CONTRACT NO. GE/2021/03

TASK ORDER NO. GE/2021/03.23

AGREEMENT NO. CE 26/2022 (EP)

DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES PHASE 2 – INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)

MARINE GEOPHYSICAL SURVEY (GS)

FINAL REPORT

HK268623

SEPTEMBER 2023

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Contract Data Summary

Project Name & No. GE/2021/03.23	Site Name	Date: 23-Jun-2023 to 8-Nov-2023	
Marine Geophysical Survey	Agreement No. CE 26/2022 (EP) Development of Integrated Waste Management Facilities Phase 2 - Investigation, Design and Construction (SA1)	Official only	
G.I. Contractor Fugro Geotechnical Services Ltd./ EGS (Asia) Limited	Employer CEDD	G.E.O. Data Bank No.	
Contract No. GE/2021/03	Task Order No. GE/2021/03.23	File Ref.	

Field Work Summary

Drillholes Total No. N/A	Method: N/A	Date : 26-Jun-2023 to 6-Jul-2023
Pits / Trenches / Caissons : No. N/A		
Probes : No. N/A		
Piezometers : No. N/A		
Insitu Tests : No. N/A	Types	
Geophysics : Marine	Type SBES/ MBES/ SSS/ SBP/ MAG/ SBP+MAG	

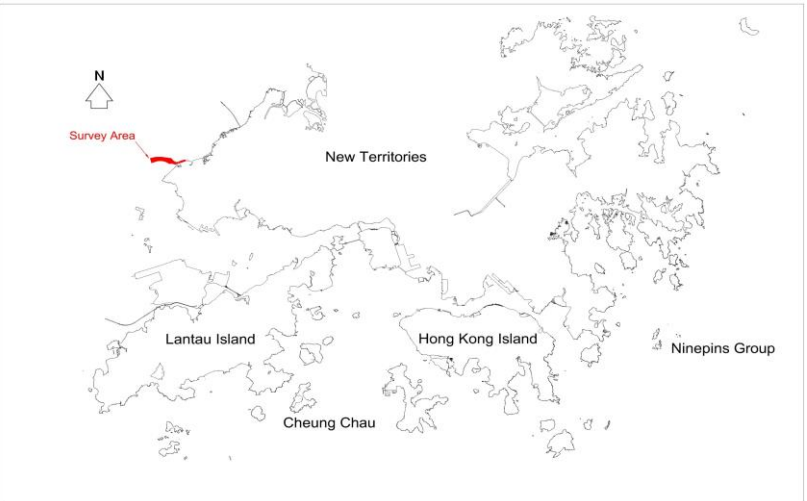
Laboratory Testing Summary

Total No. of Tests : Date to

Soil	Physical Properties	LL	PL	PSD	MC
		SG	γm/γd		
	Strength Tests	CU	CD	UU	Shear box
	Compaction & CBR Tests	Standard	Modified		CBR
	Oedometer & Perm. Tests	Cv	k		
	Others				
Rock	γ	Pt load	UC	Shear Box	US Vel.

Location Plan SCALE 1 : 20 000 Derived from : 20 000 Sheet

SCALE 1 : 5 000 5 000 Sheet



	G.S.	Laboratory	GEOTECHNICAL ENGINEERING OFFICE
Contractor	Fugro Geotechnical Services Ltd./ EGS (Asia) Limited	-	CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT HONG KONG SPECIAL ADMINISTRATIVE REGION
Works Order No.	GE/2021/03.23	-	

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September 2023
(HK268623/Report/Final HW)

1 INTRODUCTION

1.1 INSTRUCTIONS AND OBJECTIVES

Under the Task Order No. GE/2021/03.23 issued by the Civil Engineering and Development Department (CEDD) on 15th June 2023, geophysical surveys were commissioned to study the seabed features and the shallow geology covering the designated survey area SA1 at Tsang Tsui and its surrounding area, west of New Territories, to facilitate the investigation, design and construction for development of integrated waste management facilities.

According to the survey scope, the study area SA1 was further divided into two areas: Area N1 and N2 (Figure 1 and Figure 2). As shown in Table 1 below, a list of geophysical survey methods was utilised to achieve specified survey objectives:

AREA	SURVEY TYPE	OBJECTIVE
N1 and N2	Single beam echo sounding (SBES)	To spontaneously measure seabed levels on site and to authenticate the multi-beam sounding system
	Multibeam echo sounding (MBES)	To provide seabed levels in detail
	Side scan sonar (SSS)	To locate anomalous features and map sediment types on the seabed
N1	Sub-bottom profiling (SBP)	To provide levels and thicknesses of geological interfaces, if identified
	Marine magnetometer (MAG)	To identify metallic objects and any archaeological remains on, or just beneath the seabed
	Subsea utility survey (SBP+MAG)	To locate the existing subsea utilities

Table 1: Geophysical survey methods used in the project

1.2 SURVEY PERIOD AND LOCATION OF THE SURVEY AREA

From 26th June to 29th June 2023, an EGS survey vessel *M.V. Wing Hung* (*WH2*) was utilised to conduct the MAG survey in Area N1, including the subsea utility survey for the existing power

cable and pipelines. From 3rd July to 6th July 2023, another shallow draft vessel *M.V. GEO1* (*GEO1*) was mobilised to perform the MBES and SSS survey in both Area N1 and N2 as well as the SBP survey in Area N1. The outstanding SBP and MAG survey in Area N2 will be conducted in the next phase. Overview images of the survey site are shown in Figure 1 and Figure 2 below. **Appendix A** of this report provides the Daily Site Records for reference.

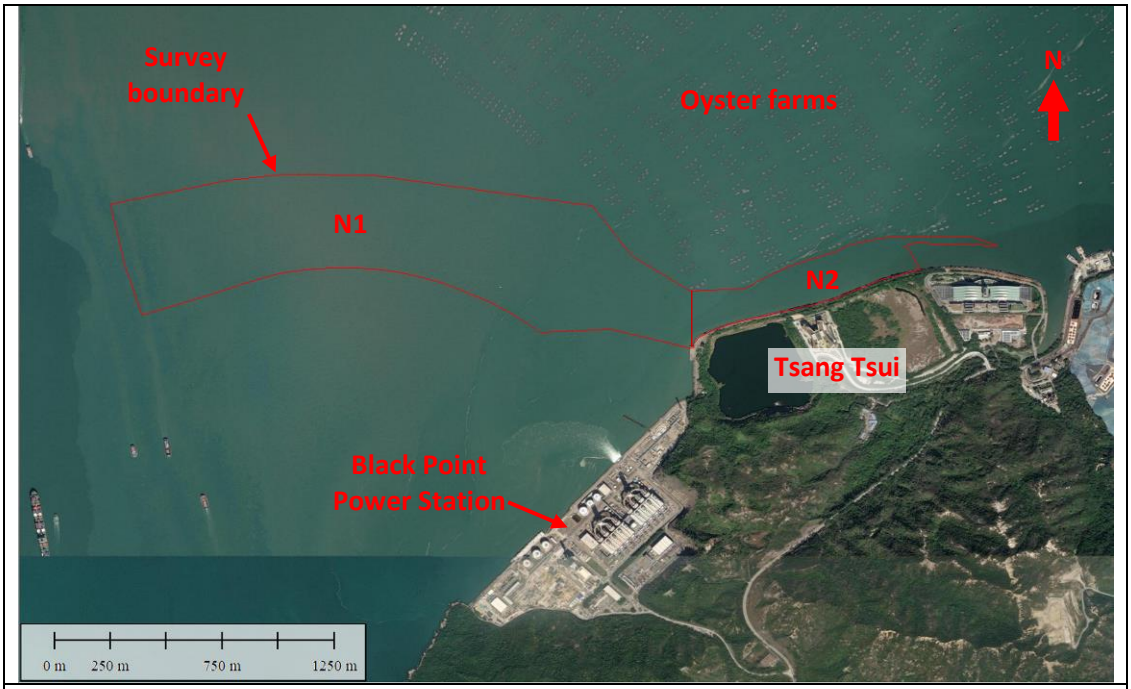


Figure 1: Satellite image of the survey area (*Courtesy of Google Earth 2023*)

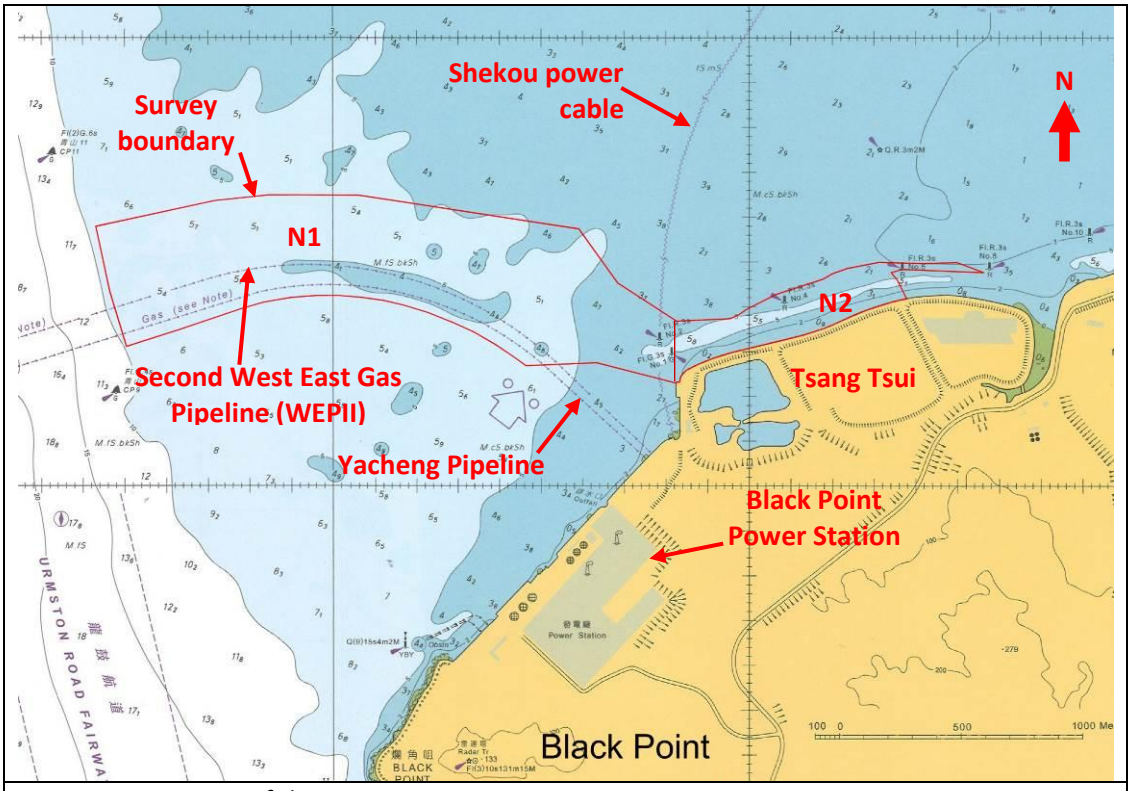


Figure 2: Overview of the survey area

2 SITE DESCRIPTION

The survey site is located to the north of Black Point Power Station (Figure 1 and Figure 2). The eastern portion of the site is bounded by a rubble mound seawall on the south and extensive oyster farms on the north (Figure 1, Figure 3 and Figure 4). Area N2 covers the narrow navigation channel marked by a series of navigation beacons (Figure 5).

During the survey period, various types of vessels were observed passing-by or anchoring in the survey area, including ferries, cargos, speed boats and small fishing boats, etc. (Figure 6). Fishing buoys were occasionally encountered (Figure 7). Survey operations were impacted and infill lines were run to avoid data gaps. Survey coverage was restricted in the proximity of the oyster farms.

The weather was mostly sunny during the survey period with scattered showers and generally calm sea states. Heavy rain and rough sea were encountered in the afternoon of 4th July 2023, and the survey was consequently aborted (Figure 8). Strong current was experienced during the survey, especially in the west of Area N1.

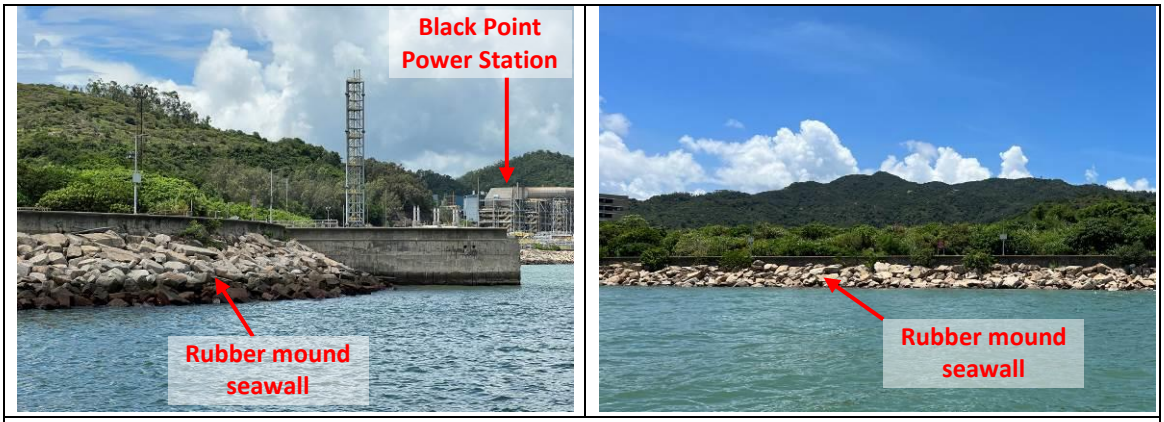


Figure 3: The coast of Area N2

Figure 4: Oyster farms to the northeast of the site

Figure 5: Navigation beacons in Area N2

Figure 6: Vessels in transit or at anchor in the vicinity of the survey area

Figure 7: Fishing buoy and boat sighted in the survey area

Figure 8: Rough sea and heavy rain encountered on 4th July 2023

3 GEOLOGICAL BACKGROUND OF SURVEY AREA

According to the Geological Map of Hong Kong (Figure 9), the solid geology around the survey site is dominated by mid-Jurassic granite while the coastal area at Tsang Tsui is reclaimed with fill materials. A subcropping area is marginally present in the south-western corner of the survey site. A northeast/southwest striking fault is charted intercepting the eastern Area N1.

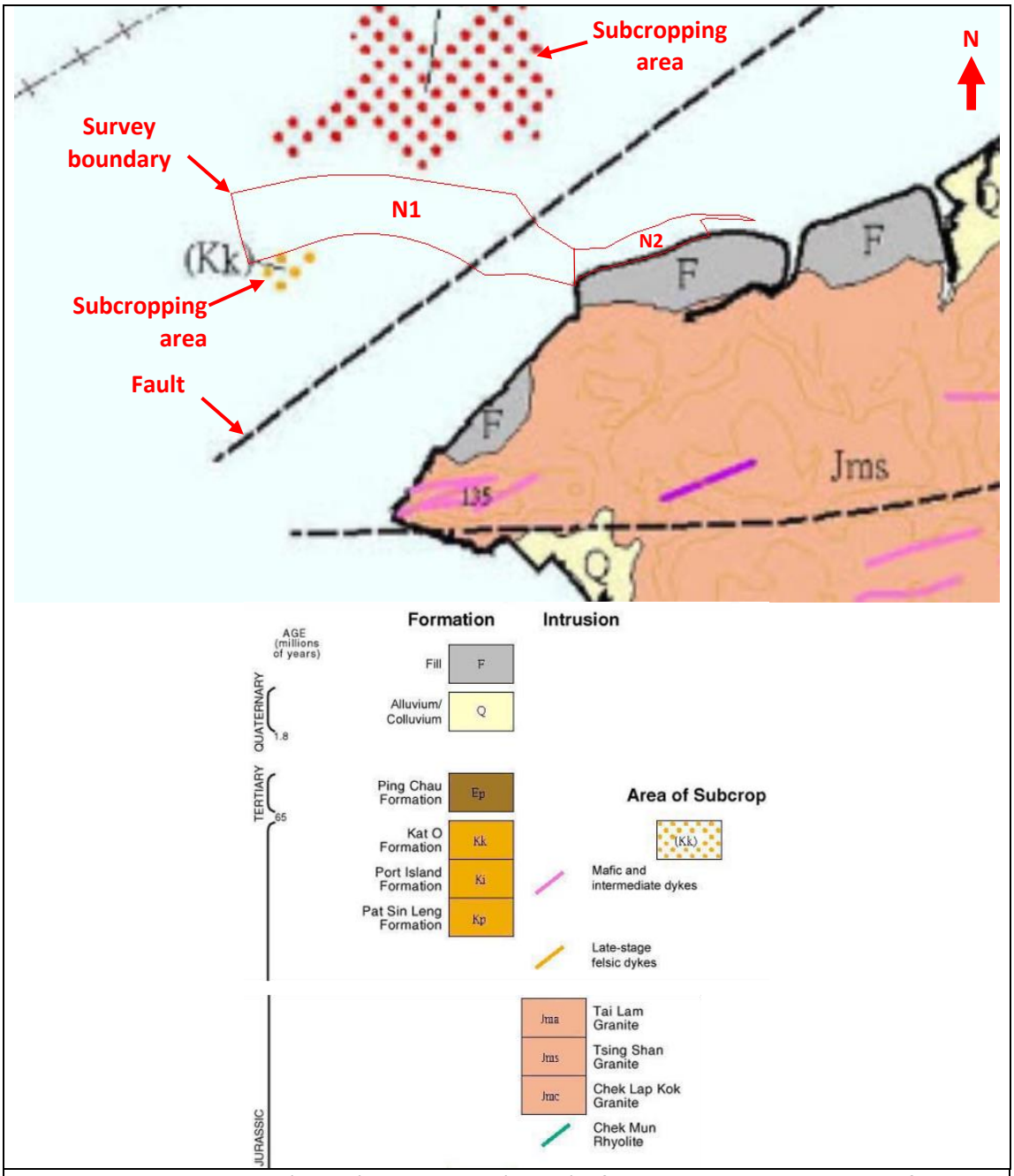


Figure 9: Geological map (upper) and legend (lower) of the survey area, extracted from the 1:100,000 Geological Map of Hong Kong (Web-based edition, 2006) (for illustration only; not to scale)

4 EQUIPMENT LIST

The survey vessel *GEO1* was utilised to conduct the main surveys (MBES, SSS and SBP). The MAG and subsea utility surveys were performed by the vessel *WH2*. The following equipment was mobilised on board the vessels (Table 2 and Table 3).

Type	Equipment
Survey Vessel	*M.V. GEO1*
Horizontal positioning	NovAtel PwrPak7 GNSS system
Motion and Heading	Teledyne TSS Saturn 10
MBES&SSS	EdgeTech 6205s combined bathymetry and side scan sonar system
SVP	Valeport miniSVP
SBES	Odom Echotrac MK III single beam echo sounding system
SBP	C-Boom low voltage boomer (LVB) system
Survey Software	QPS QINSy survey and office modules C-View Nav computerised navigation suite C-View Acquisition EdgeTech Discover
Table 2: The equipment mobilised on the survey vessel *M.V. GEO1 (GEO1)*	

Type	Equipment
Survey Vessel	*M.V. Wing Hung 2*
Positioning	C-Nav 3050 GNSS system
SBES	Kongsberg EA440 single beam echo sounder system
MAG	Geometrics G882 Caesium Vaper magnetometer
SBP	Innomar SES-2000 medium-100 parametric sub-bottom profiler EdgeTech 3400-OTS sub-bottom profiler
Survey Software	C-View Nav computerised navigation suite EdgeTech Discover Geometrics MagLog SESWIN Innomar data acquisition software ISE Innomar post processing software
Table 3: The equipment mobilised on the survey vessel *M.V. Wing Hung 2 (WH2)*	

5 LOCATION CONTROL

5.1 HORIZONTAL

5.1.1 POSITIONING AND NAVIGATION

The survey vessels were located by NovAtel PwrPak7 (on *GEO1*) and C-Nav 3050 (on *WH2*) GNSS systems. Both systems have positioning technique using a proprietary Precise Point Positioning message broadcasting from their processing centres which provides decimetre positioning to terrestrial users. The system consists the following:

- A geodetic-quality dual frequency GNSS receiver which tracks and locks onto the L1 (C/A code and phase) and L2 (Y-code and phase) signals from GPS and GLONASS satellites.
- An integrated INMARSAT L-Band decoder to receive the TerraStar corrections (NovAtel system) and RTG Gipsy corrections (C-Nav 3050 system) from geostationary INMARSAT communications satellites.

5.1.2 COMPUTERISED NAVIGATION

The computerised navigation system was added to the positioning system to control the steering of the boat along the traverses specified, and to log all horizontal and vertical control data. This system provides the user with a dynamic screen display on which the following are continuously updated:

Skewed grid set parallel to the desired survey line direction
The water depth
Date and Time
DGNSS diagnostics enabling quality control

Other information displayed for the assistance of the hydrographic surveyor includes, course, speed, fixing status, coordinates on the Hong Kong Metric Grid, as well as a number of other user-defined options including a graphical 'left and right' offset indicator and a numerical display of water depth along the survey line. The system includes a multiple instrument fixing unit and records the single beam echo sounding data during the survey.

5.1.3 CALIBRATION, ACCURACY AND QUALITY ASSURANCE

The positioning systems used on the two vessels were checked at a control point located at Yau Ma Tei Typhoon Shelter for positioning accuracy. For *GEO1*, the calibration results revealed a horizontal offset of 0.468 m in Easting and -0.317 m in Northing, corresponding to a bias of 0.566 m. The Distance Root Mean Squared (DRMS) was 0.049 m. For *WH2*, the bias was 0.666 m with a DRMS of 0.070 m. Such small offsets and DRMS confirmed that the system achieved a high positioning accuracy. Please refer to **Appendix B** for the GPS check plots.

5.2 VERTICAL

5.2.1 DATUM

The datum in use or implied in Hong Kong are as follows in Figure 10:

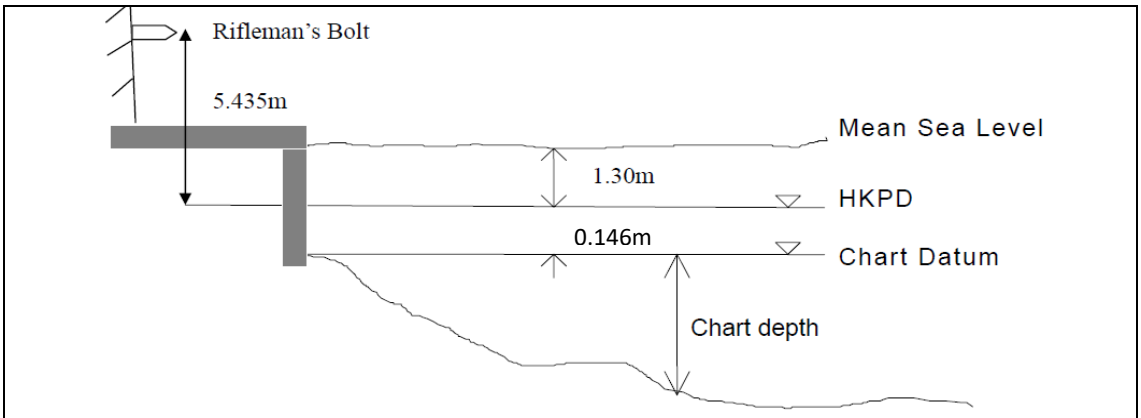


Figure 10: Definitions of Vertical Datum in Hong Kong (with reference to SMO, Lands Department HKSAR, 2018)

5.2.2 UTILIZATION OF TIDAL MEASUREMENTS

Tide records from the Chek Lap Kok (West) tide gauge managed by the Airport Authority were used to reduce the soundings to the Hong Kong Principal Datum (PD) in this survey.

