interface, Quality control parameters indicating precision, reliability and availability can be visualized for estimated positions as well as for corrections and individual satellites.

Technical specifications

GNSS hardware engine	• Trimble BD982 with two antenna inputs: 220 channel GPS/ GLONASS, Galileo/BeiDou available with software option upgrade • Single or dual NovAtel OEMV-3: 72 channel GPS/GLONASS board • Trimble BD960: 72 channel GPS/ GLONASS board (no longer manufactured, but serviceable)
Corrections	Integrated receiver for Starfix differential and orbit/clock corrections
Processor	Intel Pentium III, embedded Linux operating system
Data rate	1 Hz - 5Hz
Data storage	10 days, raw and correction data (1 Hz) on internal disk
Size	245 x 60 x 195 mm (W x H x D)
Weight	2 kg
Input voltage	80 – 250 VAC, 40 – 60 Hz
Input/output	4 RS232 ports, LAN with more than 30 configurable ports, 1 PPS
Operating temperature	-20°C – +50°C
Storage temperature	-40°C – +85°C
Humidity	95% non-condensing
Compliant	EMC 2004/108/EC (EN60945:2002) 2011/65/EU(RoHS 2)

Service/ solution	Accuracy (hor. 95%)	System	Correction data	Coverage
Starfix.G2	0.1m	GPS GLONASS	Clock and orbit corrections	Global
Starfix.XP	0.1m	GPS	Clock and orbit corrections	Global
Starfix.HP	0.1m	GPS	Ionosphere-free carrier phase corrections from multiple reference stations	Regional <1000km*
Starfix.EPlus	1m	GPS GLONASS	Clock and orbit corrections	Global
Starfix.L1	1.5m	GPS	L1 pseudo range corrections from multiple reference stations	Regional <500km*
Best Position	0.1m	GPS GLONASS	All available correction data	Global
Heading	Better than 0.1°for baselines longer than 3m	GPS GLONASS	-	Global

** distance to reference station*

August © Fugro 2013

STARPACK

The StarPack platform

StarPack provides multiple, high precision, GNSS positioning solutions. The unit comes with a survey-grade 72 channel, triple frequency GNSS receiver and powerful processor.

This combination provides multiple, robust, precise, simultaneous position calculations. The system provides extensive QC through comparisons between the different high precision calculations. For maximum system reliability the internal software is embedded on flash memory configured on the processor. Control and configuration of the system is via the backlit LCD front panel display, via a (LAN) web interface, or RS232 serial port.

Four (4) serial ports are provided on the rear of the system (in addition to the integrated receiver) to either read multiple correction sources or provide user configured outputs.



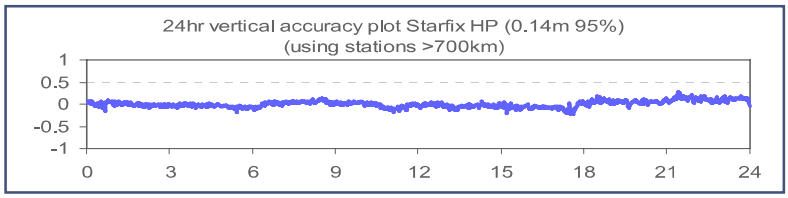
Simultaneous positioning solutions available on the StarPack:

- Starfix.HP
- SkyFix-XP
- Starfix.L1 (VBS)
- Starfix.Plus
- Starfix.XP
- Starfix.HP / XP combined

Ten (10) days of raw dual frequency data is continuously logged to enable high quality support in case of any problems. The user can download this data to Fugro's development centre for either problem analysis or re-processing.

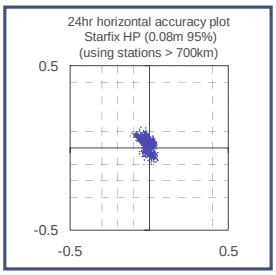
Positioning solutions available in the StarPack

Fugro is the un-rivalled world leader in global high precision GNSS positioning services. Fugro is consistently first in introducing new high precision positioning services and technology. Fugro invests heavily in the development of future services that will incorporate the latest generation GNSS signals. These signals include modernized GPS (L2C, L5), Russian Glonass and the planned European Galileo. The StarPack is easily upgradeable to benefit from these new signals.



Applications of the StarPack

- Accurate relative positioning of structures.
- Automated vessel guidance.
- Accurate height for tidal corrections and heave compensation.
- Accurate position for seabed mapping surveys.
- Accurate vertical reference for "out of straightness" pipeline surveys.
- Accurate (instantaneous) heading source in combination with a second unit.
- Stable position for station keeping on DP vessels



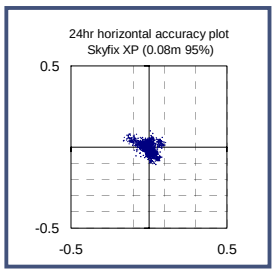
Starfix.HP

In 2001, Fugro deployed Starfix.HP (High Precision). This dual frequency GPS carrier phase based service was a breakthrough in global positioning. Starfix.HP offers sub-decimeter horizontal position accuracies 95% at distances up to 500km and 20cm horizontal position accuracies up to 1000km from the closest reference station. Vertical accuracies are 15cm and 30 cm, respectively. Fugro operates an extensive network of over 100 high accuracy dual frequency reference stations world-wide. The network has 100% redundancy in both infrastructure and control.

SkyFix-XP

For clients who are looking for the ultimate in independence, SkyFix-XP is also available. SkyFix-XP is a completely separate system that uses PPP state space technology but with a completely different code base (part of MultiFix IV).

SkyFix-XP provides positioning accuracies comparable to Starfix XP while using the same JPL state space data stream. For easy comparison, the SkyFix-XP calculation has also been made available in the StarPack and can be selected / de-selected at the sole discretion of the user.



Starfix.Plus

In 1998 it became apparent that the maximum of the 11 year solar cycle would have a significant negative impact on GPS based positioning services. Position errors of over 20m were becoming common near the geomagnetic equator, this caused by solar activity impacting the ionosphere. Fugro was the first to develop a system to combat this problem, releasing the Starfix Plus system in 1999. Starfix Plus provided an accuracy of 2m 95% under these extreme conditions caused by the solar maximum in equatorial and auroral areas. The prime operating principle is based on measuring the ionospheric delays using direct GPS L1/L2 code measurements as opposed to modelling of the ionosphere.

Starfix.XP

The Starfix.XP GPS positioning service is complementary to the existing Starfix.HP service. Starfix.XP is based on clock and orbit corrections supplied by NASA's Jet Propulsion Laboratory (JPL). Starfix.XP is a Precise Point Positioning (PPP) technology, which distinguishes itself from the traditional differential approach as satellite errors are not lumped together but estimated per source, per satellite; it is also known as State Space solution. The GPS clock and orbit corrections are computed independently, free of ionospheric and tropospheric effects.

The advantages of Starfix.XP are:

- A single set of corrections per satellite valid independent of the geographic location.
- Independence from the existing Fugro reference station network
- Simplicity for the user

Direct comparisons with competing providers' capabilities and performance show that Fugro continues to lead in accuracy and robustness of solution. Starfix.XP has a 95% accuracy of 10cm horizontal and 20cm vertical.

Combined Starfix.HP / XP

Taking advantages of the fundamental strengths of both HP and XP services in a single calculation, an integrated HP/XP engine was developed. This engine uses both the HP differential corrections and the XP state space data in a single computation. A benefit of this solution is improved robustness and accuracy of the solution. It also provides for seamless transition between the two services if one or the other data stream is lost.

With Fugro, clients have a clear choice between fully independent, redundant, high performance solutions with Starfix.HP, XP and combined HP/XP.

Convergence time and recovery after loss of GPS lock.

A disadvantage of solutions like Starfix.HP / XP and SkyFix-XP, as opposed to solutions with RTK integer ambiguity resolution, is the initial and re - convergence time. Convergence typically takes 30 minutes, and in some instances up to an hour, before the full accuracy is achieved. In a marine environment this is generally not a problem as the antenna is usually mounted on a location with an un-obstructed view to the sky. For applications that do not have the advantage of clear skies Fugro has developed an algorithm which bridges temporary disruption of the GPS signals, without the need for full convergence. This unique method will bridge gaps up to 60 seconds in the GPS data. The algorithm is integral in the combined HP / XP engine.

ProTrack heading

To add accurate and reliable GPS vessel heading capability to the StarPack, a second unit (with a second antenna) can be connected. Alternatively the unit can be fitted with two boards. The StarPack can be configured to compute the heading of the baseline between the two antennas. The accuracy of this heading is 0.1 deg for a baseline of 10m. ProTrack provides instantaneous ambiguity resolution on single epoch dual frequency data.

Technical Specifications

GNSS hardware engine (optionally 2 cards):

- Novatel OEMV: 72 channel, triple frequency board that includes L2C,
- GLONASS measurements and hardware support for the future L5 GPS frequency

Corrections:

- Integrated receiver for Starfix differential and state space corrections

Processor:

- Intel Pentium 3, Embedded Linux

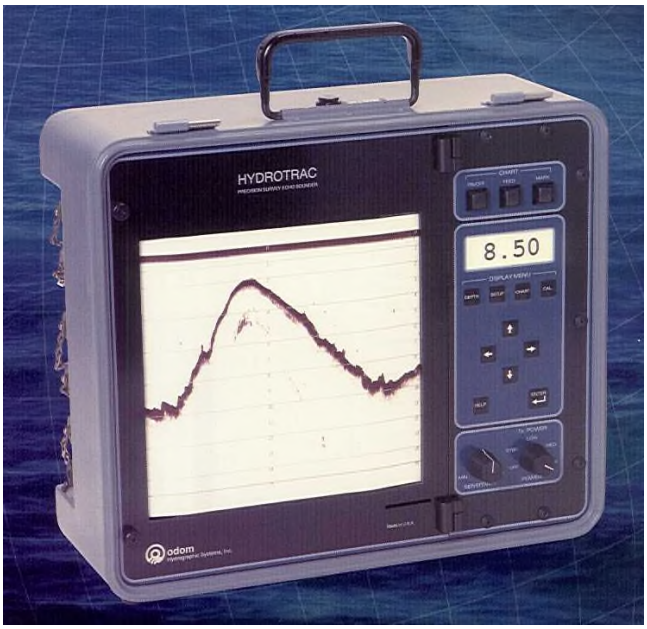
Accuracy (95%)	Horizontal	Vertical
Starfix.VBS	0.5 m	1 m
Starfix.Plus	2 m	2 m
Starfix.HP	0.08 m	0.15 m
SkyFix-XP	0.1 m	0.2 m
Starfix.HP/XP	0.1 m	0.2 m

- Data Rate 1Hz, optional 20 Hz
- Size (WxHxD): 245 x 60 x 195 mm
- Weight 2 kg
- Input Voltage 80 – 250 VAC, 40-60Hz
- Input / Output 4 RS232 COM ports, 1PPS, LAN, USB
- Op. Temp - 20°C to +50°C
- Stor. Temp -40°C to +85°C
- Humidity 95% non-condensing
- Compliant EMC 2004/108/EC (EN 60945:2002)



Odom Hydrotrac

Hydrotrac is designed with the difficult working conditions experienced by surveyors in small boats and inflatables in mind. Rugged, compact and portable, it is fully waterproof with the clear cover in place. Although competitively priced, Hydrotrac incorporates the high resolution thermal printer and many of the advanced features of Odom's industry leading Echotrac line of echo sounders.



SPECIFICATIONS

Frequency
- Frequency Agile to accommodate common transducer frequencies
- 210kHz, 200kHz (std.), 40kHz, 33kHz, 28 kHz, 24 kHz
- 200kHz dedicated very shallow water transceiver and transducer
- 200kHz dedicated Side Scan (40 log TVG curve)

Power Requirement
- 11-28 VDC
- 110/220 VAC (optional)

Com Ports
- 2 bi-directional (RS232 or RS422)
- Resolution 0.1 feet or 0.01 meters (units selectable)

Features
- 8.5" thermal printer (uses standard Fax paper)
- Optional built-in DGPS or NMEA string input
- Heave compensation from motions sensors
- Annotation up to 80 characters printed on chart
- Output: NMEA, Odom Echotrac, DESO
- Waterproof
- Small Size (fits in airline overhead compartment)
  (14.5 h x 16.5 w x 7.5 d inches)
  (36.83 h x 41.91w x 19.05 d cm)
- Built-in simulator
- Help menus

Touch Pad Controls
- Draft, velocity and tide inputs
- Time and date
- Scale width and center
- Blanking
- Calibration gate
- Digitizer filter
- Autofix marking

R2Sonic 2024 Multibeam Echo Sounder



The first wideband high resolution shallow water multibeam

OVERVIEW
Sonic Series broadband / wideband multibeam echo sounders represent the latest in advanced underwater acoustic technology.

The Sonic 2024 is the world's first true wideband high resolution shallow water multibeam echo sounder. With proven results and unmatched performance, the Sonic 2024 produces reliable and remarkably clean data with maximum user flexibility through all range settings to 500m.

With over 20x selectable operating frequencies to chose from within the 200 to 400 kHz band, the user is not limited by two or three operating frequencies and thus can trade off resolution and range and effectively control interference from other active acoustic systems.

In addition to selectable operating frequencies, Sonic 2024 provide variable swath coverage selections from 10° to 160° on the fly and across all frequencies from 200 to 400 kHz. No other high resolution, high frequency sonar offers such wide coverage and productivity.

When a narrow sector is selected, all soundings are concentrated within the swath for increased resolution over small scale bottom features. Wide swath sectors are typically used for general mapping or when surveying vertical surfaces such as quays, breakwaters, dams, pilings or bridge abutments as the increased opening angles eliminate need to rotate the sonar head.

Sonic 2024 performance is characterized by low internal noise, high signal dynamic range and true broad band signal processing that suppress multi-bounce interference at greater beam angles.

Advanced functions including equidistant beam spacing, roll and pitch stabilization, and auto-ranging will all be released when the expanded data format accommodating these features is implemented. New enhanced firmware features may be easily downloaded in the field.
In addition, an optional steerable transmit projector upgrade is currently under development. With this option, customers will be able to select true multi-ping operation providing four simultaneous transmit pulses for 100% coverage at all ranges at increased survey speeds.

Components
Sonic Series systems represent new modern design and architecture, unencumbered by legacy designs.

The heavy, bulky and power consuming topside electronic components that characterize old multibeam echo sounder technology have been eliminated.

The sonar consists of three major components: a compact and lightweight projector, a receiver and a small dry side Sonar Interface Module (SIM). The extremely low power draw of <50W makes it possible to operate the system on vessel battery power (with DC/AC converter).

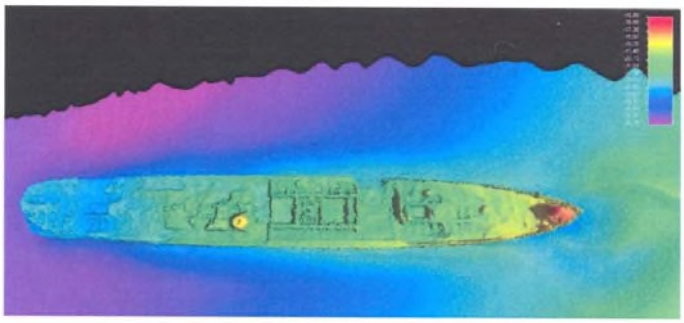
Unlike other commercial shallow water multibeam systems, all processing is embedded in the sonar receiver, dramatically increasing system efficiency. Third party auxiliary sensors are connected to the sonar interface module. The sonar data is tagged with GPS time.

The compact size, low weight, low power consumption <50W and elimination of separate topside processors make Sonic 2024 very well suited for small survey vessel or ROV/AUV operations. For AUV integration, apart from the transmit and receive transducer, the only hardware to be housed on the AUV is an interface board the size of a PC/104, Ethernet ports, and the provision of isolated 48V DC power.

Operation
The sonar operation is controlled from a graphical user interface (GUI) on a PC or laptop, which is typically equipped with navigation, data collection and storage application software. The operator sets the sonar parameters in the sonar control window, while depth, imagery and other sensor data are captured and displayed by the application software.

Commands are transmitted through an Ethernet interface to the Sonar Interface Module. The SIM supplies power to the sonar heads, synchronizes, time tags sensor data, and relays data to the application workstation and commands to the sonar head.

The receiver head decodes the sonar commands, triggers the transmit pulse, receives, amplifies, beamforms, bottom defects, packages and transmits the data through the SIM via Ethernet to the control PC.

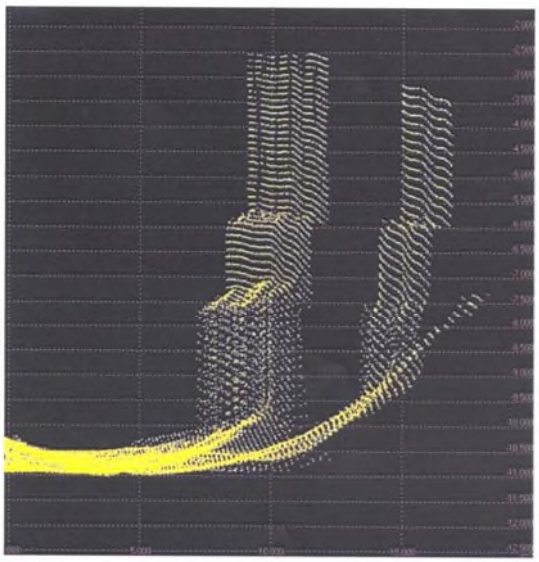


30°- 45° coverage, for increased resolution over bottom features

R2Sonic 2024 Multibeam Echo Sounder

Technical Specification:

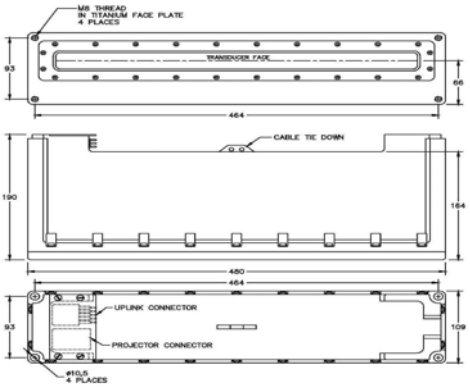
Frequency	200 kHz – 400 kHz Over 20x frequency selections User selectable in real-time
Bandwidth	60 kHz, all frequency selections
Beamwidth	0.5° x 1° 0.5° x 0.5°** (w/steerable projector)
Swath Sector	10° to 160°
	All frequency selections
	User selectable in real-time
Max Range Setting	500m
Max Ping Rate	Up to 75 Hz
Range Resolution	1.25 cm, all frequency selections
Pulse Length	10µs-1ms
Number of soundings per ping	256 equiangular/1300 equidistant 1024 equiangular/5200 equidistant (w/steerable projector)
Near-field Focusing	Yes, all beams, over entire swath
Equiangular or Equidistant beams	Yes*
Roll Stabilization	Yes*
Pitch Stabilization	Yes*
Muti-ping	Yes**, 4x simultaneous transmit pings w/steerable projector
Depth Rating	100m, 3000m optional
Operating Temperature	0°C to 50°C
Storage Temperature	-30°C to 55°C
Mains	90-260 VAC, 45-65Hz
Power Consumption	<50W
Uplink/Downlink	10/100/1000Base-T Ethernet
Deck Cable Length	15m, optional 25m, 50m
Receiver Dim (LWD)	480 x 109 x 190mm
Receiver Mass	12.9 kg
Projector Dim (LWD)	273 x 108 x 86mm
Projector Mass	3.3 kg
SIM (LWD)	280 x 170 x 60mm
Sim Mass	2.4 kg



160° coverage, for mapping high up vertical surfaces

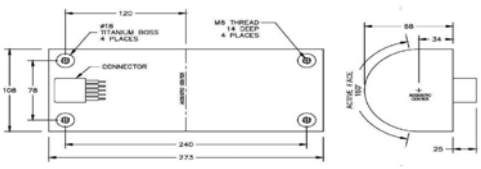
Sonar Options:
Snippets Imagery Output
Switchable Forward Looking Sonar Output
Steerable Transmit Projector incl. Multi-ping Operation
Mounting Frame & Hardware
Over-the-side Pole Mount Hardware
Sound Velocity Probe & Profiler
Extended Sonar Deck Cable, 25m or 50m
3000m Depth Immersion Depth

*Available through firmware upgrade
**Available with steerable projector option



Sonic 2024 Receiver





Sonic 2022 Projector

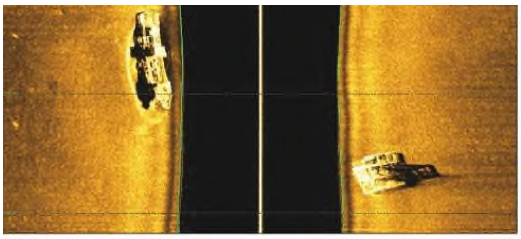
SonarTech
Side Scan Sonar S-150Pi

FEATURES:
- PC compatible
- Extremely portable system
- Very high resolution
- Low power consumption





Mosaic Data Overlay



Sunken Ship & Artificial Reef

SPECIFICATIONS

Towfish
- Stainless Steel (SUS304)
- Size : 900 x Ø89 (mm)
- Weight (in air) : 32 kg
- Operating Frequency : 1250 kHz / 400kHz
- Transducer Radiation
  - 1250 kHz : 0.3 degree horizontal, 30 degree vertical
  - 400 kHz : 0.3 degree horizontal, 40 degree vertical
- Transducer Depression Angle : 5, 10, 15, 20, 25, degrees down, adjustable
- Transmission Pulse
  - 1250 kHz : 5 μs ~ 25 μs, 400 kHz :15 μs ~ 100 μs
- Range
  - 1250 kHz : 35 m ~ 400 kHz : 22.5 m ~ 150 m
- Altimeter : 200 kHz, 20 degrees
- Depth Sensor : ±0.5% Full Scale
- Towing Speed : 1 ~ 8 knots
- Operating Depth : 300 m

[Safety Recovery System]
- Safety Pin : Up to 200kg Shear Strength

[Transit Case]
- Wooden Case

Deck Control Unit – D-150i
- Size : 200 x 250 x 45 (mm)
- Weight : 0.5 kg
- USB, Interface
- Power : 90 – 240 VAC or 12-24VDC
- Operating Temperature: 0 – 50ºC
- Operating Humidity: 10 – 98% RH, Non-condensing

Software
- Operating System : Windows XP professional

[Operating S/W] Real Scan
- Image Filtering
- Target Making
- Transducer Protection Function
- Survey Route Planner

[Post-Processing S/W] PostScan
- Image Save Function
- Target Measurement Function
- Mosaicing
- Partial Image Zoom
- Altitude Line Correction Function

[Post-Processing S/W] MapScan (Optional)
- Mosaic Data Overlay
- Survey Area Drawing Function
- Marine Chart Overlay Control
- Compatible with CM-93 & S-57
- Towfish Cable Option
  - Kevlar Reinforced Polyurethane Sheathe Cable
  - Single Coaxial Double Armored Cable

[Polyurethane Cable]
- User Selectable Length up to 300m
- Termination
- Portable cable Reel with Slip Ring]
- Kevlar Double Eye Cable Grip

[Single Coaxial Armored Cable]
- User Selectable Length Up to 1,000 m
- Termination
- User Friendly Electric Winch System

Seatex MRU 5

The MRU 5 is specially designed for high precision motion measurements in marine applications and for users requiring the highest accuracy roll, pitch and heave measurements. The MRU 5 provides high performance motion data for various marine applications ranging from small underwater vehicle heading guidance to large ship position control. Very high reliability is achieved by using sensors with no rotational or mechanical wear out parts.

MRU 5 applications
The MRU 5 is the ideal sensor for motion compensation in multibeam echo sounders, DP systems, ROV's, helideck monitoring systems, vessel motion damping systems of high speed vessels, tow fish systems and structural monitoring of offshore platforms and large vessels, where accurate motion data is crucial for high quality performance and safety. Providing an unsurpassed dynamic roll and pitch measurement accuracy of 0.05° RMS at a ±5° amplitude. The MRU 5 can maintain the specified accuracy aboard any surface vessel or subsea vehicle.

Easy to set up and use
Interfacing the MRU 5 data output to various sonar systems is easy since the MRU 5 software includes data protocols for more than twenty frequently used single and multibeam echo sounder systems. Using the configuration cable and Seatex "MRC" configuration software included with the MRU 5, a series of simple menu prompts allows you to choose the optimum configuration for your application. The MRU 5 and the MRC software are flexible and can accommodate a very wide variety of application types.

Output variables
The MRU 5 offers 189 data output variables. These variables can either be digital or analog output signals. Status messages of the MRU 5 health and overall performance can also be easily monitored by the user.



