


(TECHNICAL PART)



PRE - BID
SUAI SUPPLY BASE – PHYSICAL SURVEY CAMPAIGN
PACKAGE 1 – TOPOGRAPHICAL, GEOPHYSICAL & METOCEAN SURVEY

January 9th, 2024


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TOPOGRAPHICAL SURVEY

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1. PROJECT BACKGROUND

- ❑ TIMORGAP new management is currently revisiting and selecting, the SSB Design Review outcomes and its Offshore infrastructure layout as SSB new project masterplan. Part of it the physical assessment is a critical component of SSB project development study to collect data as design basis or requirement , has been defined as the "Physical Survey Campaign for SSB development Area".
- ❑ A prudent approach of this survey is to reassess the current SSB optimization layout with a view to accommodating an intermediate stage. Data consistency from this physical survey campaign will greatly influence the future Detail Engineering Design (DED) of "SSB - Full Development".
- ❑ The area allocated for the SSB infrastructure facilities and establishment covers a potential land area of 414 hectares with the development being minimized as much as practical within this footprint.



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2. SURVEY SCOPE DESCRIPTION

2.1 TOPOGRAPHICAL SURVEY SCOPE OF WORK

2.1.1 Scope of Work

- ❖ Collection of topographic data covering the entire potential site.
- ❖ provide details of the proposed equipment and methodology to undertake this survey, considering the information provided within TOR document, and the deliverables required

2.1.2 Survey Inputs

The following is the anticipated information required by the contractor to enable them to assess the most appropriate method for capturing the required data:

2.1.2.1 Survey Extents

- ❖ The area to be surveyed is approximately 414 ha.
- ❖ This area comprises of topographies ranging from dunes / beach areas, low-lying areas, potentially swampy areas, low shrub areas, tree covered areas, and fields.
- ❖ **Boundary:** Co-ordinates for the site boundary are included in Appendix B2
- ❖ **Distance Beyond the Boundaries:** To ensure that the captured information meets the potential and varying needs of the work the survey will also capture topographic data 100 m beyond the boundary

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2.1 TOPOGRAPHICAL SURVEY SCOPE OF WORK (CONT.....)

2.1.2.2 Survey Datums

- ❖ The horizontal datum for the survey is to be WGS 84 and Projection UTM 51 S
- ❖ The vertical datum for the survey is to be WGS 84 and Projection UTM 51 S.

2.1.2.3 Survey Grid

- ❖ The survey area approx. 414 ha and the undeveloped nature of the site (greenfield site) the resolution / granularity of the survey data can be relatively course.
- ❖ The anticipated level of the survey grid is 0.5 m square.

2.1.2.4 Digital Terrain Model (DTM)

- ❖ The survey shall provide a Digital Terrain Model (DTM) (elevation of the ground), not tallest Digital Surface Model (DSM) (tallest surface at that point)

2.1.2.5 Airport

- ❖ As the site is located adjacent to Xanana Gusmao International Airport the contractor will need to apply for and acquire relevant permits to operate equipment in this area, including any related to drones or aircraft should they be used to collect the required data

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2.1 TOPOGRAPHICAL SURVEY SCOPE OF WORK (CONT.....)

2.1.3 Daily Field Reporting Requitements

During the field work execution, the Contractor shall provide the Company / Company Representative with a daily report detailing the progress of the preceding day. The Contractor shall propose a daily report template prior to the field execution detailing the following as a minimum:

- ❖ Shift details/observations
- ❖ Weather conditions and forecasts
- ❖ No. of personnel and equipment present
- ❖ Health, safety and environmental incidents, near misses, observations, inspections and drills
- ❖ Details of delays and breakdowns
- ❖ Quantities and types of consumables used
- ❖ Survey location details
- ❖ Shut down time
- ❖ Completed scope
- ❖ Any other observations or information that would be necessary to reconstruct fieldworks in future where required

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2.1 TOPOGRAPHICAL SURVEY SCOPE OF WORK (CONT.....)