A full set of sounding data was acquired between 3rd and 6th July 2023. The tide data for the same period is presented in **Appendix C** for reference.

6 FIELD PROCEDURES

6.1 SURVEY VESSEL

Two survey vessels, *GEO1* and *WH2*, were utilised for this survey (Figure 11 and Figure 12). The daily site records are enclosed in **Appendix A**.

Figure 11: Survey vessel *GEO1*

Figure 12: Survey vessel *WH2*

6.2 COVERAGE

The following survey traverse intervals (Table 4) were agreed with the client prior to the fieldwork. Due to the presence of oyster farms, the survey coverage was restricted in the northeast of Area N1.

AREA	SURVEY TYPE	SURVEY SPACING
N1 and N2	MBES	20 m plus infill lines
	SSS	40 m plus coast-lines
N1	SBP	40 m x 100 m
	MAG	10 m
	Utility survey (SBP+MAG)	100 m perpendicular to the pipeline alignments 25 m perpendicular to the power cable alignment

Table 4: Survey types and intervals

6.3 MULTI-BEAM ECHO SOUNDING BATHYMETRY

Seabed level observations were made with a multi-beam echo sounder (EdgeTech 6205s) on *GEO1*.

To achieve high position accuracy, the MBES system requires careful calibrations. A potential significant source of error relates to the speed of sound in water. The system requires the speed of sound to be measured through the water column, and for these data to be entered into a file which is accessed by the acquisition and processing software. In addition, due to the fact that the speed of sound can vary significantly near the sea surface, a sound velocity probe was installed at the MBES transducer so that measurements were recorded at all times during the survey and the corresponding corrections can be made within the system in real time.

A patch test was required to calibrate system components as listed in the following Table 5.

Test	Description
Roll Offset	A survey line was set over an area with a flat and featureless seabed. The line was run in opposite direction at the same speed.
Pitch Offset	A survey line was set exactly over a well-defined feature. The line was run in opposite directions at the same speed.
Yaw (Heading) Offset	Two parallel lines were set to either side of a well-defined feature with the feature positioned in the middle of the two lines. The off-track distance between the feature and the lines were selected according to water depth and the fan width of the MBES system, so that the features were detected at the outer part of sounding 'fan'. The lines were run in the same direction at the same speed, once passing the feature to Port and once to Starboard.
Navigation Delay	A survey line was set exactly over a well-defined feature, such as a rock outcrop, a significant slope or a man-made structure. The line was run twice in the same direction at different speeds of 3 knots and 6 knots.

Table 5: A list of parameters calibrated in a patch test

By applying appropriate algorithms to match the apparent differences in the positions of the selected feature and the seabed topography measured in the individual calibration line, these calibration factors were determined and then entered into the acquisition system to correct the sounding measurements in real time.

Velocity profiles collected during the MBES survey are presented in **Appendix D1**. Daily MBES patch test report for the survey is given in **Appendix E**.

Figure 13: EdgeTech 6205s MBES transducer (left) and illustration of bathymetry swath (right)

In the case of the Edgetech 6205s combined bathymetry and side scan sonar system on board *GEO1* used in this survey (Figure 13), the interferometric sonar measures the sum of all returns on both port and starboard sides combining both Beamforming and Phase Differencing techniques to determine each sounding along the seafloor. The seabed level data is obtained over a seafloor coverage centred on the vessel track depending on the range

settings of the sonar, which controls the seafloor coverage with suitable selection to different water depths. The system produces up to 800 soundings in each resulting ping. Considering the resolution of the side scan imagery, the range was set to 50 m with a sounding bin size of 0.3 m in this survey.

A single beam echo sounder was also installed as a QC tool for the bathymetry survey. The SBES transducer produced pulses of acoustic waves at set intervals and recorded two-way travel time for the primary seabed reflection signal. This time was correlated to seabed depth by sinking a metal plate at known depths below the transducer, and recording travel times for the different depths. This process, known as a "bar check", was carried out before and after the survey operations. The procedure is important to correct the sound velocities in water.

Please refer to **Appendix D2** for an example of the bar check record.

6.4 SIDE SCAN SONAR SURVEY

A schematic diagram (towed mode) of side scan sonar survey is presented in Figure 14. Side-scan uses a sonar device that emits a fan-shaped pulse down toward the seafloor across a wide angle perpendicular to the path of the sensor through the water to map the features on seabed. Before survey commencement, the side scan sonar system was wet tested to ensure that the system is in good working condition.

For this survey the EdgeTech 6205s was pole-mounted on the *GEO1*. The SSS wet test was performed by running a test line with the same settings for the coming survey. Parameters like gain, slant ranges, equipment connections, etc. were all tested and the results were checked and approved by the on-site geoscientist before proceeding to the survey work.

The recording parameters for the side scan survey were as follows:

Vessel speed:	generally 1.5 - 2.0 m/sec
Fix interval:	10 seconds
Source frequency:	230 kHz and 550 kHz
Slant range:	50 m

Four channels (low and high frequency; port and starboard) were simultaneously recorded with navigation information and the high resolution 550 kHz data were used in the data processing.

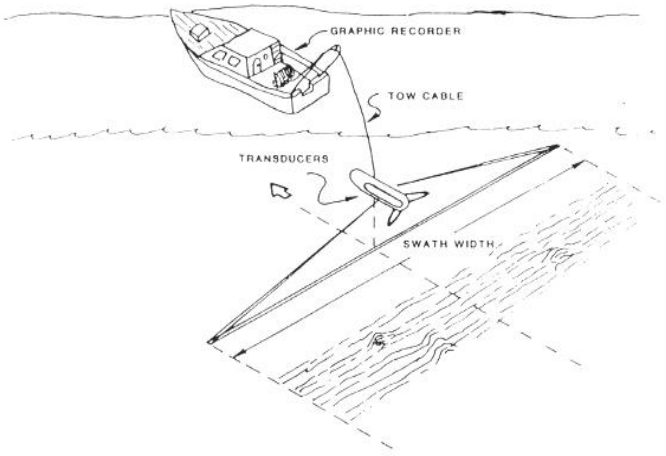


Figure 14: Schematic diagram of SSS

6.5 SEISMIC REFLECTION SURVEY

A schematic diagram of seismic reflection survey is presented in Figure 15. In short, the seismic energy generated by a boomer is transmitted downwards through water column. The signals are then reflected by the seabed and underlying geological interfaces, on both sides of which the acoustic impedances are different. The return signals are recorded by a hydrophone after the two-way travel time. By using appropriate velocities in different mediums, the seismic reflectors (horizons) are constructed.

The boomer was towed behind the survey vessel at a distance of 20 m from the stern to minimise noises from the vessel (Figure 16). Before the commencement of the survey, the C-Boom low voltage boomer was wet-tested. Further test on SBP system was conducted by running a test line with settings adjusted for the best data quality. System parameters like source frequency, power, equipment connections, etc. were all tested, adjusted and the results were checked and approved by the on-site geoscientist before proceeding to the survey work.

The recording parameters for the seismic reflection survey were as follows:

Vessel Speed:	1.2 - 2.2 m/sec
Fix Interval:	10 seconds
Source Frequency:	~1.0 kHz dominant
Sweep:	200 ms
Delay:	0 ms
Sample Rate:	20,000 Hz

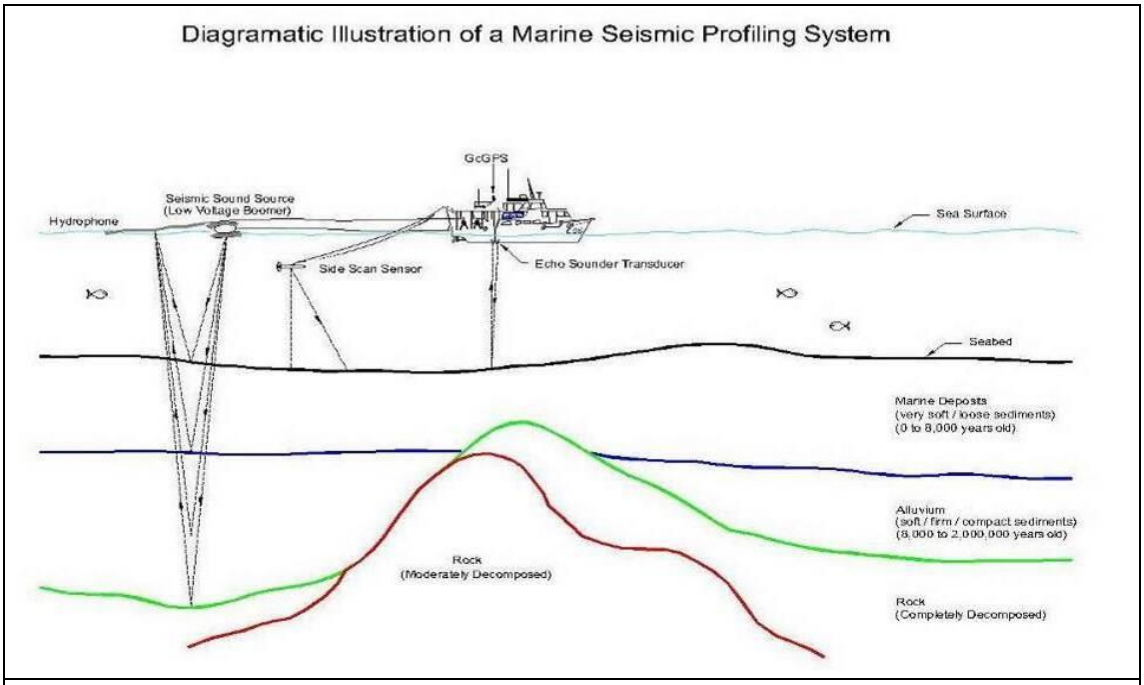


Figure 15: Schematic diagram of seismic reflection survey

Figure 16: The towed SBP set-up during the survey

6.6 MAGNETIC SURVEY

A marine magnetic survey was conducted for the identification of any ferrous objects on the seabed or buried within sediments at shallow depths (Figure 17). Before the start of the survey, the magnetometer (Geometrics G-882) was wet-tested to ensure that the system is in good working condition.

The magnetometer was towed astern the survey vessel. Cable out and vessel speeds were adjusted during the survey to keep the magnetometer around 3-4 m above seabed.

The recording parameters for the magnetometer survey were as follows:

Vessel speed:	1.5 - 2.5 m/sec
Fix interval:	10 seconds
Magnetic sensor sample rate:	10 Hz

Figure 17: The Geometrics G-882 marine magnetometer

6.7 SUBSEA UTILITY SURVEY

The above marine magnetometer was used for the subsea utility survey, with lower fish altitudes (1-2 m). Additionally, two high frequency sub-bottom profiling systems (Innomar SES-2000 medium-100 and EdgeTech 3400-OTS as a supplement, shown in Figure 18) were also utilised to detect the subsea utilities within the survey area.

The Innomar system provides a wide range of high frequencies (4-15 kHz) of acoustic signals. Operating frequency of 8 kHz was selected to ensure both high data resolution and good seismic penetration throughout the survey.

The EdgeTech 3400-OTS transmits wide band Frequency Modulated (FM) pulses utilising EdgeTech's proprietary Full Spectrum CHIRP technology. The system uses flat multi-channel hydrophone array to generate high resolution images of the sub-bottom stratigraphy provides excellent penetration in various bottom types. The 3400-OTS receiver array is segmented for

standard sub-bottom profiling operations or “pipeline” mode for optimal location and imaging of buried pipelines or cables.

Alternately, the Innomar and EdgeTech 3400-OTS transducers were rigidly mounted over-the-side of the survey vessel and located underneath the GPS antenna (Figure 19), to attain a high positioning accuracy of the seismic data. Furthermore, a motion sensor was secured just next to the transducer pole, which allowed a smooth profiling image to be recorded from the seismic traces, particularly under marginal weather condition.

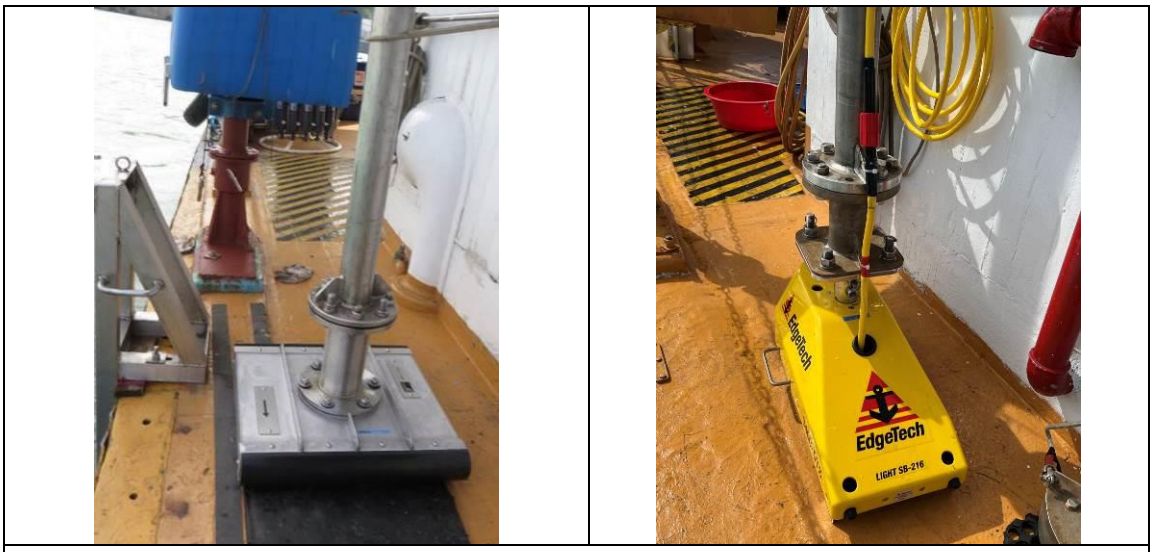


Figure 18: Innomar (left) and EdgeTech 3400-OTS (right) transducers

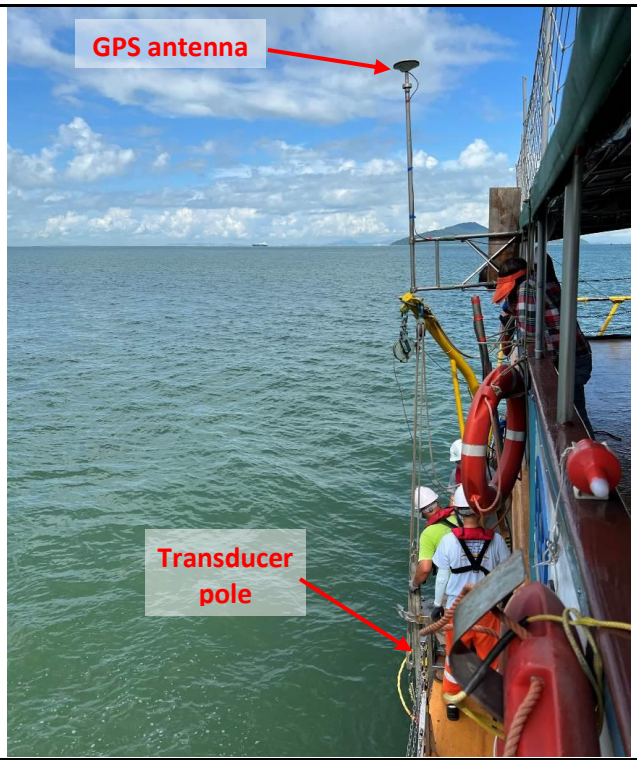


Figure 19: The over-the-side SBP set-up during the utility survey

6.8 SITE SAFETY

An internal safety system was implemented in accordance with the EGS Safety Manual that was based on industry requirements as set out in the 'Marine Geophysical Operations Safety Manual' (International Association of Geophysical Contractors, Eighth Edition, 1996) and local requirements.

6.9 QUALITY ASSURANCE

Quality is assured by adopting the measures set out in the EGS ISO9001 Quality Handbook.

7 REDUCTION OF OBSERVATIONS AND INTERPRETATION

7.1 SOUNDING DATA

For MBES data reduction, data coverage and density were checked. Soundings were cleaned for outliers or artefacts by using various data filters and surface cleaning algorithms before they are validated.

All instrument offsets derived from patch test results, sound velocity correction, draft and attitude data correction were applied in the processing environment. All bathymetric data were corrected for speed of sound based on the SVP measurements. The smoothed sounding data were reduced to levels below HKPD using the measured tide levels.

After all corrections applied, “BASE Surfaces” (Bathymetry with Associated Statistical Error) were generated for a correlated check on the data quality. Any irregularity or artefact in the data identified would trigger further processing for the tidal and sound velocity corrections. Then the Digital Terrain Model as “BASE Surfaces” was calculated and exported. All BASE Surfaces were finally processed into grids. Localised gradients on features of smaller lateral extent may not be resolved.

Gridded sounding selection was used for this survey, as is widely used for engineering purposes. The selection procedures for this project are as follows:

- The processed data were gridded on to 1 m spacing dataset, during which median sounding values were used.
- The gridded data were then plotted at a spacing of 6 mm at the charting scale, to provide a sounding plan for the whole area surveyed.

This gridded plot was then contoured and coloured using 'C-View Bathy' processing and charting software, to provide the sounding plans.

Contours with 1 m intervals were derived based on the final bathymetry grid and presented along with spot depth values in Chart 6 series of this report. The digital MBES results are also provided in ASCII .XYZ files.

7.2 SIDE SCAN SONAR DATA

Processing and interpretation of side scan sonar data were carried out using the C-View interpretation software. Relevant geometries were applied to the C-View system and features were individually marked or grouped into regions. The subsequently generated interpretation files were then imported to the AutoCAD environment on a line-by-line basis where a detailed check was performed and the interpretations reconciled.

The SSS data interpretation is presented in Chart 7 series of this report.

7.3 SEISMIC DATA

7.3.1 GENERAL

The quality of the seismic records is generally good for the interpretation of the sub-bottom geology. However, some specific strata are barely discernible, as constrained by the following conditions:

1. Along the 2 existing pipelines, the surficial armour rock layer largely blocked the acoustic penetration where the seismic interpretation was extended as much as possible and interpolation was made wherever unmapped. Moreover, gas masking was present in places in the west of the survey area and restricted the recognition of the deeper geological interfaces. Another masking area from dumped materials was present in the coastal area.

2. In the northeast of Area N1, a depression of ROCK head level was mapped near the charted fault on the geological map, where the signal return was generally weak. The interpreted ROCK head in this area is of low confidence and the result is presented in dashed lines on the charts.

7.3.2 INTERPRETATION OF THE GEOLOGICAL SUCCESSION

In general, the seismic records acquired in Hong Kong can quantify the following four elements of marine geological succession (Table 6):

GEOLOGICAL UNIT	AGE
Marine Deposits (Hang Hau Formation, mainly mud with beach deposit or debris flow deposit in coastal area)	Holocene (after the last glacial period)
Alluvium (Chek Lap Kok Formation; mainly coarse sediments with gravels)	Pleistocene
Highly to Completely Decomposed Rock	Various
Fresh to Moderately Decomposed Rock	Various

Table 6: Marine geological units commonly applied in HK

Marine Deposits, the most recent upper layers are generally soft or very soft clay or silt and are readily identifiable on seismic records as clear conformable horizontal layers, sometimes with unconformities represented by displaced reflections which could be results of local re-working of deposits underwater currents. Coarse-grained sediments such as sand, gravel, cobbles and boulders could be present near shore, which would produce wavy and discontinuous reflections in the seismic profile.

Alluvium is generally comprised of sand and gravel which produced wavier, semi-horizontal reflectors in the seismic records. Reflectors of alluvial deposits could be graded, inclined and cross-bedded, and sometimes traces of old river channels could be seen.

Highly to Completely Decomposed Rocks are more heterogenic than superficial deposits and therefore produced more chaotic, non-linear reflections in the seismic records.

Fresh to Moderately Decomposed Rocks produced very strong reflection when first encountered, and reflection diminishes very quickly within the rock.

7.3.3 DATA PROCESSING AND INTERPRETATION

Seismic data processing was conducted in C-View Processing and subsequent interpretation was carried out in 3D environment. Related procedures are summarised as follows:

1. Seismic records were band-pass filtered and the water column noise was suppressed.

2. All traces were corrected for positions and seabed levels by using C-View Processing. Data files were then exported to the 3D seismic interpretation environment for horizon picking.

3. Seismic horizons/geological interfaces were picked in the two-way-travel time domain in accordance with the geological sequences listed above. Inline-crossline correlation was conducted for the horizons in the 3D interpretation environment.

4. For time-to-depth conversion, the speed of sound was estimated as 1600 m/s in *Marine Deposits*, 1800 m/s in *Alluvium,* and 2000 m/s in *Highly to Completely Decomposed Rocks*.

5. Available borehole data was imported into the 3D interpretation environment and displayed as borehole stick for correlation with the nearby seismic records.

6. Finally, the correlated horizons were exported in digital ASCII format. Calculations were done for horizon levels with reference to the vertical datum and isopachs of each sediment/soil unit.

7. Horizon levels and isopachs were then gridded for contouring and charting.

The results of the SBP data interpretation are presented in Chart 8 to 13 series of this report.