Digital I/O protocols
For two-way communication with the MRU 5, a proprietary binary serial protocol is used. Output variables are transmitted as IEEE 32 bit floats (recommended) or as scaled integers. In addition, ASCII-based NMEA 0183 proprietary sentences or various echo sounder formats may be selected as the data output protocol.

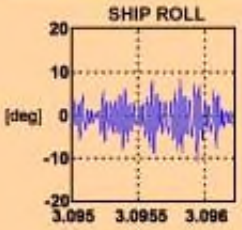
External communication
The MRU 5 accepts external input of speed and heading information on separate serial lines for improved accuracy in heave, roll and pitch during turns and accelerations. Additionally, a third logical CMOS input line is available for polling or synchronizing the MRU data output from a peripheral computer.

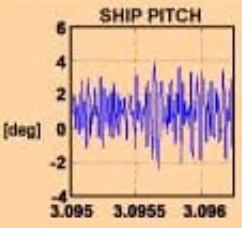
Seatex MRU 5

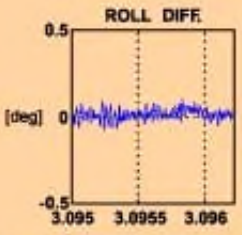
Features

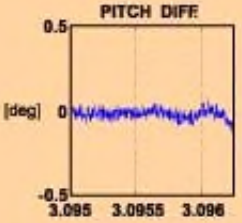
- High accuracy roll, pitch and heave measurements during turns and accelerations.
- Small size, lightweight, low power consumption.
- High output data rate (100 Hz).
- No limitation in mounting orientation.
- Lever arm compensation when mounted off vessel CG (center of gravity).
- Selectable communication protocols in the MRC software for any system using motion sensors.
- 2 years warranty

Field test data









Roll difference between MRU and INS*.
Standard deviation is 0.037 degrees.

Heading and speed feedback.

Pitch difference between MRU and INS*.
Standard deviation is 0.046 degrees.

Heading and speed feedback.

* Honeywell Ring Laser Gyro platform used as reference.

Technical Spesifications

Roll and pitch output data:

Angular orientation range	unlimited
Angular rate range	150°/s
Resolution roll, pitch	<0.01°
Static accuracy roll, pitch	0.04°(Long term drift)
Dynamic accuracy roll, pitch	0.05° RMS for a ±5° ampl. mounted at CG

Heave output data:

Acceleration range	±30m/s²
Heave output range	adjustable, max.±50m,
Lower cut-off frequency	0.1 to 0.002 Hz
Dynamic accuracy	2% rel.error + sensor noise
Sensor noise heave (at cut-off freq. 0.03 Hz)	0.001 m RMS in heave 0.1 m RMS in surge/sway

Data output:

Analog channels	# 4, ±10V, 14 bit resolution
Digital output variables	# 16 (max), RS 232
Data output rate (max)	100 Hz
Internal update rate	800 Hz (angular)

Power:

Power requirements	12-30V DC, Max 8 W

Environment:

Temperature range	-5° to +55°C
Humidity range, electronics	Sealed, no limit
Max vibration (operational)	0.5m/s²
Max vibration (non operational)	20m/s²
Max shock (non operational)	1000m/s² (10ms peak)

Other data:

MTBF (computed)	50,000 h
Housing dimensions	Ø105 x 204 mm (4.134" x 8.051")
Material	Anodized Aluminum
Weight	2.5 kg
Connector	Souriau 851-36RG 16-26S50

Velocity input formats:

NMEA 0183, incl. VTG, VHW, VBW or
IEEE single precision floating point

Heading input formats:

NMEA 0183, HDT, HDM, LR 40 interface or IEEE single precision float point
(unit in radians)

Data output protocols:

- MRU normal
- Submetrix
- Atlas Fansweep 15/-20
- Simrad EM3000
- Digital Hippy 120
- Sounder
- NMEA proprietary
- Simrad EM1000
- RDI ADCP

GeoPulse
GeoAcoustics Pinger Sub-Bottom Profiler

DESCRIPTION
GeoPulse is the survey industry's industry standard Sub-Bottom Profiler system. Its proven success is due to its reliability, ruggedness, ease of operation and flexibility.

Sub-Seabed structures are delineated using reflexions from a selectable single frequency multi-cycle high power signal, which is transmitted from an over-the-side, towed or hull mounted platform. The signal is processed in the compact deck unit.

FEATURES
- selectable transmit frequency 2 to 12 kHz
- over-the-side, towed or hull mounted deployment
- reliable, proven, easy to use
- good penetration and resolution

OPTIONS
- Combined with side scan sonar
- Third party acquisition system integration
- Range of tow cables and winches

SYSTEM COMPONENTS
The system comprises the deck unit (Transmitter Model 5430A and Receiver Model 5210A) and a four transducer array (Models T135) in a tow-fish (Model 136), over the side-mount assembly (Model 132) or a bespoke hull mount arrangement, which can be configured to hold up to 16 transducers.

Transmitter
The compact unit controls the transmitted signal. The output power is continuously adjustable up to 10 kW with a selectable frequency from 2 to 12 kHz. The pulse length is selected by number of cycles to improve penetration and reduce ringing effects. The transmit repetition rate can be controlled externally or internally.

Receiver
The Receiver allows the operator to apply gain up to 100 dB to the received signal. This can be done manually as well as using automatic algorithms including bottom tracking TVG (time variant gain) and AGC (automatic gain control). The processed signal can be output on a wide range of storage and printing media.



TRANSDUCER DEPLOYMENT OPTIONS

Over-The-Side-Mount (Model 132)
The assembly was designed for small boat operation at lower speeds. The transducers are mounted on a plate at the end of a vertical, gimballed staff. The staff, in turn, is supported by a mounting pad, which can be fastened to either the deck of the boat, or to an athwart-ships timber.

Towed Transducer Vehicle (Model 136A)
The Model 136A fish is the industry standard of the GeoAcoustics profiling systems. It has logged more survey kilometres and more pipeline crossings than any other profiling vehicle in the world. Its design allows for stable, noise-free towing in high seas and at speeds up to 12 knots.

The rugged galvanised body and fibreglass cowling, provides protection and will stand up to the punishment encountered in harsh marine environments.

Hull mounting
The transducers are mounted in a bespoke sea-chest arrangements. Up to 16 transducers are supported for deep water operations producing a narrower beam.

GeoPulse
GeoAcoustics Pinger Sub-Bottom Profiler

TECHNICAL SPECIFICATIONS

TRANSMITTER MODEL 5430A

Output:
- 10kW with 0.75% duty cycle, continuously adjustable.
- 2 to 12kHz, continuously adjustable.
- Short circuit proof.
- Impedance matched.

Pulse Cycles:
- 1, 2, 4, 8, 16 or 32 cycles of the frequency selected. The transmitted output pulse will be phase coherent within 22.5°.

Key:
- External: 2 to 12 V pulse, either + or – leading edge triggered. Max width 50 ms to eliminate double triggering. Transformer isolated.
- Internal: Set by internal potentiometer, 1 to 10 pps, uncalibrated.

Output to Receiver Transformer isolated or Third Party Acquisition System:
- Frequency response flat Processor: between approximately 1 kHz and 20 kHz.
- Two modes of operation:
  - o A: Flat gain –0 dB gain
  - o B: Short range TVG -20 dB (10:1) of attenuation during transmit pulse and a –20 dB to 0 dB ramp within 15ms after end of transmit signal.

Power:
- 115/230 VAC ± 10%, 47 to 63 Hz, 220 W maximum.

Auxiliary Power:
- IEC connector, unfused, 6 A maximum.

Environmental:
- Operational: -5 to 50°C
- Storage: -15 to 85°C

Dimensions: 45.7 cm (L) x 43 cm (W) x 13 cm (H)

Weight: 18 kg

RECEIVER MODEL 5210A

Amplifier:
- Differential common mode rejection: 100 dB at 60 Hz. Sensitivity 30 µV RMS in, produces 1V RMS out at 90 dB total gain with TVG.

Signal to noise:
- 20 dB at 100 dB gain 1 kHz centre frequency and 1 kHz bandwidth.

Coarse gain:
- 40 dB maximum

Fine gain:
- 0 – 30 dB in 3 dB increments

Filter:
- Low pass and high pass, active type, maximally flat, 24 dB/octave minimum roll-off, 0 gain, 0.02 kHz to 15 kHz adjustable in ½ octave increments. Knobs interlock to prevent overlap.

TVG:
- Dynamic range: 30 dB
- Rate: approximately flat to 30 dB in 14 ms.
- Manual delay: vernier adjust from 1 to 14 ms with multiplier of x 1, x 10, x 100 and internal select of x 1000

AGC:
- Attack: adjustable from 330 µs to 330 ms.
- Decay: adjustable from 330 µs to 330 ms.
- Range: 20 dB

Power:
- 115/230 VAC ± 10% (internal switch selectable), 47 to 63 Hz, 45 W maximum

Environmental:
- Operational: -5 to 50° C,
- Storage: -15 to 85°C

Dimensions: 45.7 cm (L), x 43 cm (W), x 17.8 cm (H)

Weight: 12kg

OVER-THE-SIDE MOUNT ASSEMBLY (MODEL 132B)

Beam width:
- 55° at 3.5kHz.
- 40° at 5.0kHz.
- 30° at 7.0kHz
  (4 Transducers)

Source level: 214dB re 1µPa/1M

Dimensions: 70 cm (L) x 52 cm (W) x 46 cm (H)

Mounting Staff: One section 183 cm, two sections 360 cm

Weight: 120 kg

TOW-FISH (MODEL 136A)

Beam width:
- 55° at 3.5kHz.
- 40° at 5.0kHz.
- 30° at 7.0kHz
  (4 Transducers)

Source level: 214dB re 1µPa/1M

Dimensions: 156 cm (L) x 46 cm (W) x 46 cm (H)

Weight: 125 kg

HULL MOUNT
- 2 x 2 (4), 3 x 3 (9) and 4 x 4 (16) transducer arrays available
- Bespoke sea chest deployment

Geometrics G-882

Marine Magnetometer

The G-882 provides very high resolution Cesium Vapor performance in a small size system for professional surveys in shallow or deep water. Its digital output can be recorded with any serial data logger.

The G-882 offers flexibility for operation from small boat, shallow water surveys as well as deep tow applications (4,000 psi rating, telemetry over steel coax available to 10Km). The G-882 also directly interfaces to all major side scan manufacturers for tandem tow configurations. Being small and lightweight (44 lbs net, without weights) it is easily deployed and operated by one person. But add several streamlined weight collars and the system can quickly weigh more than 100 lbs. for deep tow applications. Power may be supplied from a 24 to 30 VDC battery power or the included 110/220 VAC power supply. The tow cable employs high strength Kevlar strain member with a standard length of 200 ft (61 m) and optional cable length up to 500m with no telemetry required.

A rugged fiber-wound fiberglass housing is designed for operation in all parts of the world allowing sensor rotation for work in equatorial regions. The shipboard end of the tow cable is attached to an included junction box or optional onboard cable for quick and simple hookup to power and output of data into any Windows 98, ME, NT, 2000 or XP computer equipped with RS-232 serial ports.

The G-882 system is particularly well suited for the detection and mapping of all sizes of ferrous objects. This includes anchors, chains, cables, pipelines, ballast stone and other scattered shipwreck debris, munitions of all sizes (UXO), aircraft, engines and any other object with magnetic expression.



Objects as small as a 5 inch screwdriver are readily detected provided that the sensor is close to the seafloor and within practical detection range. (Refer to table below.).

Typical Detection Range for Common Objects	
Ship 1000 tons	0.5 to 1 nT at 800 ft (244 m)
Anchor 20 tons	0.8 to 1.25 nT at 400 ft (120 m)
Automobile	1 to 2 nT at 100 ft (30 m)
Light Aircraft	0.5 to 2 nT at 40 ft (12 m)
Pipeline (12 inch)	1 to 2 nT at 200 ft (60 m)
Pipeline (6 inch)	1 to 2 nT at 100 ft (30 m)
100 KG of iron	1 to 2 nT at 50 ft (15 m)
100 lbs of iron	0.5 to 1 nT at 30 ft (9 m)
10 lbs of iron	0.5 to 1 nT at 20 ft (6 m)
1 lb of iron	0.5 to 1 nT at 10 ft (3 m)
Screwdriver 5 inch	0.5 to 2 nT at 12 ft (4 m)
1000 lb bomb	1 to 5 nT at 100 ft (30 m)
500 lb bomb	0.5 to 5 nT at 50 ft (16 m)
Grenade	0.5 to 2 nT at 10 ft (3 m)
20 mm shell	0.5 to 2 nT at 5 ft (1.8 m)

TECHNICAL SPECIFICATIONS*

Operating Principle:	Self-oscillating split-beam Cesium Vapor (non-radioactive)
Operating Range:	20,000 to 100,000 nT
Operating Zones:	The earth's field vector should be at an angle greater than 6° from the sensor's equator and greater than 6° away from the sensor's long axis. Automatic hemisphere switching.
Cm-221 Counter Sensitivity:	<0.004 nT/ √Hz rms. Up to 20 samples per second
Heading Error:	±1 nT (over entire 360°spin)
Absolute Accuracy:	<2 nT throughout range
Output:	RS-232 at 1,200 to 19,200 Baud
Mechanical:	
Sensor Fish:	Body 2.75 in. (7 cm) dia., 4.5 ft (1.37 m) long with fin assembly (11 in. cross width), 40 lbs. (18 kg) includes Sensor and Electronics and 1 main weight. Additional collar weights are 14lbs (6.4kg) each, total of 5 capable
Tow Cable:	Kevlar Reinforced multiconductor tow cable. Breaking strength 3,600 lbs, 0.48 in OD, 200 ft maximum. Weighs 17 lbs (7.7 kg) with terminations.
Operating Temperature:	-30°F to +122°F (-35°C to +50°C)
Storage Temperature:	-48°F to +158°F (-45°C to +70°C)
Altitude:	Up to 30,000 ft (9,000 m)
Water Tight:	O-Ring sealed for up to 4,000 psi (9000 ft or 2750 m) depth operation
Power:	24 to 32 VDC, 0.75 amp at turn-on and 0.5 amp thereafter
Standard Accessories:	View201 Utility Software operation manual and ship kit

*specifications subject to change without notice

Valeport Series 600 MKII CTDS Meter

GENERAL DESCRIPTION

The series 600 Conductivity/ Temperature/ Depth/ Salinity (C/T/D/S) meter is designed for Continental Shelf operation and permits the accurate measurement of sea water conductivity and temperature against a depth profile. The results obtained are applicable to many fields of scientific research. The meter is particularly suited to the obtaining of temperature and salinity profiles for the computation of the speed of sound through water, as required for the calibration of survey echo sounders and acoustic navigation systems.

The basic system comprises:

- an underwater probe, linked via a suspension/signal cable to,
- a surface readout unit displaying C/T/D/S on two liquid crystal displays and providing an analogue output of all parameters

FEATURES

- direct reading
- linearised thermister temperature sensor
- calibrated to international standards
- battery powered by standard dry cells
- salinity derived over wide range of C & T
- dual inductive coil conductivity sensor
- produces data base for velocity of sound calculation

SPECIFICATIONS

1. PROBE

- **Probe**

  Manufactured from black, shock resistant, Delrin (acetal) and supplied complete with a stainless steel suspension assembly. A Valeport Hanger Bar and Columbus sinker Weight may be hung below the prove when used in high current conditions to prevent excessive streaming of the unit behind the vessel.

  size : 380 x 72 dia. mm
  weight : 3 kg in air; 0.5 in water



- **Sensors**

  Sensors are internally mounted to prevent accidental damage. A 'T' hole permits water flow past the sensors.

- **Conductivity**

  Sensor Type:
  Dual Inductive Coils

  Operating Range:
  0-60 mmho/cm

  Accuracy:
  better than 0.2 mmho/cm

  Display Resolution:
  0.01 mmho/cm

- **Temperature**

  Sensor Type :
  Linearised Thermistor

  Operating Range:
  -5° to +40° C

  Accuracy :
  better than 0.2° C

  Response Time:
  less than 3 secs to 98% pt.

  Display Resolution: 0.01°

- **Pressure (Depth)**

  Sensor Type :
  Stain Gauge Pressure Transducer

  Operating Range:

  0 to 10, or 0 to 20 bar standard, (100 or 200 metres)
  Optional, 0 to 50 bar (500 metres)

  Note, 10 bar transducer fitted in units with 50 metre cables
  Accuracy :
  ±0.3% of full scale

  Display Resolution:
  0.1 metre

- **Salinity**

  Derived from measurements of temperature and conductivity

  Range:
  0 to 40 parts per thousand

  Accuracy:
  ±0.4 ppt for salinity between 0 and 30 ppt and temperature 0 to +30° C

  Display Resolution:
  0.01° C

Valeport Series 600 MKII CTDS Meter

2. CABLE

Polyurethane sheathed oceanographic cable with integral Kevlar strain member supplied on a hand reel.

Supplied in standard 50, 100 or 200 metre lengths (other lengths to special order).

size (200 m):
380 dia. x 210 mm

weight: 17 kg.

3. SURFACE READOUT UNIT

Splash-proof field portable unit, with twin 4 digit liquid crystal displays, control switches for on/off and parameter display selection (Conductivity/Salinity and Temperature/ Depth)

Analogue Output :
0 to 4 Volts full scale, each channel

Power Supply:
Internal “C” size dry cells, 4 off. Low Battery indicator. Additional decimal point shown.

Size:
160 x 110 x185 mm.

Weight:
2.5 kg.

4. TRANSIT CASE

All items supplied packed in a transit and storage case.

Size:
730 x 510 x 300 mm

Weight:
12 kg.

Total Wt., Packed for Shipment:
38 kg.

Calibration

The Series 600 instruments are calibrated used a Guildline Model 8400 Salinometer against a reference of Institute of Oceanographic Sciences, UK, standard sea water using the UNESCO equations for the derivation of salinity.

B.2 VESSEL

Fugro Surveyor



SPECIFICATIONS*

LOA:	7.90 m
Beam:	2.25 m
Draft:	0.40 m (Fully Loaded)
Engine:	Twin Diesel 36Hp
Power:	6kVa 240V Generator
UPS:	3kVa (30 mins Full Load)
Lifting Weight:	3.6 Tons
Standard Equipment:	12 Channel GPS receivers
	Starfix.SPOT and IALA DGPS Corrections
	Starfix.NAV Software Suite
	Knudsen 320M 210/33Khz Echosounder
	Dual KVH 1000 Compasses

Survey Capabilities:	Geophysical Site Surveys
	Cable and Pipeline Route Surveys
	Cable and Pipeline Inspection
	Cable Location and DOB Surveys
	Geotechnical Surveys
	Multibeam Bathymetry
	ROV Surveys (Eyeball)
	Spillage Monitoring
	Oceanographic and Environmental
General Specifications:	Conforms to all MCA Safety and Operational Regulations
	Road transportable
	Capable of carrying four personnel

*Specifications understood to be correct at time of going to press

C. JOB DESCRIPTIONS AND CURRICULA VITAE

C.1 JOB DESCRIPTIONS

Job Description/Role Profile

Job Title: **PARTY CHIEF**

Reports to: Operations Manager

Direct reports: Assigned Staff

Authority Level: Not applicable

Key Accountabilities:

Basic Function

The Party Chief is the Companies representative in the field and is responsible for ensuring that the project is completed in accordance with the procedures and Client specifications and within the confines of the contract. Also responsible for ensuring that the results are presented in a professional, timely, and efficient manner.

1. Primary Duties and Responsibilities

1.1 Operations

a) Supervise the performance of the project including logistics and administrative aspects in cooperation with the appointed Project Manager.
b) Lead and direct the survey team during the performance of the field survey operations to ensure the project is performed in accordance with the Company's contract, to perform survey work, and to liaise with the Client's representative onsite regarding operational matters.
c) To be fully aware of the company's contractual obligations for the project and to ensure they are met.
d) To monitor and ensure that the field operations are performed in accordance with the Company's published Quality Assurance, Health, Safety and Environmental procedures, Client requirements and local legislation.
e) To ensure that all survey equipments are calibrated, tested and fit for purpose.
f) To ensure that sufficient spares, manuals and consumables are held onboard and that the survey team is familiar with the equipment and prepared for the survey.
g) To verify that the vessel is adequately provisioned and that logistics are organized such that the survey is conducted as efficiently as possible.
h) To ensure that the survey is performed and the data acquired in accordance with good survey practice, survey logs are completed and that data processing and interpretation is maintaining pace with data acquisition where necessary.
i) Compile and submit daily reports to the Clients representative for approval and distribute as required.

j) To liaise with the project manager on any deficiencies in the survey and on matters of survey planning.
k) To ensure that on completion of project(s) that all survey records are collated and in good order prior to departure of crews.

1.2 Specific Additional Duties

a) Actively participate in adherence to and improvement of the company Management System on Quality and HSE related issues.
b) May be required to perform role of Surveyor, Engineer, Geophysicist during execution of work (dependent on discipline).

2. Principal Working Relationships

a) Work closely with QC Surveyor / Reports Co-ordinator and Chief Cartographer for timely submission of reports, where applicable
b) Liaise with the Project Manager during the performance of the field survey operations.
c) Liaise with Client representatives on data quality and processing requirements.

Qualifications required:

a) M.Sc. or B.Sc. level in surveying or engineering.

Skills / experience required to do the job:

a) 6-8 years offshore experience with a minimum of 3 years in a senior role
b) Conversant with software/equipment in use.
c) English language.

Role specific Behavioural competencies required:

1. **Problem-solving/judgment:** ability to observe, think critically and to solve problems using data, analysis, interpretation, and reasoning skills.

2. **Managing Information/communication:** the ability to generate, collect and share relevant information (goals, results, developments etc.), in order to enable others (within or outside own Team) to achieve better or more results.

3. **Decision-making & Prioritising:** the ability to make right decisions, based on a sound analysis, reasoning, judgment, and well-balanced priority setting.

4. **Teamwork:** dedication and ability to work successfully with others in a team.

5. **Managing Performance:** The ability to set challenging goals, build appropriate team(s), distribute and manage tasks, and to encourage and lead the team to achieve the goals set.

6. **Agility:** the proven capability to be flexible, responsive, adaptive, and show initiative in times of change (e.g. priorities, work planning/location, skills/technologies, work processes, relationships), uncertainty and opportunities.

7. **Client focus:** The ability to generate client satisfaction (internally or externally), potentially resulting in long term client relationships and additional work. The ability to create a client oriented culture and atmosphere among his/her staff members, resulting in client satisfaction.

Approval Operations Manager: ..... DATE: .....

Job Description/Role Profile

Job Title: **SENIOR SURVEY ENGINEER**

Reports to: Operations Manager

Direct reports: Not applicable

Authority Level: Not applicable

Key Accountabilities:

Basic Function

The Senior Survey Engineer performs all office and field related survey assignments as defined by the Project or Engineering Manager. The role in projects may also be defined as Party Chief. The position commands a responsibility and necessity to set example. Initiative is a pre requisite part in the role of all duties whether in the lead or supportive role.

1. Primary Duties and Responsibilities

1.1 Operations

a) Organise own work and delegate tasks to assigned staff.
b) If applicable assist and directly support the Party Chief with the execution of given work and tasks.
c) Execute given work ensuring it is within project targets and in accordance with specifications, procedures and work practices.
d) If applicable is responsible for field reporting compilation of survey reports in given company format.
e) Check work of subordinate staff.
f) In Party Chief role is expected to liaise directly with client on relevant technical issues and on contractual / operational issues.
g) Responsible for actively following of QC procedures in the field environment.
h) Responsible for actively ensuring all safety standards are met and followed and reports are duly completed as and when necessary.
i) If applicable responsible for or executes repair, maintenance and testing of equipment in filed locations.

1.2 Financial

a) Is either responsible for or assist the Party Chief, Project Manager and / or Operations Co-ordinator in maintaining expense accounting in the field.
b) Account for own project and business related expenditure.

1.3 Personnel

a) Assess and advises superior on subordinate staff performance.
b) Assist with advising and training of subordinate staff on a technical, quality and safety related issues.

1.4 Administration

a) If applicable check and approve all field administrative reporting.
b) Is responsible for and / or assist with maintenance of field survey and engineering administration and field filing system in accordance with work practices.
c) Ensure time spent on projects is properly accounted for.
d) Is responsible for and / or assist with field related expenditure reporting.

1.5 Specific Additional Duties

a) Actively participate in adherence to and improvement of the company Management System on Quality and HSE related issues.

2. Principal Working Relationships

a) If applicable work with superior field staff to ensure projects are completed to clients specifications.
b) Meet with own staff on a regular basis to monitor job progress.
c) Meet with Project Manager for project debrief.
d) Meet with Operations Manager Engineering Manager for selected for project debriefs.
e) Meet with Operations Manager for Staff Development Interviews and if applicable personal Performance Appraisal discussion.
f) Meet with HSE/QA/HR Manager for QA discussions, feedback, training.