2.1.4 Deliverables

The following are the deliverables required from the survey company:



2.1.4.1 Survey report including:

- ❖ Methodology
- ❖ Datums used
- ❖ Equipment used
- ❖ Survey monuments used and details of any installed for this project
- ❖ Accuracy
- ❖ Difference between Chart Datum (Offshore Datum) and Landside Survey Datum (Topographic Datum) including the basis for the assumption
- ❖ Site plan showing: Site Boundary and Site Contours
- ❖ Site plan overlaid with georeferenced photos
- ❖ Site plan that combines georeferenced photos and site contours

2.1.4.2 Georeferenced photos in .ecw format

2.1.4.3 Electronic file detailing the DTM for upload to computer modelling software in the following formats:

- ❖ .xyz (X, Y Z pint data file)
- ❖ .CSV or similar format
- ❖ DTM format to be advised by TG

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2. 1 TOPOGRAPHICAL SURVEY SCOPE OF WORK (CONT.....)

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2.1.4.4 Electronic copies of raw data files from surveys


2.1.4.5 Electronic copies of modelling files:
❖ Report to have a section that advises software used and version for each file / file typpment

2.1.4.6 Equipment

No	Category	Equipment	Quantity (at least No. of Equipment)
1	Terrestrial Topography	GPS Geodetic, RTK and its Accessories	1
2	UAV	Drone LiDAR	1

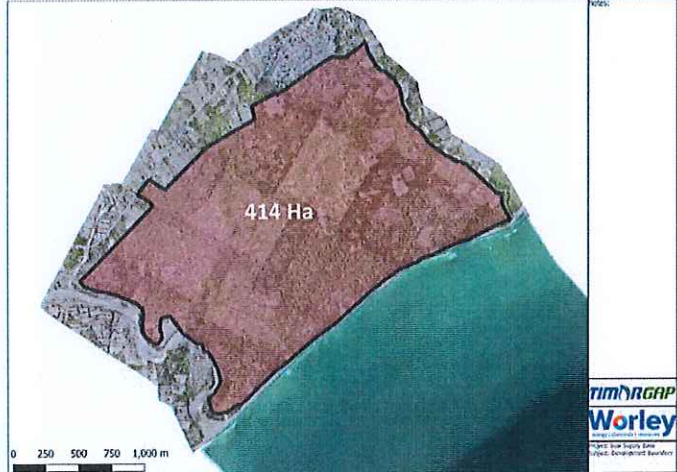
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414 Ha

0 250 500 750 1,600 m

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Figure 1. Location of Topographical Survey @ SSB Development Area

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ONSHORE GEOPHYSICAL SURVEY

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2. 2 ONSHORE GEOPHYSICAL SURVEY SCOPE OF WORK

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2.2.1 Purpose of the Onshore Geophysical Survey
The purpose of the onshore geophysical survey for the SSB Project is to provide:
Site data and information on the site ground conditions to enable the engineering design of the onshore infrastructure.

2.2.2 Survey Datums

- ❖ The Project Geodetic system to be used shall be specified by Company by means of an official Company geodetic system data sheet including an example of coordinates transformation.
- ❖ All geodetic data, spheroid and projection parameters, datum shift values shall be input in the positioning system, verified and submitted for approval of the Company Representative before the start of the operation.
- ❖ Transformation from International Terrestrial Reference Frame (ITRF) to local datum shall be tested, using a set of coordinates provided by Company.
- ❖ All the coordinates shall be based on the single reference datum
- ❖ As TG's VPIU is to incorporate both Offshore facilities and landside facilities documentation (reports and drawings) is required to provide the difference between Project Geodetic vertical datum and local Chart Datum (CD).


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2.2 ONSHORE GEOPHYSICAL SURVEY SCOPE OF WORK (CONT.....) 

2.2.3 Scope of the Onshore Geophysical Survey
 The scope of the onshore geophysical survey shall comprise as a minimum:

- ❖ Multichannel Analysis of Surface Waves (MASW) to provide:
 - ✓ S-wave velocity profiles of the subsurface ground conditions
 - ✓ Interpretation of soil stiffness parameters
- ❖ Seismic Refraction (SR) to provide:
 - ✓ P-wave velocity profiles of the subsurface ground conditions
 - ✓ Interpretation of soil strength parameters
- ❖ The positions of all geophysical traverses shall be accurately located and recorded using equipment such as Real Time Kinetic Differential Global Positioning System (RTK DGPS) equipment or equivalent, with a horizontal positional accuracy of at least ±0.1 m and reported relative to the PROJECT Geodetic system
- ❖ Vertical control shall be established at the Chart Datum (CD) from an approved benchmark.
- ❖ Vertical positional accuracy of at least ±0.1 m shall be achieved and reported relative to Chart Datum
- ❖ Geophysical Factual Report
- ❖ Geophysical Interpretive Report.