A screenshot of the 3D interpretation environment is presented in Figure 20:

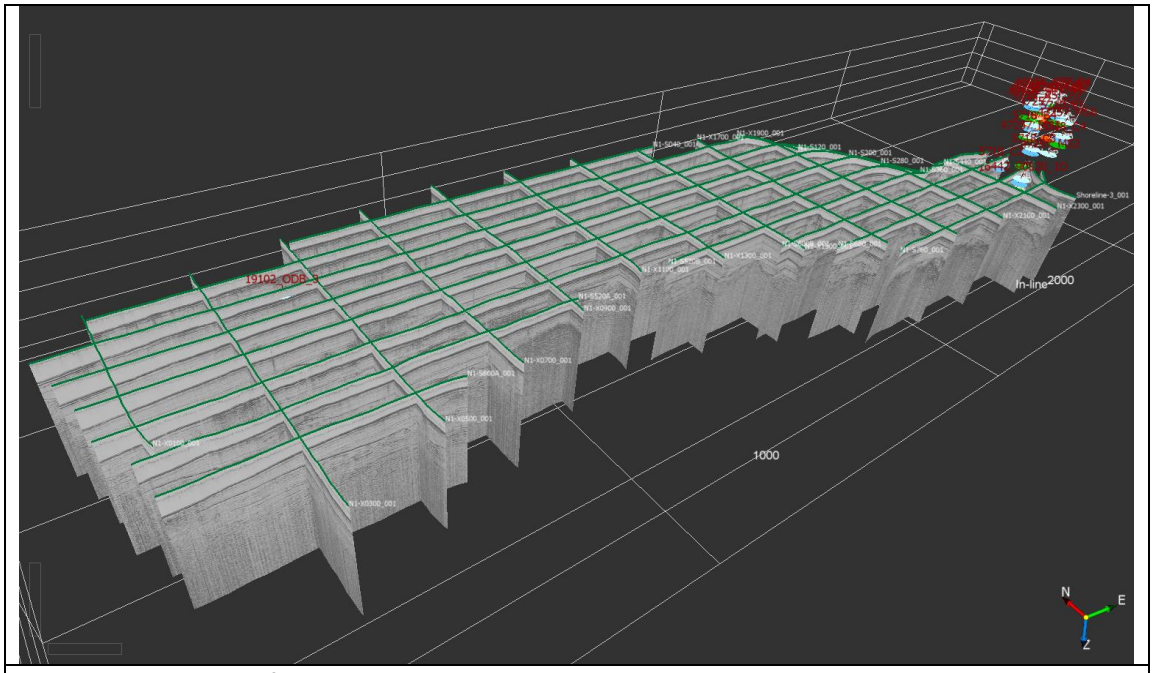


Figure 20: Example of SBP data interpretation in 3D environment

7.4 MAGNETIC DATA

A 10 m line interval magnetic survey was designed to detect the existence of any utilities or ferromagnetic objects on the seafloor or shallowly buried over the survey area.

The Geometrics G-882 Marine Magnetometer recorded the total magnetic field which was the sum of several magnetic fields: Earth's internal field (IGRF), lithospheric anomalies associated with sediments, solid geology and tectonic activities, physical interferences from outer space and anomalies associated with man-made objects.

IGRF and external interferences are time-dependent within this small survey area, whilst magnetic anomalies related to man-made objects and solid geology were generally independent of time since they contain remnant magnetization acquired in their formation and induced magnetization associated with the material's susceptibility.

In data space, these magnetic anomalies have wavelengths relatively shorter than time-dependent anomalies. In addition, their wavelengths vary with the depth of their corresponding source, by which anomalies related to very shallow objects can be differentiated from the background field. Various data processing procedures were conducted to isolate such signals from the background geology and interferences.

The data processing in this project is summarised below:

1. Median Filtering

Marine magnetic data were processed through median filters in the space domain to remove long-wave components or background field generated by deep causative sources, magnetic anomalies associated with regional geology and Earth's internal magnetic field. High-frequency noises, such as spikes, were also removed.

2. Transform to Quasi-Analytical Signal

The result of background filtering would be a residual magnetic field dominated by a series of dipole anomalies, associated with shallow causative sources such as ferromagnetic man-made objects and volcanic rock outcrop. However, these localised anomalies would vary dramatically in amplitudes, directions and wavelengths and anomaly peaks or troughs would not necessarily locate exactly above source positions, due to different source burial depths and different remnant magnetizations.

To remove such dipolar effect and present source positions more accurately, the anomalies underwent a quasi-analytical signal transformation, which involved a calculation for field gradients in all three dimensions and their quadratic means. The peak of the analytical signal represented a local gradient maximum, and more importantly, would coincide with horizontal positions of the causative sources in general, regardless of their magnetization directions.

The resultant map of the quasi-analytical signal is presented in Chart 14 series of this report.

7.5 SUBSEA UTILITY SURVEY DATA

Survey lines perpendicular to the database alignments of existing subsea utilities were run utilising the magnetometer and seismic profiling systems, for utility detection.

The subsea utility is generally made of ferromagnetic substances which can produce a magnetic field, and the electric current of the cathodic protection or power transmission along the seabed utilities can also produce an additional magnetic field at the same time. Such generated magnetic fields would induce a magnetic anomaly in the total magnetic field measured. The location and amplitude of the anomalies were recorded and measured on each survey line to delineate the subsea utilities.

Reflected seismic signals recorded by the Innomar or EdgeTech 3400-OTS SBP system were used to identify the subsea utility. Ideally, as the vessel moved along a survey traverse, continuous pings formed a section image showing the near seabed geological changes and the buried pipeline position as a characteristic ‘diffraction hyperbola’. However, it should be noted that the seismic profiling data can be used to confirm sections of subsea utility covered by rock armour or natural backfill of coarse sediments, but the burial depth along these sections is unlikely to be determined due to the signal masking.

The subsea utility survey result is described together with Seabed Feature Result in Section 8.4 and presented with the SSS data interpretation in Chart 7 series of this report.

8 RESULTS

8.1 PRESENTATION

The results have been presented as follows:

Frontispiece Contract Data Summary

APPENDICES

Appendix A	Daily Site Records
Appendix B	GPS Check Records
Appendix C	Tide Data
Appendix D	Velocity Profiles
Appendix E	MBES Calibrations
Appendix F	Contacts (sonar contacts, seismic contacts and magnetic contacts)
Appendix G	Positions of High Magnetic Gradients
Appendix H	Borehole Records

DIGITAL DATA DVD

Digital Copy of Survey Report

DRAWINGS

Chart 1 series	Swath Track Plot
Chart 2 series	Hydrophone Track Plot
Chart 3 series	Side Scan Sonar Track Plot
Chart 4 series	Magnetometer Track Plot
Chart 5 series	Subsea Utility Survey Track Plot
Chart 6 series	Contoured Swath Bathymetry Plan
Chart 7 series	Seabed Features
Chart 8 series	Contoured Levels at the Base of Marine Deposits
Chart 9 series	Contoured Levels at the Top of ROCK in Any State of Decomposition
Chart 10 series	Contoured Levels at the Top of Presumed Moderately Decomposed ROCK
Chart 11 series	Contoured Isopachs of Marine Deposits
Chart 12 series	Contoured Isopachs of Alluvium
Chart 13 series	Contoured Isopachs of Highly to Completely Decomposed ROCK
Chart 14 series	Magnetic Analytic Signal Plan

8.2 SURVEY TRACK PLOTS (CHART 1 TO 5 SERIES)

The survey tracks were plotted to show the data coverage of the bathymetry echo sounding, seismic reflection, side-scan sonar, magnetic and subsea utility surveys.

The survey lines were slightly deviated in places to avoid buoys, vessels and navigation beacons within the survey area. Infill lines were run to achieve full data coverage. The northeast of the survey area was blocked by the extensive oyster farms.

8.3 SWATH BATHYMETRY PLAN (CHART 6 SERIES)

Tide-reduced, datum corrected and 1 m-gridded seabed levels in the survey area were plotted with colour codes and spot values (positive downwards) in 6 mm spacing at the chart scale. Level contours are presented in 1 m interval.

To the east of the Urmston Road Fairway, the seabed ascends quickly from around -11 mPD at the western limit of Area N1 to -7 mPD, and then maintains generally -5 mPD to -7 mPD across the rest of Area N1. Rugged terrain along the backfilled trench of Second West East Gas Pipeline (WEPII) is apparent (Figure 21). Shallow patches of armour rock are present along Yacheng Pipeline in the west of Area N1.

Eastwards, the central Area N2 was dredged for the navigation purpose with levels of -5 mPD to -6.7 mPD. The seabed shoals southwards towards the rubble mound seawall and up to -2 mPD along the northern survey limit (Figure 22).

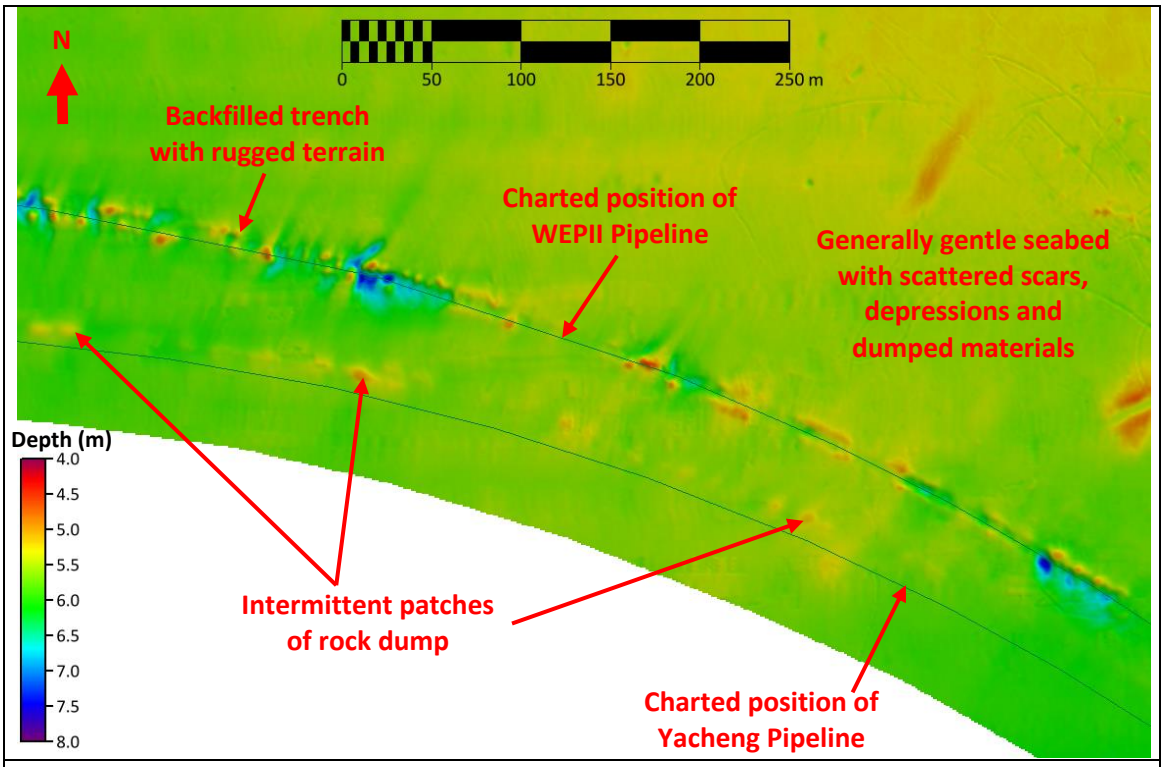


Figure 21: Bathymetry data example showing the seabed condition in the central south of Area N1

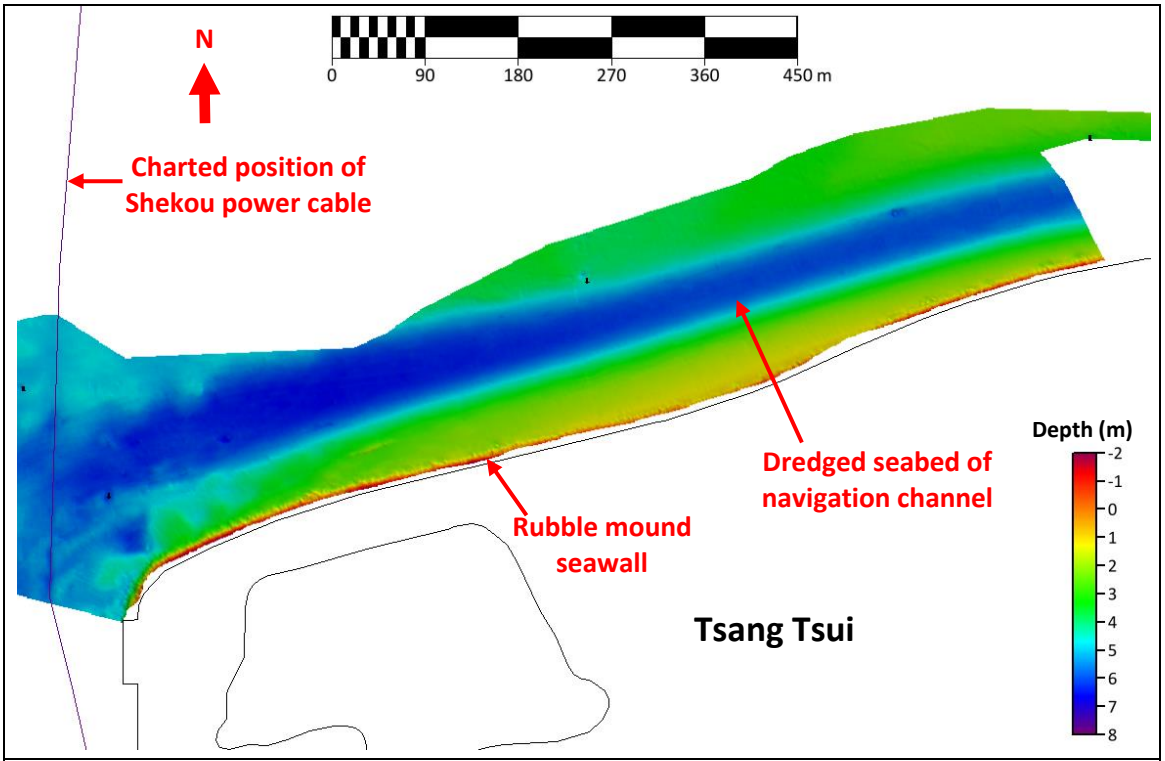


Figure 22: Bathymetry data example showing the seabed condition across Area N2

8.4 SEABED FEATURES (CHART 7 SERIES)

The seabed predominantly comprises CLAY/SILT throughout Area N1 and N2, with some SAND content in places giving rise to the increase of the sonar reflectivity. Patches of dumped materials were locally observed. Scattered debris/tyres/boulders were commonly found. Scattered depressions were observed in the western Area N1 and fields of scattered to numerous pockmarks were mapped in places. Seabed scars are scattered and intensify eastwards, mainly caused by vessel anchoring and likely seabed dredging in the vicinity of the navigation channel across Area N2. Typical data examples are present in Figure 23 to Figure 26 below.

Backfilled trench of WEPII Pipeline was evidently observed, with scattered to numerous armour rock (Figure 26). Patches of rock dump were intermittently found along Yacheng Pipeline in the central Area N1.

Throughout Area N1 and N2, totally 17 sonar contacts were picked, including 15 debris and 2 unknown objects of larger dimensions. A data example can be found in Figure 25. A summary table and specific screen captures of the sonar contacts are provided in **Appendix F**.

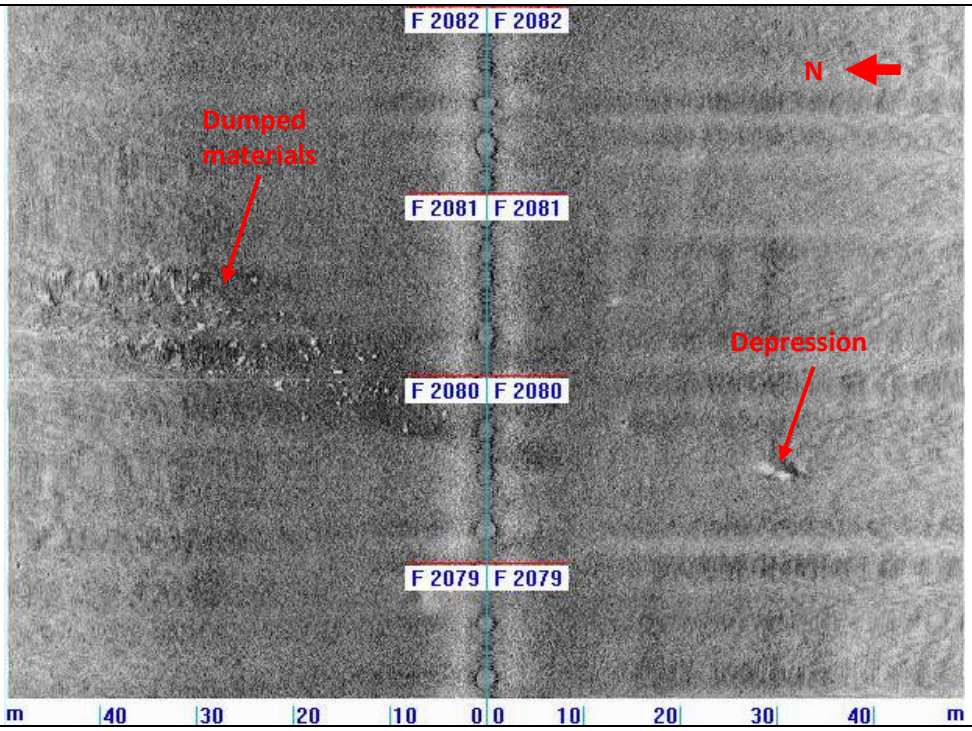


Figure 23: Side scan sonar data capture showing dumped materials and a depression

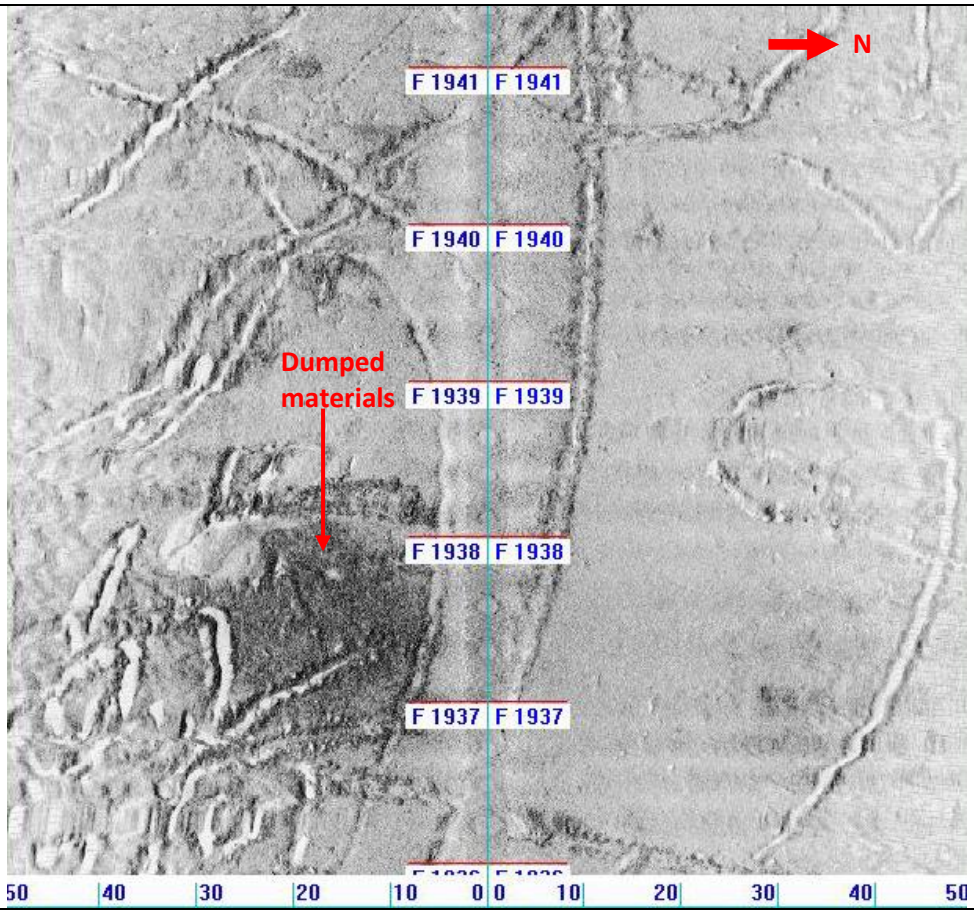


Figure 24: Side scan sonar data capture showing dumped materials and scars

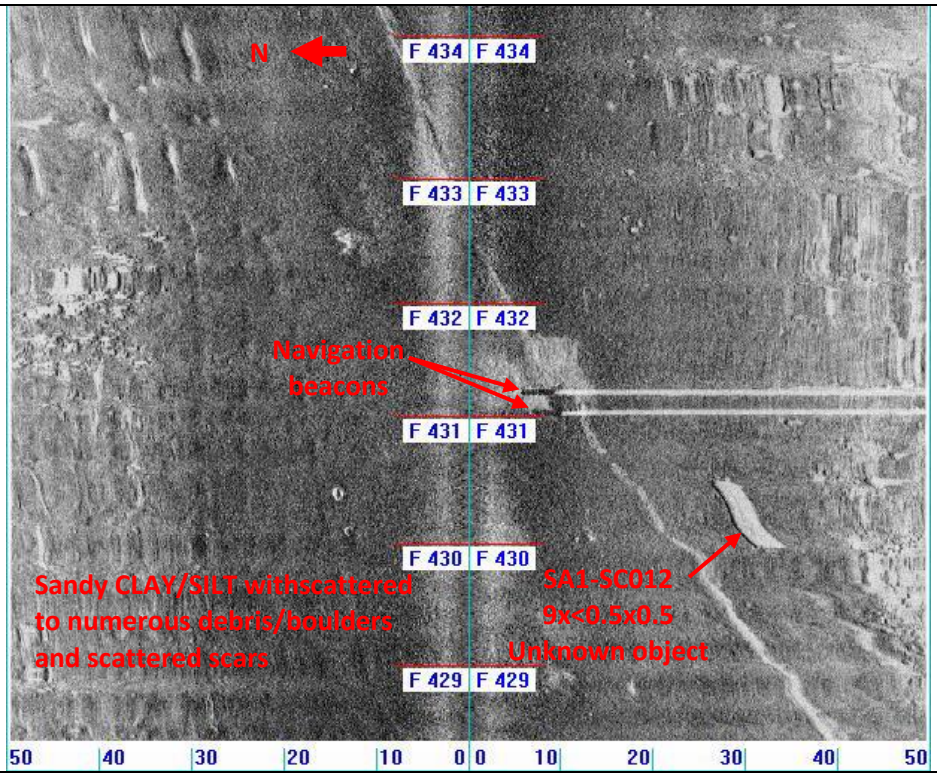


Figure 25: Side scan sonar data capture showing debris/boulders, scars and a sonar contact

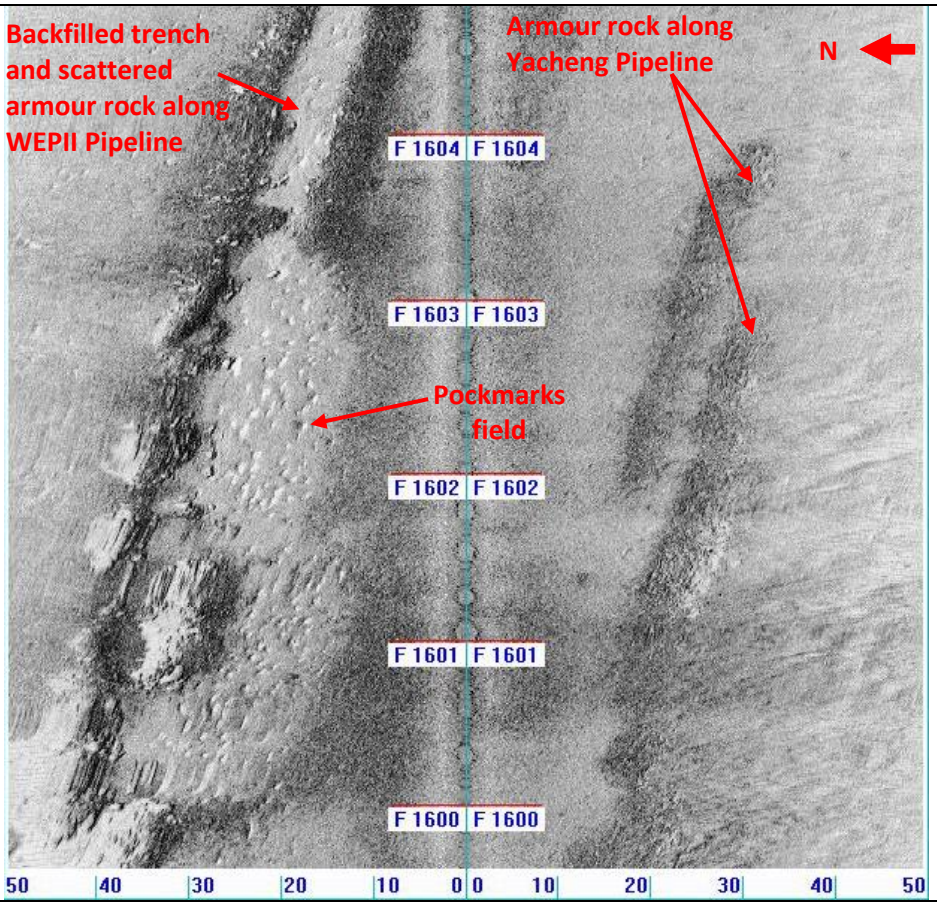


Figure 26: Side scan sonar data capture showing armour rock along existing pipelines

The subsea utility survey results are also presented in Chart 7 series of this report. Both pipelines were positively located by the magnetometer (Figure 27). The WEPII Pipeline was found to generally match well with its database position, while the as-found Yacheng Pipeline lies about 10-25 m north of its database alignment. Due to heaving signal masking from the rock armour, the pipelines could not be revealed from the seismic profiling data (Figure 28).