Qualifications required:

a) B.Sc. or Diploma qualification.

Skills / experience required to do the job:

a) Minimum 5 years related engineering experience.
b) Conversant with computer operation and a basic knowledge of application software.
c) English language.

Role specific Behavioural competencies required:

1. **Problem-solving/judgment:** ability to observe, think critically and to solve problems using data, analysis, interpretation, and reasoning skills.

2. **Teamwork:** dedication and ability to work successfully with others in a team.

3. **Information & Communication:** The ability to receive information from and convey information to others timely and successfully, using appropriate language, and communication tools (spoken, written etc.).

4. **Client focus:** The ability to generate client satisfaction (internally or externally), potentially resulting in long term client relationships and additional work.

5. **Planning & organizing:** The ability to set priorities and determine actions, time and resources (tools, software, people, and budget as appropriate.) to achieve pre-defined goals. Monitor and manage timely delivery, leading to reliability and client satisfaction. Resources (documents, tools, diary etc.) are well-organized and up to date.

6. **Agility:** the proven capability to be flexible, responsive, adaptive, and show initiative in times of change (e.g. priorities, work planning/location, skills/technologies, work processes, relationships), uncertainty and opportunities.

Approval Operations Manager: ..... DATE: .....

Job Description/Role Profile

Job Title: **SENIOR SURVEYOR**

Reports to: Operations Manager

Direct reports: Assigned Staff

Authority Level: Not applicable

Key Accountabilities:

Basic Function

The Senior Surveyor performs all office and field related survey assignments as defined by the Project or Operations Manager. The role in projects may also be defined as Party Chief. The position commands a responsibility and necessity to set example. Initiative is a pre requisite part in the role of all duties whether in the lead or supportive role.

1. Primary Duties and Responsibilities

1.1 Operations

a) Organise own work and delegate tasks to assigned staff.
b) If applicable assist and directly support the Party Chief with the execution of given work
c) and tasks.
d) Execute given work ensuring it is within project targets and in accordance with
e) specifications, procedures and work practices.
f) If applicable is responsible for field reporting, process of data, carry out computations
g) and compile survey reports in given company format.
h) Check work of subordinate staff.
i) In Party Chief role is expected to liaise directly with client on relevant technical issues
j) and on contractual / operational issues.
k) Responsible for actively following of QC procedures in the field environment.
l) Responsible for actively ensuring all safety standards are met and followed and reports
m) are duly completed as and when necessary.

1.2 Financial

a) Is either responsible for or assist the Party Chief or Project Manager in maintaining expense accounting in the field.
b) Account for own project and business related expenditure.

1.3 Personnel

a) Assess and advise superior on subordinate staff performance.
b) Assist with advising and training of subordinate staff on a technical, quality and safety related issues.

1.4 Administration

a) If applicable check and approve all field administrative reporting.
b) Is responsible for and / or assist with maintenance of field survey administration and field filing system in accordance with work practices.
c) Ensure time spent on projects is properly accounted for.
d) Is responsible for and / or assist with field related expenditure reporting.

1.5 Specific Additional Duties

a) Actively participate in adherence to and improvement of the company Management System on Quality and HSE related issues.

2. Principal Working Relationships

a) If applicable work with superior field staff to ensure projects are completed to clients
b) specifications.
c) Meet with own staff on a regular basis to monitor job progress.
d) Meet with Project Manager for project debrief.
e) Meet with Operations Manager for selected for project debriefs.
f) Meet with Operations Manager for Staff Development Interviews and if applicable
g) personal Performance Appraisal discussion.
h) Meet with HSE/QA/HR Manager for QA discussions, feedback, training.

Qualifications required:

a) B.Sc. or Diploma qualification

Skills / experience required to do the job:

a) Minimum 3 years related surveying experience
b) Conversant with computer operation and a basic knowledge of application software.
c) English language.

Role specific Behavioural competencies required:

1. **Problem-solving/judgment:** ability to observe, think critically and to solve problems using data, analysis, interpretation, and reasoning skills.

2. **Teamwork:** dedication and ability to work successfully with others in a team.

3. **Information & Communication:** The ability to receive information from and convey information to others timely and successfully, using appropriate language, and communication tools (spoken, written etc.).

4. **Client focus:** The ability to generate client satisfaction (internally or externally), potentially resulting in long term client relationships and additional work.

5. **Planning & organizing:** The ability to set priorities and determine actions, time and resources (tools, software, people, and budget as appropriate.) to achieve pre-defined goals. Monitor and manage timely delivery, leading to reliability and client satisfaction. Resources (documents, tools, diary etc.) are well-organized and up to date.

6. **Agility:** the proven capability to be flexible, responsive, adaptive, and show initiative in times of change (e.g. priorities, work planning/location, skills/technologies, work processes, relationships), uncertainty and opportunities.

Approval Operations Manager: ..... DATE: .....

Job Description/Role Profile

Job Title: **SENIOR GEOPHYSICIST**

Reports to: Operations Manager

Direct reports: Not applicable

Authority Level: Not applicable

Key Accountabilities:

Basic Function

The Senior Geophysicist performs all office and field geophysics related assignments acquisition, as defined by the Project or Survey Manager or Chief Geophysicist. Primarily responsible for interpretation and reporting of geophysical data. The position commands a responsibility and necessity to set example. Initiative is a pre requisite part in the role of all duties whether in the lead or supportive role. Supports other departments with geological background information.

1. Primary Duties and Responsibilities

1.1 Operations

a) Acquisition and interpretation of geophysical data.
b) Check geophysical data in the field for completeness and quality.
c) Responsible for field reporting and compilation of survey reports in given company format.
d) Implement QC procedures for own works in consultation with the Chief Geophysicist / Reports Co-ordinator
e) Organise own work and delegate tasks to assigned staff.
f) In Party Chief / Project Manager role check and advise contract variations.
g) If applicable assist and directly support the Party Chief with the execution of given work and tasks.
h) Execute given work ensuring it is within project targets and in accordance with specifications, procedures and work practises.
i) Expected to liaise directly with client on relevant technical issues and on contractual / operational issues when in the responsible role.
j) Responsible for actively ensuring the implementation of QC procedures in the field environment.
k) Responsible for actively ensuring all safety standards are met and followed and reports are duly completed as and when necessary.

1.2 Financial

a) Is either responsible for or assist the Party Chief or Project Manager in maintaining expense accounting in the field.
b) Account for own project and business related expenditure.

1.3 Personnel

a) Assess and advise Management on subordinate staff performance.
b) Assist with advising and training of subordinate staff on a technical, quality and safety related issues.

1.4 Administration

a) If applicable check and approve all field administrative reporting.
b) Is responsible for and / or assist with maintenance of field survey / engineering administration and field filing system in accordance with work practices.
c) Ensure time spent on projects is properly accounted for.
d) Responsible for geophysical data administration.
e) Submit monthly work reports in company prescribed format.

1.5 Specific Additional Duties

a) Actively participate in adherence to and improvement of the company Management System on Quality and HSE related issues.

2. Principal Working Relationships

a) Work with Chief Geophysicist, Reports Co-ordinator for timely submission of reports.
b) Liaise with Party Chiefs on data quality of geophysical data.
c) If applicable work with senior field staff to ensure projects are completed to clients specifications.
d) Meet with own staff on a regular basis to monitor job progress.
e) Meet with Project Manager for project briefing and debriefing.
f) Meet with Operations Manager for selected project debriefs.
g) Meet with HR Manager for Staff Development Interviews, feedback and training and when required, for personal Performance Appraisal discussion.
h) Meet with HSE/QA Manager for QA discussions and feedback.

Qualifications required:

a) M.Sc. or B.Sc. level in geophysics / geology or equivalent.

Skills / experience required to do the job:

a) Must have valid offshore medical and survival certificate.

b) Min. 2 years experience, including 200 operational days offshore as a Geophysicist Grade I.
c) Conversant with accoustic equipment and word processing software.
d) Thorough knowledge in at least one side scan sonar and sub-bottom profiler data interpretation software
e) English language.

Role specific Behavioural competencies required:

1. **Problem-solving/judgment:** ability to observe, think critically and to solve problems using data, analysis, interpretation, and reasoning skills.

2. **Teamwork:** dedication and ability to work successfully with others in a team.

3. **Information & Communication:** The ability to receive information from and convey information to others timely and successfully, using appropriate language, and communication tools (spoken, written etc.).

4. **Client focus:** The ability to generate client satisfaction (internally or externally), potentially resulting in long term client relationships and additional work.

5. **Planning & organizing:** The ability to set priorities and determine actions, time and resources (tools, software, people, and budget as appropriate.) to achieve pre-defined goals. Monitor and manage timely delivery, leading to reliability and client satisfaction. Resources (documents, tools, diary etc.) are well-organized and up to date.

6. **Agility:** the proven capability to be flexible, responsive, adaptive, and show initiative in times of change (e.g. priorities, work planning/location, skills/technologies, work processes, relationships), uncertainty and opportunities.

Approval Operations Manager: ..... DATE: .....

Job Description/Role Profile

Job Title: **SENIOR DATA PROCESSOR**

Reports to: Operations Manager

Direct reports: Asigned Staff

Authority Level: Not applicable

Key Accountabilities:

Basic Function

The Senior Data Processor is responsible to ensure the processing and drafting activities required by different projects are carried out in accordance with the instructions and priorities given by the supervisor.

1 Primary Duties and Responsibilities

1.1 Operations

a) Perform/Co-ordinate/Supervise data processing and drafting activities
b) Organise own work and delegate tasks to assigned staff.
c) Acquire necessary background information data.
d) Provide survey information prior to project commencement to Party Chiefs and ensures survey parameters are correctly defined
e) Responsible for correct processing of survey data and for correct technical data submitted in reports
f) Identify requirement and perform calibrations
g) Identify requirement and prepare tidal information.
h) Closely monitor acquired data to ensure accuracy and quality.
i) Understand and verify working Geodesy.
j) Identify requirements and request for drafting consumables.
k) Maintain processing and charting records.
l) Ensure maintaining Cad Standards.
m) Perform Quality control check pertaining to drafting/processing.
n) Perform video reviewing and prepare images for inclusion in reports for submission to Clients.
o) Ensure completeness of data as per procedure.

1.2 Specific Additional Duties

a) Actively participate in adherence to and improvement of the Company Management System on Quality and HSE related issues.

2. Principal Working Relationship

a) Work closely with Party Chief /Senior Data Processor in field.

b) Work closely with Chief Cartographer / Chief Data Processor / Reports Coordinator in office.
c) Work with the Survey secretary regarding compilation of reports for client delivery

Qualifications required:

a) Experience / Qualification in Processing, AutoCAD and Micro station or equivalent.

Skills / experience required to do the job:

a) Must have valid offshore medical and survival certificate.
b) Min. 2 years experience , including 200 operational days offshore as a Data Processor Grade I.
c) English language.

Role specific Behavioural competencies required:

1. **Problem-solving/judgment:** ability to observe, think critically and to solve problems using data, analysis, interpretation, and reasoning skills.

2. **Teamwork:** dedication and ability to work successfully with others in a team.

3. **Information & Communication:** The ability to receive information from and convey information to others timely and successfully, using appropriate language, and communication tools (spoken, written etc.).

4. **Client focus:** The ability to generate client satisfaction (internally or externally), potentially resulting in long term client relationships and additional work.

5. **Planning & organizing:** The ability to set priorities and determine actions, time and resources (tools, software, people, and budget as appropriate.) to achieve pre-defined goals. Monitor and manage timely delivery, leading to reliability and client satisfaction. Resources (documents, tools, diary etc.) are well-organized and up to date.

6. **Agility:** the proven capability to be flexible, responsive, adaptive, and show initiative in times of change (e.g. priorities, work planning/location, skills/technologies, work processes, relationships), uncertainty and opportunities.

Approval Operations Manager: ..... DATE: .....

C.2 CURRICULA VITAE

Pasupathy Balasubramanian

Party Chief Survey Engineer

Personal Information

Nationality	Indian
Profile	• Specialization in offshore surveys over 25 years of experience in Geophysical pre-engineering surveys, Pipeline/cable route surveys, ROV Pipeline cable inspection surveys and Rig Hazard clearance surveys etc. • Present 15 years I have been working with Fugro Survey (Middle East) Ltd., in various roles such as site manager, offshore vessel manager, party chief, survey engineer, Multibeam processor and reporting coordinator. • Before joining Fugro, I had worked for 10 years in National Institute of Ocean Technology (NIOT) for implementation of various technology projects such as ocean thermal energy conversion (OTEC), deep-sea mining (DSM), coastal ocean pollution monitoring (COMAPS) and I am member of exclusive economic zone (EEZ) Project, for acquisition of high resolution bathymetry data for coastal seabed mapping project of India. • Additional experience of 5 years as service engineer in varies fields like bio-medical engineering, computer engineering and telecommunication engineering with different companies in Chennai, India.
Qualifications	ME – Electronics and Control Engineering BE – Electronics and Communication Engineering DECE – Electronics and Communication Engineering 2005 – 2006 Satyabhama Institute of Science and Technology, India 2002 – 2005 Madras Institute of Technology, Anna University, India. 1988 – 1991 M K Polytechnic, State Board of Technical Education, India.
Training/skills	**Safety:** ▪ F.O.E.T: 08 May 2022 ▪ H2S (OPITO Approved): 04 February 2022 **Software Training:** • Starfix NG training • CARIS HIPS & SIPS processing training • QINSy operator training • HYPACK operator training • TERRAMODEL & TERRAVISTA Processing training • KONGSBERG SIMRAD multibeam operator training • RESON Seabat multibeam operator training

Languages spoken	Native	Tamil
	Fluent	English

Current responsibilities

Party Chief Survey Engineer

Managing projects offshore ensuring the project is completed in accordance with the procedures and Client specifications and within the confines of the contract. Responsible for ensuring the results are presented in a professional, timely, and efficient manner. Supervise the performance of the project including logistics and administrative aspects in cooperation with the appointed Project Manager.

Lead and direct the survey team during the performance of the field survey operations to ensure the project is performed in accordance with the Company's contract, to perform survey work, and to liaise with the Client's representative onsite regarding operational matters.

Career History

2020

Party Chief Survey Engineer:

Oct–Dec 2020 Job No: MCB001, Vessel Name: Fugro Proteus, Client: Al Gihaz contracting Co., Worked As: Senior Survey Engineer, Project Description: Pre-lay Geophysical & UXO Survey, Hawar Island to Ras Al Bar, 66 KV Submarine Cable Project, Hawar Island, Bahrain.

Sep 2020 Job No: MRU901, Vessel Name: Fugro Proteus, Client: Fugro ITOV Refit 2020, Worked As: Senior Support Engineer, Project Description: Refitting of V-Sat internet system, Fibre Optic networking and installation of new computers with OS Windows-10.

Aug 2020 Job No: MRQ051, Vessel Name: Fugro Proteus, Client: SAIPEM Spa, Worked As: Senior Survey Engineer, Project Description: Geophysical Survey –pre-installation survey for proposed jacket site, North Field, State of Qatar.

Aug 2020 Job No: MRQ049, Vessel Name: Fugro Proteus, Client: Qatargas Operating Company, Worked As: Senior Survey Engineer, Project Description: 2DHR and Geophysical single pass survey for NF drilling sites NF22/23/24, North Field, State of Qatar.

Jan – Feb 2020 Job No: RINQ030, Vessel Name: Crest Argus 1, Client: Qatargas Operating Company (QG) Worked As: Party Chief Survey Engineer, Project Description: ROV under water platform structural inspection, North Field, State of Qatar.

2019

Party Chief Survey Engineer:

Nov – Dec 2019 Job No: RINQ030, Vessel Name: Crest Argus 1, Client: Qatargas Operating Company (QG) Worked As: Party Chief Survey Engineer, Project Description: ROV under water platform structural inspection, North Field, State of Qatar.

Aug – Oct 2019 RINQ027, Vessel Name: Crest Argus 1, Client: Qatargas Operating Company (QG) Worked As: Party Chief Survey Engineer, Project Description: ROV under water pipeline/cable inspection, North Field, State of Qatar.

Apr – May 2019 RINQ022, Vessel Name: Allianz Zeus, Client: Qatargas Operating Company (QG) Worked As: Party Chief Survey Engineer, Project Description: ROV crossing pipeline/cable inspection, North Field, State of Qatar.

Feb – Mar 2019 Job No: MRU073 / GIU359 / RINU039, Vessel Name: Fugro Adventurer, Client: Valentine Marine Gulf LLC, Working As: Party Chief Survey Engineer, Project Description: Pre-engineering Geophysical, Geotechnical and ROV survey for replacement of TB-3 mooring system with zero outage/shutdown of the tanker berth at Das Island, ADNOC Offshore, United Arab Emirates.

Jan 2019 Job No: RINU041, Vessel Name: Nor Spring, Client Name: TechnipFMC, End Client: Dubai Petroleum, Worked As: Survey Party Chief, Project description: ROV As-built survey and platform riser survey for phase-3 development at Rashid field, offshore Dubai using FCV ROV 610.

2018

Party Chief Survey Engineer:

Dec 2018 Job No: RINU041, Vessel Name: Nor Spring, Client Name: TechnipFMC, End Client: Dubai Petroleum, Worked As: Survey Party Chief, Project description: ROV As-built survey and platform riser survey for phase-3 development at Rashid field, offshore Dubai using FCV ROV 610.

Dec 2018 Job No: MRU072, Vessel Name: Fugro Surveyor, Client Name: ADNOC, Worked As: Survey Party Chief / Engineer / Processor, Project Description: Geophysical survey for Rig approach to ZK01 platform within 500m zone of ZCSC super complex.

Sep - Oct 2018 Job No: RINQ012, Vessel Name: Nor Spring, Client Name: Qatar Gas Operating Co Ltd, Worked As: Survey Party Chief, Project Description: ROV Pipeline inspection survey and platform riser inspection survey, using FCV ROV 610 and Panther ROV, North Field, Offshore Qatar.

Aug 2018 Job No: PCBQ031, Vessel Name: Allianz Zeus, Client Name: North Oil company, Worked As: Survey party chief cum survey engineer, Project Description: ROV debris clearance survey, Al Shaheen Field, Offshore Qatar.

Mar – May 2018 Job No: MRQ021, Vessel Name: Topaz Khubayb, Client Name: Qatar Gas Operating Co Ltd, Worked As: Survey Party Chief, Project Description: Geophysical proposed wellhead site survey using geophysical equipment, 2DHR, ROV, EBS and Geotechnical equipment's. North Field, Offshore Qatar.

Feb 2018 Job No: RINS003, Vessel Name: Stanford Eagle, Client Name: Mc Dermott Arabian Co, Worked As: Mobilisation Engineer, Project Description: ROV As-laid and As-build survey, Offshore Saudi Arabia, KSA.

Feb 2018 Job No: MRS031, Vessel Name: Stanford Kite, Client Name: Mc Dermott Arabian Co, Worked As: Mobilisation engineer, Project Description: Geophysical As-laid and As-build survey, Offshore Saudi Arabia, KSA.

2017

Party Chief Survey Engineer:

Nov – Dec 2017 Job No: MRP001, Vessel Name: Fugro Proteus/Thea, Client Name: TOTAL E&P South Pars ,Worked As: Sr. Survey Engineer, Project Description: Offshore Geophysical site investigation, South Pars, offshore Iran using Geophysical equipment, 2DHR, UHR, ROV, EBS and Geotechnical equipment's. Including near shore small boat survey works.

Aug – Oct 2017 Job No: MRU054, Vessel Name: Fugro Proteus, Small Boat: Thea, Client Name: ADNOC, Worked As: Survey Engineer, Project Description: Hail & Ghasha Gas development project, Island detailed design and survey using geophysical equipment, UHR, Refraction and Geotechnical equipment.

Jun – Jul 2017 Job No: MRU055, Vessel Name: Fugro Proteus/Fugro Surveyor, Client Name: ADMA/ZADCO, Worked As: Survey Engineer, Project Description: Jack-up Rig entry survey at ZK20 Platform, using Geophysical equipment, UHR, 2D and ROV equipment.

May 2017 Job No: OTU022, Vessel Name: Fugro Surveyor, Worked As: PC/survey engineer, Project Description: Lidar survey using Trimble MX2 Laser scanner and Edgetech 6205 bathymetry integrated side scan sonar system with QINSy software.

Apr 2017 Job No: MRQ017, Vessel Name: Nor Spring, Client Name: Mc Dermott/Total E & P, Worked As: Survey Engineer, Project Description: Pre-engineering Geophysical and ROV survey, Pre construction pipeline route survey for DP4-DP3-DP2 platforms of AL Khalij field, Qatar.

Feb – Mar 2017 Job No: MRQ017, Vessel Name: Nor Spring, Client Name: Mc Dermott/Total E & P, Worked As: Survey Engineer, Project Description: Pre-engineering Geophysical and ROV survey, Pre construction pipeline route survey for DP4-DP3-DP2 platforms of AL Khalij field, Qatar.

Jan 2017 Job No: PCBQ021, Vessel Name: Allianz Zeus, Client Name: Maersk Oil Qatar AS, Qatar Worked As: Party Chief/Engineer, Project Description: GVI survey, multibeam survey and ROV survey in Al Shaheen Field, Block-5, State of Qatar.

2016

Party Chief Survey Engineer:

Dec 2016 Job No: PCBQ021, Vessel Name: Allianz Zeus, Client Name: Maersk Oil Qatar AS, Qatar Worked As: Party Chief/Engineer, Project Description: GVI survey, multibeam survey and ROV survey in Al Shaheen Field, Block-5, State of Qatar.

Oct 2016 Job No: PCBQ021, Vessel Name: Allianz Zeus, Client Name: Maersk Oil Qatar AS, Worked As: Party Chief/Engineer, Project Description: GVI Survey, Multibeam survey and current meter observation at free-span location in Al Shaheen Field, Block-5, State of Qatar.

Sep 2016 Job No: PCBQ021, Vessel Name: Allianz Zeus, Client Name: Maersk Oil Qatar AS, Worked As: Party Chief/Engineer, Project Description: ROV Pipeline Inspection survey using surface positioning and under water positioning for ROV in Al Shaheen Field, Block-5, State of Qatar.

Aug 2016 Job No: PCBQ025, Vessel Name: Allianz Zeus, Client Name: Maersk Oil Qatar AS, Worked As: Party Chief/Engineer, Project Description: ROV debris clearance survey and Multibeam swath bathymetry survey for the Rig entry sites (AS-B-A) in Al Shaheen Field, Block-5, State of Qatar.

Jul – Sep 2016 Job No: PCBQ021, Vessel Name: Allianz Zeus, Client Name: Maersk Oil Qatar AS, Worked As: Party Chief/Engineer, Project Description: ROV Pipeline Inspection survey using surface positioning for vessel and under water positioning for ROV in Al Shaheen Field, Block-5, State of Qatar.

May 2016 Job No: PCBQ019, Vessel Name: Allianz Zeus, Client Name: Maersk Oil Qatar AS, Worked As: Party Chief/Engineer, Project Description: ROV debris clearance survey and Multibeam swath bathymetry survey for the Rig entry sites (AS-A-B/AS-C-D/AS-I-A) in Al Shaheen Field, Block-5, State of Qatar.

Apr 2016 Job No: CPR001, Vessel Name: Altus Exertus, Client Name: Marine Engineering Diving Services, Worked As: Mobilisation Engineer, Project Description: Surface & under water positioning for pipe line inspection & SPM chain inspection by ROV survey , North Gulf, Iraq.

Feb – Mar 2016 Job No: PRGQ020, Vessel Name: Drilling Rig-Rowan California, Client Name: Maersk Oil, Worked As: senior survey engineer, Project Description: Rig move operation and positioning from AS-C-D to AS-F-A location, Al Shaheen Field, Block-5, State of Qatar.

2015

Party Chief Survey Engineer:

Sep - Dec 2015 Job No: PCBU010, Vessel Name: Jack-up Rig (JB114),Client Name: ADYARD / ZADCO, Worked As: Survey Party Chief / Engineer, Project Description: Jack-up Rig move operation and positioning at 11 different WHP locations towards replacement of new boat landing in upper Zakum field, UAE.

Jun 2015 Job No: MRU006, Vessel Name: Fugro Surveyor, Client Name: ADMA-OPCO Worked As: Site Manager / PC / Engineer / Processor, Project Description: IHO order-1 Hydrographical survey for Das harbour extension project, Das Island, UAE.

Jun 2015 Job No: MRU003, Vessel Name: Fugro Surveyor, Client Name: Archirodon Construction / ADGAS, Worked As: Site Manager / PC / Engineer / Processor, Project Description: Geophysical and multibeam survey for IGD-E Project at Das Island, UAE.