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2.2 ONSHORE GEOPHYSICAL SURVEY SCOPE OF WORK (CONT.....) 



2.2.4 Site Access

- ❖ The Survey Contractor should make provision for a pre-survey site visit to assess site access and survey constraints and logistics prior to full mobilization to site.
- ❖ Alternative survey methods may be proposed by the Survey Contractor, but may not be used without the prior written consent of the Company or Company Representative

2.2.5 Other Requirements

a. **Equipment**

- ❖ The equipment proposed for use shall be fully bench tested and certified prior to dispatch to site and shall be capable of meeting the required specifications herein.
- ❖ The Survey Contractor shall provide in their response to the IFB, information on the equipment that they propose to use in the geophysical survey and method statements for how the survey and site-specific calibrations will be performed.

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2.2.4.4 Other Requirements (continued....)

b. Positioning
 ❖ The positioning system used should be capable of achieving repeatable measurements to a horizontal and vertical accuracy of ±0.1 m (Survey Contractor to specify achievable horizontal and vertical accuracy based on recommended equipment) and shall provide real-time positioning on site.

c. Personnel
 The Survey Contractor must provide a list of all personnel to be employed on this project to be approved by the Company at least two (2) weeks prior to mobilization to site
 All personnel proposed for the works must demonstrate:
 ❖ Appropriate training, education and qualifications appropriate for their proposed tasks

d. Deliverables
 ❖ Deliverables shall include a factual report and a geophysical interpretive report. These shall include velocity-contoured cross-sections and plans (e.g. isopach maps), identifying the lateral extent and depth of significant P-wave and S-Wave velocity contours. Consideration shall be given to the rate of change in seismic velocities with depth (i.e. velocity gradients) and the potential relationship with geological boundaries, when making an assessment of significant velocity contours for the purposes of developing cross-sections and charts. Deliverables shall be provided in portable electronic format (*.pdf) and editable geo-referenced electronic format (e.g. *.dxf, *.dwg, *.shp).

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2.2.6 Survey Contractor Scope
 The Survey Contractor will be responsible for all aspects of survey operations, including:

- ❖ Preparation of daily records of progress of the survey
- ❖ Provision of all personnel and equipment, including any subcontractors as required to perform the scope of work
- ❖ Coordination of the operations with all relevant authorities, stakeholders, the Company's Representative
- ❖ Compliance with all applicable laws, regulations and guidelines in relation to the works
- ❖ Mobilisation, maintenance and demobilisation of all plant, vehicles, equipment and personnel necessary to perform the work
- ❖ Messing and accommodation for all Survey Contractor personnel
- ❖ Fuel and means to refuel and service plant and equipment as required
- ❖ Provision and operation of Differential GPS systems for the positioning and survey of geophysical traverses
- ❖ Preparation of Health, Safety, and Environmental Management Plans (HSEMP) and other Project Plans as required
- ❖ Preparation of factual and Interpretive Survey Report.

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2.2.7 Reporting Requirements

2.2.7.1 Daily Field Reporting

Daily field reports shall be compiled by the Survey Contractor throughout the course of the onshore geophysical survey and be provided to the Company / Company Representative for approval, inclusive of during mobilisation and demobilisation.

2.2.7.2 Geophysical Reporting

Post-survey reporting and deliverables shall include factual (operational) and interpretive (data) survey reports, including but not limited to interpreted geophysical cross-sections and plans (e.g. seismic velocity profiles etc.), identifying the lateral extent and depth of major geophysical features and boundaries (e.g. contoured velocity profiles) in portable electronic (*.pdf) and editable geo-referenced electronic (e.g. *.dxf, *.dwg, *.shp) formats, as well as native format (*.segy) where applicable.

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Figure 2. Onshore Geophysical Survey Line

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OFFSHORE GEOPHYSICAL SURVEY


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2.3 OFFSHORE GEOPHYSICAL SURVEY SCOPE OF WORK



2.3.1 Purpose of the Offshore Geophysical Survey
 The purpose of the Offshore geophysical survey for the SSB Project is to provide site data and information to allow detailed ground information to be derived for detail engineering of the Offshore infrastructure and dredging program including:

- ❖ Bathymetry
- ❖ Seabed features
- ❖ Sub-bottom ground profiles, including sand and gravel lenses
- ❖ Outcrops and boulders
- ❖ Potential obstructions etc.