Over the Shekou power cable, hyperbolic reflections were recorded from the seismic data, the top of which ranges from 0.9 m to 1.5 m below the ambient seabed (Figure 29). Considering a general cable burial depth of 5 m as per EGS's as-laid record, those diffraction hyperbolae were interpreted as top of backfill or protection layer of the cable. The as-found alignment agrees well with the as-laid record and the subtle cable trench as exhibited by the MBES data.

In total 47 magnetic contacts and 8 seismic contacts were recorded from the utility survey. The summary tables can also be found in **Appendix F**.

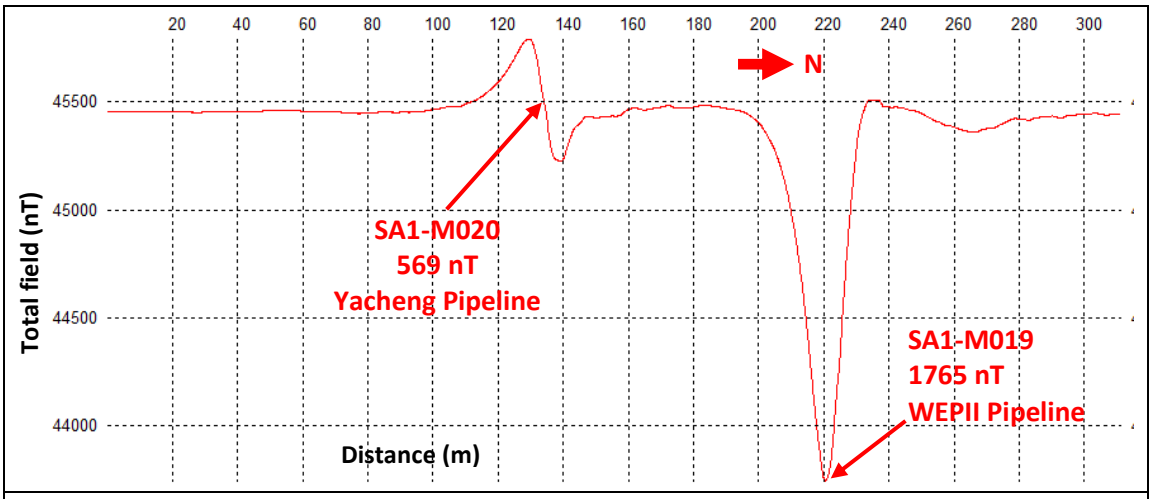


Figure 27: Magnetic data example showing anomalies from the pipelines

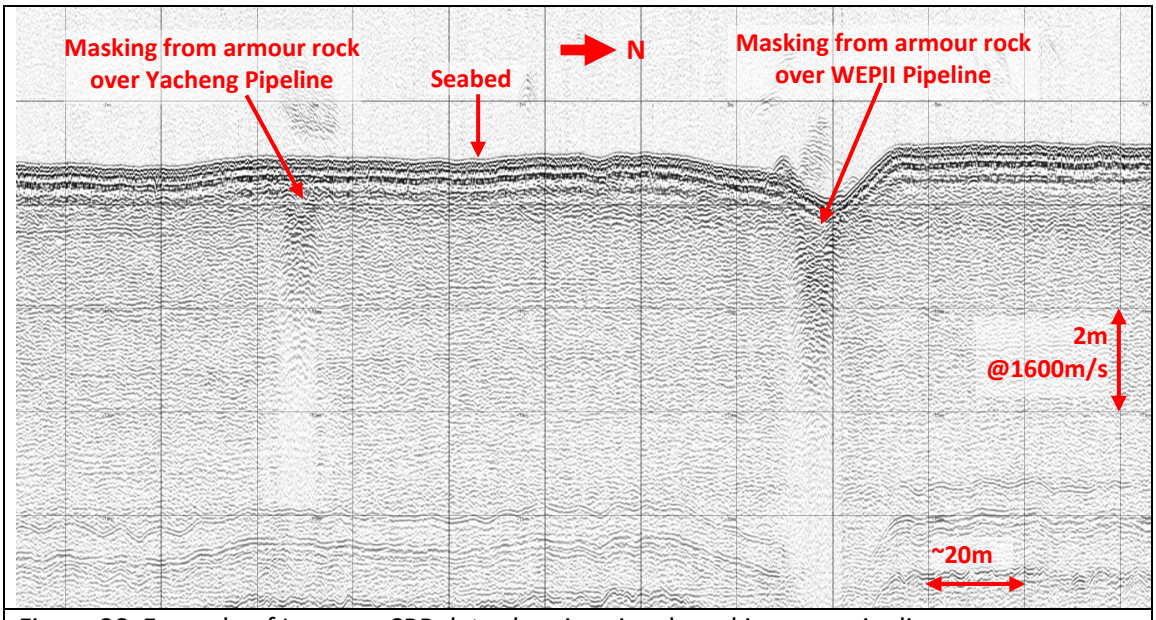


Figure 28: Example of Innomar SBP data showing signal masking over pipelines

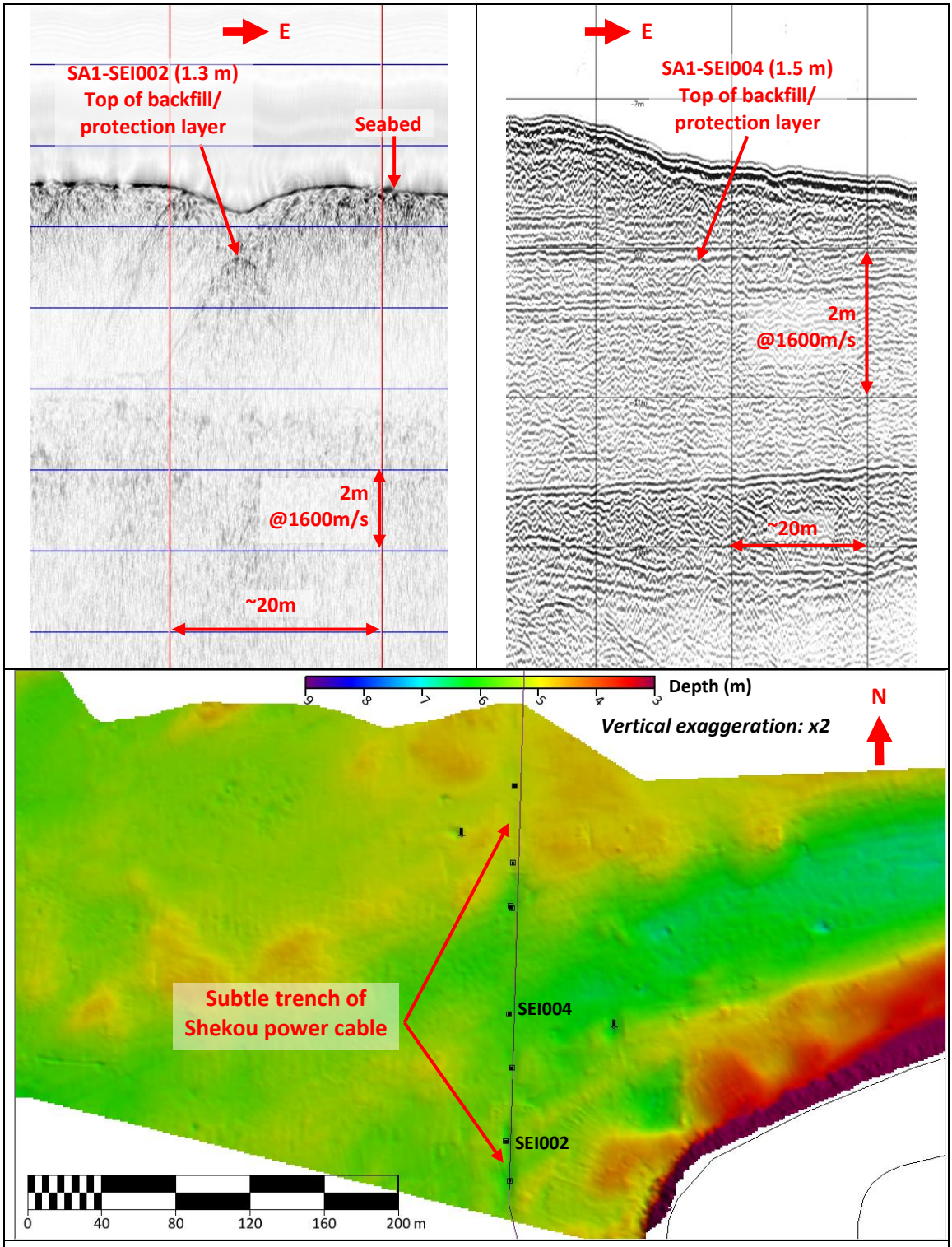


Figure 29: Examples of EdgeTech 3400-OTS SBP (a), Innomar SBP (b) and bathymetry (c) data showing the survey findings about the Shekou power cable

8.5 MARINE DEPOSITS (CHART 8 AND CHART 11 SERIES)

Chart 8 series illustrates the general regime of the base levels of the Marine Deposits and Chart 11 series presents the thickness of the interpreted Marine Deposits.

Across the surveyed Area N1 from the west to the east, the base of the Marine Deposits gradually ascends from nearly -19 mPD to about -10 mPD. Signal masking was locally observed at both ends of the survey area due to gas and/or dumped materials.

The thickness of the interpreted Marine Deposits generally ranges between 7 m and 11 m, decreasing to around 4 m towards the eastern end of Area N1.

8.6 ALLUVIUM (CHART 9 AND CHART 12 SERIES)

Chart 9 series illustrates the top levels of ROCK in any state of decomposition which serves as the bottom of Alluvium deposits (if present), and Chart 12 series demonstrates the thickness of the interpreted Alluvium.

The base of Alluvium rises irregularly from -40 mPD to -28 mPD eastwards in Area N1, and shoals quickly up to around -14 mPD towards the coast. The unit of Alluvium deposits maintains mainly 16 m to 25 m thick and thins up to about 3 m in the coastal area. Acoustic masking due to gas and dumped materials are present in places.

8.7 HIGHLY TO COMPLETELY DECOMPOSED ROCK (CHART 10 AND CHART 13 SERIES)

Presented in Chart 10 series are the top levels of presumed moderately decomposed ROCK (ROCK head). The thickness of the highly to completely decomposed ROCK is presented in Chart 13 series.

The ROCK head varies between -30 mPD and -44 mPD in the majority of Area N1, and shoals locally up to around -18 mPD in the eastern portion. A depression of ROCK head was mapped in the northeast of Area N1 near the charted fault on the geological map, where the ROCK head level descends to slightly over -50 mPD. Due to generally weak signal return, the interpreted results are of low confidence and shown in dashed lines on the charts. Other than that, no clear indication about the fault could be revealed from the SBP data acquired during this survey.

The thickness of the highly to completely decomposed ROCK is predominantly less than 8 m across Area N1, and increases locally to around 20 m towards the low confidence area of interpreted ROCK head and the coastal area in the south-eastern corner.

Some examples of the SBP data with interpreted units are given below.

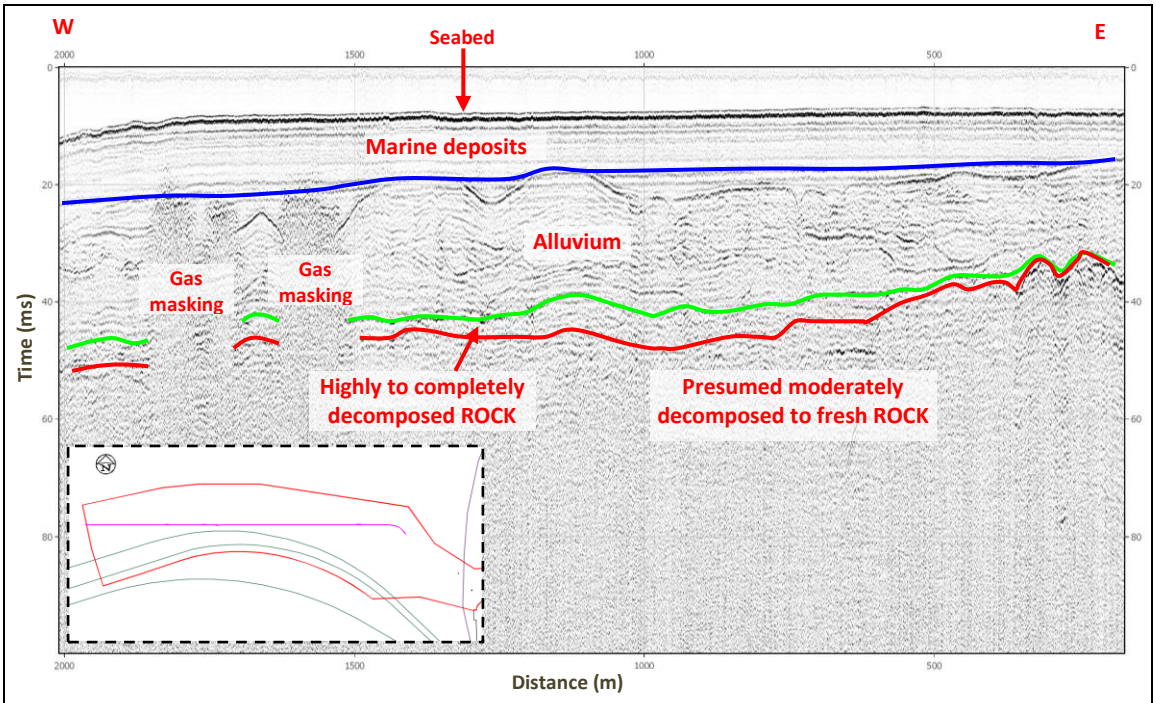


Figure 30: Example of SBP data showing the geological succession (Line No. N1-S280)

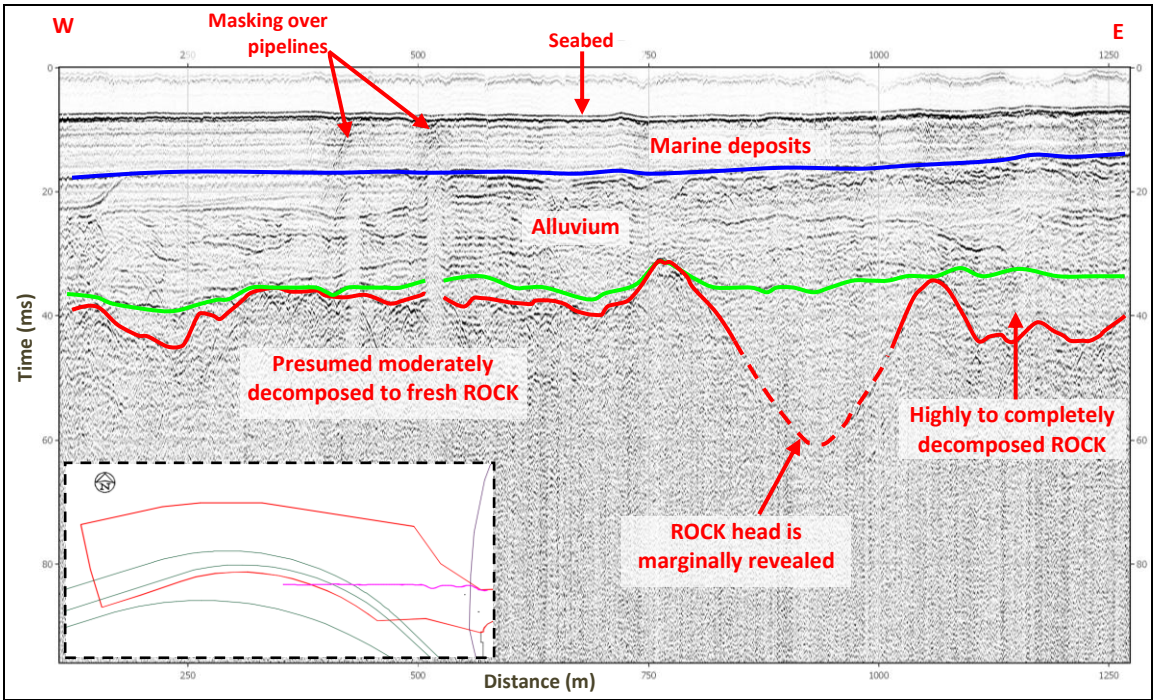


Figure 31: Example of SBP data showing the geological succession (Line No. N1-S520B)

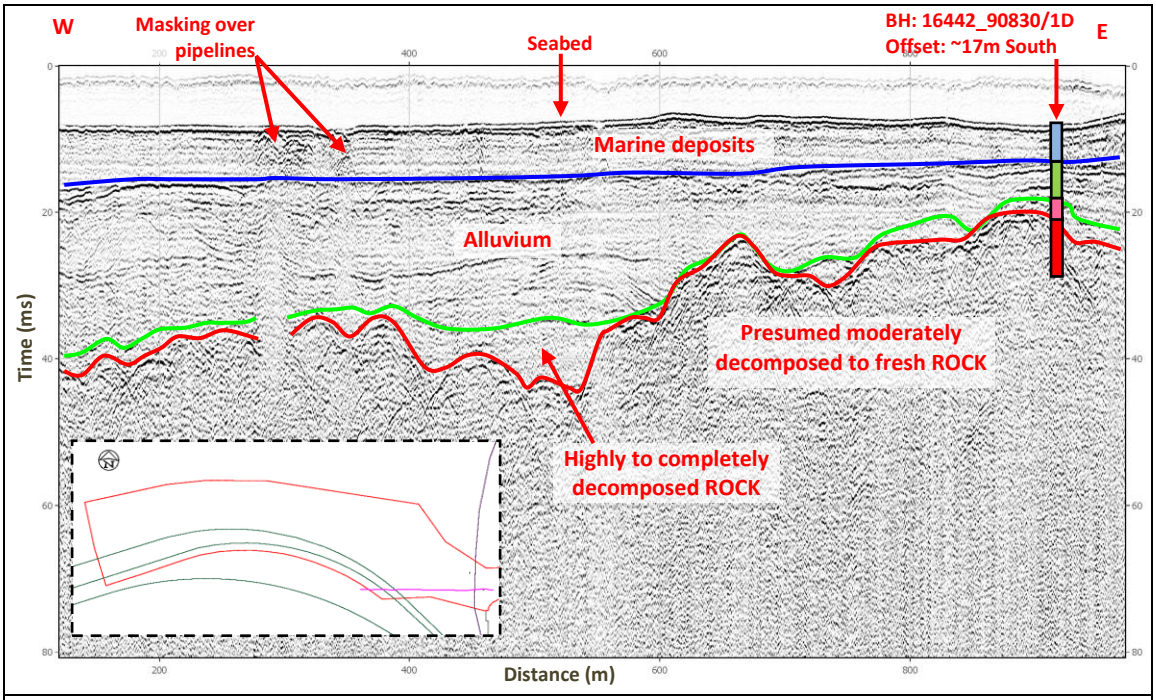


Figure 32: Example of SBP data showing the geological succession (Line No. N1-S680)

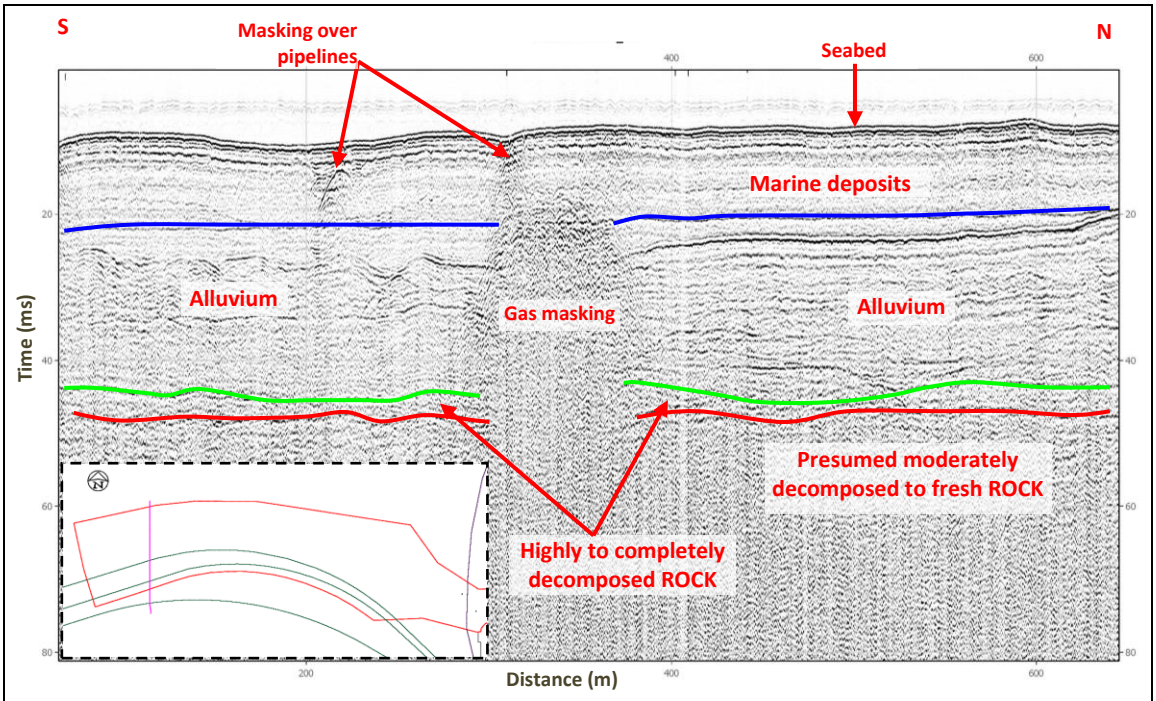


Figure 33: Example of SBP data showing the geological succession (Line No. N1-X0500)