May 2015 Job No: SU123, Vessel Name: FS-VIII, Client Name: Jumeirah beach resort Worked As: PC / Engineer, Project Description: Near shore bathymetric survey with RTK positioning.

May 2015 Job No: SQ10, Vessel Name: FS106,Client Name: FME / ASHGAL Public Work Authority, Worked As: PC / Engineer, Project Description: Service visit for Tide Gauge & ADCP in Doha Bay, State of Qatar.

Apr 2015 Job No: MRU005, Vessel Name: Fugro Surveyor, Client Name: FME / Dubai Maritime Port, Worked As: PC / Engineer, Project Description: Geophysical survey for jetty construction in Dubai Maritime city.

Feb – Mar 2015 Job No: MHQ001, Vessel Name: FS106,Client Name: FME / ASHGAL Public Work Authority, Worked As: PC / Engineer, Project Description: Doha bay & Port channel survey for Qatar museum authority, State of Qatar.

Feb 2015 Job No: OMQ001, Vessel Name: FS106,Client Name: FME / ASHGAL Public Work Authority, Worked As: PC / Engineer, Project Description: Environmental studies at Doha west Bay, State of Qatar.

Feb 2015 Job No: SQ10, Vessel Name: FS106,Client Name: FME / ASHGAL Public Work Authority, Worked As: PC / Engineer, Project Description: Service visit for Tide Gauge & ADCP in Doha Bay, State of Qatar.

Jan 2015 Job No: MRU001, Vessel Name: Seacor Mariner, Client Name: ADMA, Worked As: PC / Engineer, Project Description: Geophysical site survey for field development in ADMA Field, United Arab Emirates.

Jan 2015 Job No: MU130, Vessel Name: Seacor Mariner, Client Name: HHI / ADMA, Worked As: PC / Engineer, Project Description: Pre-Engineering cable route survey in Um Al Shief Field, United Arab Emirates.

2014

Party Chief Survey Engineer:

Dec 2014 Job No: CS800, Vessel Name: MV. Lang Jing, Client Name: COOEC, China. Worked As: PC / Engineer, Project Description: Tie-in platform top deck installation in Hasbah & Arabiya Field, Kingdom of Saudi Arabia.

Sep – Oct 2014 Job No: MQ143, Vessel Name: Stanford Gold, Client Name: Maersk Oil Qatar. Worked As: PC / Engineer, Project Description: 2DHR and shallow geophysical survey services for seven (7) sites in Al Shaheen Field, State of Qatar.

Aug 2014 Job No: MQ143, Vessel Name: Stanford Gold, Client Name: Maersk Oil Qatar. Worked As: PC / Engineer, Project Description: 2DHR and shallow geophysical survey services for seven (7) sites in Al Shaheen Field, State of Qatar.

Apr – Jun 2014 Job No: SQ10, Vessel Name: FS106, Client Name: ASHGHAL. Worked As: PC / Engineer, Project Description: "Sharq bay crossing programme – Specialist advanced studies: Site investigation" in Doha Bay, State of Qatar.

Jan – Feb 2014 Job No: POQ88, Vessel Name: Topaz Salalah, Client Name: Maersk Oil Qatar. Worked As: PC / Engineer, Project Description: ROV Debris clearance surveys at AS-B-F and AS-G-A platforms.

2013

Party Chief Survey Engineer:

Dec 2013 Job No: SU141, Vessel Name: Fugro Surveyor, Client Name: Dubai Supply Authority, Worked As: PC / Engineer, Project Description: Geophysical survey services inside Jebel Ali Port Trust.

Nov 2013 Job No: MQ133, Vessel Name: Seacor Mariner, Client Name: CNOOC Middle East (Qatar) Ltd. Worked As: Survey engineer, Project Description: Geophysical and 2D seismic survey in proposed well site CQBH-1 & CQMN-1, offshore Qatar.

Oct 2013 Job No: MQ132, Vessel Name: Seacor Mariner, Client Name: JX Nippon Oil & Gas Exploration (Qatar) Ltd. Worked As: Sr. Engineer, Project Description: Geophysical, 2D Seismic and Environmental survey in Block-A & Block-B, offshore Qatar.

Aug 2013 Job No: POQ78, Vessel Name: Al Huwaila, Client Name: Halul Offshore LLC. Worked As: Party Chief, Project Description: Diving Survey using IXSEA Gaps, Halul Island Bay", offshore Qatar.

Jun 2013 Job No: MS27, Vessel Name: Seacor Mariner, Client Name: Mc. Dermott Arabian Co. Worked As: Party Chief, Project Description: Pre-Engineering and Anchor clearance survey for Safaniya phase II LTA/LSTK CRPO Project in Safaniya, KSA.

May 2013 Job No: CS537, Vessel Name: Zakher Dolphin, Client Name: Mc. Dermott Arabian Co. Worked As: Survey Party Chief, Project Description: As-Laid Cable route survey, Safaniya, KSA.

May 2013 Job No: CS522, Vessel Name: Zakher Dolphin, Client Name: Mc. Dermott Arabian Co. Worked As: Survey Party Chief, Project Description: Pre-Lay Cable route survey, Safaniya / Marjan / Abusafah, KSA.

Apr 2013 Job No: CS529, Vessel Name: Zakher Dolphin, Client Name: Mc. Dermott Arabian Co. Worked As: Survey Party Chief, Project Description: Pre-Engineering survey of proposed pipeline and cable-Karan 45 project, Karan Field, KSA.

Feb – Mar 2013 Job No: CS504, Vessel Name: Zakher Dolphin, Client Name: Mc. Dermott Arabian Co. Worked As: Survey Party Chief, Project Description: Pre-Engineering and Anchor clearance survey for Safaniya phase II LTA/LSTK CRPO Project in Safaniya, KSA.

Jan 2013 Job No: CS416, Vessel Name: Segovia Tide, Client Name: Mc. Dermott Arabian Co. Worked As: Survey engineer cum multibeam processor, Project Description: Pre-installation geophysical survey for proposed cable route in Safaniya, KSA.

2012

Party Chief Survey Engineer:

Dec 2012 Job No: POQ53, Vessel Name: Topaz Salalah, Client Name: Maersk Oil Qatar. Worked As: Party chief cum survey engineer, Project Description: Surface positioning & under water positioning for environmental monitoring in Al Shaheen Field.

Oct 2012 Job No: POQ45, Vessel Name: Topaz Salalah, Client Name: Maersk Oil Qatar. Worked As: Survey Engineer, Project Description: ROV pipe line inspection survey in Al Shaheen Field.

Sep 2012 Job No: POQ46, Vessel Name: Topaz Salalah, Client Name: Maersk Oil Qatar. Worked As: Party Chief, Project Description: Geophysical survey for twelve (12) sites and one (1) route in Al Shaheen Field.

Jun – Aug 2012 Job No: CS382, Vessel Name: Intermac 406, Client Name: McDermott Arabia Co. Worked As: Survey Engineer, Project Description: 115kvA power cable lay from Safaniya TP18 to Beach, KSA.

May 2012 Job No: MS25, Vessel Name: Dean Andrew, Client Name: McDermott Arabia Co. Worked As: Party Chief, Project Description: Pre-engineering survey for 20" Crude pipe line from offshore gathering station to near shore, KSA.

Apr 2012 Job No: MS24, Vessel Name: Dean Andrew, Client Name: McDermott Arabia Co. Worked As: Party Chief, Project Description: Pre-engineering survey for 24" Gas pipe line from offshore gathering station to near shore, KSA.

Apr 2012 Job No: MS23, Vessel Name: Dean Andrew, Client Name: McDermott Arabia Co. Worked As: Party Chief, Project Description: Anchor clearance site survey at Al Khafji Oil Field, KSA.

Mar 2012 Job No: MU114, Vessel Name: Seacor Mariner, Client Name: Hyundai Heavy Industries, Worked As: Survey Engineer, Project Description: Geophysical survey at Das Island, UAE.

Mar 2012 Job No: MU113, Vessel Name: Seacor Mariner, Client Name: ADMA, Worked As: Survey engineer, Project Description: Geophysical survey at Um Al Shaf, UAE.

Feb 2012 Job No: MU111, Vessel Name: Seacor Mariner, Client Name: ADMA, Worked As: Survey Engineer, Project Description: Geophysical survey from Das Island to Um Al Shaf, UAE.

Feb 2012 Job No:CU46, Vessel Name: Seacor Mariner, Client Name: Hyundai Heavy Industries, Worked As: MBES Processor, Project Description: Geophysical near shore survey at Das Island, UAE.

Feb 2012 Job No: POQ37, Vessel Name: Topaz Salalah, Client Name: Maersk Oil Qatar Worked As: Survey engineer cum multibeam processor, Project Description: ROV Debris clearance survey on AS-A-D, AS-A-A, AS-E-A platforms of Al Shaheen Field, Qatar.

2011

Party Chief Survey Engineer:

Sep - Oct 2011 Job No: POR01 / MR01B, Vessel Name: Seaworker / Dulas Island / AfonCaradog / AM4, Client Name: Shell Iraq petroleum development, Worked As: Party Chief survey engineer and multibeam processor, Project Description: FANS Remote data transmission & Hydrographical survey services for Shatt Al Arab river, Iraq.

May 2011 Job No: XU140, Vessel Name: Small Boat, Client Name: Environmental Department, Worked As: Party Chief / Engineer, Project Description: Geophysical survey at environmental site at UAE.

May 2011 Job No: CS351C, Vessel Name: GMS Endurance, Client Name: Mc Dermott Worked As: Party Chief / Engineer, Project Description: Rig move operation in Qatar.

May 2011 Job No: MB10, Vessel Name: Zaker Fugro, Client Name: Occidental, Worked As: Party Chief / Survey Engineer, Project Description: Geophysical survey at Bahrain.

May 2011 Job No: MQ121, Vessel Name: Zaker Fugro, Client Name: Hundai Worked As: Sr. Survey Engineer, Project Description: Geophysical survey at Barzan field for proposed pipeline route, Qatar.

Apr 2011 Job No: MU105, Vessel Name: Zaker Fugro, Client Name: ZADCO Worked As: Sr. Survey Engineer, Project Description: Geophysical survey at Bunduq field for proposed pipeline route and site survey, UAE.

Jan – Feb 2011 Job No: MR01, Vessel Name: Seacor Mariner, Client Name: Shell Iraq, Worked As: Survey engineer, Project Description: Geophysical survey at Shat Al Arab river (Approx. 150Km) for the development of Majnoon Oil Field, Iraq.

2010

Party Chief Survey Engineer:

Dec 2010 Job No: MR01A, Vessel Name: Seacor Mariner, Client Name: Shell Iraq, Worked As: Survey engineer, Project Description: Multibeam survey for the development of Majnoon Oil Field, Iraq.

Aug 2010 Job No: MU98 (Phase-II), Vessel Name: Seacor Merchant, Client Name: NMDC Worked As: Survey engineer cum processor, Project Description: Geophysical Survey at west, south & central islands for making artificial Islands inside Zakum Field, UAE.

Jul 2010 Job No: MQ116, Vessel Name: Seacor Merchant, Client Name: GTL SHELL Worked As: Survey Engineer, Project Description: 2D Seismic survey and Geophysical survey at NF6 and NF7 field, Qatar.

Jun 2010 Job No: MU98, Vessel Name: Seacor Merchant, Client Name: NMDC, Worked As: Survey engineer cum processor, Project Description: Multibeam survey at 3 blocks outside zakum field to borrow sand for making artificial Island inside zakum field, UAE.

May 2010 Job No: MU96, Vessel Name: INW-2, Client Name: Dubai Petroleum, Worked As: Sr. Survey Engineer, Project Description: Geophysical Survey for 28 Km pre-engineering route and twelve (12) Rig Approach sites at Jebel Ali, UAE.

Apr 2010 Job No: CU25, Vessel Name: DB16, Client Name: J RAY Mc Dermott, Worked As: Sr. Survey Engineer, Project Description: Installation two MultiFix and two Star Fix positioning suit for DP trial at Jebel Ali, UAE.

Apr 2010 Job No: SU89, Vessel Name: FS-II, Client Name: SBM Offshore Inc, Worked As: Party Chief / Survey Engineer, Project Description: Post barge clearance survey with geophysical equipments and multibeam for MOPUSTOR sail out, UAE.

Apr 2010 Job No: SU88, Vessel Name: FS-II, Client Name: SBM Offshore Inc, Worked As: Party Chief / Survey Engineer, Project Description: Geophysical survey for sail out MOPUSTOR barge out of the Musaffah Channel, UAE.

Mar 2010 Job No: SU87, Vessel Name: FS-I, Client Name: Archirodon Construction Co (Overseas) Ltd, Worked As: Party chief survey engineer, Project Description: Geophysical survey with magnetometer for under water hazard clearance survey at Jebel Ali, UAE.

2009

Party Chief Survey Engineer:

Nov - Dec 2009 Job No: PQ119, Vessel Name: Posh Bali, Client Name: Larsen & Tubro, Worked As: Party Chief/Engineer, Project Description: Setup Wombat Telemetry & Anchor Telemetry for position the barge close to the platform in 6 point mooring with 2 piggy back anchors.

Sep 2009 Job No: MQ106, Vessel Name: Zakher Fugro, Client Name: Maersk Oil Qatar, Worked As: Survey Engineer, Project Description: Geophysical survey with multibeam for Jack-up Rig Hazard clearance Survey at Al Shaheen Field, Qatar.

Sep 2009 Job No: MQ105, Vessel Name: Zakher Fugro, Client Name: Maersk Oil Qatar, Worked As: Survey Engineer, Project Description: Geophysical and multibeam survey for anchor clearance at Al Shaheen Field, Qatar.

Aug 2009 Job No: MQ103, Vessel Name: Zakher Fugro, Client Name: Maersk Oil Qatar, Worked As: Survey Engineer, Project Description: Geophysical survey with multibeam for anchor clearance at Al Shaheen Field, Qatar.

Jul 2009 Job No: MQ102, Vessel Name: Zakher Fugro, Client Name: Larsen &Tubro, Worked As: Survey Engineer, Project Description: Geophysical survey with multibeam for anchor clearance at Al Shaheen Field, Qatar.

Jul 2009 Job No: CQ100, Vessel Name: Rem Fortress, Client Name: J. Ray. McDermott, Worked As: Survey Engineer, Project Description: Sleeper installation using under water positioning & heading system at Qatar.

May – Jun 2009 Job No: MU86, Vessel Name: Zakher Fugro, Client Name: ZADCO, Worked As: Survey engineer cum multibeam processor, Project Description: Multibeam survey to identify seabed features in proposed ocean bottom cable route, using SWATH Plus and Reson 7125 system in SATA field.

Mar – Apr 2009 Job No: CS313, Vessel Name: Setia Tegap, Client Name: J. Ray. McDermott, Worked As: Party Chief, Project Description: Geophysical survey for anchor clearance at Safaniya and Berri oil field, Kingdom of Saudi Arabia.

Jan – Feb 2009 Job No: CS45, Vessel Name: Setia Tegap, Client Name: J. Ray. McDermott, Worked As: Party Chief, Project Description: Geophysical survey for anchor clearance at Zulf, and Marjan oil field, Kingdom of Saudi Arabia.

2008

Senior Surveyor / Party Chief Survey Engineer:

Nov - Dec 2008 Job No: CS306, Vessel Name: Masindra Hawk, Client Name: J. Ray. McDermott, Worked As: Party Chief, Project Description: Geophysical survey for anchor clearance at Manifa Oil Field, Kingdom of Saudi Arabia.

Sep 2008 Job No: MU78, Vessel Name: Zakher Fugro, Client Name: ZADCO, Worked As: Survey Engineer, Project Description: Deployment of 6 Tide gauges and geophysical survey for full field development of SATA oil field.

Sep 2008 Job No: MU77B, Vessel Name: Zakher Fugro, Client Name: Dolphin Energy, Worked As: Survey Engineer, Project Description: Geophysical and multibeam survey for the inspection of underwater assets.

Aug 2008 Job No: MQ78, Vessel Name: Zakher Fugro, Client Name: Dolphin Energy, Worked As: Survey Engineer, Project Description: Geophysical survey and multibeam survey for the inspection of underwater assets.

Aug 2008 Job No: MQ80, Vessel Name: Zakher Fugro, Client Name: J. Ray. McDermott, Worked As: Survey Engineer, Project Description: Geophysical and multibeam survey for the development of Ras Gas Barzan Field.

Jul 2008 Job No: MQ79, Vessel Name: Zakher Fugro, Client Name: Maersk Oil Qatar, Worked As: Survey Engineer, Project Description: Geophysical and multibeam survey for anchor clearance at Jack-up Rig site at Al Shaheen Field.

Apr – May 2008 Job No: CS44, Vessel Name: DLB 332, Client Name: Global Al Rushaid Offshore Co Ltd, Worked As: Survey Engineer, Project Description: Running anchor and Wombat Telemetry for the installation of 30" water injection line, installation of sleepers at pipe line crossings and recording the touchdown position of the field joints using USBL positioning system at Kingdom of Saudi Arabia.

Feb – Mar 2008 Job No: CQ60, Vessel Name: Seamac Princess, Client Name: Qatar Petroleum Corporation, Worked As: Survey Engineer, Project Description: Survey setup, video overlay and computer LAN network to view ROV video and navigation information for the installation of spool piece for Qatar Petroleum Corporation.

Jan 2008 Job No: CQ55, Vessel Name: DB27, Client Name: J. Ray. McDermott, Worked As: Survey Engineer, Project Description: Installation of wombat system onboard barge DB27 and five supporting tugs for Mc-Dermot construction Job at Qatar.

20007 **Senior Survey Engineer**

Nov – Dec 2007 Job No: MX03, Vessel Name: Zakher Fugro, Client Name: Total, Worked As: Survey engineer cum multibeam processor, Project Description: Geophysical and multibeam survey for hazard clearance at off Chittagong, Bangladesh.

Oct 2007 Job No: MU71, Vessel Name: Zakher Fugro, Client Name: ADMA-OPCO, Worked As: Survey Engineer, Project Description: Geophysical and multibeam survey for mapping the pipeline originating from the central platform complex in UAE.

Aug – Sep 2007 Job No: MU73, Vessel Name: FS-V, Client Name: ADGAS/FLOUR, Worked As: Survey Engineer, Project Description: Geophysical Seismic Reflection / Refraction surveys conducted with the assistance of FSME's sister company, in association with the "IGD-HAP & Das Island reclamation project.

Jun – Jul 2007 Job No: MU66, Vessel Name: Zakher Fugro, Client Name: ADMA OPCO, Worked As: Survey Engineer, Project Description: Geophysical multibeam survey for existing routes of ADMA offshore, UAE.

Apr – May 2007 Job No: KU04, Vessel Name: FS-106, Client Name: Nexans Norway AS, Worked As: Survey Engineer, Project Description: Pre-Engineering geophysical survey services in association with "New subsea high voltage power link to Delma Island", in United Arab Emirates of Nexans Norway.

Mar 2007 Job No: MU67, Vessel Name: Zakher Fugro, Client Name: Boskalis West Minister M.E. Ltd, Worked As: Survey Engineer, Project Description: Geophysical survey services in association with sand search project of Boskalis West minister M.E. Ltd., Dubai.

Mar 2007 Job No: CU10, Vessel Name: FS-106, Client Name: SUBTEC, Worked As: Survey engineer, Project Description: Geophysical pre-installation survey of SUBTEC Middle East LTD, UAE.

Mar 2007 Job No: SU37, Vessel Name: FS-106, Client Name: GASCO, Worked As: Survey Engineer, Project Description: Post-dredging survey off Al Ruwaise using Reson 8101 system.

Jan 2007 Job No: KG-D6, Vessel Name: Setouchi Surveyor, Client Name: ALL SEAS, Worked As: Survey Engineer, Project Description: Geophysicaland multibeam survey for KG-D6 Field development project of Reliance Industries Ltd., India.

2006

Senior Survey Engineer

Dec 2006 Job No: CK03, Vessel Name: Ekteshaf, Client Name: Hyundai Heavy Industries, Worked As: Survey Engineer, Project Description: Touchdown monitoring & As-laid survey for 56 inch pipe line construction done by Hyundai Heavy Industries Co. Ltd. off Kuwait.

Nov 2006 Job No: CS17, Vessel Name: Dickerson Tide, Client Name: J Ray Mc Dermott, Worked As: Survey Engineer/MBES Processor, Project Description: As-laid survey at Safanya, Zulf and Marzan field for J Ray Mc Dermott, Kingdom of Saudi Arabia.

Sep – Oct 2006 Job No: MP58, Vessel Name: Zakher Fugro, Client Name: IOECL, Worked As: Survey engineer cum multibeam processor, Project Description: Geophysical pre-engineering &anchor clearance survey for new pipeline route of Iran offshore engineering and construction company.

Aug 2006 Job No: MQ62, Vessel Name: Zakher Fugro, Client Name: Qatar Petroleum Corporation, Worked As: Survey engineer cum multibeam Processor, Project Description: Geophysical pre-engineering survey at Maydan Mahzam Field of Qatar Petroleum, Qatar.

Jul 2006 Job No: MQ61, Vessel Name: Zakher Fugro, Client Name: Qatar Petroleum Corporation, Worked As: Survey Engineer/MBES Processor, Project Description: Geophysical pre-engineering survey at BulHanine Field of Qatar Petroleum Corporation, Qatar.

Previous Experience

1997-2006	National Institute of Ocean Technology (NIOT), Department of Ocean Development(DOD) – Project Scientist for the following technology development.
	EEZ-Swath Bathymetry Survey: Multibeam operator cum processor for swath bathymetry survey towards acquiring bathymetry data for mapping East coast of India using Reson and Simrad Multibeam system under Department of Ocean Development Project, India.
	COMAPS Project: Environmental Engineer for the operation & acquisition of Oceanographic data onboard Research vessels- Sagar Nidhi, Sagar Manjusha, Sagar Purvi and Sagar Paschimi, subsequently for the Coastal Ocean Monitoring and Prediction System (COMAPS-project – 5 years) under Department of Ocean Development, India.
	Hydro carbonates Studies: System Engineer for Seabed Hydro carbonate Analysis project in association with National Geographical Research Institute, India.
	PMN Project: Hydrographical Survey Engineer for identifying the potential site for Poly metallic Nodule dredging project at 6000m water depth in deep Indian Ocean below equatorial line under Department of Ocean Development, India.
	De-salination Project: Survey engineer cum data processor for identifying suitable site for implementation of desalination project at Lakshadweep Islands, India.
	OTEC Project: Environmental engineer for the operation of environmental equipment at the Ocean Thermal Energy Conversion Project site, India.
	ONGC-IPSEM Project: Environmental engineer for the operation of environmental equipment and current profiler at Bombay High oil field, India clients
1995-1997	Computer Engineering Experience JTS Technology Pvt Ltd: Worked as QC Engineer in production department, to render service, calibration and certification for the production support equipment's.
1993 -1995	Medical Electronics Engineering Experience JTS Technology Pvt Ltd: Worked as QC Engineer in production department, to service, calibration and certification for the production support equipment's.

	South Indian Medical Co. Ltd: Worked as Installation Service/maintenance engineer for Critical lifesaving medical equipment such as pulse oximetry, artificial respiratory system, defibrillator, Drug Infusion system and renal dialysis machine. Vital Instrumentation Pvt Ltd: Worked as Installation Service/maintenance for medical laboratory equipment's, such as blood gas analyser, blood cell counter and endoscopy system.
1991-1993	Telecommunication Engineering Experience Applied Electronics Ltd: Worked as field service engineer for office automation product such as Telephone. Telex, Fax, EPABX and Intercom systems.

RESUME

Ram Niranjan

Job Title: Surveyor

PERSONAL INFORMATION

Nationality Indian

Profile Commence working as surveyor in year 2006 and worked as Surveyor in various survey teams in India, Malaysia and Middle East region. Having experience of surveying as Land surveyor with over 6 years and as Hydrographic surveyor over 6 years. During this period undertaken variety of Jobs such as construction, geotechnical, geophysical and hydrographic surveys, Land surveyor in Refinery Job & various Jobs for Qatar Petroleum, Saudi Aramco, ADMA, Dubai Petroleum, Technip FMC, Total, Shell, Saipem Snamprogetti & Sabah Sarawak Gas Pipe Line Job for Petronas.