2.3.2 Survey Datums (Same as described in previous Onshore Geophysical Survey Scope Of Work)

2.3.3 Scope of the Offshore Geophysical Survey

- ❖ The geophysical survey is to be conducted for the Offshore component of the SSB Site, the approximate extent of which is shown on **Sketch A-1 in Appendix A (See in Advisian SoW Report No. 311015-00244-GP-SOW-00001_0)**
- ❖ The Offshore survey area is approximately 3,250 m long in an alongshore direction and shall extend past the boundaries of the adjacent onshore project area by a minimum of 250 m. The width of the survey area in an offshore direction varies from approximately 750 m in the south-west, to approximately 1,500 m in the north-east, but has been approximated to coincide with position of the -20 mCD bathymetric contour. It is noted that during execution the Survey Contractor must acquire relevant data up to and including the position of the -20 mCD bathymetric contour, which may require modification of the offshore survey extents, either through enlargement or reduction in the survey area.

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2.3.3 Scope of the Offshore Geophysical Survey (Continued....)

The scope of the Offshore geophysical survey shall comprise:

- ❖ Bathymetric survey to provide accurate levels of the seabed
- ❖ Side-scan sonar to provide detailed imagery and surface profile of the seabed
- ❖ Sub-bottom profiling (e.g. seismic reflection) to a minimum depth of 50 m below seabed level by appropriate means as required to delineate ground stratigraphy .
- ❖ Seismic velocity profiling (e.g. seismic refraction) to a minimum depth of 30 m below seabed level
- ❖ Magnetic anomaly survey for identification of potential obstructions such as wrecks, buried metals, pipelines or other unnatural metallic debris etc. if they exist
- ❖ Offshore electrical resistivity profiling to delineate ground stratigraphy and relative permeability of the subsurface materials.
- ❖ The positions of all geophysical traverses shall be accurately located and recorded using equipment such as Real Time Kinetic Differential Global Positioning System (RTK DGPS) equipment or equivalent, with a horizontal positional accuracy of at least ±0.1 m and reported as longitude and latitude.
- ❖ Vertical control shall be established at Chart Datum (CD) from an approved benchmark. Vertical sea level shall be calibrated against tide gauges.



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2.3.4 Deliverables

- ❖ Deliverables shall include factual survey reports, cross-sections and charts (e.g. isopach maps), identifying the lateral extent and depth of major geophysical boundaries (e.g. zones of similar electrical resistivity), in portable electronic format (*.pdf) and editable geo-referenced electronic format (e.g. *.dxf, *.dwg, *.shp).

2.3.5 Other Requirements


2.3.5.1 Vessel, Personnel and Permits

- ❖ The Survey Contractor shall employ vessels and plant capable of appropriately supporting the equipment and personnel required to complete the scope of work proposed for the project. Vessels and plant shall be operated and crewed according to maritime industry best-practice and regulations, including health, safety and environment (HSE) requirements.
- ❖ Information on all vessels, plant and equipment proposed for use by the Survey Contractor shall be provided as part of the response to the Invitation for Bid (IFB). Operability constraints of the proposed vessels and plant in relation to sea-state and weather (metocean conditions) shall also be provided. The Survey Contractor shall obtain all necessary Offshore permits required for the work.
- ❖ The proposed personnel shall be experienced in the operation and management of the required vessels and equipment in conducting Offshore geophysical investigations. All of the Survey Contractor's Offshore personnel shall have appropriate certification and training, which shall be documented prior to mobilisation. Documentation of the experience of key personnel shall also be provided



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2.3.5.2 Equipment

- ❖ The equipment proposed for use shall be fully bench tested and certified prior to dispatch to site and shall be capable of meeting the required specifications herein.
- ❖ The positioning system used should be capable of achieving repeatable measurements to a horizontal accuracy of ±0.1 m (Survey Contractor to specify achievable horizontal accuracy based on recommended equipment). It shall provide real-time navigation on board the offshore survey vessel.
- ❖ Equipment shall be 'Bar Checked' or otherwise calibrated in the survey area prior to commencement of the survey, on a weekly basis thereafter and at completion of the survey. Records of 'Bar Checks' and other site specific calibrations shall be provided in Survey Contractor reports.