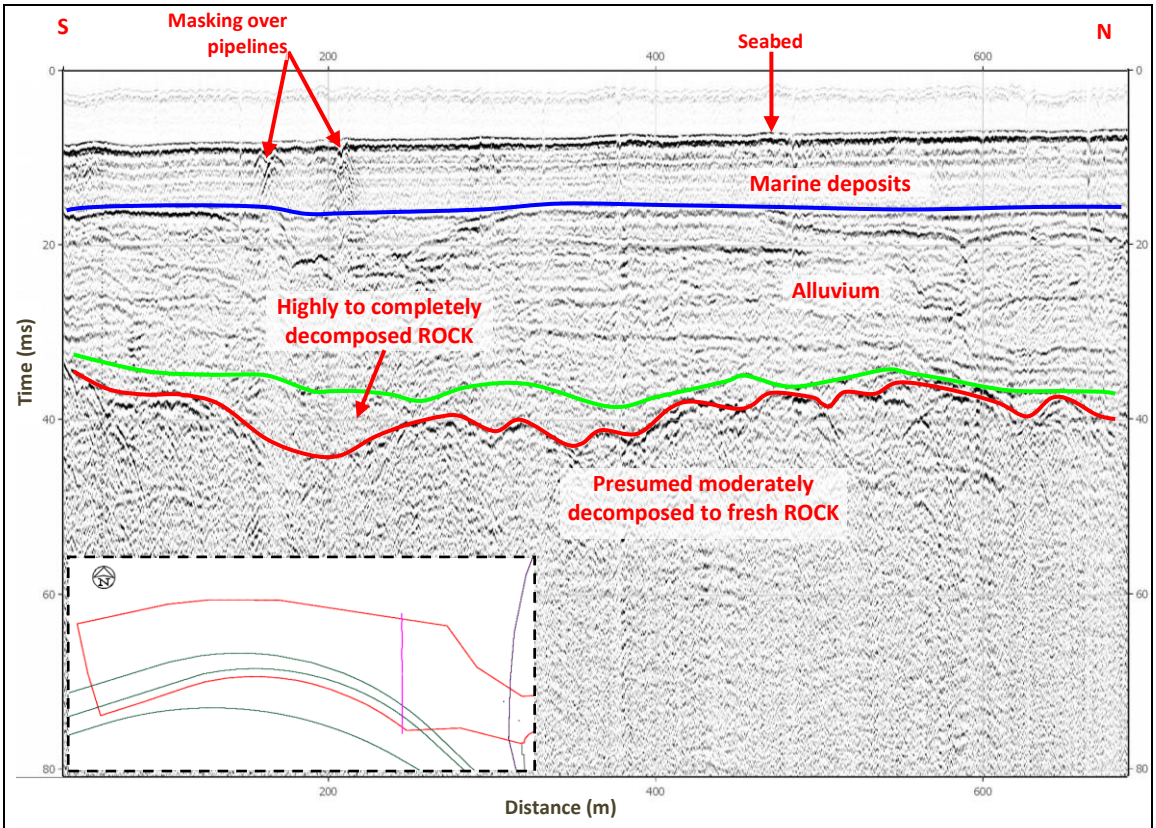


Figure 34: Example of SBP data showing the geological succession (Line No. N1-X1800)

8.8 CORRELATION WITH BOREHOLE RECORDS

Existing borehole (BH) records were provided by Client for the SBP data correlation. The borehole records are included in **Appendix H** of this report and the locations are shown on the survey charts.

Three boreholes are located within the seismic survey area and were taken into account during data interpretation. Table 7 below compares the levels of the major geological interfaces from seismic interpretation with those logged in the boreholes. The boreholes generally match with the SBP data, while the differences are mainly from the offsets to the SBP survey lines where the "Survey" results were estimated from interpolation.

BH No.	Seabed Level (m below PD)		Base Level of MD (m below PD)		Base Level of AL (m below PD)		Top Level of Grade III Rock (m below PD)		BH Termination Level (m below PD)
	BH	Survey	BH	Survey	BH	Survey	BH	Survey	
19102_ODB/3	5.93	6.4	17.93	17.0	-	39.0	-	41.5	41.43
16442_90830/1D	5.50	5.7	9.50	10.2	16.30	15.5	19.59	19.0	25.00
5718_C2	5.04	5.6	10.14	10.2	25.04	25.3	-	31.0	29.54

Table 7: Comparison of major horizons observed on seismic data and in borehole logs

Note: MD = Marine Deposits; AL = Alluvium

8.9 MAGNETIC ANALYTIC SIGNAL PLAN (CHART 14 SERIES)

A plan of the quasi-analytic signal derived from the processed magnetic data is presented in Chart 14 series and extracted here in Figure 35. The quasi-analytical signal represents the gradient "amplitude" of the magnetic total field which indicates how fast the magnetic field changes and normally peaks over locations of ferrous objects or other causative sources.

Apart from the intense magnetic variations along WEPII Pipeline and Yacheng Pipeline, the surveyed Area N1 is characterised by scattered low to high magnetic peaks which largely concentrate in the eastern portion of the survey area. Totally 68 magnetic anomalies of >10 nT/m were marked, including two from the navigation beacons and one likely related to the power cable. Several of the anomalies correlate well with the sonar contacts identified as debris/ unknown objects, notably the two (SA1-MC055 and MC066) near the eastern survey limit. The remaining ones are of unknown origin.

Due to the widespread oyster farms, the MAG data coverage was limited in the northeast of Area N1.

The positions of high magnetic gradients are presented in Chart 14 series and enclosed as **Appendix H** of the report.

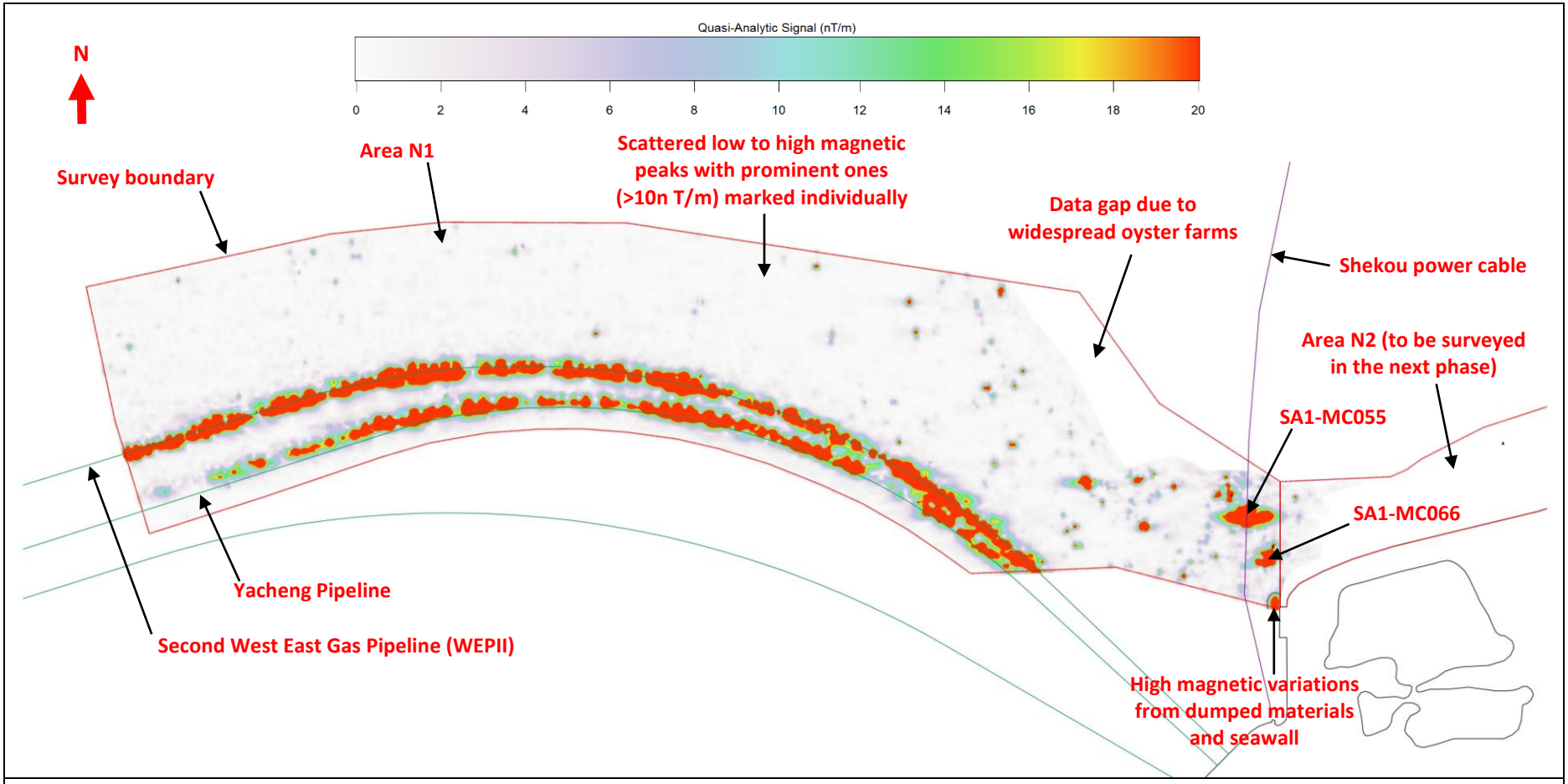


Figure 35: Processed magnetic Quasi-analytic signals over the surveyed Area N1

9 ACCURACY

9.1 ACCURACY OF SEABED LEVELS

The overall accuracy of an echo sounding survey could have been affected by numerous factors listed below, and the quality assurance procedures were sought to eliminate some of the potential errors (those marked with an asterisk (*)):

* Incorrect benchmark level
* Settlement of benchmark between successive surveys
* Uncertainties in setting up the tide gauge
  Reading off errors of the tide gauge data
  Surveyor bias in seabed interpretation
  Incorrect removal of the effects of waves
  The (inevitable) assumption that there is no water surface gradient between the tide gauge and the survey boat from time to time
  Variations in the salinity of the seawater across the survey period, affecting the speed of sound in water
* Minor uncertainties in bar checks
* Uncertainty in horizontal control
  The beamwidth of the transducer
  Variations in boat 'balance'
* Manufacturer's stated echo sounder accuracy

In this survey, the sounding data collected by MBES have been cross-checked within the overlapping areas. Generally, the accuracy of seabed levels is better than 0.2 m.

9.2 PRESENTATION OF DATA IN CONTOURED FORM

Presentation of data in contoured form implied knowledge of the level between survey lines, for which traverse separation and topographic relief determined the extent to which such interpolation is justified. Where a smaller traverse separation and smoother topography would result in a smaller interpolation error, large separation and rough topography would increase the error beyond that of the estimations presented below.

9.3 ESTIMATES OF ACCURACY

The following estimates of accuracy would be appropriate in this project, which are of high accuracy for the surveying equipment deployed:

Horizontal position of soundings	± 1 m
Seabed level	± 0.2 m
Horizontal position of seabed features and boundaries	± 2 m
Base level of marine deposits	± 1 m
Base level of Colluvium/Alluvium	± 1-2 m
Top level of Presumed Moderately Decomposed Rock	± 3-5 m

10 CONCLUSIONS

The survey was carried out to locate the subsea utilities, measure the seabed levels and reveal the nature of materials of seabed and underneath. All surveys were conducted in a safe manner.

In Area N1, the seabed maintains generally between -5 mPD and -7 mPD with apparent undulations along the two existing pipelines, and descends quickly up to about -11 mPD towards the Urmston Road Fairway. Across Area N2, the seabed is generally shallower than -5 mPD and deepens into the narrow navigation channel up to -6.7 mPD.

The seabed predominantly comprises CLAY/SILT throughout Area N1 and N2, with scattered depressions, pockmarks fields and patches of dumped materials. Seabed scars, mainly related to anchoring and dredging activities, are scattered and intensive in the east of Area N1. Backfilled trench of WEPII Pipeline is evident with scattered to numerous armour rock. Patches of rock dump were intermittently found along Yacheng Pipeline. Totally 17 sonar contacts were marked, including two unknown objects of relatively prominent dimensions.

Geological units of marine deposits, Alluvium and decomposed ROCK/bedrock were mapped wherever possible. A depression of ROCK head was observed in the northeast of Area N1, within which the interpreted level of the ROCK head should be used with caution due to acoustic penetration limit of the SBP data. No clear topographic or subsurface indication of the fault as shown on the geological map could be found from the survey datasets.

Other than the strong magnetic variations related to the two pipelines, totally 68 anomalies of high magnetic gradients were picked. Some of them were found to be associated with the sonar contacts.

The alignments of the subsea utilities within the survey area were determined. However, no burial information could be obtained due to the signal masking from the backfill materials and/or protection layer (i.e. armour rock).

Howard Wang
Senior Geoscientist
EGS (Asia) Limited
Date: 12 September 2023

Certified Complete By: _____
Mr. WONG Sai Cheong, George
Main Contractor's Representative

APPENDICES

APPENDIX A

Daily Site Records

GEOPHYSICAL SURVEY - DAILY SITE RECORD

CEDD CONTRACT NO. : GE/2021/03

PROJECT TITLE : Task Order No. GE/2021/03.23
Agreement No. CE 26/2022 (EP) Development of Integrated Waste Management Facilities Phase 2 - Investigation, Design and Construction (SA1) - Marine Geophysical Survey (GS)

Works Order no. :	GE/2021/03.23	Location :	Nim Wan
Contractor :	EGS (Asia) Ltd	Survey Type :	Geophysical Survey

AA PERSONNEL ON SITE

Site In-charge : Leo 2 Contact No. : 61510436 Vehicle / Vessel : VH2

Number of Site Staff	Geophysicist 1	Surveyor 1	Engineer 1	Technician 2
	Client Rep. 2	GEO Rep.	Others	

BB MAJOR EQUIPMENT

Item	GPS	SBES	MBES	
Model Number	GPS 133			
Item	Side Scan	Marine Seismic ✓	Marine Magnetic ✓	
Model Number		EdgeTech3400 (Innomar)	G882	

CC SUITABILITY OF WORK

Weather	~~Fine~~ Sunny	Suitable for work	YES / NO
Site Clearance	OIC Good	Suitable for work	YES / NO
Noise Monitoring	OIC Good	Suitable for work	YES / NO

DD ACTIVITY SUMMARY

DATE : 26/06/2023

On Site Time	Activity	Comment
0830	Tuen Mun,	
10:00	SBP + MAG for utility	
13:00	Lunch	
17:00	End for day	

EE PRODUCTION SUMMARY

Survey Item	Estimated no. of dayworks	% Completed
SBP + MAG	7	10%

FF PROGRAMME FOR NEXT DAY

DATE : 27/6/2023

Proposed On Site Time	Activity	Vehicle / Vessel	No. of Staff
0830	MAG	VH2	5

Site In-charge Leo 2 Contact No. 61510436

GG INSPECTED BY

Title	Name	Signature
Binnies	CHU WAN YUEN	

GEOPHYSICAL SURVEY - DAILY SITE RECORD

CEDD CONTRACT NO. : GE/2021/03

PROJECT TITLE : Task Order No. GE/2021/03.23
Agreement No. CE 26/2022 (EP) Development of Integrated Waste Management Facilities Phase 2 - Investigation, Design and Construction (SA1) - Marine Geophysical Survey (GS)

Works Order no. :	GE/2021/03.23	Location :	Nim Wan
Contractor :	EGS (Asia) Ltd	Survey Type :	Geophysical Survey

AA PERSONNEL ON SITE

Site In-charge :	Leo 2		Contact No. :		Vehicle / Vessel :	WH2	
Number of Site Staff	Geophysicist	1	Surveyor	2	Engineer	1	Technician 1
	Client Rep.		GEO Rep.		Others		

BB MAJOR EQUIPMENT

Item	GPS	SBES	MBES	
Model Number	GPS 133			
Item	Side Scan	Marine Seismic	Marine Magnetic	
Model Number		EdgeTech 3400	G882	

CC SUITABILITY OF WORK

Weather	Sunny	Suitable for work	YES / NO
Site Clearance	Oyster farm inside survey area	Suitable for work	YES / NO
Noise Monitoring	Good	Suitable for work	YES / NO

DD ACTIVITY SUMMARY

DATE : 27-06-2023

On Site Time	Activity	Comment
0830	Meet to Tuen Mun	
0945	start to work	
1300	Having lunch	
1330	start to survey	
1830	End of day	

EE PRODUCTION SUMMARY

Survey Item	Estimated no. of dayworks	% Completed
SBP + Mag	7	25%

FF PROGRAMME FOR NEXT DAY

DATE : 28-06-2023

Proposed On Site Time	Activity	Vehicle / Vessel	No. of Staff
0830	Mag	WH2	5

Site In-charge LAI Pui Ming Contact No. 61510436

GG INSPECTED BY

Title	Name	Signature

GEOPHYSICAL SURVEY - DAILY SITE RECORD

CEDD CONTRACT NO. : GE/2021/03

PROJECT TITLE : Task Order No. GE/2021/03.23
Agreement No. CE 26/2022 (EP) Development of Integrated Waste Management Facilities Phase 2 - Investigation, Design and Construction (SA1) - Marine Geophysical Survey (GS)

Works Order no. :	GE/2021/03.23	Location :	Nim Wan
Contractor :	EGS (Asia) Ltd	Survey Type :	Geophysical Survey

AA PERSONNEL ON SITE

Site In-charge : Leo 2 Contact No. : 61510436 Vehicle / Vessel : WH2

Number of Site Staff	Geophysicist	1	Surveyor	2	Engineer	1	Technician 1
	Client Rep.		GEO Rep.		Others		

BB MAJOR EQUIPMENT

Item	GPS	SBES	MBES	
Model Number	GPS 133			
Item	Side Scan	Marine Seismic	Marine Magnetic	
Model Number		EdgeTech 3400	G882	

CC SUITABILITY OF WORK

Weather	Sunny	Suitable for work	YES / NO
Site Clearance	Oyster farm inside survey area	Suitable for work	YES / NO
Noise Monitoring	Good	Suitable for work	YES / NO

DD ACTIVITY SUMMARY

DATE : 28-06-2023

On Site Time	Activity	Comment
0830	Tuen Mun check safety	
1015	to site start survey	
1300	Lunch	
1330	start to survey	
1830	End of day	

EE PRODUCTION SUMMARY

Survey Item	Estimated no. of dayworks	% Completed
Mag	1	65%

FF PROGRAMME FOR NEXT DAY

DATE : 28-06-2023

Proposed On Site Time	Activity	Vehicle / Vessel	No. of Staff
0830	Mag	WH2	5

Site In-charge LAI Pui Ming Contact No. 61510436

GG INSPECTED BY

Title	Name	Signature

GEOPHYSICAL SURVEY - DAILY SITE RECORD

CEDD CONTRACT NO. : GE/2021/03

PROJECT TITLE :	Task Order No. GE/2021/03.23 Agreement No. CE 26/2022 (EP) Development of Integrated Waste Management Facilities Phase 2 - Investigation, Design and Construction (SA1) - Marine Geophysical Survey (GS)

Works Order no. :	GE/2021/03.23	Location :	Nim Wan
Contractor :	EGS (Asia) Ltd	Survey Type :	Geophysical Survey

AA PERSONNEL ON SITE

Site In-charge : Leo 2 Contact No. : 61510436 Vehicle / Vessel : WH2

Number of Site Staff	Geophysicist	1	Surveyor	2	Engineer	1	Technician 1
	Client Rep.		GEO Rep.		Others		

BB MAJOR EQUIPMENT

Item	GPS	SBES	MBES	
Model Number	GPS133			
Item	Side Scan	Marine Seismic	Marine Magnetic	
Model Number			G882	

CC SUITABILITY OF WORK

Weather	Sunny	Suitable for work	YES / NO
Site Clearance	Oyster farm inside survey area	Suitable for work	YES / NO
Noise Monitoring	Good	Suitable for work	YES / NO

DD ACTIVITY SUMMARY

DATE : 29-06-2023

On Site Time	Activity	Comment
0830	Meet to Tuen Mun	
0945	to site start survey	
1300	Lunch	
1330	start to survey	
1830	End of day	

EE PRODUCTION SUMMARY

Survey Item	Estimated no. of dayworks	% Completed
Mag	4	100%
MBES/SSS	3	0%

FF PROGRAMME FOR NEXT DAY

DATE : ~~24~~

Proposed On Site Time	Activity	Vehicle / Vessel	No. of Staff

Site In-charge Leo 2 Contact No. 61510436

GG INSPECTED BY

Title	Name	Signature

GEOPHYSICAL SURVEY - DAILY SITE RECORD

CEDD CONTRACT NO. : GE/2021/03

PROJECT TITLE :	Task Order No. GE/2021/03.23 Agreement No. CE 26/2022 (EP) Development of Integrated Waste Management Facilities Phase 2 - Investigation, Design and Construction (SA1) - Marine Geophysical Survey (GS)

Works Order no. :	GE/2021/03.23	Location :	Nim Wan
Contractor :	EGS (Asia) Ltd	Survey Type :	Geophysical Survey

AA PERSONNEL ON SITE

Site In-charge : Leung Tsz kit Contact No. : 97549901 Vehicle / Vessel : GE01

Number of Site Staff	Geophysicist x 1	Surveyor x 3	Engineer x 1	Technician
	Client Rep.	GEO Rep.	Others	

BB MAJOR EQUIPMENT

Item	GPS	SBES	MBES	
Model Number	NovAtel	Odom MKIII	EdgeTech 6205s	
Item	Side Scan	Marine Seismic	Marine Magnetic	
Model Number	EdgeTech 6205s	LVB		

CC SUITABILITY OF WORK

Weather	Rainy & Cloudy	Suitable for work	(YES) / NO
Site Clearance	Oyster farm inside survey area	Suitable for work	(YES) / NO
Noise Monitoring	N/A	Suitable for work	YES / NO

DD ACTIVITY SUMMARY

DATE : 03-07-2023

On Site Time	Activity	Comment
08:30 ~ 09:50	Survey crew onboard	
09:50 ~ 11:00	MBES Calibration	
11:00 ~ 16:10	Start to survey	
16:10 ~ 16:30	End of survey, back to YUT	
16:30 ~ 18:30	End of day	

EE PRODUCTION SUMMARY

Survey Item	Estimated no. of dayworks	% Completed
Geophysical Survey	4 day.	30%.