Education

2009 - University of Rajasthan, Jaipur, Rajasthan, India
2008 – Construction Industry Development Council, New Delhi, India
2007 - CE-Tech Computer Education Society, Jaipur, Rajasthan, India
2005 - University of Rajasthan, Jaipur, Rajasthan, India
2004 - DOEACC Society, New Delhi, India

Qualifications

Master of Geography
B.Tech. in Civil Engineering
Surveying
Auto Cad
Bachelor Degree (English Litt. Economics & Political Science)
O level Computer Course

Training/skills

QHSE training (validated certificates)

- Basic H2S (OPITO) Valid until 29th Sep 2021
- FOET (OPITO) Valid until 13th Mar 2022

Software training

- Basic Starfix NG.
- Starfix Sies

Languages spoken

Native	Hindi & English
Fluent	Hindi & English

Current responsibilities **Fugro Survey Middle East Ltd.**

Current Job Title 2014 – Present: **Surveyor**

2014 – Present: As Surveyor ensure to liaise with the Survey Party Chief, Anchor Foreman, Anchor Hoist Operators, Field Engineers and (as required) Barge Superintendent throughout the daily activities and all discussions / instructions / information passed clearly entered into the log book.

At the beginning of every shift, verify and ensure that the barge navigation and AHT Management systems are configured correctly and are receiving continuous updates from the all AHT BMS mobiles. If not, contact the barge survey engineer and respective AHT surveyor to ensure the issue is rectified

Ensure that the barge navigation systems are loaded with and utilise / display the most current / up-to-date seabed asset backgrounds, bathymetry data etc. with standard colour coding. Surveyor shall update the database with ongoing Job as-installed / as-laid data as may have been achieved, with the same issued to AHT spreads at least daily. If formal site database issue exceeds 30 days, availability of new update to be checked with Party Chief and request / response logged.
As required, Surveyor may occasionally cover some of the Party Chief Role and Responsibilities, whenever party chief is on off-shift

Jobs Undertaken:

Apr 2014 – Present: **Worked as Hydrographic Surveyor with Fugro Survey (Middle East) Ltd, UAE**

Feb 2020 –Jun 2020 Job No. : CPS329, Vessel: Lan Jiang, Client: COOEC/DYNAMICS IND. LTD., End Client: Saudi Aramco Job: : 36” Trunkline from BRRI TP-1 to GOSP-5, BERRI Field, Saudi Offshore

Dec 2019 –Dec 2019 Job No. : RINQ031, Vessel: Nor Spring, Client: Shell Qatar GTL Ltd., Job: : RO Inspection Survey on Pipelines, Fibre Optic Cables and Platforms, QATAR Offshore.

Nov 2019 –Dec 2019 Job No. : CPQ044, Vessel: Emerald Sea, Client: McDermott Eastern Hemisphere Ltd., Job: : Bul Hanine field development Project for Qatar Petroleum at Bul Hanine Field, QATAR Offshore.

Sep 2019 –Sep 2019 Job No. : CPQ044, Vessel: Emerald Sea, Client: McDermott Eastern Hemisphere Ltd., Job: : Bul Hanine field development Project for Qatar Petroleum at Bul Hanine Field, QATAR Offshore.

Jul 2019 – Sep 2019 Job No. : CJQ043, Vessel: DB27, Client: McDermott Eastern Hemisphere Ltd., Job: : Pipeline and Offshore Structure Installation for Qatar Petroleum at Bul Hanine Field, QATAR Offshore.

May 2019 – May 2019 Job No. : CPS621, Vessel: Intermac 406, Client: McDermott Arabia Company Ltd., Job: : Construction Support Services Shallow Water Subsea Installation Operations Aramco SAF-VI Project, KSA Offshore.

Jan 2019 – Feb 2019	Job No. : GIQ345 Phase 2, Vessel: Fugro Adventurer, Client: QatarGas, Job: : **Error! Unknown document property name.** for Marine Shallow Subsurface Site Surveys Proposed Platform Locations, Qatar Offshore.
Oct 2018 - Dec 2018	Job No. : RINU034, Vessel: DSCV Picasso , Client:Technip FMC/Dubai Petroleum , Job: : Spool and Riser Installation at Rashid D Development Project and Associated Pipelines, Dubai Offshore.
Jul 2018 - Sep 2018	Job No. : GIS336, Vessel: Fugro Adventurer, Client:Worley Parsons Engineering/Saudi Aramco, Job: : **Error! Unknown document property name.** for Platforms at Marjan Field Development Project, KSA Offshore.
Jun 2018 - Jun 2018	Job No. : GIU264, Vessel: Fugro Adventurer, Client:ADNOC Offshore, Job: : **Error! Unknown document property name.** for Rig Sites Phase-3, UAE Offshore.
Jun 2018 - Jun 2018	Job No. : GIU334, Vessel: Fugro Adventurer, Client: ADNOC/TECHNIP FMC, Job: : **Error! Unknown document property name.**, Abu Dhabi Offshore.
May 2018 - May 2018	Job No. : GIP317, Vessel: Fugro Adventurer, Client: **Error! Unknown document property name.**, Job: : **Error! Unknown document property name.**, **Error! Unknown document property name.**.
Dec 2017 - Mar 2018	Job No. : CJS598, Vessel: GMS Sharqi, Client: McDermott Arabia Company Ltd / Saudi Aramco, Job: : Hook up Job in Zuluf Field, Saudi Arabia.
Sep - Nov 2017	Job No. : CPS554, Vessel: Mubarak Supporter, Client: McDermott Arabia Company Ltd / Saudi Aramco, Job: : Cable & Umbilical Installation, Spool, ICCP, Riser & SSVS Installation in Safaniya Field, Saudi Arabia.
Aug - Sep 2017	Job No. : CJS551, Vessel: Zakher Duty, Client: McDermott Arabia Company Ltd / Saudi Aramco, Job: : Hook up job in Safaniya Field, Saudi Arabia.
Jul - Jul 2017	Job No. : MRU055, Vessel: Fugro Proteus, Client: ADMA, Job: Jack-Up Rig Site Hazard Analogue, UHR & 2DHR Survey at ZK20 Platform in Zakum Field, Abu Dhabi.
Apr - Jun 2017	Job No. : CPS550, Vessel: Thebaud Sea, Client: McDermott / Saudi Aramco, Job: Cable Installation in Berri, Zuluf and Marjan Field, Saudi Arabia.
Nov 2016 – Feb 2017	Job No. : CPS541, Vessel: Nor Spring, Client: McDermott / KJO, Job: Rov Touchdown Monitoring & As Laid survey For Pipe Lay by DB27 at Khafji Field, Saudi Arabia.
Aug - Oct 2016	Job No. : CPS531, Vessel: Thebaud Sea, Client: McDermott / Saudi Aramco, Job: Cable Installation in Berri, Zuluf and Marjan Field, Saudi Arabia.
Jun 2016	Job No. : CPS526, Vessel: Thebaud Sea, Client: McDermott / Saudi Aramco, Job: Post Lay Mattress Installation in Marjan Field, Saudi Arabia.
May - Jun 2016	Job No. : CPS532, Vessel: Thebaud Sea, Client: McDermott / Saudi Aramco, Job: Mattress Installation in Berri, Zuluf and Marjan Field, Saudi Arabia.
Apr 2016	Job No. : CS594, Vessel: AOS Victory, Client: McDermott Arabia Company Ltd. / Saudi Aramco, Job: Hook up job in Safaniya Field, Saudi Arabia.

Dec 2015 to Mar 2016	Job No. : CS594, Vessel: Stanford Condor/ Stanford Nile, Client: McDermott Arabia Company Ltd. / Saudi Aramco, Job: Hook up job in Safaniya Field, Saudi Arabia.
Sep - Oct 2015	Job No. : CPU005, Vessel: DLB1600, Client: VMGL/PETROFAC/ADMA, Job: 26" Well Fluid Pipeline from RPS to Zirku.
Jul - Aug 2015	Job No. : CPU005, Vessel: DLB1600, Client: VMGL/PETROFAC/ADMA, Job: 48" Crude Export Pipeline from Zirku to SPM.
Apr - May 2015	Job No. : CRU001 & CJU004, Vessel: DLB1600, Client: VMGL/PETROFAC/ADMA, Job: Installation of 6 Anchor Piles for SPM Location @ SARB Field & Installation of Zirku Flare Platform (ZFP1) @ SARB Field.
Feb - Mar 2015	Job No. : MHQ001 & OMQ001, Vessel: FS 106, Client: ASHGAL, Job: Geophysical survey of Doha Bay & Port Channel, Envoirmental Studies.
Oct 2014 to Jan 2015	Job No.: CU55, Vessel: Maridive Constructor 300, Client: VMGL/PETROFAC/ADMA, Job: SARB Field Development Job for pipe laying in UAE.
Aug - Sep 2014	Job No.: CS87&CS88, Vessel: DLB Castro II, Client: Saipem Snamprogetti / Saudi Aramco Job: 12" CRA-FL pipe laying and Jacket installation, Riser, J-tube and alignment frame installation Job in Hasbah & Arabia oil field, Saudi Arabia.
Jul - Aug 2014	Job No.: CS87, Vessel: Britoil 51, Client: Saipem Snamprogetti / Saudi Aramco Job: 12" CRA-FL pipe laying and Jacket installation, Riser, J-tube and alignment frame installation Job in Hasbah & Arabia oil field, Saudi Arabia.
Jan 2013 – Feb 2014:	Worked as Surveyor Civil with AGCC (Saudi Arabia) in various Jobs of Saudi ARAMCO / SATORP & SABIC.
Dec 2013 to Feb 2014	Worked as Surveyor Civil for construction of Asphalt road in Wasit Co-Generation & Steam Generation Plant for Samsung E&C Saudi Arabia Client Saudi Aramco Using Leica TS 02 Total Station and Sokkia Auto Level.
Oct - Dec 2013	Worked as Surveyor Civil for positioning of pillar / foundation in HADEED (Saudi Iron & Steel company, Saudi Arabia) for Etec Saudi Arabia Client SABIC (Saudi Arabia Basic Industries Co.) Using Leica TS-02 Total Station and Sokkia Auto Level.
Jan - Oct 2013	Worked as Surveyor Civil for positioning / land survey for construction of Refinery in SATORP (Saudi Aramco Total Petrochemical & Refinery Job) JERP (Jubail Export Refinery Job) for PETROL STEEL Saudi Arabia Client Saudi Aramco. Using Leica TS-02 Total Station and Sokkia Auto Level.

Jul 2012 to Dec 2012	**Worked as Surveyor with Punj Lloyd Oil & Gas (Malaysia)**
	Worked as Surveyor Civil in Sabah Sarawak Gas Pipeline Job, Malaysia for Punj Lloyd / Petronas Carigali Sdn. Bhd. Malaysia Using Leica TC-06 Total Station and Sokkia Auto Level and charting using AutoCAD 2005 Drawing Software.
Apr 2010 to Feb 2012	**Worked as Hydrographic Surveyor with Global Surveys Pvt Ltd**
Nov 2011 to Feb 2012	Positioning of Dredger in Rihand Dam, Shahpur Pump House Job, Waidhan Madhya Pradesh for **Gammon India** / **Reliance** Using Hemisphere R110 DGPS and Hypack Software along with AutoCAD Drawing Software.
Oct 2011	Bathymetry Survey of Tapi River for **Reliance Ga**s Hazira, Surat. Using Leica 420/8 DGPS and Bathy 500 DF Echo sounder, Hypack 6.2b Software and processing of Bathymetry Using Hypack Processing Software.
Aug - Oct 2011	Bathymetry Survey for **Shivam Dredging Co**. in ABG Shipyard, Dahej, Gujarat. Using Leica 420/8, Simrad 500 DGPS and Bathy 500 DF Echo sounder with Hypack 6.2b Software and processing of Bathymetry.
Aug 2011	Land survey in Pipava Shipyard for **Costal land survey / EGS Surveys India**. Using Leica Total Station and AutoCAD for plotting.
Apr 2010 to Jun 2011	Positioning of Dredger in Revadanda channel, Alibagh for **Shreya Dredging**. Using Leica 420/8 DGPS and Hypack Software and plotting using AutoCAD.
Jul 2008 to Feb 2009	**As Surveyor with Shankaran & Co.**
Oct - Dec 2008	Positioning of offshore Piles for Construction of Marine Tug-Berth for **RDS Job Ltd**., Ratnagiri. Using Topcon Total Station.
Dec 2006 to Aug 2008	**As Land Surveyor / Charting for Jaipur Development Agencies**
Oct 2007 to Jul 2008	Worked as Surveyor & Draftsman in construction & Development Sector using Leica Total Station in “KITIKA ARCH” Jaipur, for Jaipur Development Authority.
Apr - Sep 2007	Worked as Surveyor for Topographic Survey & levelling in jawahar Navodaya Vidyalaya in Patan, Rajasthan for “S.S.Surveys Pvt. Ltd.” Jaipur using TOPCON Total Station and Sokia Auto Level, for Jaipur Development Authority.
Dec 2006 to Mar 2007	Worked as Surveyor for construction & Development Sector using Leica Total Station in “Lakshya consultancy” Jaipur for Jaipur Development Authority.

EQUIPMENT EXPERIENCE:

Software:	HyPack 6.2, AutoCAD, Starfix Seis, Starfix Nav, Starfix MRDGPS, Starfix Wombat,Starfix Proc, Terramodel.
Equipment:	**Positioning -** Starpack, Starfix HP, Real-Time Kinematic GPS.
	Navigation Software - Starfix.Seis, Starfix Nav, Starfix NG
	Gyro Compasses: SG Brown Meridian Surveyor Gyrocompass, Octans Gyrocompass.
	Underwater Systems - Simrad HiPAP 400 USBL, SVPlus SVP, IXSEA Gaps USBL, Valeport CTD SVP, ADCP Wave and Current Meter.
	Echo Sounders – Geo Acoustics System.
	Total Station & Level - TOPCON Total Station, Trimble Total Station, Topcon & Sokia Auto Level, Leica TS-02/06 Total Station and Auto Level
Computer and Peripherals:	Hewlett Packard series, IBM and compatible PC's
Language/System:	MS-DOS, Windows 3.1 and Windows 95-97 & 2010 Administration: MSWord, MS Excel, MS Power Point.

RESUME

Vijesh Vadakkinayil

Job Title: Geophysicist

PERSONAL INFORMATION

Nationality Indian

Profile Presently I am working as a senior geophysicist. I have twelve years of experience in the offshore field.

- Different roles – Data acquisition, Processing, Reporting and QC
- Team management – Worked as a lead Geophysicist at offshore
- Duration of experience-Eleven years of experience
- Different types of experiences – I worked at Indonesia, UAE & Iran and Qatar Offshore

Education

2004 – 2006 School of Marine Sciences CUSAT, Cochin.
2001 – 2004 Government College Kasaragod.
1999-2001 GVHSS Trikarpur.
1999 GHS Korom.

Qualifications

List most recent first in the following example format:
MSc Marine Geology
BSc Geology
Plus Two- Science Group
SSLC

Training/skills

Vocational training

- Offshore Experiences

QHSE training (validated certificates)

- Further Offshore Emergency Training (FOET)

Software training

- Fugro Proprietary Software-Starfix, SonarMap, Spatial, Interp, VBA Proc
- CODA, Discover, Maglog

Languages spoken

Native	English, Malayalam, Hindi
Fluent	English, Malayalam, Hindi
Intermediate	
Basic	

Current responsibilities **Fugro FSME**

Insert current job title

2019 – present:

Data acquisition, Processing, interpretation and reporting.

Previous Experience

2017- 2018	Daniel Surveying FZC – Base Geophysicist QC of Reports and Charts, Data Management
2010-2017	Fugro Survey (India) PVT. LTD – Geophysicist Data acquisition, Processing, Interpretation & Reporting
2009-2010	Coastal Marine Construction and Engineering (COMACOE) – Geophysicist Data acquisition, Processing, Interpretation & Reporting
2008-2009	Valentine Survey- Geophysicist Data acquisition, Processing, Interpretation & Reporting
2007-2008	Sai Surveys-Geophysicist Data acquisition, Processing, Interpretation & Reporting

Detailed Employment History

Northern Offshore Drilling Operations Ltd - Geophysical Seabed Survey at Shamal 1 Well Location (formerly Al Wassmi North-1), Block 1, Offshore Kingdom of Bahrain.

- Processing, interpretation and reporting

Al Gihaz Marine - Electricity Supply to Hawar Island, 66 kV Submarine and Underground Cable Work – Pre-Lay Cable Route Survey, Kingdome of Bahrain.

- Processing, interpretation and reporting

Qatargas - Geophysical and Geotechnical Offshore Survey for Pipeline/Cable (Compression Phase) of the North Field Production Sustainability (NFPS) Project, Offshore State of Quatar.

- Processing, interpretation.

ADNOC- Provision of Geophysical, Geotechnical and Environmental Baseline Surveys for Subsea Cable Routes, ADNOC offshore UAE.

- Processing, interpretation.

Dubai Petroleum – Provision of Geophysical and Geotechnical Survey, Fateh Field, U.A.E

- Processing, interpretation and Reporting.

McDermott Arabia Company Ltd – As-built survey for Aramco Safaniya VI Project, Safaniya field, Kingdom of Saudi Arabia.

- Processing, interpretation and Reporting.

Qatargas Operating Company Limited – Pipeline Underwater Inspection Survey, Qatargas – North Interfield Pipeline Survey, State of Qatar.

- Processing, interpretation and Reporting.

Qatargas Operating Company Limited – Pipeline Geophysical Survey, Operational (South)- Offshore Production Subsea and Integrity Division, North Field, State of Qatar.

- Processing, interpretation and Reporting.

North Oil Company (NIOC) – Geophysical Offshore Site Surveys, Al –Shaheen field Offshore State of Qatar.

- Processing, interpretation and Reporting.

Al Yasat Petroleum Operations Co.Ltd (ADNOC) – Geophysical Survey for Area-1 Offshore Wells, Offshore UAE.

- Processing and interpretation.

Qatar Gas Operating Company Limited - Pipeline geophysical Surveys at proposed pipeline routes cable routes, riser platforms and well head platforms for North field production sustainability (NFPS) project in the North Field, Offshore state of Qatar.

- Processing and interpretation.

Qatar Gas Operating Company Limited- Pipeline geophysical and Geotechnical Surveys at proposed new pipeline routes, new subsea cable routes, new riser platforms and new well head platforms for North field production sustainability (NFPS) project in the North Field, Offshore state of Qatar.

- Onboard visual analysis of core and grab soil samples.

National Iranian Oil Company (NIOC)-Pre-engineering & Site survey for proposed pipeline route and SPM area at Phase 19, Offshore Iran Persian Gulf. (May-2018)

- QC of reports & Charts

Drilling Company International (DCI) - Geophysical site survey services at WHP3 platform location at Hengam field Offshore Iran, Persian Gulf. (April-2018)

- QC of reports & Charts

Drilling Company International (DCI) - Geophysical site survey services at DPG platform location at Sirri field, Offshore Iran Persian Gulf. (April-2018)

- QC of reports & Charts

Mubarak Marine Company. - Container search survey at Jebel ali port offshore UAE
(Nov-2017)

- As a lead geophysicist onboard

- QC of reports & Charts

Petro Gohar Kish Company (PGK) - Geophysical site survey services for proposed FSP location at SPD23 Platform at at South Pars Gas Field, Offshore Iran Persian Gulf (Nov-2017)

- QC of reports & Charts

Persia Shidak Raya Company. - Pre-engineering survey services for Fibre optic cable route system at SPD13A, SPD14A platforms at South Pars Gas Field, Offshore Iran Persian Gulf. (Nov-2017)

- QC of reports & Charts

Drilling Company International (DCI). - Geophysical survey services at S1, and D7 platforms at Foroozan Oil Field, Offshore Iran Persian Gulf f(Octo-2017)

- QC of reports & Charts

Drilling Company International (DCI). - Geophysical site survey services at F13 platform at Foroozan Field, offshore Iran, Persian Gulf (Sept-2017)

- QC of reports & Charts

L&T Hydrocarbon Engineering. - Pre-construction and anchor clearance survey at Foroozan Oil Field, Offshore Iran Persian Gulf. (Sept-2017)

- QC of reports & Charts

National Iranian Oil Company (NIOC). - As-installed survey for 32”/4.5’’ phase 13B export pipeline at South pars Gas Field, Offshore Iran, Persian Gulf

- QC of reports & Charts

National Iranian Oil Company (NIOC). - Pre-lay survey for proposed 18” infield pipeline from SPD 13D to SPD13A at South Pars Field, Offshore Iran, Persian Gulf.

- QC of reports & Charts

Halani International Limited -As a lead Geophysicist for anchor clearance survey services for Life Extension Well Platform Project2 (LEWP2) on board MV Saga at Mumbai High, West Coast of India. (April 2017)

- Data acquisition, Processing & Reporting

Avantgrade & Tuff offshore -As a lead Geophysicist for Sub-bottom Profiler survey for mooring anchors of FPSO onboard MV Diamond Discovery at South Pars field Iran. (Nov-2016-Jan-2017).

- Data acquisition, Processing & Reporting

BG Exploration & Production India Pvt Ltd -As a lead geophysicist for pre rig move seabed survey onboard VM Pioneer at Tapti field East coast of India. (October-2016)

- Data acquisition, Processing & Reporting

H-Energy -As a lead Geophysicist for Pre-engineering survey of sub-sea pipeline east coast of LNG Project at Off Digha, West Bengal East coast of India. (May-2016)

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- Data acquisition, Processing & Reporting

J.RAY Mcdermott.SA -As a lead Geophysicist for Pre-engineering Geophysical and geotechnical survey services for Vashishta and S1 Development Project, Vashista field East coast of India for. (March -2016)

- Data acquisition, Processing & Reporting

ONGC-As a lead Geophysicist for external Inspection survey of submarine pipelines at Mumbai Offshore, West coast of India. (December-205-February-2016)

- Data acquisition, Processing & Reporting

Swiber Offshore -As a lead Geophysicist for Pre-construction and anchor clearance survey for ONGCL's pipeline replacement project -4 season-1 at Mumbai high, Bassein, Heera and Neelam fields, West cost of India.(October-November-2015)

- Data acquisition, Processing & Reporting

Alcatel –lucent -As a lead Geophysicist for Pre-engineering survey for Sulaweisi Maluku papua cable system package 1/phase 2 for submarine networks Ltd at Indonesia. (September 2015)

- Data acquisition, Processing & Reporting

Mumbai Port Trust -As a lead Geophysicist for Pipeline Inspection and CP survey for MBPT pipelines from Jawahar dweep to Pirpau, Mumbai West Coast of India. (June-2015)

- Data acquisition, Processing & Reporting

ONGC-As a lead Geophysicist for Pre-engineering survey of Proposed Pipeline Route 22'' Gas export pipeline at, Ravva field East Coast of India. (May-2015)

- Data acquisition, Processing & Reporting

TE Subsea Communications LLC -As a lead Geophysicist for Pre-engineering survey of AAE-1Cable system Segment S-1S.6 BMH Mumbai to BU India at Mumbai West coast of India. (April-2015)

- Data acquisition, Processing & Reporting

TL Offshore Sdn.Bhd -As a lead Geophysicist for As-laid survey of MB Platform and Pipeline Project onboard PB Komata at Panna / Mukta field West coast of India. (December-2014)

- Data acquisition, Processing & Reporting

Indian Oil Corporation Limited -As a lead Geophysicist for Pipeline Inspection Survey onboard Gangeshwar-1 at PHBPL, off Paradip, East Coast of India. (November-2014)

- Data acquisition, Processing & Reporting

Leighton India Pvt. Ltd.-As a lead Geophysicist for Pre-construction and Anchor clearance Survey onboard MV Flamboyan for ONGCL's Additional Pipeline Project (APP) at Mumbai High, Heera, Neelam and Bassein fields West Coast of India (October-2014)

- Data acquisition, Processing & Reporting

Leighton India Pvt.Ld -As a lead Geophysicist for Pre-construction and Anchor clearance Survey onboard MV Flamboyan for ONGCL's Heera Redevelopment Project (HRD) at Heera field West Coast of India (October -2014)

- Data acquisition, Processing & Reporting

Leighton India Pvt. Ltd. -As a lead Geophysicist for Pre-construction and Anchor clearance Survey on board MV Flamboyan for ONGCL's Pipeline Replacement Project (PRP) at Mumbai High, Heera, Neelam and Bassein fields, West Coast of India (October -2014)

- Data acquisition, Processing & Reporting

Leighton India Pvt. Ltd. -As a lead Geophysicist for As-built and CP Survey on board MV Albatross-19 of newly laid pipelines for ONGCL's Additional Pipeline Project (APP) at Mumbai High, Heera, Neelam and Bassein fields, West Coast of India (April- May2014)

- Data acquisition, Processing & Reporting

Leighton India Pvt. Ltd -As a lead Geophysicist for As-built and CP Survey on board MV Albatross-19 of newly laid pipelines for ONGCL's Heera Redevelopment project (HRD) at Heera field, West Coast Of India (April-May2014)