2.3.5.3 Field Data Processing

- ❖ The preliminary interpretation of the records shall be undertaken to provide maximum information on the bathymetry, boundaries of seabed materials, their inferred composition and mapping of areas of seabed relief and presence of any metallic objects, as well as to identify specific features of interest or anomalies.
- ❖ The Survey Contractor shall make the field-processed data available to the Company Representative as soon as reasonably practicable and shall also specifically advise of any features that could be of sufficient significance to impact upon the project, if any are identified.
- ❖ The Survey Contractor shall provide in the response to this IFB the anticipated timeframes required for field processing and delivery of preliminary data to the Company Representative.


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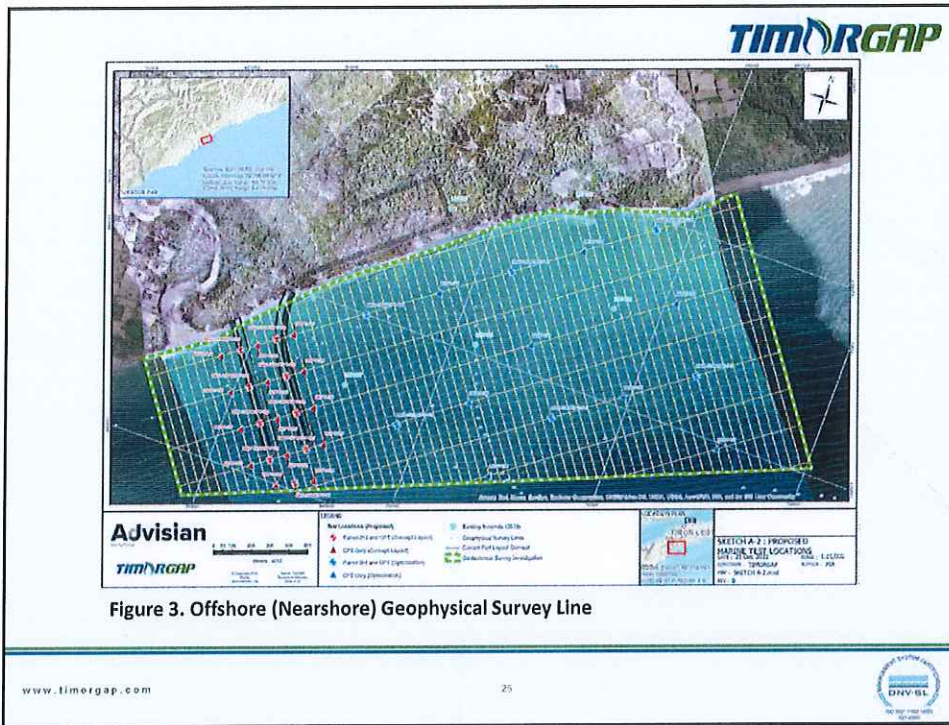
2.3.6 Equipment for Onshore and Offshore Geophysical Survey

No	Category	Equipment	Quantity (at least No. of Equipment)
1	Navigation	Primary pos	1
		Secondary pos	1
2	Bathymetry	SBES	1
3		MBES(Primary)	1
		MBES(Backup)	1
4	Motion Compensator	Primary	1
		Backup	1
5		Selsmic(Primary)	1
		Selsmic(Secondary)	1
6	Analog Geophysical	Side Scan Sonar(Primary)	1
		Side Scan Sonar(Secondary)	1
7		Magnetometer	1
8	Offshore Geophysical	AUV	1
9	Robotics	Multi-Role USV	1
10	Magnetometer	SeaSPY PYOverhauser Sensor	1