FF PROGRAMME FOR NEXT DAY

DATE : 04-07-2023

Proposed On Site Time	Activity	Vehicle / Vessel	No. of Staff
08:30.	Continue the Geophysical Survey	GE01	5

Site In-charge Contact No. 97549901

GG INSPECTED BY

Title	Name	Signature

GEOPHYSICAL SURVEY - DAILY SITE RECORD

CEDD CONTRACT NO. : GE/2021/03

PROJECT TITLE :	Task Order No. GE/2021/03.23 Agreement No. CE 26/2022 (EP) Development of Integrated Waste Management Facilities Phase 2 - Investigation, Design and Construction (SA1) - Marine Geophysical Survey (GS)

Works Order no. :	GE/2021/03.23	Location :	Nim Wan
Contractor :	EGS (Asia) Ltd	Survey Type :	Geophysical Survey

AA PERSONNEL ON SITE

Site In-charge : Leung Tsz Kit Contact No. : 97549901 Vehicle / Vessel : GE01

Number of Site Staff	Geophysicist x 1	Surveyor x 3	Engineer x 1	Technician
	Client Rep.	GEO Rep.	Others	

BB MAJOR EQUIPMENT

Item	GPS	SBES	MBES	
Model Number	NovAtel	Odom MK III	EdgeTech 6205	
Item	Side Scan	Marine Seismic	Marine Magnetic	
Model Number	EdgeTech 6205	LVB		

CC SUITABILITY OF WORK

Weather	Rainy & cloudy	Suitable for work	(YES) / NO
Site Clearance	Oyster Farm inside sunny area	Suitable for work	(YES) / NO
Noise Monitoring	N/A	Suitable for work	YES / NO

DD ACTIVITY SUMMARY

DATE : 04-07-2023

On Site Time	Activity	Comment
08:30 ~ 09:15	Survey Crew onboard.	
09:15 ~ 09:40	Deploy LVB, bar check, SVP	
09:40 ~ 14:00.	Start to survey	
14:00 ~ 15:00.	Weather standby due strong wave	
15:00 ~ 18:00.	MBES cal, end of day	

EE PRODUCTION SUMMARY

Survey Item	Estimated no. of dayworks	% Completed
Geophysial Survey	2 days	60 %

FF PROGRAMME FOR NEXT DAY

DATE : 05-07-2023

Proposed On Site Time	Activity	Vehicle / Vessel	No. of Staff
08:30.	Tuen Mun Pier.		

Site In-charge SIN Yu Lung Contact No. 93647464

GG INSPECTED BY

Title	Name	Signature

GEOPHYSICAL SURVEY - DAILY SITE RECORD

CEDD CONTRACT NO. : GE/2021/03

PROJECT TITLE :	Task Order No. GE/2021/03.23 Agreement No. CE 26/2022 (EP) Development of Integrated Waste Management Facilities Phase 2 - Investigation, Design and Construction (SA1) - Marine Geophysical Survey (GS)

Works Order no. :	GE/2021/03.23	Location :	Nim Wan
Contractor :	EGS (Asia) Ltd	Survey Type :	Geophysical Survey

AA PERSONNEL ON SITE

Site In-charge : SIN Yu Lung Contact No. : 93647464 Vehicle / Vessel : GEO 1

Number of Site Staff	Geophysicist 1	Surveyor 3	Engineer 1	Technician
	Client Rep.	GEO Rep.	Others	

BB MAJOR EQUIPMENT

Item	GPS	SBES	MBES	
Model Number	NovAtel	Odom MK III	EdgeTech 6205S	
Item	Side Scan	Marine Seismic	Marine Magnetic	
Model Number	EdgeTech 6205S	LVB System	/	

CC SUITABILITY OF WORK

Weather	Heavy rain in afternoon	Suitable for work	(YES) / NO
Site Clearance	Oyster farm inside survey area	Suitable for work	(YES) / NO
Noise Monitoring		Suitable for work	YES / (NO)

DD ACTIVITY SUMMARY

DATE : 5/7/2023

On Site Time	Activity	Comment
0830 - 0910	Meet at TM, transit to site	
0910 - 1445	Deploy equipment, Bar check, SVP, start survey	
1445 - 1545	Weather standby (Heavy Rain)	
1545 - 1630	MB Cal, Bar check, SVP	
1630 - 1800	Transit back to YMT, EOD.	

EE PRODUCTION SUMMARY

Survey Item	Estimated no. of dayworks	% Completed
Geophysical	1	80%.

FF PROGRAMME FOR NEXT DAY

DATE : 6/7/2023

Proposed On Site Time	Activity	Vehicle / Vessel	No. of Staff
08:30	Tuen Mun Pier	GEO 1	3

Site In-charge SIN Yu Lung Contact No. 93647464

GG INSPECTED BY

Title	Name	Signature

GEOPHYSICAL SURVEY - DAILY SITE RECORD

CEDD CONTRACT NO. : GE/2021/03

PROJECT TITLE :	Task Order No. GE/2021/03.23 Agreement No. CE 26/2022 (EP) Development of Integrated Waste Management Facilities Phase 2 - Investigation, Design and Construction (SA1) - Marine Geophysical Survey (GS)

Works Order no. :	GE/2021/03.23	Location :	Nim Wan
Contractor :	EGS (Asia) Ltd	Survey Type :	Geophysical Survey

AA PERSONNEL ON SITE

Site In-charge : Siu Yu Lung Contact No. : 93647464 Vehicle / Vessel : GEO 1

Number of Site Staff	Geophysicist	✓	Surveyor	3	Engineer	✓	Technician ✓
	Client Rep.	✓	GEO Rep.		Others		

BB MAJOR EQUIPMENT

Item	GPS	SBES	MBES	
Model Number	NovAtel	Odom MK III	EdgeTech 6205S	
Item	Side Scan	Marine Seismic	Marine Magnetic	
Model Number	✓	✓	✓	

CC SUITABILITY OF WORK

Weather	Sunny	Suitable for work	(YES) / NO
Site Clearance	Oyster farm inside survey area	Suitable for work	(YES) / NO
Noise Monitoring		Suitable for work	YES / NO

DD ACTIVITY SUMMARY

DATE : 6/7/2023

On Site Time	Activity	Comment
0830 - 0900	Meet at TM & transit to site	
0900 - 0945	Deploy Equipment, Bar check, SVP.	
0945 - 1140	Continue survey, Bar check, SVP.	
1140 - 1400	Transit back to YMT	
1400 - 1800	Demob equipment. EOD.	

EE PRODUCTION SUMMARY

Survey Item	Estimated no. of dayworks	% Completed
Geophysical	0	100

FF PROGRAMME FOR NEXT DAY

DATE : 7/7/2023

Proposed On Site Time	Activity	Vehicle / Vessel	No. of Staff
	No fieldwork		

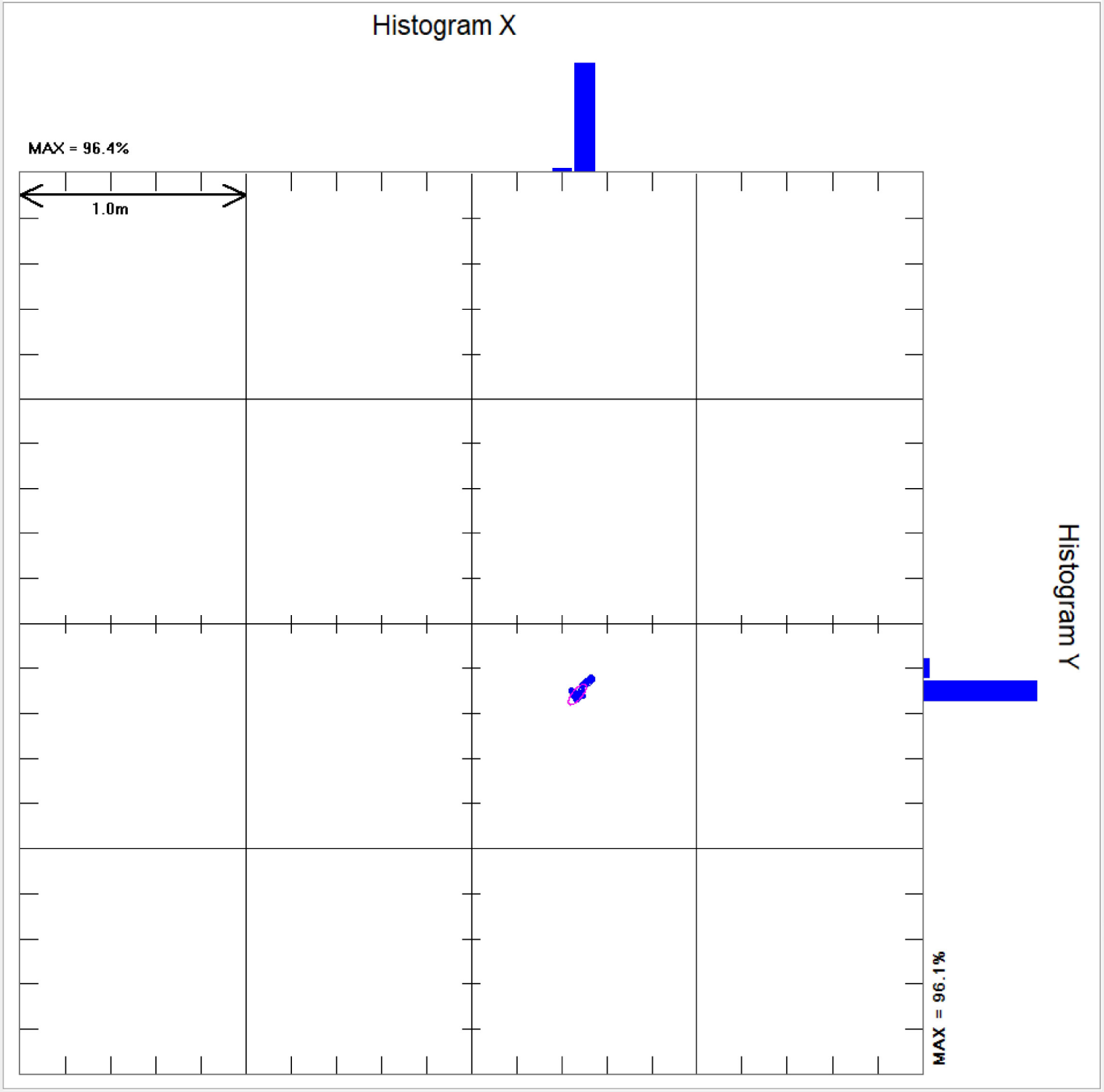
Site In-charge Contact No.

GG INSPECTED BY

Title	Name	Signature

APPENDIX B

GPS Check Records

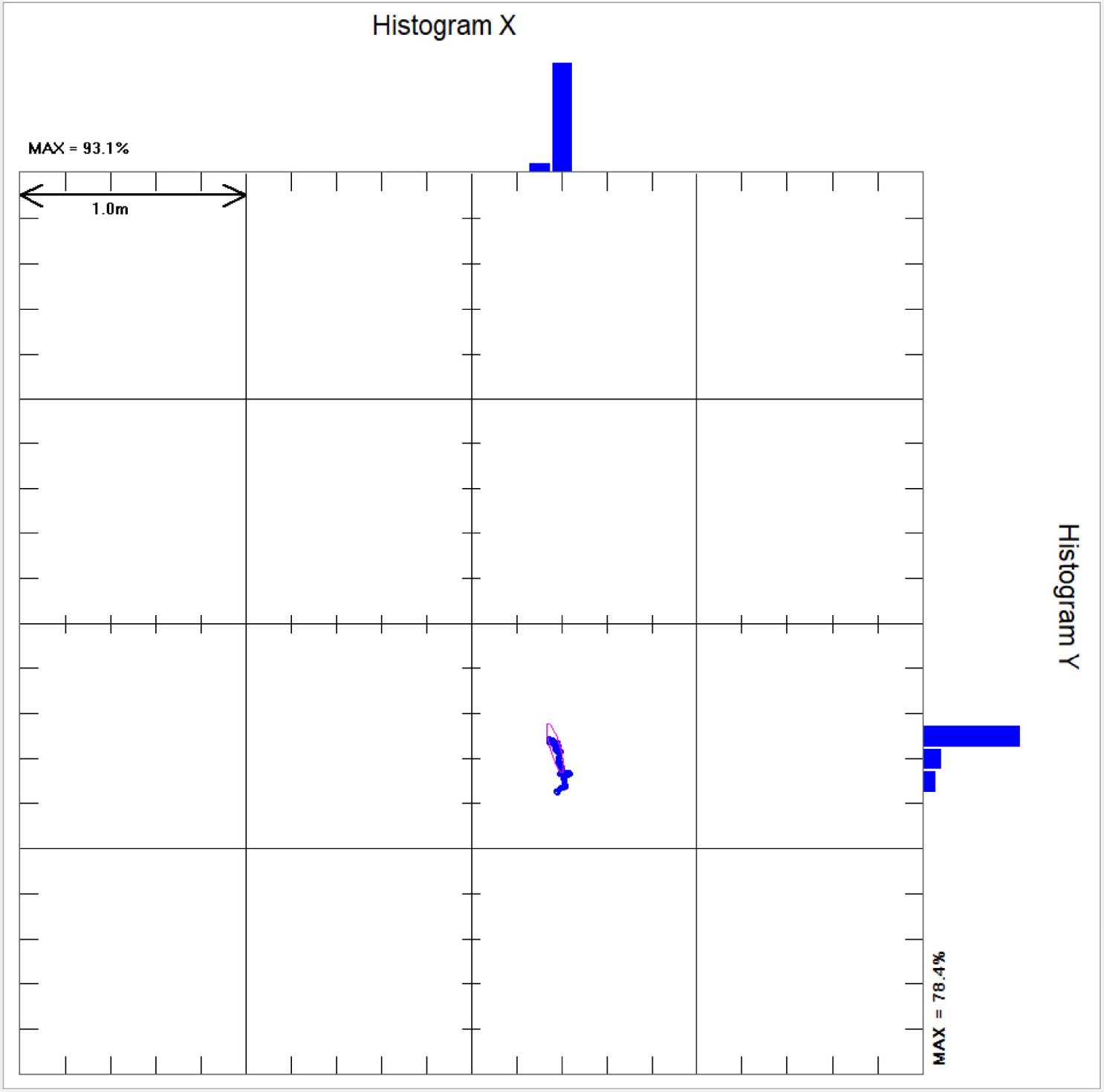


Job Number	HK268623
Job Name	Task Order No. GE/2021/03.23 Agreement No. CE 26/2022 (EP) Development of Integrated Waste Management Facilities Phase 2 - Investigation, Design and Construction (SA1) - Marine Geophysical Survey (GS)
Survey Date	23-Jun-2023
Survey Time	15:47 - 15:53
No. Of Data	337
Data File	HK268623_20230623_GEO1 _GPS Check_GPS137_N4.dat
GPS Receiver	NovAtel PwrPak 7 (SN : GPS137)
Location	Yau Ma Tei
Station Name	N4

	Easting(X)	Northing(Y)
Centre (Known)	834427.080	818849.703
Mean Observed	834427.548	818849.386
Offset (95%)	0.468	-0.317

Bias (95%)	0.566m
Drms (95%)	0.049m
Prepared By	Ava TSE
Approved By	Jay PANG

EGS (ASIA) Ltd.



Job Number	HK268623
Job Name	Task Order No. GE/2021/03.23 Agreement No. CE 26/2022 (EP) Development of Integrated Waste Management Facilities Phase 2 - Investigation, Design and Construction (SA1) - Marine Geophysical Survey (GS)
Survey Date	23-Jun-2023
Survey Time	15:28 - 15:39
No. Of Data	635
Data File	HK268623_20230623_WH2_GPS Check_GPS133_N4.dat
GPS Receiver	C-Nav 3050 (SN : GPS133)
Location	Yau Ma Tei
Station Name	N4

	Easting(X)	Northing(Y)
Centre (Known)	834427.080	818849.703
Mean Observed	834427.451	818849.150
Offset (95%)	0.371	-0.553

Bias (95%)	0.666m
Drms (95%)	0.070m
Prepared By	Ava TSE
Approved By	Jay PANG

EGS (ASIA) Ltd.

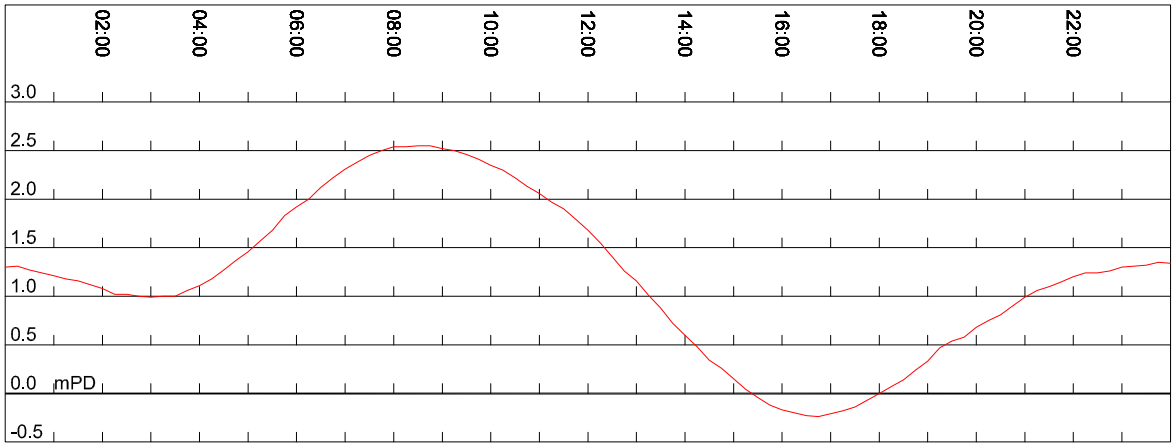
APPENDIX C

Tide Data

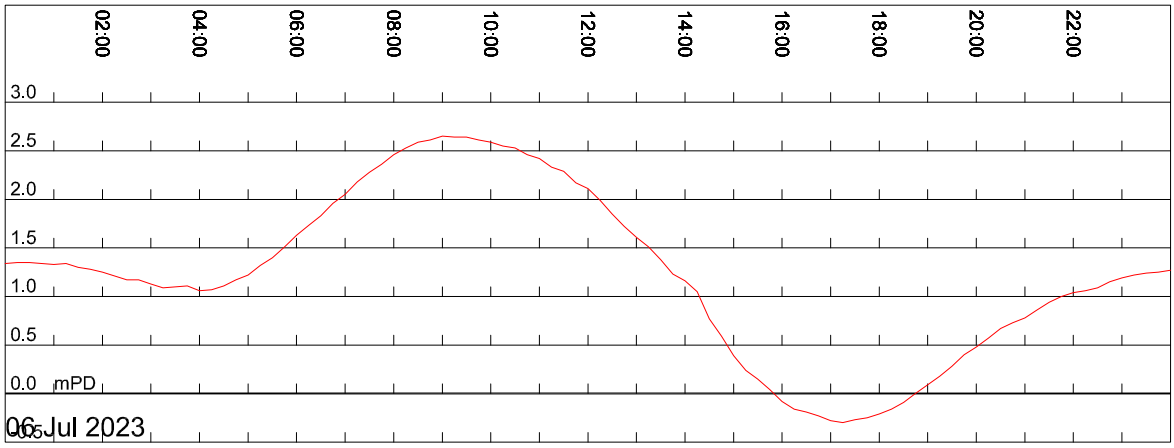
Appendix C - Tide Record

Tide Levels at Chek Lap Kok West
03/07/2023 and 04/07/2023

03 Jul 2023



04 Jul 2023



06 Jul 2023

Legend :

Tide Curve

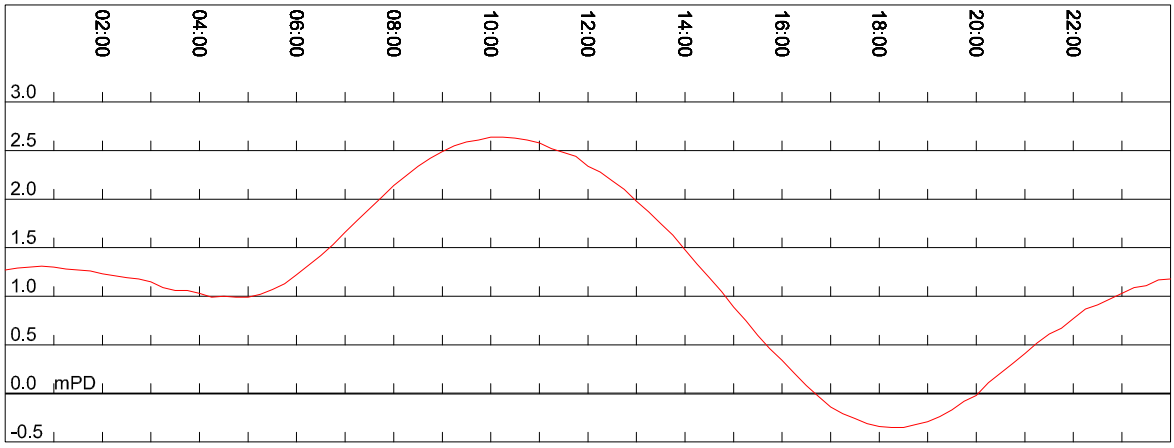
EGS (ASIA) LIMITED

HK268623

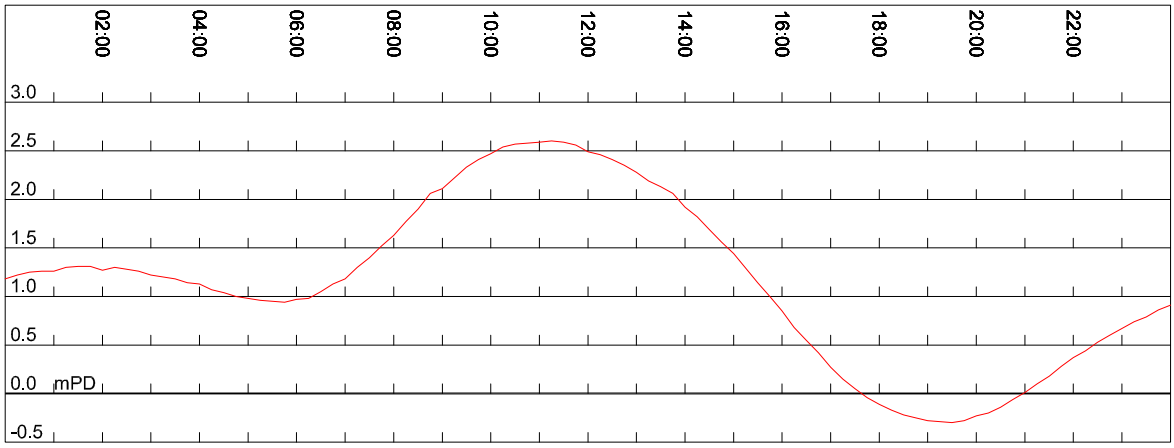
Appendix C - Tide Record

Tide Levels at Chek Lap Kok West
05/07/2023 and 06/07/2023

05 Jul 2023



06 Jul 2023



Legend :