- Data acquisition, Processing & Reporting

Leighton India Pvt. Ltd -As a lead Geophysicist for As-built and CP Survey on board MV Albatross-19 of newly laid pipelines ONGCL's Pipeline Replacement Project (PRP-3) Season 2 at Mumbai High, & Neelam fields West Coast of India. (April- May2014)

- Data acquisition, Processing & Reporting

Leighton India Pvt. Ltd -As a lead Geophysicist for As-built and CP Survey on board MV Albatross-19 of newly laid pipelines ONGCL's Pipeline Replacement Project (PRP-3) Season-1 at Mumbai High,Heera,Neelam and Bassein fields West Coast of India.(April- May2014)

- Data acquisition, Processing & Reporting

Leighton India Pvt. Ltd -As a lead Geophysicist for As-laid Survey on board MV Albatross-19 of newly laid pipelines for ONGCL's Heera Redevelopment project (HRD) PhaseII at Heera field West Coast of India. (April-May2014)

- Data acquisition, Processing & Reporting

Leighton India Pvt. Ltd -As a lead Geophysicist for As-laid Survey on board MV Albatross-19 of newly laid pipelines ONGCL's Pipeline Replacement Project (PRP-3) Season-2 at Mumbai High and Neelam fields West Coast of India
(April- May2014)

- Data acquisition, Processing & Reporting

Leighton India Pvt. Ltd -As a lead Geophysicist for As-laid Survey on board MV Albatross-19 of newly laid pipelines ONGCL's Pipeline Replacement Project-III (PRP-3) Season-1 at Mumbai High, Heera, Neelam and Bassein fields West Coast of India (April- May2014)

- Data acquisition, Processing & Reporting

Leighton India Pvt. Ltd -As a lead Geophysicist for As-laid Survey on board MV Albatross-19 of newly laid pipelines for ONGCL's Additional Pipeline Project (APP) at Mumbai High, Heera, Neelam and Bassein fields West Coast of India. (April- May2014)

- Data acquisition, Processing & Reporting

Consortium of and Pipavav Defense and offshore Engg.Co.Ltd -As a lead Geophysicist for Pre-engineering survey on board MV SCI-03 for of C24WHP location sagar Pragati conversion Project South Tapti Field,West coast of India.(March-2014)

- Data acquisition, Processing & Reporting

Swiber at Madura offshore -As lead Geophysicist for As-built survey on board MV Logindo Overcomer for Santos offshore pipeline & well head platform Peluang field development project at Surabaya Indonesia. (January & February-2014)

- Data acquisition, Processing & Reporting

Leighton Welspun Contractors Pvt.Ltd -As a lead Geophysicist for Pre-construction and Anchor clearance Survey on -board MV Albatross-19 for ONGCL's Additional Pipeline Project (APP) at Mumbai High, Heera, Neelam and Bassein fields West Coast of India (October-November-2013)

- Data acquisition, Processing & Reporting

Leighton Welspun Contractors Pvt.Ltd -As a lead Geophysicist for Pre-construction and Anchor clearance Survey on board MV Albatross-19 for ONGCL's Heera Redevelopment project (HRD) Phase-II at Heera field West Coast of India for (October-November-2013)

- Data acquisition, Processing & Reporting

Leighton Welspun Contractors Pvt.Ltd -As a lead Geophysicist for Pre-construction and Anchor clearance Survey on board MV Albatross-19 for ONGCL's Pipeline Replacement Project (PRP-3) Season-II at Mumbai High, & Neelam fields West Coast of India (October-November-2013)

- Data acquisition, Processing & Reporting

BGEPIL -As a lead Geophysicist for Pre–rig move Site Survey onboard MV Poorna at Tapti and Panna Field, India West Coast (September-October - 2013)

- Data acquisition, Processing & Reporting

ONGC-As a lead Geophysicist for open site pre-rig move survey on board SCI 06 at East Coast of India. (June - 2013)

- Data acquisition, Processing & Reporting

ONGC-As a lead Geophysicist for open site pre-rig move survey on board Yushodhaya at East Coast of India. (April - 2013)

- Data acquisition, Processing & Reporting

ONGC-As a lead Geophysicist for open site pre-rig move survey on board Integrated Vessel MV Flamboyan at West Coast of India (January- March-2013)

- Data acquisition, Processing & Reporting

ONGC-As a lead Geophysicist for open site pre-rig move survey on board Lotus - 1 at East Coast of India. (October-2012)

- Data acquisition, Processing & Reporting

ONGC -As a lead Geophysicist for open site pre-rig move survey onboard Integrated Vessel MV Flamboyan at West Coast of India. (September-October-2012)

- Data acquisition, Processing & Reporting

Leighton Welspun Contractors Pvt.Ltd -As a lead Geophysicist for As-built & CP survey for 48'' pipeline SPM & associated facilities project at Mangalore, West Coast of India. (July-August-2012)

- Data acquisition, Processing & Reporting

ONGC -As a lead Geophysicist for Open site pre-rig move survey onboard Captain FM Juvale East Coast of India (July-2012)

- Data acquisition, Processing & Reporting

ONGC -As a lead Geophysicist for Open site platform survey, pre-rig move survey, pipeline route survey onboard Integrated Vessel MV Flamboyan at East Coast of India. (April-May- 2012)

- Data acquisition, Processing & Reporting

ONGC -As a lead Geophysicist for Open site platform survey, pre-rig move survey, pipeline route survey onboard Integrated Vessel MV Flamboyan at West Coast of India. (April-2012)

- Data acquisition, Processing & Reporting

ONGC-As a lead Geophysicist in Open site platform survey, pre-rig move survey, pipeline route survey onboard Integrated Vessel MV Flamboyan at West Coast of India. (January- March-2012)

- Data acquisition, Processing & Reporting

ONGC -As a lead Geophysicist for Open site platform survey, pre-rig move survey, pipeline route survey at West Cost of India. (November -December-2011)

- Data acquisition, Processing & Reporting

ONGC-As a lead Geophysicist for Pre-Rig move Site Survey onboard Integrated Vessel MV Flamboyan at Mumbai High field (September-October-2011)

- Data acquisition, Processing & Reporting

Hind Offshore Pvt. Ltd- As a lead Geophysicist for Pre-Seismic Seabed Hazard Survey in GK-OSN-2009/1 & 2 Block onboard MV Time Trader at Gujarat, West Coast of India. (January-March-2011)

- Data acquisition, Processing & Reporting

Swiber Offshore Construction Pte Ltd -As a lead Geophysicist for Pre-construction and anchor clearance survey at Mumbai High field, West Coast of India for. (December-2010)

- Data acquisition, Processing & Reporting

ONGC-As Geophysicist on External Acoustic Inspection and CP survey of Sub Sea Pipeline in Western Offshore using ROTV and ROV at Mumbai High (October-November-2010)

- Data acquisition, Processing & Reporting

Swiber offshore Pte Ltd -Pre engineering Survey of Pipeline Routes of ONGC's north Tapti Oil field at West Coast Of India for.(April 2010)

- Data acquisition, Processing & Reporting

Gujarat State Petroleum Corporation (GSPC) - Seabed Engineering survey for Process platform (PLQP) and associated pipeline route survey for Deen Dayal Field Project at KG-OSN-2001/3 Exploration Block west Coast of India for (March 2010)

- Data acquisition, Processing & Reporting

Indian Oil corporation Limited -Seabed Engineering Investigations for SPM and associated submarine Pipeline systems off Paradip, East Coast of India. (Dec 2009-Jan 2010)

- Data acquisition, Processing & Reporting

Valentine Maritime (Mauritius) Ltd- Pre- Engineering survey for ONGC's MHN pipelines and modification Project at Mumbai High field for Consortium. (October 2009-December 2009)

- Data acquisition, Processing & Reporting

Hercules Offshore-Seabed survey at Kakkinada Inner anchorage, East Coast of India. (Aug-2009)

- Data acquisition, Processing & Reporting
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Grasim Ultra Cement industries Gujarat-Seabed Survey for feasibility study to set up a Cement Jetty at Bhavnagar, West Coast of India. (January-2009)

Gujarat Adani Port Ltd -Pre-engineering survey in Adani port at Off Mundra, Gulf of kutch West Coast of India (October-2008)

- Data acquisition, Processing & Reporting

MBPT (Mumbai Port Trust) - Shallow seismic survey onboard MV Maaldar Tiger at Pirpau, Mumabi, West Coast of India for (April-2008)

- Data acquisition, Processing & Reporting

Vikram Ispat - Wreck Investigation Survey onboard MV Snehal at off Khanderi Island. (December-2007)

- Data acquisition, Processing & Reporting

RESUME

Meiyappan Gangadharan

Job Title: Data Processor

PERSONAL INFORMATION

Nationality Indian

Profile Experienced Data Processor / CAD Processor with over 7 Years and 10 months in Fugro Survey of India, Mumbai and Daniel Survey, UAE.

- Base and Offshore Data processor, Cad Processor
- Leading Offshore Data Processor
- 7 years and 10 months
- Qatar, UAE, Oman, Offshore Iran, Various Fields in India

Education Qualifications

- MSc Applied Geology (2008-2010), Periyar University, Salem.
- BSc Applied Geology (2005-2008), Periyar University, Salem.

Training/Skills

Equipment Proficiency

Single Beam Echo sounders: Echotrac DF 3200, Simrad ES 600
Multi Beam Echo sounders: Simrad EM3002, Reson Seabat 7101, 7125, 8125, Reson T20-P, R2 Sonic 2020& 2024, Geoswath+, Kongsberg EM2040, Norbit iWBMSh Single Head

Software

- Marine Data Processing: Fugro's Starfix 9.1 Processing Suite (VBA Proc, Workbench, Multibeam Backscatter, Tide, Cast, Swath Edit, Data IO, MBE Calib, Geo, Projgen), Caris Hips and Sips 7.1, Qinsy 8.1, Hydropro (Datum Conversion).

- GIS : Arc GIS 9.2, Arc GIS 9.3, Map Info 6.0, LIDAR, Surfer 8.0, Visual Modflow 4.2, Aqua Chem 4.0

- Auto Cad : Auto Cad 2015, 2013, 2011, 2010 2007, 2005, Auto Chart 2007, 2005, Micro Station, Geomedia, Starfix NG charting

- Data base : Microsoft Access

- Operating System : Window 98, 2000, Xp, Windows 7, Windows 8, Windows 10.
- Other Literacy : CILP (One-year duration Computer and Internet Program conducted in Govt. Arts College, Salem-7.)

Training Courses

- Behavioral Training
- HSE Training

1. Personal Safety and Social Responsibilities (2013)
2. Proficiency in Survival Techniques (2013)
3. Elementary First Aid (2013)
4. Fire Prevention and Fire Fighting (2013)
5. Helicopter Underwater Escape Training (2013)

- Occupational Training

1. Induction to Marine Survey (2013)
2. Micro station Charting Course (2013)
3. AutoCAD Basic Course (2013)
4. Charting of Marine Survey Data (2013)
5. Starfix 9.1 (SBE and MBE Data Processing) (2013)
6. Multibeam Data Processing (2013)

- OPITO Certifications

1. BOSIET - 2018 (Valid up to 10/06/2022)
2. Basic H2S - 2020
3. ADNOC Safety Induction - 2018

- Medical Certifications

1. Offshore Medical - 2020
2. ADMA Medical - 2018

Languages spoken	Native	Tamil
	Fluent	Hindi, English

Current responsibilities Fugro Survey Middle East

Data Processor: Responsible to ensure the processing and drafting activities required by different projects are carried out in accordance with the instructions and priorities given by the supervisor.

Projects Undertaken:

Sept 20 - Jan 21:	Job No: MCB001, Vessel Name: MV Fugro Proteus, Client Name: AL GIHAZ Contracting, Worked As: Data Processor / CAD Processor, Project Description: Prelay Survey of Electricity Supply to Hawar Island, 66 kV Subsea Cable Installation (Marine Geophysical & UXO Surveys) – Hawar Island, Kingdom of Bahrain.
Aug 20:	Job No: MRQ051, Vessel Name: MV Fugro Proteus, Client Name: Qatar Petroleum / Saipem, Worked As: Data Processor / CAD Processor, Project Description: Pre-Installation Clearance Survey of Proposed WHJ-U08C Jacket and Temporary Deck - Idd El Shargi Field, State of Qatar.
July - Aug 20:	Job No: MRQ049, Vessel Name: MV Fugro Proteus, Client Name: Qatar gas Operating Company Limited, Worked As: CAD Processor, Project Description: Geophysical Work Scope for Drill Centres in Support of NFS – Offshore Ras Laffan, State of Qatar.
Jan - Feb 20:	Job No: RINQ031, worked at office, Client Name: Qatar Shell GTL Limited, Worked in Video Review and Charting using Starfix Edit, Data IO and AutoCAD, Project Description: ROV Pipeline Inspection Survey Pearl Pipelines

	NFP1, NFP2, Platform Pearl 1, Pearl 2 and Fibre Optic Cables FOC1, FOC2, FOC3 - North Field, State of Qatar.
Dec 19 - Jan 20:	Job No: MRQ045, Vessel Name: MV Pacific Grouse, Client Name: Qatar gas Operating Company Limited, Worked As: Data Processor using Starfix Vba Proc, Project Description: North Field Production Sustainability (NFPS) 2D UHR Seismic Survey for 9 Compression Platforms and 6 Riser Platforms - North field, State of Qatar.
Sept - Oct 19:	Job No: RINQ020, Vessel Name: MV Nor Spring, Client Name: McDermott Eastern Hemisphere Limited, Worked As: CAD Processor using Starfix NG, Project Description: ROV Prelay, Touchdown Monitoring and As-laid surveys, Bul Hanine Redevelopment (Phase 1B) Project – Bul Hanine field, State of Qatar.
June - July 19:	Job No: MRQ034, Vessel Name: MV Allianz Zeus, Client Name: McDermott Eastern Hemisphere Limited, Worked As: MBES Data Processor and CAD, Project Description: Pre-Construction Anchor Clearance (Geophysical) Survey, Bul Hanine Redevelopment (Phase 1B) Project – Bul Hanine field, State of Qatar.
May - June 19:	Job No: CPQ042, Vessel Name: MV Nor Spring, Client Name: McDermott Eastern Hemisphere Limited, Worked As: Reporting Coordinator, Project Description: ROV Prelay, Touchdown Monitoring and As-laid surveys, Bul Hanine Redevelopment (Phase 1B) Project – Bul Hanine field, State of Qatar.
Apr - May 19:	Job No: MRQ037, Vessel Name: MV Fugro Adventurer, Client Name: Qatar Petroleum Development, Worked As: MBES Data Processor and CAD, Project Description: Geophysical and Geotechnical Survey for QPD Plem Area – Plem, Bul Hanine field, State of Qatar.
Nov 18 - Jan 19:	Job No: MRQ025, Vessel Name: MV Fugro Proteus, Client Name: Qatar Gas Operating Company, Worked As: MBES Data Processor and CAD, Project Description: Pipeline Geophysical Survey – North Field Production Sustainability (NFPS), RGE Looping (I2P2) Project, North Field, State of Qatar.
Aug-Sept 18:	Job No: MRU068, Vessel Name: MV Bes Sparkle, Client Name: Bechtel International Co. Ltd., Worked As: MBES Data Processor and CAD, Project Description: Offshore Survey Feed Services for Hail and Ghasha Development, UAE
June-July 18:	Charting and making diagrams for various projects in the office.

Experience with Daniel Surveying FZC, UAE:

Jan-Apr 18:	Database & Seabed Feature Updating - For different fields in Persian Gulf, offshore Iran, from various projects.
Dec 17:	Charting – Geophysical Sidescan Sonar Survey for Locating Sunken Containers, at Jebel Ali Anchorage, Offshore UAE for Mubarak Marine LLC.
	Charting – Geophysical Site Survey at WHP2 & WHP3 Platforms at Offshore Iran, Persian Gulf for Drilling Company International (DCI).
Nov 17:	Charting – Metrology Survey Services at Phase 22-24A, South Pars Gas field, Offshore Iran, Persian Gulf for Spec Ship Management LLC.

Charting – Geophysical Site Survey at F-13 Platform, Foroozan field, S1 Platform at Salman Field, W4 Platform at Reshadat Field, D7 Platform at Dorood Field, Offshore Iran, Persian Gulf for Drilling Company International (DCI).

Charting – Pre-Engineering Survey for Fibre Optic Cable Route Between Platforms at South Pars Gas Field, Offshore Iran, Persian Gulf for RAYA Company.

Oct 17: As a Second Data Processor - (Reson T20-P) - Multibeam Processing with Caris Hips & Sips and Calibration Report & Chart preparation in M/V DS Provider II for Iranian Offshore Engineering and Construction Company (IOEC) for As-Laid Survey job in South Pars Gas Field of Offshore Iran, Persian Gulf.

As a Second Data Processor - (Reson T20) - Multibeam Processing with Caris Hips & Sips and Calibration Report & Chart preparation in M/V DS Provider II for Drilling Company International (DCI) for Geophysical Site Survey jobs in Foroozan field of Offshore Iran, Persian Gulf.

As a Second Data Processor - (Reson T20-P) - Multibeam Processing with Caris Hips & Sips and Calibration Report & Chart preparation in M/V DS Provider II for L&T Hydrocarbon Engineering for Preconstruction & Anchor Clearance Survey jobs in Various fields (Foroozan & Salman oil field) of Offshore Iran, Persian Gulf.

Sept 17: As a Second Data Processor - (Reson T20-P) - Multibeam Processing with Caris Hips & Sips and Calibration Report & Chart preparation in M/V DS Provider II for Iranian Offshore Engineering and Construction Company (IOEC) for As-Laid Survey job in South Pars Gas Field of Offshore Iran, Persian Gulf.

As a Second Data Processor - (Reson T20) - Multibeam Processing with Caris Hips & Sips and Calibration Report & Chart preparation in M/V DS Provider II for Drilling Company International (DCI) for Geophysical Site Survey jobs in Foroozan field of Offshore Iran, Persian Gulf.

As a Second Data Processor - (Reson T20-P) - Multibeam Processing with Caris Hips & Sips and Calibration Report & Chart preparation in M/V DS Provider II for L&T Hydrocarbon Engineering for Preconstruction & Anchor Clearance Survey jobs in Various fields (Foroozan & Salman oil field) of Offshore Iran, Persian Gulf.

Aug 17: Charting – Pre-Engineering Pipeline Route Survey for Phase 16 at South Pars Gas field, Offshore Iran, Persian Gulf for Iranian Offshore Engineering and Construction Company (IOEC).

July 17: Charting – High Resolution MBE & ROV Survey for Leak Detection at Phase16 Pipeline, South Pars Gas field, Offshore Iran, Persian Gulf for Iranian Offshore Engineering and Construction Company (IOEC).

Experience with Fugro Survey India:

Mar-Apr 17: As a Lead Data Processor - (Reson 8125) - Multibeam Processing and Calibration Report preparation & Onboard Charting in Fugro Mapper vessel for ONGC for Pre-Rig Move Site Survey & Pre-Engineering Route Survey jobs in Mumbai high, Bassein, Heera, Neelam, Ratna, Daman & Tapti.

Feb 17: Charting - Wreck Investigation Survey, Mormugao Port, Goa, West Coast of India for Smit Singapore PTE LTD.

	As a Lead Data Processor - (Reson 8125) - Multibeam Processing and Calibration Report preparation & Onboard Charting in Fugro Mapper vessel for ONGC for Pre-Rig Move Site Survey & Pre-Engineering Route Survey jobs in Mumbai high, Bassein, Heera, Neelam, Ratna, Daman & Tapti.
Jan 17:	As a Lead Data Processor - (R2Sonic 2020) - Multibeam Processing and Calibration Report preparation in ML Joseph Anselmo for Wreck Investigation Survey, Mormugao Port, Goa, West Coast of India for Smit Singapore PTE LTD.
	Charting - Wreck Investigation Survey, Mormugao Port, Goa, West Coast of India for Smit Singapore PTE LTD.
Oct-Nov 16:	As a Lead Data Processor - (Geoswath 125Khz) - Multibeam Processing and Calibration Report preparation in MV FLAMBOYAN for Pre-Installation Survey Mumbai High south Redevelopment Phase-III Project (MHSRD III), Mumbai High and NBP Fields, West Coast of India for Sapura Kencana.
	As a Lead Data Processor - (Geoswath 125Khz) - Multibeam Processing and Calibration Report preparation in MV FLAMBOYAN for Anchor Clearance Survey Service for Life Extension well Platforms Project 1 (LEWP1) & (LEWP2), Mumbai High Field, West Coast of India for Halani International Ltd.
	As a Lead Data Processor - (Geoswath 125Khz) - Multibeam Processing and Calibration Report preparation in MV FLAMBOYAN for Pre-Engineering Survey, B127 Cluster Pipelines Development Project, Mumbai High, Heera & Bassein Fields, West Coast of India for L&T.
Sep 16:	Charting - Pre-Installation Survey Mumbai High south Redevelopment Phase-III Project (MHSRD III), Mumbai High and NBP Fields, West Coast of India for Sapura Kencana.
	Charting - Pre-lay survey for Vashista & S1 Development Project, Kakinada, East Coast of India for McDermott.
Apr-Aug 16:	On Deputation to Fugro Survey (Middle East) as an Office Data Processor on Charting for various projects surveyed in Saudi region.
Mar 16:	Charting - ONGC for External Acoustic Inspection and CP survey of submarine pipelines at Mumbai Offshore, West coast of India.
	On Deputation to Fugro Survey (Middle East) as an Office Data Processor on Charting for various projects surveyed in Saudi region.
Feb 16:	As a Lead Data Processor - (Reson 8125) - Multibeam Processing and Calibration Report preparation in Kamrup vessel for ONGC for External Acoustic Inspection and CP survey of submarine pipelines at Mumbai Offshore, West coast of India.
Jan 16:	As a Lead Data Processor - (R2sonic 2020) - Multibeam Processing and Calibration Report preparation in Ganga dolphin vessel for ONGC for External Acoustic Inspection survey of submarine pipelines at Mumbai Offshore, West coast of India.
	As a Lead Data Processor - (Reson 8125) - Multibeam Processing and Calibration Report preparation in Kamrup vessel for ONGC for External Acoustic Inspection and CP survey of submarine pipelines at Mumbai Offshore, West coast of India.
Oct-Nov 15:	On Deputation to Fugro Survey (Middle East) as an Office Data Processor on Charting for various projects surveyed in Saudi region.

Sep 15:	As a Cad Operator in Seacore Mariner vessel for Cable Route Survey job in Oman.
	On Deputation to Fugro Survey (Middle East) as an Office Data Processor on Charting for various projects surveyed in Saudi region.
Aug 15:	Database Updating - As-built & CP Survey for Pipeline Replacement Project-3 Season II Project, As-built & CP Survey for HRD II Project, As-built & CP Survey for Additional Pipeline Project (APP) Project, Mumbai High, West Coast of India for Leighton Welspun Contractors Pvt. Ltd.
	As a Cad Operator in Seacore Mariner vessel for Cable Route Survey job in Oman.
July 15:	Database Updating - As-built & CP Survey for Pipeline Replacement Project-3 Season II Project, As-built & CP Survey for HRD II Project, As-built & CP Survey for Additional Pipeline Project (APP) Project, Mumbai High, West Coast of India for Leighton Welspun Contractors Pvt. Ltd.
Apr-May 15:	As a Lead Data Processor - (Reson Seabat 7125 & Geoswath+) - Multibeam Processing and Calibration Report preparation & Onboard Charting in Jaya Durga-1 vessel for ONGC for Pre-Rig Move Site Survey jobs in Off Kakinada, East Coast of India.
Mar 15:	As a Lead Data Processor - (Reson Seabat 7125) - Multibeam Processing and Calibration Report preparation in Chandra Jupiter vessel for CGG Veritas for various Seabed Hazard clearance Survey at FPSO Location in Mumbai high.
	As a Lead Data Processor - (Reson Seabat 7125 & Geoswath+) - Multibeam Processing and Calibration Report preparation & Onboard Charting in Jaya Durga-1 vessel for ONGC for Pre-Rig Move Site Survey jobs in Off Kakinada, East Coast of India.
Feb 15:	Charting - As-Built, Free Span and Cathodic Protection Survey of Subsea Pipelines in Ravva Field, East Coast of India for Cairn India.
	As a Lead Data Processor - (Reson Seabat 7125) - Multibeam Processing and Calibration Report preparation in Chandra Jupiter vessel for CGG Veritas for various Seabed Hazard clearance Survey at FPSO Location in Mumbai high.
Dec14-Jan 15:	As a Lead Data Processor - (Geoswath+) - Multibeam Processing and Calibration Report preparation in M.V. Coast Emerald vessel for Geotek Sciences for Pre-Seismic Bathy Survey jobs in Tapti Daman.
Sept-Nov 14:	As a Lead Data Processor - (R2Sonic 2024) - Multibeam Processing and Calibration Report preparation & Onboard Charting in Vanessa- XI vessel for ONGC for Pre-Rig Move Site Survey jobs in Mumbai high, Bassein, Heera, Neelam & Tapti.
June-Aug 14:	As a Second Data Processor - (Reson Seabat 7101) - Multibeam Processing and Calibration Report preparation in Pacific Pilot vessel for Ras Gas, Qatar for various Preconstruction & Pipeline Inspection Survey jobs in Qatar North Field, Qatar.
May 14:	Charting - Multibeam Bathymetry Survey (Ship Wreck Survey) job in South of Sagar Island, West Bengal, East Coast of India for Smit Contracting Services Pte. Ltd.
	As a Lead Data Processor - (Reson Seabat 7125) - Multibeam Processing and Calibration Report preparation in Albatross-19 vessel for Leighton for various As Built and CP Survey jobs in Mumbai high, Bassein and Heera.