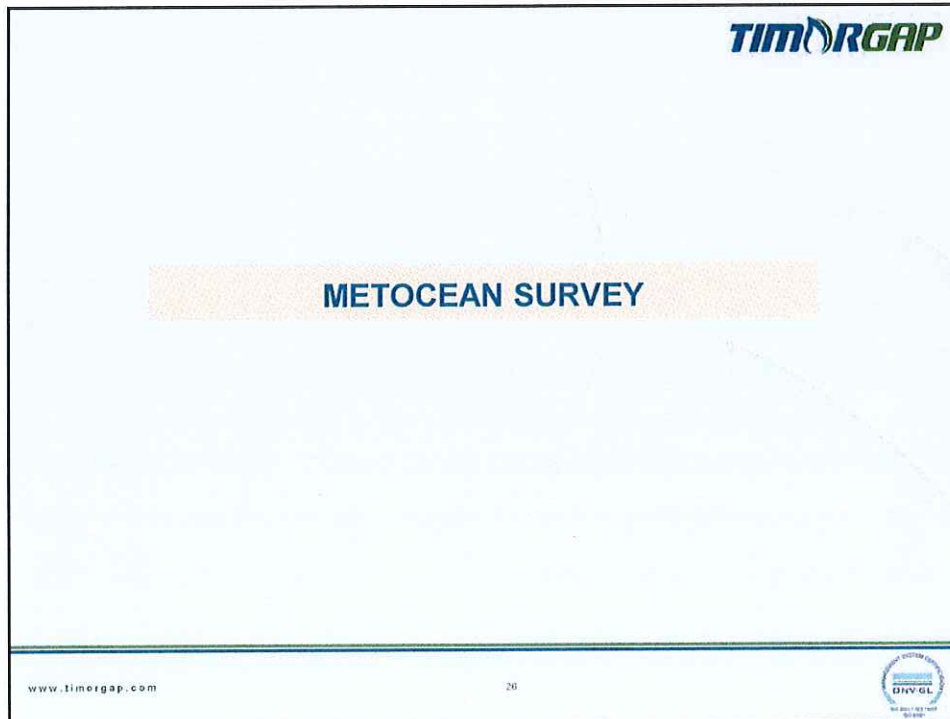
Note:
Backup and with the latest technology
In Survey Industry

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2. 4 METOCEAN SURVEY SCOPE OF WORK


2.4.1 Required Data
 Metrocean data is required for the assessment of operability of the new port and for the structural design of its elements. Metrocean data required includes:


- ❖ Sea level variations – including tidal stage, storm surge and mean level of sea (MLOS)
- ❖ Currents – tidal and other ocean currents
- ❖ Water temperature
- ❖ Gravity waves – seas and swell ($T_p < 30s$) to inform armour design and littoral drift transport assessment
- ❖ Infragravity waves – long waves ($T_p > 30s$) that cause harbour resonance and ship resonance, any tsunami that may occur
- ❖ Onshore wind gust, speed and direction, air pressure, air temperature, relative humidity, dew point, precipitation, solar radiation and evaporation rate.

2.4.2 Duration

- ❖ A total deployment period of at least 12 months is required, spanning at least each season (the south-easterlies occurring from April to October and the south-westerlies from November to March). At least 2 contiguous deployment periods are required, no longer than 7 months, with full data to be downloaded at the end of each deployment. Alternative solutions such as remote monitoring and data provision are to be confirmed prior to tender or may constitute a non-conforming tender.
- ❖ All instruments are to be deployed in parallel (i.e. at the same time)


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2.4.3 Data Analysis
 The data will need to be reduced and analysed for:

- ❖ Sea level variations including tidal stage, storm surge and mean level of sea (MLOS) (Noting that when analysing data for MLOS, MLOS is considered as changes/periods of water level >2 weeks)
- ❖ Ocean currents including tidal and residual currents over full water depth and at 3 levels (bottom, mid and upper)
- ❖ Gravity and infragravity wave spectral analysis. Fast Fourier Transformations will suffice for gravity waves but an appropriate wavelet analysis, discussed with and approved by TG, will be required for the analysis of infragravity waves
- ❖ Gravity wave heights, frequencies (periods) and directions, total (<30s), sea (<7s) and swell (7s – 30s). If based on experience and initial review of data the Survey Contractor believes a sea/swell split other than 7 s should be used, they are to contact TG and confirm before proceeding further with analysis.
- ❖ Infragravity wave heights, frequencies (periods) and directions.
- ❖ Correlation of infragravity waves (H, T) with gravity waves (Hs, Tp)
- ❖ Onshore meteorological data to be collected and analysed includes:
 - ✓ Continuous 10 minute averages (vector average for directions) of wind speed and direction, air pressure, air temperature, relative humidity, dew point, solar radiation and evaporation rate
 - ✓ 3 second wind gust and direction
 - ✓ Times of 0.2 mm tips for precipitation, or other methods to record precipitation intensity and volume (Survey Contractors to nominate proposed method).