Tide Curve

EGS (ASIA) LIMITED

HK268623

APPENDIX D

Velocity Profiles

APPENDIX D1

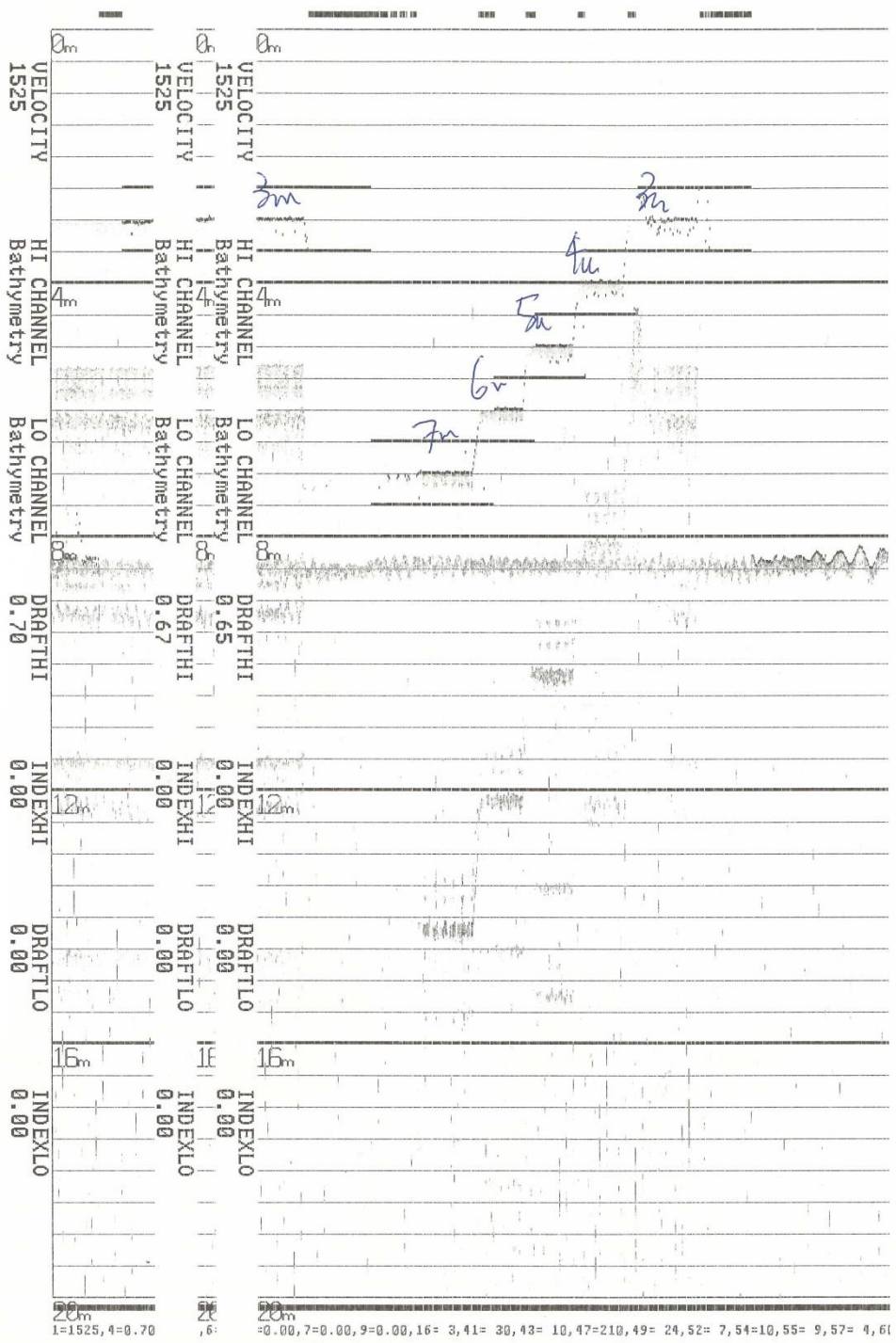
Sound Velocity Profile
(Refer to DVD)

APPENDIX D2

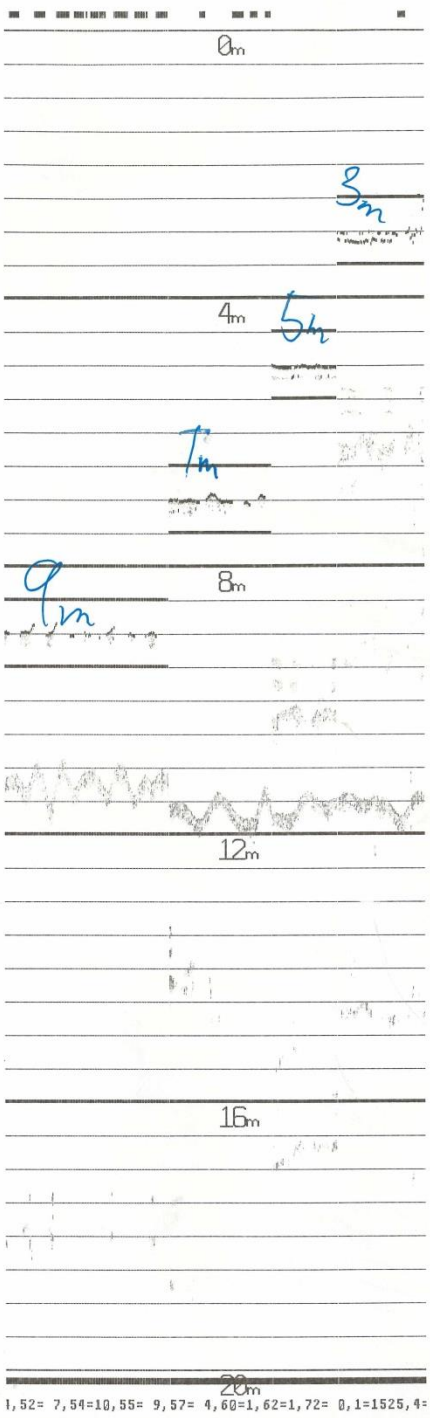
Example of Bar Check Records

Odom Hydrographic Systems
1450 Seaboard Ave.
Baton Rouge, LA 70810 USA
E-mail: email@odomhydrographic.com
http://www.odomhydrographic.com
Telephone: (225) 769-3051
Facsimile: (225) 766-5122

HK 268623
03/07/2023
T 08:40
Bar Check (AM)
GEO 1



End of Bar Check



HK268623
03/07/2023
T 16:18
Bar Check (PM)
GEO 1

End of Bar Check

APPENDIX E

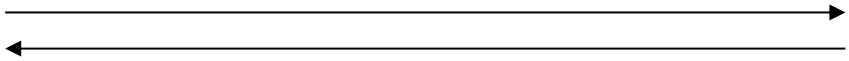
MBES Calibrations

Task Order No. GE/2021/03.23 - Agreement No. CE 26/2022 (EP)
Development of Integrated Waste Management Facilities
Phase 2 - Investigation, Design and Construction (SA1)
Marine Geophysical Survey (GS)

EdgeTech 6205s Combined Bathymetry and Side Scan Sonar Calibration Report

The Patch Test for EdgeTech 6205s combined bathymetry and side scan sonar was carried out on 03rd July 2023 and the result was illustrated below.

1） Roll Calibration – Port Head



The line is set over a flat seabed terrain; running in opposite directions at the same speed

Water Depth: 8.5 m Speed: 5.5 knots

Line Separation: 50.0 m

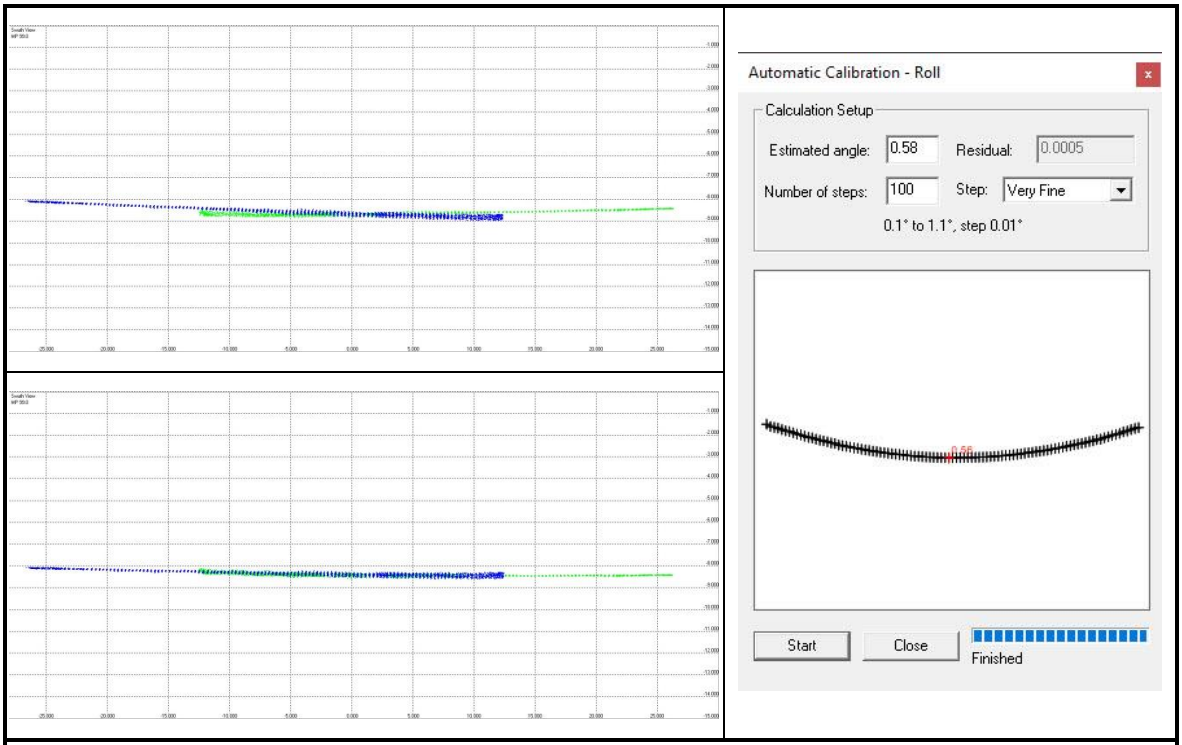
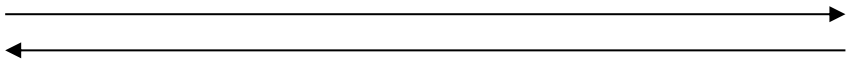


Figure 1: MBES calibration data showing transducer roll bias (Up) and corrected with bias (Down)

2） Roll Calibration – Starboard Head



The line is set over a flat seabed terrain; running in opposite directions at the same speed

Water Depth: 8.5 m Speed: 5.5 knots

Line Separation: 50.0 m

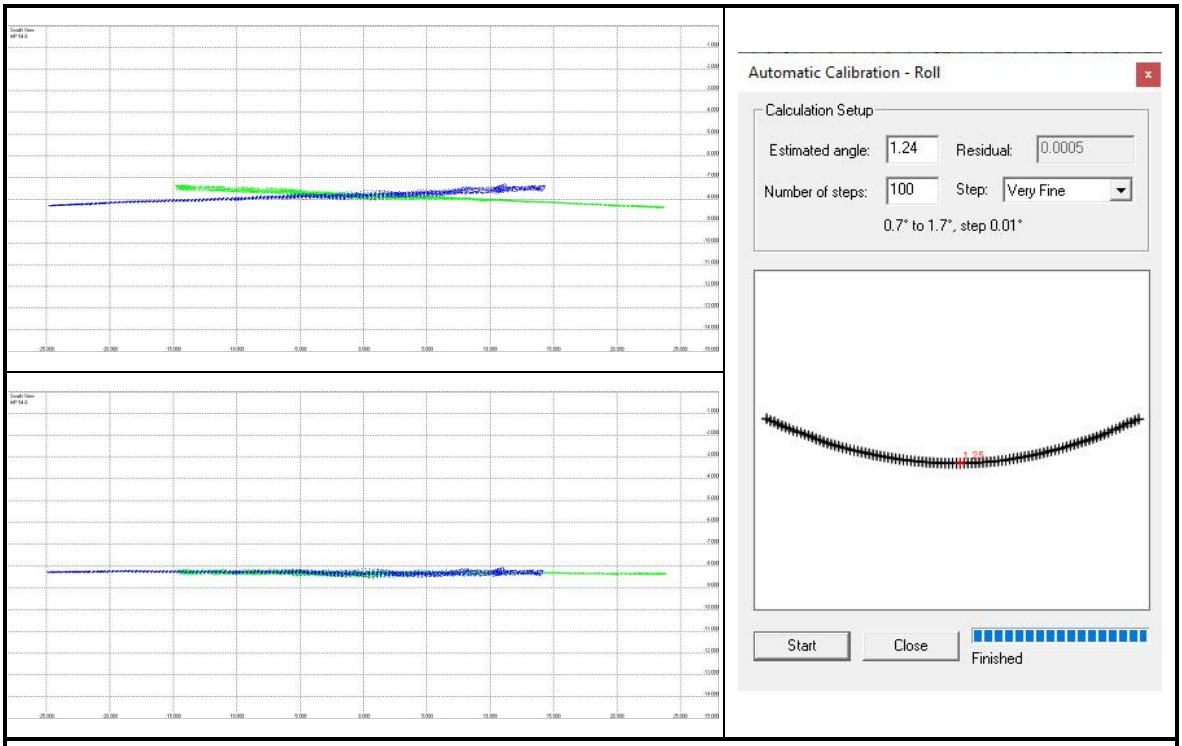
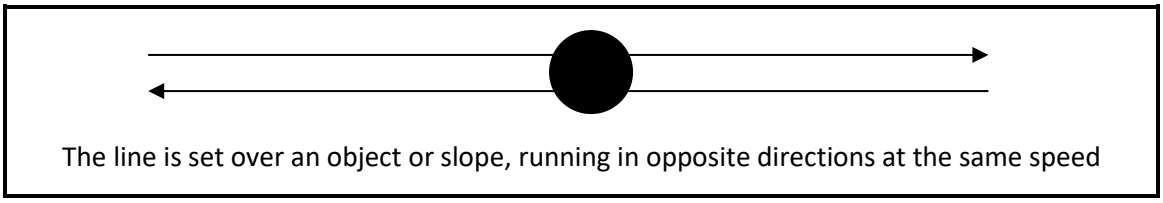


Figure 2: MBES calibration data showing transducer roll bias (Up) and corrected with bias (Down)

3） Pitch Calibration – Port Head



The line is set over an object or slope, running in opposite directions at the same speed

Water Depth: 7.6 – 9.6 m Speed: 5.5 knots

Line Separation: 30.0 m

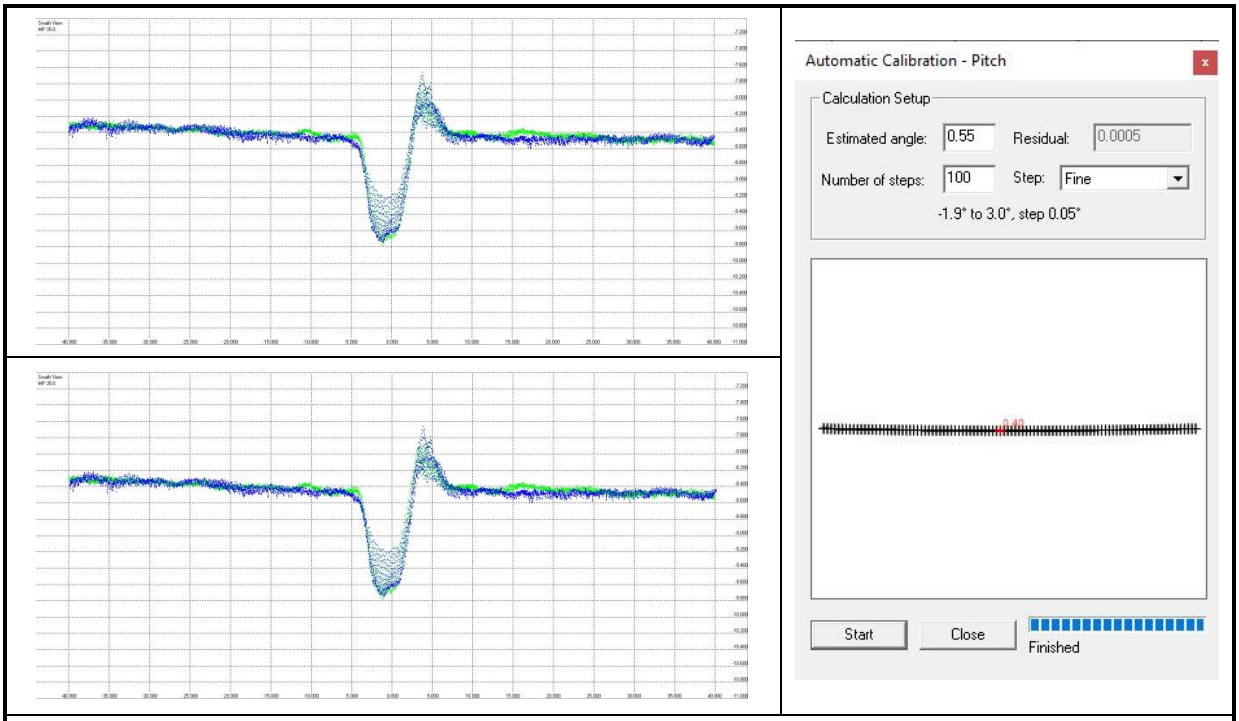
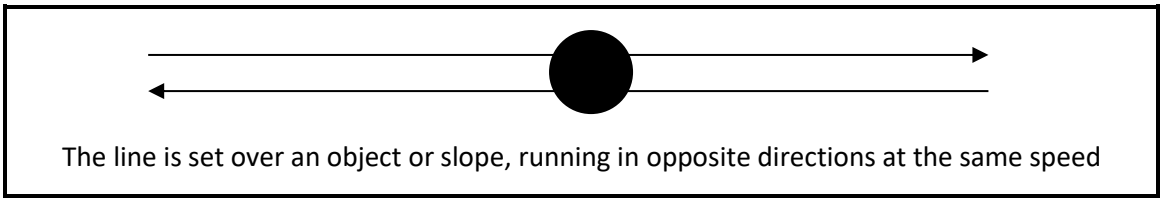


Figure 3: MBES calibration data showing transducer pitch bias (Up) and corrected with bias (Down)

4） Pitch Calibration – Starboard Head



The line is set over an object or slope, running in opposite directions at the same speed

Water Depth: 7.6 – 9.7 m Speed: 5.5 knots

Line Separation: 30.0 m

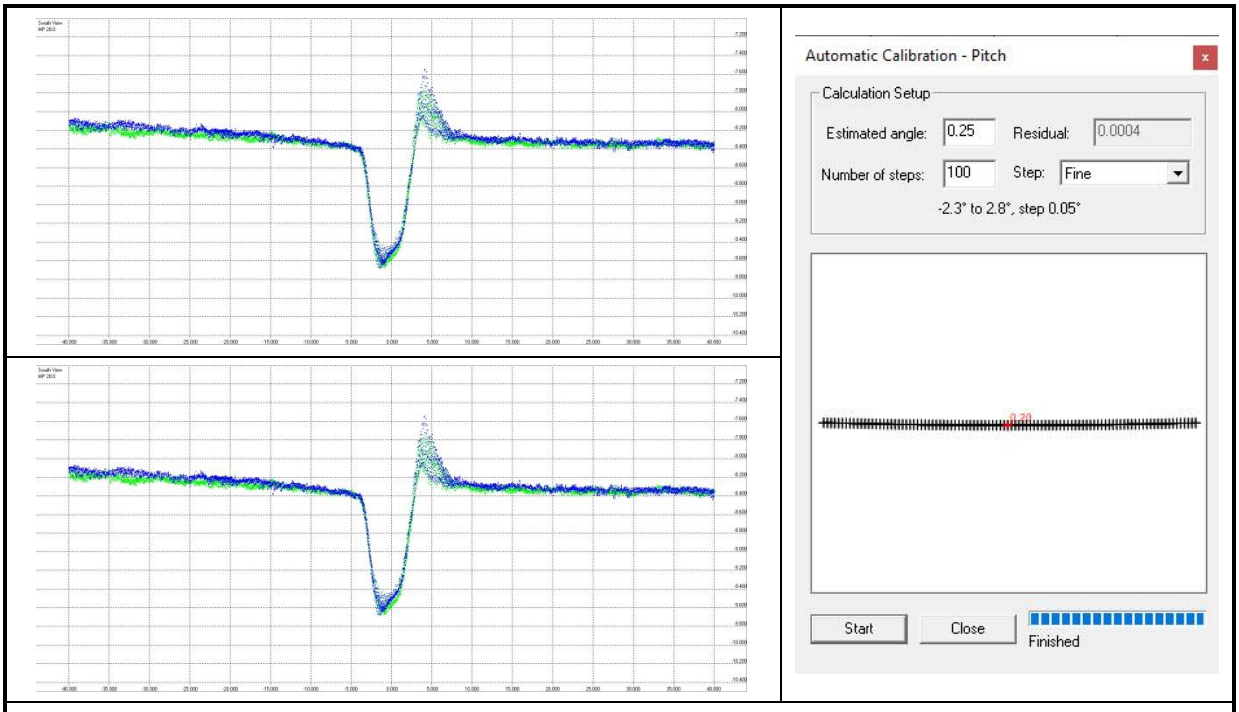
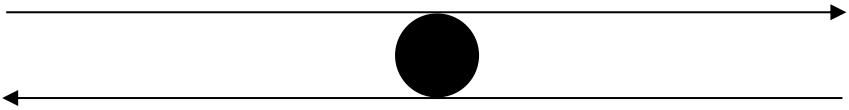


Figure 4: MBES calibration data showing transducer pitch bias (Up) and corrected with bias (Down)

5） Yaw Calibration – Port Head



2 parallel lines are set separately to make outer swath sweeping over an object or a slope with 100% overlap, running each line in opposite directions at the same speed