Apr 14:	As a Lead Data Processor - (R2Sonic 2020 & R2Sonic 2024) - Multibeam Processing and Calibration Report preparation in Konark II vessel for Punj Lloyd for Touch Down Monitoring Survey job in Yanam Field, Kakinada, East Coast of India.
	As a Lead Data Processor - (R2Sonic 2020) - Multibeam Processing and Calibration Report preparation in MFV Capricorn vessel for Smit Contracting Services Pte. Ltd. for Multibeam Bathymetry Survey (Ship Wreck Survey) job in South of Sagar Island, West Bengal, East Coast of India.
	Charting - Multibeam Bathymetry Survey (Ship Wreck Survey) job in South of Sagar Island, West Bengal, East Coast of India for Smit Contracting Services Pte. Ltd.
	Database Updating - Pre-Construction & Anchor Clearance Survey PRP-3 Project Mumbai High, West Coast of India for Leighton Welspun Contractors Pvt. Ltd.
	Database Updating - Pre-Construction & Anchor Clearance Survey for B127 Cluster Well Platform Project Mumbai High, Bassein Field West Coast of India for National Petroleum Construction Company.
	Database Updating - Pre-Construction & Anchor Clearance Survey for ONGCL's B-127 Cluster Pipeline Project Bassein Field West Coast of India for Punj Lloyd.
	Database Updating - Pre-Construction & Anchor Clearance Survey for ONGCL's Heera Re-development Project Heera Field West Coast of India for Leighton Welspun Contractors Pvt. Ltd.
	Database Updating - Pre-Construction & Anchor Clearance Survey for ONGCL's Cluster 7 Pipeline Project Mumbai High Field West Coast of India for Swiber Offshore Construction Pte. Ltd.
Feb-Mar 14:	As a Lead Data Processor - (R2Sonic 2020 & R2Sonic 2024) - Multibeam Processing and Calibration Report preparation in Konark II vessel for Punj Lloyd for Touch Down Monitoring Survey job in Yanam Field, Kakinada, East Coast of India.
Jan 14:	As a Lead Data Processor - (Reson Seabat 7125) - Multibeam Processing and Calibration Report preparation in Hanuman Krupa vessel for GCPTCL, Petronet LNG for various Bathymetry & Geophysical Survey jobs in Dahej Field in Gujarat.
	As a Lead Data Processor - (R2Sonic 2024) - Multibeam Processing and Calibration Report preparation in Albatross-19 vessel for LWIN, Essar Offshore Subsea Ltd, for various Pre-Construction & Anchor Clearance, As-laid jobs in Tapti, Mumbai high, Bassein, Heera & Neelam.
	Charting - Pre-Installation & Anchor Clearance Survey C-26 Cluster and B-173A-B Well Platform project Tapti And Neelam Field West Coast of India for Essar Offshore Subsea Ltd.
Dec 13:	As a Lead Data Processor - (Reson Seabat 7125) - Multibeam Processing and Calibration Report preparation in Hanuman Krupa vessel for GCPTCL, Petronet LNG for various Bathymetry & Geophysical Survey jobs in Dahej Field in Gujarat.
Oct-Nov 13:	As a Second Data Processor - (Reson Seabat 7125) – Multibeam Processing

and Calibration Report preparation in Albatross-19 vessel for LWIN, Punj Lloyd, Leighton, for various Pre- Construction & Anchor Clearance jobs in Mumbai high, Bassein and Heera & Neelam.

Sep 13:

Charting - Pre-Construction & Anchor Clearance Survey Ongcl's Heera Re-Development Project – Phase II Heera Field West Coast of India for Leighton Welspun Contractors Pvt. Ltd.

Charting - Pre-Construction & Anchor Clearance Survey Ongcl's Additional Pipeline Project Mumbai High, Bassein, Heera & Neelam Fields West Coast of India for Leighton Welspun Contractors Pvt. Ltd.

Charting - Pre-Construction & Anchor Clearance Survey Ongcl's Pipeline Replacement Project-Iii (Prp-3), Season 2 Mumbai High and Neelam Fields West Coast of India for Leighton Welspun Contractors Pvt. Ltd.

Aug 13:

Database Updating - Pre-Engineering Survey Ongcl's Heera Re-Development Project - Phase II Heera Field West Coast of India for Leighton Welspun Contractors Pvt. Ltd.

Database Updating - Pre-Engineering Survey Ongcl's Additional Pipeline Project Mumbai High, Bassein, Heera & Neelam Fields West Coast of India for Leighton Welspun Contractors Pvt. Ltd.

Database Updating – Pre-Engineering Survey ONGCL's B-127 Cluster Pipeline Project west coast of India for PUNJ LLOYD LTD.

Database Updating - As-Built Survey of Newly Laid Pipelines for Ongcl's Cluster Pipeline Project Mumbai High Field West Coast of India for Consortium of Swiber Offshore (India) Pvt. Ltd.

Database Updating – Post construction Debris Clearance Survey ONGL's Development of WO-16 Cluster and SB-14 wellhead Platform Project Bassein and Satellite Fields West coast of India.

Database Updating – As laid Survey WO – 16 Satellite field Bassein Project West coast of India PUNJ LLOYD LTD.

Database Updating – As Laid Survey in Mumbai High & Neelam field West Coast of India for Leighton Welspun Contractors Pvt. Ltd.

Database Updating – Hiring of Integrated Vessel (M/V FLAMBIOYAN) by ONGCL for Providing survey services at West Coast of India.

Charting - Pre-Engineering Survey Pipeline Replacement Project - III (Prp-3), Phase 2, Mumbai High and Neelam Fields West Coast of India for Leighton Welspun Contractors Pvt. Ltd.

Charting - Pre-Engineering Survey Ongcl's Heera Re-Development Project - Phase II Heera Field West Coast of India for Leighton Welspun Contractors Pvt. Ltd.

Charting - Pre-Engineering Survey Ongcl's Additional Pipeline Project Mumbai High, Bassein, Heera & Neelam Fields West Coast of India for Leighton Welspun Contractors Pvt. Ltd

July 13:

Charting - As-Built Survey of Newly Laid Pipelines for Ongcl's Cluster Pipeline Project Mumbai High Field West Coast of India for Consortium of Swiber Offshore (India) Pvt. Ltd.

	Charting - Post-construction (As-built) Survey for the Subsea Composite Cable Routes Project Mumbai High Field West Coast of India for Dolphin Offshore Enterprises (India) Ltd.
	Single Beam Processing – Seabed Site Survey East Coast of India for ONGC.
	Database Updating - Pre-Engineering Survey Pipeline Replacement Project - III (Prp-3), Phase 2, Mumbai High and Neelam Fields West Coast of India for Leighton Welspun Contractors Pvt. Ltd.
	Database Updating - Pre-Engineering Survey Ongcl's Heera Re- Development Project - Phase II Heera Field West Coast of India for Leighton Welspun Contractors Pvt. Ltd.
June 13:	Charting & Bathy Report - Pre-Engineering Survey Ongcl's Additional Pipeline Project Mumbai High, Bassein, Heera & Neelam Fields West Coast of India for Leighton Welspun Contractors Pvt. Ltd.
	Charting - Pre-Engineering Survey Subsea Pipeline Off Digha, West Bengal East Coast of India for Hiranandani Gas Company Pvt. Ltd.
	Charting - Pre-Engineering Survey Ongcl's Heera Re-Development Project - Phase II Heera Field West Coast of India for Leighton Welspun Contractors Pvt. Ltd.
May 13:	Charting - Pre-Engineering Survey Pipeline Replacement Project - III (Prp-3), Phase 2, Mumbai High and Neelam Fields West Coast of India for Leighton Welspun Contractors Pvt. Ltd.
	Charting - Pre-Engineering Survey Ongcl's Heera Re-Development Project - Phase II Heera Field West Coast of India for Leighton Welspun Contractors Pvt. Ltd.
	Charting - Pre-Engineering Survey Ongcl's Additional Pipeline Project Mumbai High, Bassein, Heera & Neelam Fields West Coast of India for Leighton Welspun Contractors Pvt. Ltd.
	Charting – As-Built Survey, B-193 Process Platform Project, Bassein Field, West Coast of India for Swiber Offshore Const Pte Ltd.
	Charting – Pre-Engineering Survey ONGCL's B-127 Cluster Pipeline Project west coast of India for PUNJ LLOYD LTD.
	Charting - Pre-Engineering Survey Subsea Pipeline Off Digha, West Bengal East Coast of India for Hiranandani Gas Company Pvt. Ltd.
	As a Trainee Data Processor - (Reson Seabat 7125) - Multibeam Processing and Calibration Report preparation in Albatross-19 vessel for Swiber, Punj Lloyd, Leighton, NPCC and Bhumiarmada for various Pre-Engineering, As-Laid, As-Built and Post Construction jobs in Mumbai high, Tapti, Bassein and Heera & Neelam.
	Charting - Baku Seaport Survey.
Apr 13:	Charting - Pre-Engineering Survey Pipeline Replacement Project - III (Prp-3), Phase 2, Mumbai High and Neelam Fields West Coast of India for Leighton Welspun Contractors Pvt. Ltd.

	Charting - Pre-Engineering Survey Subsea Pipeline Off Digha, West Bengal East Coast of India for Hiranandani Gas Company Pvt. Ltd.
	Charting - Pre-Engineering Survey Ongcl's Heera Re-Development Project - Phase II Heera Field West Coast of India for Leighton Welspun Contractors Pvt. Ltd.
	Charting - As-Built Survey of Newly Laid Pipelines for Ongcl's Cluster Pipeline Project Mumbai High Field West Coast of India for Consortium of Swiber Offshore (India) Pvt. Ltd.
	Charting – As Laid Survey in Mumbai High & Neelam field West Coast of India for Leighton Welspun Contractors Pvt. Ltd. Charting – Positioning Services during Cable lay using CS teliri for subsea composite cable routes, OGIP Power to ESP Project, Mumbai High field, West coast of India for Dolphin Offshore Enterprises (India) Ltd.
	Charting – Construction Support Job in Cluster 7, Mumbai High West coast of India for Swiber Offshore Const Pte Ltd.
	Charting – Additional PP- ONGC field layout.
Mar 13:	Charting - Pre-Construction & Anchor Clearance Survey for PLQP to LFP route, Kakinada – East Coast of India for PUNJ LLOYD LTD.

Previous Experience:

July 2017 to April 2018	Daniel Survey (FZC), Sharjah, UAE - Base/Offshore Data Processor / CAD Operator. The responsibility includes processing and charting of single beam & Multibeam Echo sounder data meeting the company standards.
Jan 2013 to June 2017	Fugro Survey (India) PVT LTD, Navi Mumbai, Maharashtra. Offshore Data Processor / CAD Operator. The responsibility includes processing and charting of single beam & Multibeam Echo sounder data meeting the company standards.
Jan 2011 to Dec 2012	Anna University, Chennai – Senior Research Fellow, the responsibility includes taking water samples in and around Chennai city on monthly basis and making rainfall maps using Arc GIS for the report.
Aug 2010 to Jan 2011	EDR Continuous Information Pvt. Ltd. Chennai - GIS Technician. The responsibility includes georeferencing and digitizing the thematic maps using Arc GIS.

RESUME

Mobeen Aziz Shah

Job Title: Coxswain

PERSONAL INFORMATION

Nationality Pakistani

Profile Coxswain

Education 1995 University:, Federal Govt school

Qualifications Bachelor of Secondary School certificate

Training/skills QHSE training (validated certificates)

- BOSIET
- OPITO H2S
- Advanced First Aid
- PSCRB
- STCW 2/4 standard course.
- ADMA Medical
- ZADCO Medical
- UKOOA Medical
- Fast Rescue Craft

Others

- ISF Marlins English Test
- RYA Power Boat

Languages spoken

Native	English
Fluent	Hindi , Urdu ,Pushto

Current responsibilities **Fugro Survey Middle East Ltd**

Coxswain

Jan 2005-Present; **Fugro Survey (Middle East) Ltd, United Arab Emirates**

Proficient in basic mechanical repairs on boats, Proficient in general **Small** Boats maintenance and basic construction,, Welding etc,

Projects Undertaken:

Sep-Dec- 2020 **Job No: MCB 001 Vessel Name: THEA , Client Name: LS Cabel Worked As: Coxswain , Project Description:** Geophysical uxo & Cabel Route Survey it bahrain

RESUME

July-Aug 2020	**Job No: MRU056 Vessel Name: Lady Nerissa , Client Name: ADNOC Worked As: Coxswain , Project Description:** Geophysical Survey it Mubaraz Island Abu Dhabi UAE
Jun- 2020	**Job No: MRU086 Vessel Name: Lady Nerissa , Client Name: JACOBS Worked As: Coxswain , Project Description:** Site Survey MBES it Abu Dhabi UAE
April- 2020	**Job No: MRU093 Vessel Name: Lady Nerissa , Client Name: ADNOC Worked As: Coxswain , Project Description:** Geophysical Survey it Marfa Abu Dhabi UAE
Jan_Fab 2020	**Job No: MRU088 Vessel Name: THEA , Client Name: ADNOC Worked As: Coxswain , Project Description:** Geophysical And EBS Survey it Zakum field Abu Dhabi UAE
Dec 2020	**Job No:MRU 088 Vessel Name: Lady Nerissa , Client Name: Fugro Worked As: Coxswain , Project Description:** Survey with DMS Challenger and USV Lady Nerissa it Abu Dhabi UAE
Sep_Oct 2019	**Job No: RND007 Vessel Name: Lady Nerissa , Client Name: Fugro Worked As: Coxswain , Project Description:** Prepair ,Triels for Demonstration of USV Lady Nerissa it Mussafah Abu Dhabi UAE
Sep 2019	**Job No: MRU 081 Vessel Name: Fugro Surveyor , Client Name: Vopak Horizon Worked As: Coxswain , Project Description:** SBES Survey it Fujairah UAE
July 2019	**Job No: OMU 034 Vessel Name: THEA , Client Name: Worked As: Coxswain , Project Description:** Recovery of ADCP And Grab Sampling it Tawillah Power Station Abu Dhabi UAE
July 2019	**Job No: MRU080 Vessel Name: THEA , Client Name: Worked As: Coxswain , Project Description:** Geophisical MBES & Bomer Survey it UMM LULU Field Abu Dhabi UAE
June 2019	**Job No: MRU078 Vessel Name: THEA , Client Name: Worked As: Coxswain , Project Description:** Geophisical MBES & Bomer Survey it Taweelah Abu Dhabi UAE
May -June 2019	**Job No: MRU077 Vessel Name: THEA , Client Name: ADNOC Worked As: Coxswain , Project Description:** Geophisical MBES Survey for Adnoc it jabal Dhana UAE
May - 2019	**Job No: MRU056 Vessel Name: THEA , Client Name: ADNOC Worked As: Coxswain , Project Description:** MBES Survey it Das Island UAE
April - 2019	**Job No: MRS 034 Vessel Name: F S 106 , Client Name: Qatar Petrolium Worked As: Coxswain , Project Description:** Near Shore Geophysical Survey It Halul Island Qatar

Fab - 2019	**Job No: Vessel Name: Lady Amelia , Client Name: Mesaed Port Worked As: Coxswain , Project Description:** Diving Support in Mesaed port
Aug - 2018	**Job No: MRS 036 Vessel Name: Fugro Surveyor , Client Name: Worley parsons Worked As: Coxswain , Project Description:** Near Shore Geophysical Survey It Marjan KSA
Jun-july 2018	**Job No: MRU 056 Vessel Name: THEA , Client Name: ADNOC Worked As: Coxswain , Project Description:** IHO Hydro graphic Survey it Rowais UAE
Jun 2018	**Job No:** MRP 001 **Vessel Name:** TUNA ANN , **Client Name:** SAIPEM **Worked As:** COXSWAIN , **Project Description:** MBES ,SSS Survey it Sharjah Port UAE
April-May 2018	**Job No: MRU 056 Vessel Name: THEA , Client Name: ADNOC Worked As: Coxswain , Project Description:** IHO Hydro graphic Survey it Rowais UAE
Mar 2018	**Job No: OEQ 007 Vessel Name: Halul 63 , Client Name: Total QATAR Worked As:** Assisting With Environmental Survey **, Project Description:** Under Water Sand Sampling /Water Sampling /Under Water Video/CTD it Doha Qatar
Jan_Fab 2018	**Job No:** MRP 001 **Vessel Name:** THEA , **Client Name:** Total & NIOC **Worked As:** COXSWAIN , **Project Description: Geo Physical & UHR Survey it Asaluyah Iran**
Jan_ 2018	**Job No:** OMU 028 **Vessel Name:** FS 8 , **Client Name:** Shoba Al Ferdos **Worked As:** COXWAIN , **Project Description: Deployment of ADCP/Tide Gage Frames&Instalition Of met Station It Sineyah Island Umm Al Quaen UAE**
Dec_ Jan 2017_18	**Job No:** MRU 059 **Vessel Name:** FS 8 , **Client Name:** Shoba Al Ferdos **Worked As:** COXWAIN , **Project Description: SBES Survey It Sineyah Island Umm Al Quaen UAE**
Dec _ 2017	**Job No:** MRU 037 **Vessel Name:** FS 8 , **Client Name:** Jumerah Beach Hotel& Resort **Worked As:** COXWAIN , **Project Description: SBES It Jumerah beach Dubai UAE**
Aug-Oct 2017	**Job No:** MRU 054 **Vessel Name:** THEA , **Client Name:** ADNOC **Worked As:** COXWAIN , **Project Description: Site And Route Geophysical Survey It Hail/Ghasha field Abu Dhabi UAE**

Mar_ April 2017	**Job No:** MRS 020 **Vessel Name:** THEA , **Client Name:** McDermott Saudi Arabia **Worked As:** COXWAIN , **Project Description: As lye and Site Survey it Safaniyah/Marjan /Arabi/ Barri field Saudi Arabia**
Fab 2017	**Job No:** MRS 019 **Vessel Name:** THEA , **Client Name:** Dynamic industries/ Saudi Aramco **Worked As:** COXWAIN , **Project Description: Geophysical Site And Pre Engineering Survey it Barri Field Saudi Arabia**
Jan 2017	**Job No:** MRS 016 /017 /018 /020 **Vessel Name:** THEA , **Client Name:** Mecdermott Saudi Arabia **Worked As:** COXWAIN , **Project Description: Geophysical Anchor and Pre Engineering /Rout Survey it Berri /Safaniyah/Zaluf field Saudi Arabia**
Aug - Sep 2016	**Job No:** MRS 013 **Vessel Name:** THEA , **Client Name:** Mecdermott Saudi Arabia **Worked As:** COXWAIN , **Project Description: Geophysical Anchor clearance survey it KJO Saudi Arabia**
Jul 2016	**Job No:** OMU 021 **Vessel Name:** FS 10 , **Client Name: Worked As:** COXWAIN , **Project Description:Deployment of ADCP &water /sand sampling it Abu Dhabi UAE**
Apr 2016	**Job No:** MRU 028 **Vessel Name:** THEA , **Client Name:** Baroge, AST Rowais **Worked As:** COXWAIN , **Project Description:MBES GEOPHISICAL &Bathymatric Survey it Rowise UAE**
Apr 2016	**Job No:** MRU 032 **Vessel Name:** FS 10 **Client Name:** LAMPRALL Sharjah **Worked As:** COXWAIN , **Project Description: Bathymatric +SSS it Port Khalid Sharjah UAE**
Apr 2016	**Job No:** MRU 031 **Vessel Name:** FS 10 , **Client Name:** DUSUP Jabal ali Port **Worked As:** COXWAIN , **Project Description: Bathymatric, MBES ,,SSS survey it Jabal ali port Dubai UAE**
Feb – Mar 2016	**Job No:** MRU 017 **Vessel Name:** THEA , **Client Name:** ZADCO ARZANA ISLAND **Worked As:** COXWAIN , **Project Description: MBES GEOPHISICAL Survey it UAE**
Jan 2016	**Job No:** MRU 024 **Vessel Name:** THEA , **Client Name:** GASCO ROWAIS **Worked As:** COXWAIN , **Project Description: MBES SSS Survey it UAE**
Dec – Jan 2016	**Job No:** MRS 003 **Vessel Name:** AL GOSAIBI 51,,FUGRO SURVEYOR , **Client Name:** SAUDI ARAMCO **Worked As:** COXWAIN , **Project Description:** SAFANIYAH FEILD KSA
Nov – Dec 2015	**Job No:** MRS 008 **Vessel Name:** FUGRO PROTEIS ,THEA , **Client Name:** JRM ARAMCO **Worked As:** COXWAIN , **Project Description:** MARJAN,ZULUF,SAFANIYAH and HASBAH field KSA

Aug – Sep 2015	**Job No:** MS 29 **Vessel Name:** AL NEHEEM , **Client Name:** ARAMCO **Worked As:** COXWAIN , **Project Description:** MBES Red Sea KSA
May – Jun 2015	**Vessel Name:** work in on shore &off shore support for geos buoy deployment , **Client Name:** OTCO **Worked As:** Coxswain **Project Description:** deployment of geos wave buoy and installation of tide gage and mate station in Oman duqm OMAN
Apr 2015	**Vessel Name:** AL AMOSH , **Client Name:** PTC **Worked As:** Coxswain, **Project Description:** MBES a SBES.SSS.GEO Physical survey LAND FALL survey it PAKISTAN
Jan – Feb 2015	**Vessel Name:** THEA FUGRO PROTEUS , **Client Name:** SAUDI ARAMCO **Worked As:** Coxswain, **Project Description:** MBES a SBES KSA
Aug – Dec 2014	**Vessel Name:** LADY NARRESA AL NEHEEM , **Client Name:** SAUDI ARAMCO **Worked As:** Coxswain, **Project Description:** MBES a SBES KSA
Apr – Jun 2014	**Vessel Name:** FS 106 , **Client Name:** ASHGHAL Doha Qatar **Worked As:** Coxswain, **Project Description:** Geophysical Survey and tide gage & ADCP installation for Doha Bay Crossing .QATAR
Jan – Feb 2014	**Vessel Name:** FS 106 , **Client Name:** Chimyawaat chamecal compny **Worked As:** Coxswain, **Project Description:** Recovery of ADCP and Tide gages & met station. UAE
Dec – Jan 2014	**Vessel Name:** AL HOOT , **Client Name:** Cable route survey for Oman tel Fugro Germany **Worked As:** Coxswain, **Project Description:** Diving survey and Geophysical survey it Barka Oman.
Dec 2013	**Vessel Name:** FS 106 , **Client Name:** Chimyawaat chamecal compny **Worked As:** Coxswain, **Project Description:** Installation and service visit of ADCP and Tide gages. UAE
Sep – Dec 2013	**Vessel Name:** FS 106 , **Client Name:** Chimyawaat chamecal compny **Worked As:** Coxswain, **Project Description:** Installation of ADCP and Geophysical survey it rowais.and deplyment of tide gage UAE
Sep 2013	**Vessel Name:** Farida Oman , **Client Name:** Oman oil company **Worked As:** Coxswain, **Project Description:** Installation of ADCP and Tide gage and SSS survey for ADCP search it markaz near ras madraka OMAN
Apr – Jul 2013	**Vessel Name:** Fugro surveyor, **Client Name:** Saudi aramco + JRmcdermot **Worked As:** Coxswain, **Project Description:** Geophysical + Pre Eng. + Anchor clearance survey it Safaniya field KSA