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2.4.4 Instrumentation and Equipment

- ❖ The offshore metocean data required, including ocean currents, gravity and infragravity waves, may all be obtained with a seabed-mounted upward-looking acoustic doppler current meter with pressure sensor.
- ❖ At least 2 instruments are to be used in contiguous deployment periods as required.
- ❖ The offshore metocean instrumentation shall meet the applicable standards outlined in either WMO-No.8 or NORSOK N-002.
- ❖ The Survey Contractor may provide instrumentation meeting applicable standards other than the previously listed, granted the Survey Contractor receives prior confirmation from the Company and or Company Representative.
- ❖ Survey Contractors are to nominate proposed equipment (supplier and model), methods for redundancy or alternatives, for both onshore and offshore data.
- ❖ Survey Contractors will provide all equipment necessary for the safe installation, mooring and recovery of instrumentation.

2.4.5 Locations

- ❖ Offshore data is to be monitored at 2 locations, located in 10 m and 20 m depth, offshore from the proposed port site. This is at approximately 9°19'S, 125°18.5'E
- ❖ The Survey Contractor shall confirm their preferred location prior to mobilisation and confirm water depth once on site prior to installation.

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2.4.6 Data Return

- ❖ A minimum of 90% good data for each parameter (e.g. currents, gravity waves, wind speed and direction, solar radiation) is required for each deployment, from each location (i.e. 10 m water depth, 20 m water depth, onshore).

2.4.7 Offshore Wave Sampling

- ❖ Water pressure and orthogonal currents are to be sampled each second for at least 4096 seconds (1 hr 10 mins) every 4 hours. Alternative sampling strategies are to be confirmed prior to tender submission or may constitute a non-conforming tender.

2.4.8 Deliverables

2.4.8.1 Reports


A report detailing the findings of the metocean data will be produced by the Survey Contractor in electronic format (Word and pdf). 4 versions of the report will be produced:

- ❖ Draft preliminary following the first deployment
- ❖ Preliminary incorporating comments received from the Company
- ❖ Draft following the second deployment
- ❖ Final incorporating comments received from the Company

2.4.8.2 Data Files

The following is a list of the minimum electronic files to be provided by the Survey Contractor as part of the Works:

- ❖ Electronic files containing the measured and analysed data described in Section 2.4.8.1 above, including spectral analysis, in:
 - ✓ netCDF
 - ✓ CSV or similar format (excluding full spectral analysis)
- ❖ Electronic copies of raw data files

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2.4.9 Equipment

No	Category	Equipment	Quantity (at least No. of Equipment)
1.	Water Level	Tide Gauge	1
			1
2.	Current	ADCP	1
3.	Wave	AWAC	1
4.	Seabed Sediment	Grab Sampler	1
5.	Suspended Sediment	Water Sampler	1
6.	Weather Forecast	Weather Station	1



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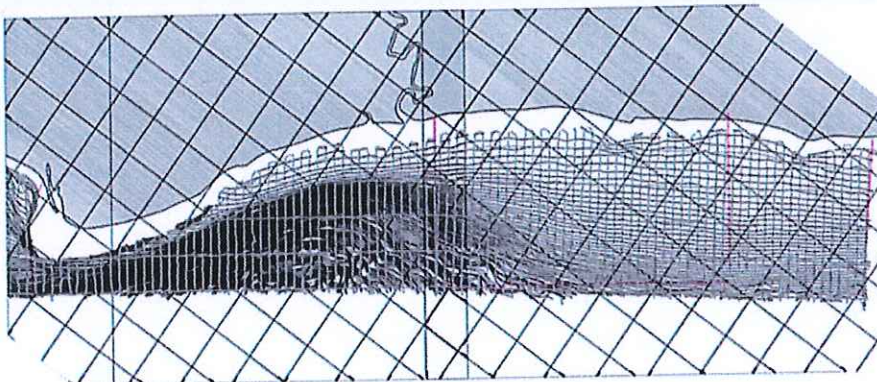


Figure 4. Bathymetric Contour Survey line



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