Feb – Mar 2013	**Vessel Name:** F S 106 , **Client Name:** Raps Gas Qatar Ras laffan **Worked As:** Coxswain, **Project Description:** Geophysical + Pipe line Cable Inspection with ROV QATAR
Dec – Jan 2013	**Vessel Name:** F S II , **Client Name:** Fujairah LNG terminal survey **Worked As:** Coxswain, **Project Description:** Geophysical +MBES+ADCP+ Wave raider buoy deployment UAE
Oct – Nov 2012	**Vessel Name:** F S 106 , **Client Name:** Ras gas Qatar **Worked As:** Coxswain, **Project Description:** ROV survey it raslaffan QATAR
Jun – Aug 2012	**Vessel Name:** Fugro surveyor , **Client Name:** Shall Iraq **Worked As:** Coxswain, **Project Description:** Geo physical +MBES +UHR +Gradiometer in Iraq ummQasar IRAQ
May 2012	**Vessel Name:** F S 106 , **Client Name:** RAS Gas **Worked As:** Coxswain, **Project Description:** Geo physical +MBES +ROV for Pipe and cable inspection in Qatar
Apr 2012	**Vessel Name:** F S II , **Client Name:** Vopak horizon **Worked As:** Coxswain, **Project Description:** Geo physical +MBES in Fujairah UAE
Mar 2012	**Vessel Name:** F S 106 , **Client Name:** BHAPCO Bahrain **Worked As:** Coxswain, **Project Description:** Geo physical +MBES+UHR BAHRAIN
Jan 2012	**Vessel Name:** Fugro surveyor , **Client Name:** Topaz engineering **Worked As:** Coxswain, **Project Description:** Geo physical +MBES UAE
Dec 2011	**Vessel Name:** FS 106 , **Client Name:** Saipem **Worked As:** Coxswain, **Project Description:** Pre engineering survey and vibrocoring KSA
Nov – Oct 2011	**Vessel Name:** FS 106 , **Client Name:** Saipem **Worked As:** Coxswain, **Project Description:** Pre engineering survey and vibrocoring KSA
Jul – Aug 2011	**Vessel Name:** FS 106 , **Client Name:** Dragging international **Worked As:** Coxswain, **Project Description:** Geo physical survey it Ruwais RR3 UAE
Jul 2011	**Vessel Name:** supply boat , **Client Name:** Abu Dhabi Environmental Department **Worked As:** Coxswain, **Project Description:** reef search with sss UAE
Jun 2011	**Vessel Name:** F S L , **Client Name:** Target Engineering **Worked As:** Coxswain, **Project Description:** cable search with magnetometer UAE
Apr – May 2011	**Vessel Name:** F S 106 , **Client Name:** Union Pipe Line **Worked As:** Coxswain, **Project Description:** SBES survey for pipe line UAE

Feb – Mar 2011	**Vessel Name:** Fugro surveyor , **Client Name:** TravOcean **Worked As:** Coxswain, **Project Description:** cable route survey it jabal dana UAE
Dec – Jan 2011	**Vessel Name:** Fugro surveyor , **Client Name:** Shell **Worked As:** Coxswain, **Project Description:** geophysical survey it shat al Arab Basra IRAQ
Oct – Nov 2010	**Job No:** SY 01, **Vessel Name:** FSL , **Client Name:** DP world **Worked As:** Coxswain, **Project Description:** Bathymetric survey YAMEN
May –Jun 2010	**Job No:** KX 02B, **Vessel Name:** FS 106 , **Client Name:** SubCom **Worked As:** Coxswain, **Project Description:** cable route survey it Bahrain
Apr 2010	**Job No:** SU 89, **Vessel Name:** FS II , **Client Name:** GPC Mussafah **Worked As:** Coxswain, **Project Description:** MBES+ sss+SES200 UAE
Mar 2010	**Job No:** SO 36, **Vessel Name:** FSL , **Client Name:** Haya water Oman **Worked As:** Coxswain, **Project Description:** Bathymetric survey OMAN
Feb 2010	**Job No:** MQ 112, **Vessel Name:** FS 106 , **Client Name:** Worley parsons, **Worked As:** Coxswain, **Project Description:** Geophysical Pre_engineering+ Cable route survey Refraction survey
Dec 2009	**Job No:** MU 88, **Vessel Name:** Fugro survey II, **Client Name:** Dubai Municipality, **Worked As:** Coxswain, **Project Description:** Seabed classification &Sand Search by using Mbes+sES2000 QATAR
Sep – Oct 2009	**Vessel Name:** FS V, **Client Name:** Oman LNG, **Worked As:** Coxswain , **Project Description:** Work in Sur Oman Geophysical survey using Mbes +SSS +Pinger OMAN
Jul – Aug 2009	**Job No:** CS 11 , **Vessel Name:** FS 106 , **Client Name:** Global Alrushaed **Worked As:** Coxswain, **Project Description:** Pipeline ASLay survey by using Mbes +SSS in Dammam KSA
Jun 2009	**Vessel Name:** FS 8 , **Client Name:** GPC Abu Dhabi **Worked As:** Coxswain, **Project Description:** Mussafah Chanel survey for semisubmersible rig using Mbes +SSS UAE
May 2009	**Vessel Name:** FS 106, **Client Name:** TR Engineering **Worked As:** Coxswain, **Project Description:** work in Ruwais for plant intake seawater line using Mbes +SSS +Pinger UAE
Mar – Apr 2009	**Job No:** MQ92+MQ91, **Vessel Name:** FS 106 , **Client Name:** J Ray McDermott Qatar **Worked As:** Coxswain, **Project Description:** Anchor clearance+ ROV survey in Raslaffan QATAR
Jan 2009	**Vessel Name:** FS 106 , **Client Name:** GPC Abu Dhabi **Worked As:** Coxswain, **Project Description:** Mussafah channel survey UAE

Oct – Nov 2008	**Vessel Name:** FS V , **Client Name:** TDIC **Worked As:** Coxswain, **Project Description:** Work for tourism depart in serbeyas+Delma island UAE
Aug – Sep 2008	**Vessel Name:** FS 106 , **Client Name:** Rasgas+Dulfen **Worked As:** Coxswain, **Project Description:** ROV survey for pipeline inspection +Geophysical survey in raslaffan Qatar
Jul – Aug 2008	**Vessel Name:** FS 8 , **Client Name:** Ministry of fisheries Oman **Worked As:** Coxswain, **Project Description:** survey of all fishing harbours for extension in Oman
Mar – Apr 2008	**Job No:** SS 07+08+09, **Vessel Name:** FS 106 , **Client Name:** Hyundai **Worked As:** Coxswain, **Project Description:** Chanel survey for dragger survey in Dammam naval Base KSA
Jan – Feb 2008	**Job No:** MS11, **Vessel Name:** FS 106 , **Client Name:** J Ray McDermott **Worked As:** Coxswain, **Project Description:** Pre_engineering Survey in Dammam KSA
Nov – Dec 2007	**Vessel Name:** FS 106 , **Client Name:** Global Alrushaed **Worked As:** Coxswain, **Project Description:** Pre_ engineering Rout survey in Dammam KSA
Jul – Aug 2007	**Vessel Name:** FS V , **Client Name:** J Ray McDermott **Worked As:** Coxswain, **Project Description:** Pre_engineering Rout survey in Raslaffan Qatar
May – Jun 2007	**Vessel Name:** FS 106 , **Client Name:** Global UAE **Worked As:** Coxswain, **Project Description:** Geo physical survey in UAE
Mar – Apr 2007	**Vessel Name:** FS 106 , **Client Name:** Nexins Norway AS **Worked As:** Coxswain, **Project Description:** Pre_engineering cable Route survey from jabaldana to Dalma island UAE
Mar 2007	**Vessel Name:** FS 106 , **Client Name:** Gasco UAE **Worked As:** Coxswain, **Project Description:** Pre_engineering Geo physical survey for gas pipeline it Ras al-Khaimah UAE
Mar 2007	**Job No:** CU12, **Vessel Name:** FS 106 , **Client Name:** RAK Gas **Worked As:** Coxswain, **Project Description:** Multibeam survey carried out in Ruwais UAE
Feb 2007	**Vessel Name:** FS 106 , **Client Name:** Global UAE **Worked As:** Coxswain, **Project Description:** Geo physical survey in UAE
Feb 2007	**Vessel Name:** FS V , **Client Name:** Yam gas **Worked As:** Coxswain, **Project Description:** Refraction survey it Yamen
Jan 2007	**Vessel Name:** FS 106 , **Client Name:** Global alrushaed **Worked As:** Coxswain, **Project Description:** Geo physical pre_engineeing survey for pipeline Rout it Dammam KSA

Dec 2006	**Vessel Name:** FSL 4 , **Client Name:** EMAR **Worked As:** Coxswain, **Project Description:** SBEC survey +tide gear +currant meter installation in Red sea Jeddah KSA
Nov 2006	**Vessel Name:** FS 8 , **Client Name:** **Worked As:** Coxswain, **Project Description:** single beam survey it bahreny island it Abu Dhabi UAE
Oct 2006	**Vessel Name:** FS 106 , **Client Name:** Target Engineering **Worked As:** Coxswain, **Project Description:** single beam survey it Ruwais port UAE
Sep 2006	**Vessel Name:** FS 106 , **Client Name:** Gas co **Worked As:** Coxswain, **Project Description:** Single beam survey for Gasco in Ruwais UAE
Sep 2006	**Vessel Name:** FS 4 , **Client Name:** HPA **Worked As:** Coxswain, **Project Description:** Bathymetric survey it UAE
Aug 2006	**Vessel Name:** FS V , **Client Name:** Al Hssam **Worked As:** Coxswain, **Project Description:** single beam survey in UAE
Jul 2006	**Vessel Name:** FS 4 , **Client Name:** Ad yard **Worked As:** Coxswain, **Project Description:** Bathymetric survey it Abu Dhabi UAE
Jul 2006	**Vessel Name:** FS 106 , **Client Name:** Baker Atlas/ADCO **Worked As:** Coxswain, **Project Description:** Near shore VSP survey in Abu Dhabi UAE
Jun 2006	**Vessel Name:** FS 106 , **Client Name:** Nakheel **Worked As:** Coxswain, **Project Description:** Marine survey &Reef mapping it Palm Dubai UAE
Jun 2006	**Vessel Name:** FS 106 , **Client Name:** Delta Marin consultant **Worked As:** Coxswain, **Project Description:** Bathymetric survey Grab sample in UAE
Jun 2006	**Vessel Name:** FS V , **Client Name:** Tourism Development& investment co **Worked As:** Coxswain, **Project Description:** Bathymetric survey in UAE
May 2006	**Vessel Name:** FS 106 , **Client Name:** J Ray McDermott/Aramco **Worked As:** Coxswain, **Project Description:** Geo physical Pre Engineering survey in Saudi Arabia KSA
Mar 2006	**Vessel Name:** FS V, **Client Name:** Royal Haskoning **Worked As:** Coxswain, **Project Description:** Bathymetric survey in Salalah Omen
Dec 2005	**Vessel Name:** FS 106 , **Client Name:** ANS/Falcon **Worked As:** Coxswain, **Project Description:** Inshore landing survey in Huddaidha Yamen
Nov 2005	**Vessel Name:** FS V , **Client Name:** FME Oman **Worked As:** Coxswain, **Project Description:** Bathymetric survey in Oman
Nov 2005	**Vessel Name:** FS 106 , **Client Name:** FSSI/Falcon **Worked As:** Coxswain, **Project Description:** Bathymetric survey near shore UAE

Oct 2005	**Vessel Name:** FS V , **Client Name:** FME **Worked As:** Coxswain, **Project Description:** Bathymetric survey in UAE
Oct 2005	**Vessel Name:** FS V , **Client Name:** Jan Der Nul **Worked As:** Coxswain, **Project Description:** Bathymetric survey in UAE
Sep 2005	**Vessel Name:** FS 106 , **Client Name:** CSIR **Worked As:** Coxswain, **Project Description:** Bathymetric +Multibeam survey in UAE
Sep 2005	**Vessel Name:** FS V , **Client Name:** ADTA **Worked As:** Coxswain, **Project Description:** Bathymetric survey in Oman
Sep 2005	**Vessel Name:** FS V , **Client Name:** TWA Oman **Worked As:** Coxswain, **Project Description:** Geo physical Bathymetric survey in UAE
Aug 2005	**Vessel Name:** FS 106, **Client Name:** Flore **Worked As:** Coxswain, **Project Description:** Pre engineering survey in UAE
Aug 2005	**Vessel Name:** FS 106 , **Client Name:** Flore **Worked As:** Coxswain, **Project Description:** Pre engineering survey in UAE
Jul 2005	**Vessel Name:** FS 106 **Client Name:** Flore **Worked As:** Coxswain, **Project Description:** Pre engineering survey in UAE
Jun 2005	**Vessel Name:** FS 4 , **Client Name:** Target marine **Worked As:** Coxswain, **Project Description:** Bathymetric survey in UAE
May 2005	**Vessel Name:** FS 106, **Client Name:** ADMA/OPCO **Worked As:** Coxswain, **Project Description:** Geo physical & Dibis clearance survey in UAE
Apr 2005	**Vessel Name:** FS 106 , **Client Name:** Alcatel **Worked As:** Coxswain, **Project Description:** Pre engineering survey in UAE
Mar 2005	**Vessel Name:** FS 106 , **Client Name:** Abu Dhabi Tourism Authority **Worked As:** Coxswain, **Project Description:** Geo physical survey in UAE
Mar 2005	**Vessel Name:** FS V , **Client Name:** TWA **Worked As:** Coxswain, **Project Description:** Land fall survey in UAE
Feb 2005	**Vessel Name:** FS V , **Client Name:** Saipem Qatar **Worked As:** Coxswain, **Project Description:** Refraction survey in Raslaffan Qatar
Jun1998 – Dec 2004	Work as skipper in various surveys. Drilling and diving in Oman, Qatar Bahrain yamen and Djibouti. Iraq, Pakistan, Kuwait

D. CONTACT INFORMATION

Name	Job Designation	Phone Numbers	E-mail
Company: ILF Consulting Engineers - Abu Dhabi			
Simone Puzzo	Head, Water & Environment Projects	Tel: +971/ (0)2 /41 89 400 - 469 Mob: +971/ (0)50 /3170950	simone.puzzo@ilf.com
FUGRO			
Plot 1F, Sector MN1, Mussafah, Abu Dhabi P.O. Box 43088, Abu Dhabi, United Arab Emirates		Tel: +971 25547810 Fax: +971 25547811	
Muhammad Ishaq	Project Manager	Mob: +971 55 855 0029	m.ishaq@fugro.com
Venugopalan Nambiar	Project Manager	Mob: +971 508180661	v.nambiar@fugro.com
Michael Philip Meyer	Project Director	Mob: +971 561775393	michael.meyer@fugro.com
Gerard Ferreira	Service Line Manager - Geophysical	Mob: +971 506681072	g.ferreira@fugro.com
Richard Harding	Operation Manager	Mob: +971 502461451	r.harding@fugro.com
Country HSSE Manager	May Lanie De La Cruz	Mob: +971 521148837	m.delacruz@fugro.com
Tony Farn	Client Deliverable Manager	Mob: +971 506125137	t.farn@fugro.com
Remmelt de Jong	Regional Business Line Director Marine Site Characterisation	Mob: +971 588021415	R.deJong@fugro.com

Survey Launch Fugro Surveyor	
Marine Sailor VHF Radio	VHF Ch16
Coxswain (Mob)	Mob: +971 50 782 8234
Party Chief	TBA

*Note 1.) To dial 'mainland' from mobile phones, prefix number with 02 (i.e. Abu Dhabi exchange).
2.) To connect UAE mobile to mobile, drop the 050 prefix.

SEARCH AND RESCUE PRIMARY CONTACT

MARLO Bahrain

Commercial Shipping Navy (Sun – Thu 8-5)	
General Phone	Tel : + 973 17 85 3925
General Fax	Fax : + 973 17 85 3930
Email	marlo.bahrain@me.navy.mil
US Navy Emergency 24 hr Duty Phone	**Tel : + 973 39 40 1395**

SEARCH AND RESCUE SECONDARY CONTACT

Inchcape Shipping Services

Inchcape Shipping Services	Tel : + 971 2 408 1593 / 446 2424
P.O. Box 247	Mob.: + 971 50 621 8935 (Paul Anthony)
Abu Dhabi	Fax : + 971 2 446 7109
United Arab Emirates	E-mail: ops.issauh@iss-shipping.com

Inchcape Shipping Services	Tel : + 971 4 303 8500 / 555
Oud Mehta Road	Mob.: + 971 50 654 9378 (Iyer Narayanan)
P.O. Box 33166	Fax : + 971 4 334 5622
Dubai	E-mail: iyer.narayanan@iss-shipping.com
United Arab Emirates	

Inchcape Shipping Services 24hr Emergency SAR mobilisation Line (Global) Tel +971 4 3038555

SPILL NOTIFICATION POINT (ENVIRONMENTAL INCIDENTS)

Frontier & Coast guard Service	Tel : + 971 2 673 1900
P.O. Box 2432	Fax : + 971 2 673 0325/0010
Abu Dhabi	

Spills should be reported to the nearest port authority:

Jebel Ali Port	Tel : + 971 4 881 5555
Dubai Ports Authority	Fax : + 971 4 881 7777
	Tlx : 47398 DPA EM
Mina Zayed Seaport Authority	Tel : + 971 2 935 2000
	Fax : + 971 2 673 0090
	Tlx : 22890 PORTCO EM
Sharjah Ports Authority	Tel : + 971 6 528 16666/7
	Fax : + 971 6 528 1425
	Tlx : 89023

COMPETENT NATIONAL AUTHORITY

Federal Environmental Agency	Tel : + 971 2 445 4777
P.O. Box 5951	Fax : + 971 2 446 3339
Abu Dhabi	Emergency: 8009990 (24hrs)

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Response Arrangements

The first point of contact for initializing a search and rescue or emergency MEDIVAC from a vessel should be as per the emergency response plan for each particular project. As a rule Fugro Survey Middle East tries to co ordinate an emergency response plan for all eventualities with the client Fugro is working with. Often the closest first care medical expertise would be on an offshore installation and this would be the preferred method for treatment. In critical situations where time or the situation would not allow a steam and transfer to a platform emergency assistance should be requested as per the contact instructions given above.

It is important to note that time will play a critical factor in the outcome of critically injured or ill patients and everything possible should be done to ensure minimal delays in reaching first care medical attention.

A MEDIVAC form FSME_1230.03 is available on the offshore pack and should be filled in to ensure patients details are relayed to the crew coordinating the rescue.

For environmental incidents the port control for the nearest port should be contacted or the appropriate authority regarding environmental incidents as detailed above.

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E. REFERENCE DOCUMENTS

Package- C "Offshore Bathymetric Survey"

Route Map

A tentative route map and project location has been attached for your information.



Scope of Work

The key elements involved in Bathymetric Surveys (Offshore) shall include but not limited to the following:

a) Identification of any existing pipelines, cables or any other services.
b) Carrying out offshore survey, which includes also shallow coastal areas
c) Offshore survey shall also include activities in the area of the intake and outfall routing such as fishing, or other marine/shipping activities.
d) Bathymetry
e) Collection of Metaocean data including storm sure, wave, wind, sea temperatures etc.
f) Sub-bottom profile
g) Seabed obstacles, including rock outcrops, low lying islands etc. along the proposed pipeline routes.
h) Prepare associated drawings and reports.
i) Establish chemical conditions in the ground and groundwater including attack on buried structures and health and safety during construction and operation
j) Provide information and recommendations to facilitate accurate assessment of the suitability of various design and construction options
k) provide recommendations for temporary / permanent trench excavation and side stability
l) Classify soil

m) Obtain geotechnical design parameters for the adequate and economic design of foundations and earthworks at site.
n) Field investigation containing sampling from Offshore locations by gravity core, grab sampling, seawater sampling etc. and lab testing.
o) Providing factual and interpretative geotechnical reports.

BOQ: Please refer to Attachment 2. Contractor shall comply with the items mentioned in the attachment with no changes and additions.

Time Line: Surveys to be completed within 8-10 weeks.

General Condition:

1. Proposal shall be in strict compliance with Health, Safety and Environment (HSE) requirements of ADNOC HSE regulations and comply with the obligations set out in the respective agreements with ADNOC.
2. If Permits are necessary for site access, these must be obtained by the Contractor and is liable for those costs and charges

Specification:

1. The work shall be carried out as per well-established sound survey practices and standards and by qualified and competent surveyors under the direct supervision of qualified engineers/surveyors.
2. Minimum standards for the survey work are set by IHO S-44 5th Edition.
3. Works will be in accordance to the standard datum in the area; bathymetric survey coordinates and elevations shall be related to the actual site coordinates. to be retrieved by the Contractor.
4. Calibration certificates of equipment and instruments from reputable third party shall be furnished.
5. All survey sensors like the positioning system, compass and echo sounder shall be interfaced to a computer, which can be used to position and track the survey vessel. The sensor data shall be time tagged.
6. The work will include the survey of the envisaged lay-down area of the intake/outfall facilities
7. The indicated survey works may slightly vary in position and length, as will be determined at later stage and may be discussed with Contractor
8. Surface positioning shall be with a High Frequency DGPS system. The system shall have full redundancy and fail safe measures to ensure uninterrupted operation. The selected positioning system must be approved in advance by the Client. The DGPS positioning system shall be checked against known coordinates every day prior to commencement of work.
9. The bathymetric soundings shall be carried out using a high precision, heave compensated, pitch and roll corrected single/multi-beam system. Preferably, multibeam echo sounder (swathe bathy) for higher density data and higher resolution shall be used.

10. A Dual Frequency Echo Sounder shall be employed along all survey lines to measure water depth. The survey shall be conducted following a rectangular grid pattern parallel to the major axes of the areas and tie lines perpendicular to them.
11. The echo sounder shall be calibrated every day prior to commencement of work. Soundings shall be recorded in analog and digital form.
12. Echo sounding shall be carried out concurrently with the geophysical data acquisition (if any).
13. Depth recordings shall be made along parallel lines with 10m spacing. One continual profile shall also be made along each seaward side of the projected subsea loading lines at a distance < 50m there from.
14. Extra runs shall be made to define areas of interest including anchor sites, crossings, debris, or unexpected contours.
15. Soundings in deeper water shall be resolved to 0.15 meters. Minimum feature detection system capability, and positioning, and measuring accuracy requirements, are:
    - Feature Detection System Capability: > 0.5 m
    - Horizontal Position: 1.0 m
    - Vertical Position: 0.2 m
16. The nearshore survey (outside the draft capability of the primary survey vessel) shall be done with a shallow draft vessel using an echo sounder. Frequency range will be subject to approval. Any area unreachable by vessel shall be surveyed using conventional land survey techniques.
17. Tidal Heights measurements shall be conducted during the survey. The tidal measurement shall be levelled from an existing/established control point to establish FNHD. The tide gauge shall be deployed for the duration of the survey and the maximum logging interval shall be 10 minutes.
18. Survey Contractor shall document and give all the necessary details about the expected achievable vertical resolution of all the instruments.
19. Detailed procedures for the calibration of the system and data quality control shall be provided by the Survey Contractor, together with the corrections for the velocity of sound and ray bending effects.
20. The direct reading velocity meter and/or temperature/conductibility/depth meter shall have sufficient cable and adequate cable handling arrangements to allow readings to be taken to the full depth of the survey.
21. Shoreline shall be field verified for Highest Astronomical Tide (HAT) line and Lowest Astronomical Tide (LAT) line with respect to chart and other geospatial references used. Both the High Water Line and the Dry Line shall be accurately positioned.
22. Bathymetric contours shall be provided in drawings for Lowest Astronomical Tide.
23. It shall be Contractor's responsibility to identify the end of intake/outfall route coordinates to match with the land surveyor's coordinate system. If land survey coordinates are different from those used for the marine survey, the burden of conversion and coordination shall be with Contractor. The positioning system shall be calibrated first onshore over an established baseline and then offshore using the method of baseline crossings.

24. The positioning system shall be interfaced to a navigation computer system comprising of a PC-compatible central processing unit, interface, and video-graphics display unit. Navigation software shall be capable of logging navigation and bathymetric data, performing and logging the navigation quality control parameters, and generating a helmsman display. Peripherals shall include plotter and/ or printer for recording a hard copy of each fix position. All raw navigation data shall additionally be stored on CD or DVD media, or on external hard drive. The navigation computer shall have a position-keeping tolerance of no greater than + 1 m along the route centerline.

The survey boat shall have, but not limited to, the following minimum requirements:

1. Equipped with suitable dynamic positioning system as described above
2. Ensure a good operating stability
3. Deck space shall be sufficient to ensure the safe deployment and recovery of equipment and personnel
4. Satisfy the International and national safety rules applicable in the working area; for this purpose the vessel shall be provided with all necessary safety equipment;
5. Have all the permits required to operate in the work area
6. Very low draft; the boat shall be able to perform surveys up to a minimum water depth of at least 1.5 m
7. Radio equipment or mobile on board shall be capable of establishing reliable links with the main coastal radio stations within the work area
8. Hold certificates issued by Recognised Register of Shipping.