Water Depth: 7.6 – 9.8m Speed: 5.5 knots

Line Separation: 10.0 m

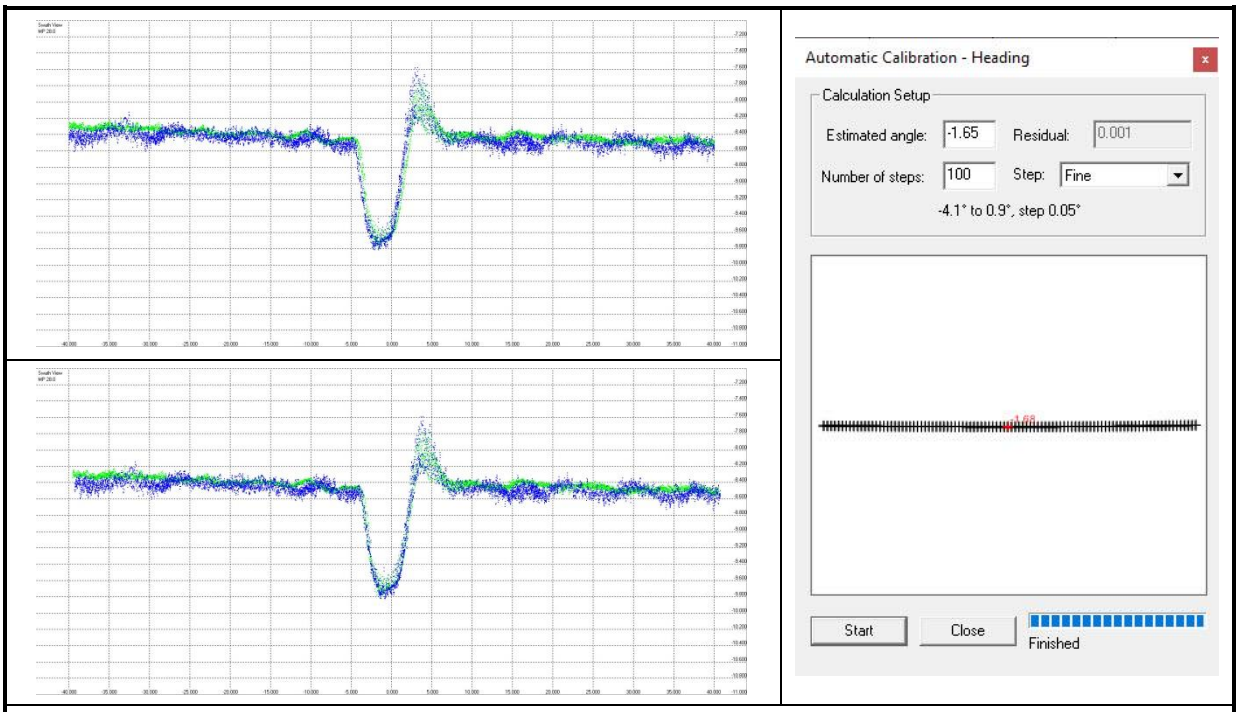
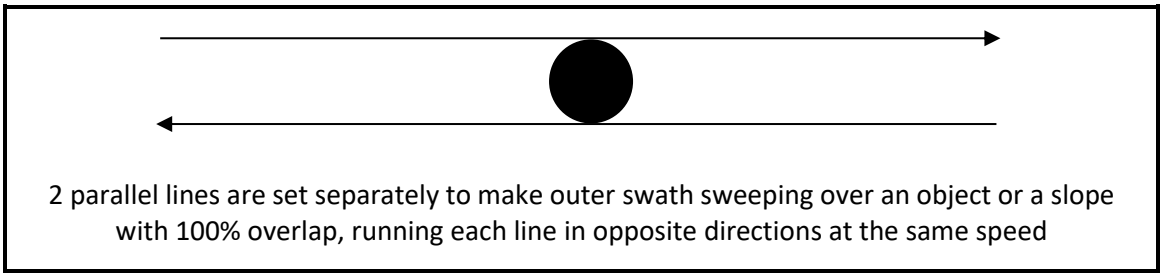


Figure 5: MBES calibration data showing transducer yaw bias (Up) and corrected with bias (Down)

6） Yaw Calibration – Starboard Head



2 parallel lines are set separately to make outer swath sweeping over an object or a slope with 100% overlap, running each line in opposite directions at the same speed

Water Depth: 7.6 – 9.6 m Speed: 5.5 knots

Line Separation: 10.0 m

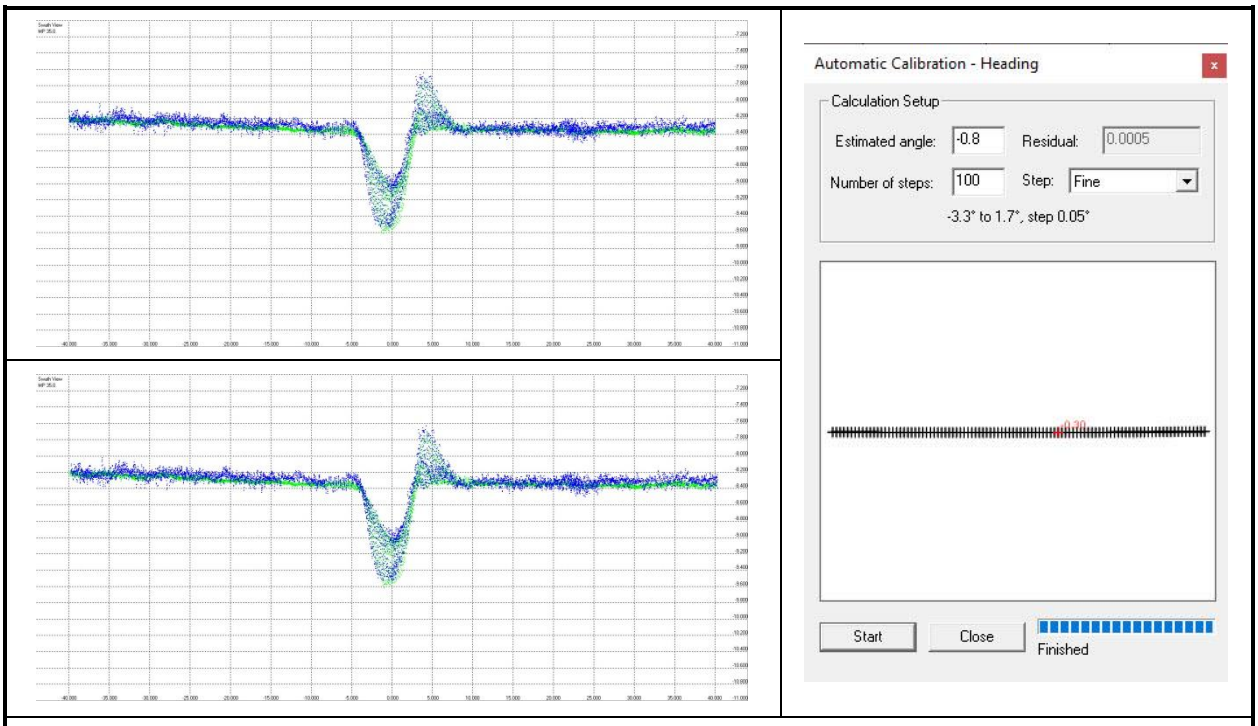
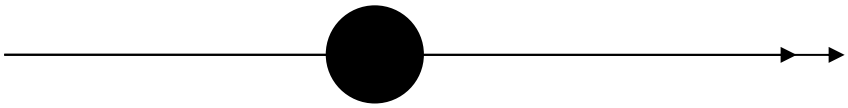


Figure 6: MBES calibration data showing transducer yaw bias (Up) and corrected with bias (Down)

7） Latency (Navigation Delay) Calibration



The line is set over an object or a slope; running with the same direction at different speeds (one at slowest possible speed and one at fastest possible speed)

Water Depth: 8.0 – 10.0 m Speed: 3.0 knots / 5.5knots

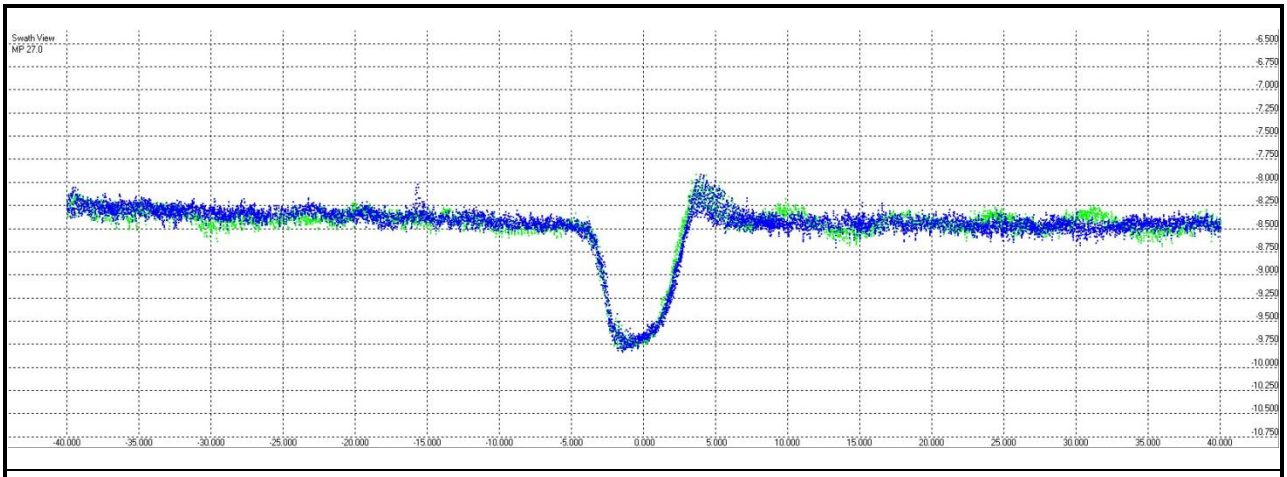


Figure 7: MBES calibration data showing negligible navigation delay error

Summary of MBES Calibration Results

The MBES calibration results are presented as follows:

Port		Starboard	
Roll:	0.58°	Roll:	1.24°
Pitch:	0.55°	Pitch:	0.25°
Yaw:	-1.65°	Yaw:	-0.80°
Navigation Delay (Latency):		Negligible (because of 1pps)	

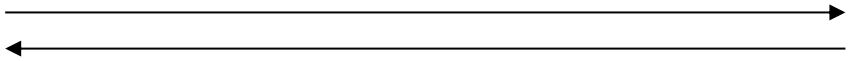
Table 1: Summary of EdgeTech 6205s combined bathymetry and side scan sonar calibration parameters

Task Order No. GE/2021/03.23 - Agreement No. CE 26/2022 (EP)
Development of Integrated Waste Management Facilities
Phase 2 - Investigation, Design and Construction (SA1)
Marine Geophysical Survey (GS)

EdgeTech 6205s Combined Bathymetry and Side Scan Sonar Calibration Report

The Patch Test for EdgeTech 6205s combined bathymetry and side scan sonar was carried out on 04th July 2023 and the result was illustrated below.

1） Roll Calibration – Port Head



The line is set over a flat seabed terrain; running in opposite directions at the same speed

Water Depth: 23.0 m Speed: 5.5 knots

Line Separation: 50.0 m

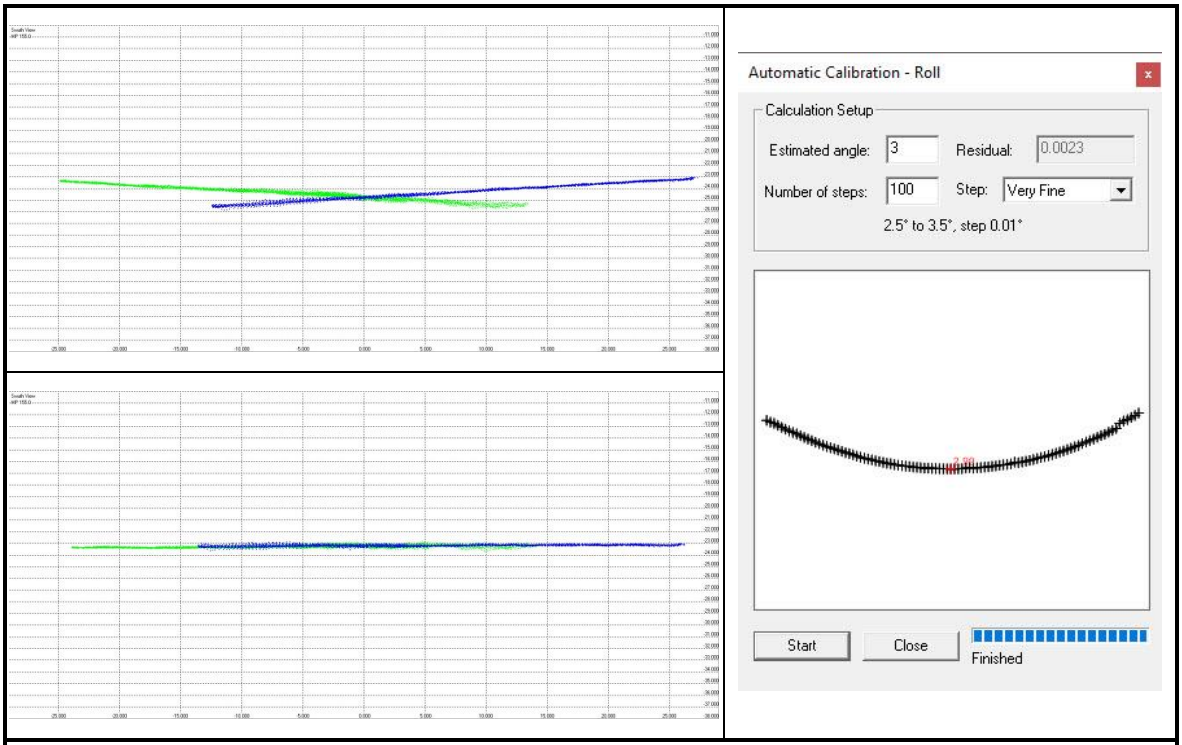
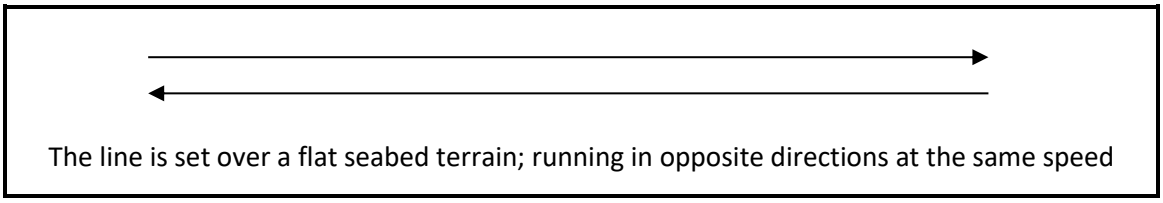


Figure 1: MBES calibration data showing transducer roll bias (Up) and corrected with bias (Down)

2） Roll Calibration – Starboard Head



The line is set over a flat seabed terrain; running in opposite directions at the same speed

Water Depth: 23.0 m Speed: 5.5 knots

Line Separation: 50.0 m

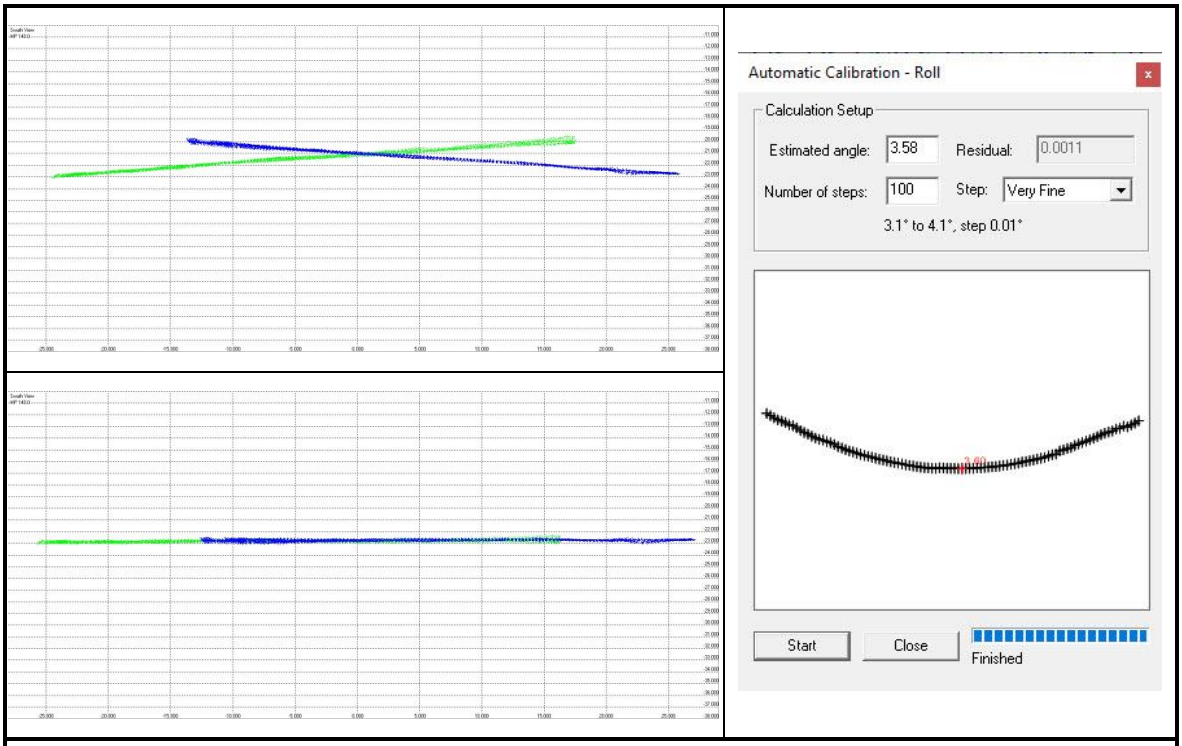
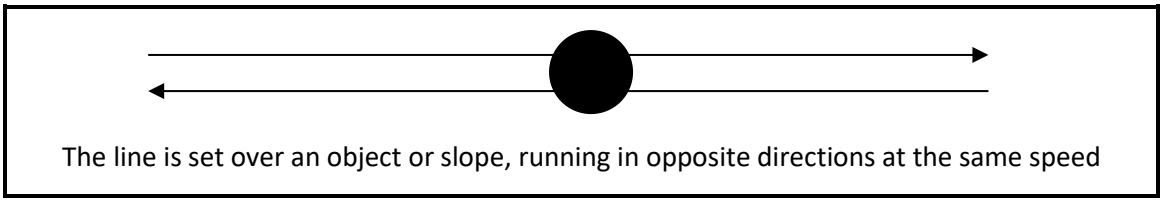


Figure 2: MBES calibration data showing transducer roll bias (Up) and corrected with bias (Down)

3） Pitch Calibration – Port Head



The line is set over an object or slope, running in opposite directions at the same speed

Water Depth: 12.5 – 23.0 m Speed: 5.5 knots

Line Separation: 30.0 m

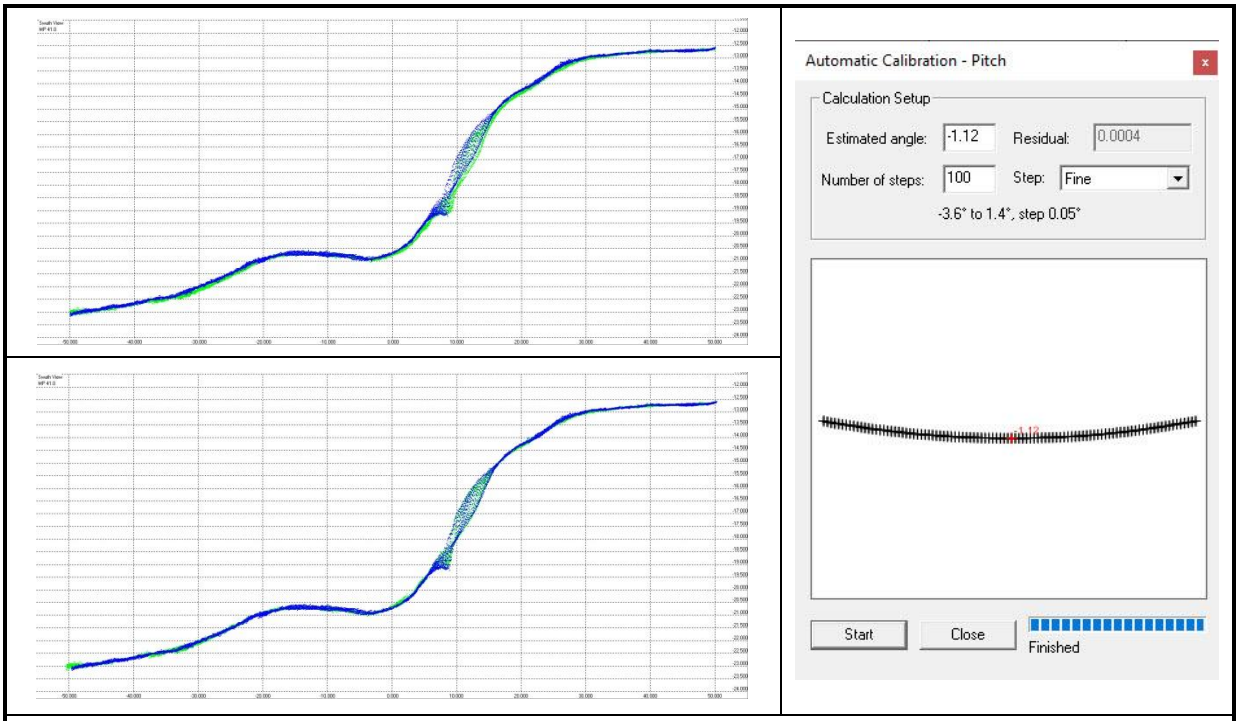
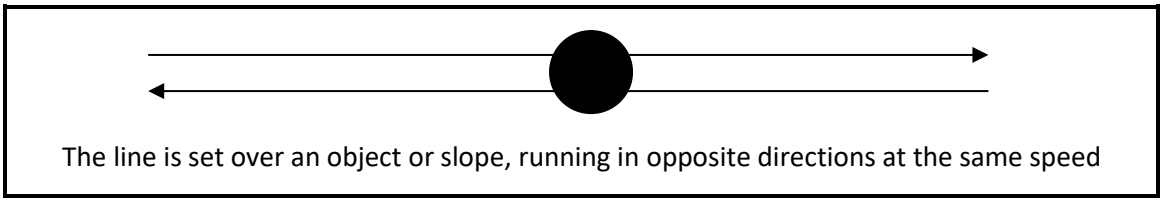


Figure 3: MBES calibration data showing transducer pitch bias (Up) and corrected with bias (Down)

4） Pitch Calibration – Starboard Head



The line is set over an object or slope, running in opposite directions at the same speed

Water Depth: 12.5 – 23.0 m Speed: 5.5 knots

Line Separation: 30.0 m

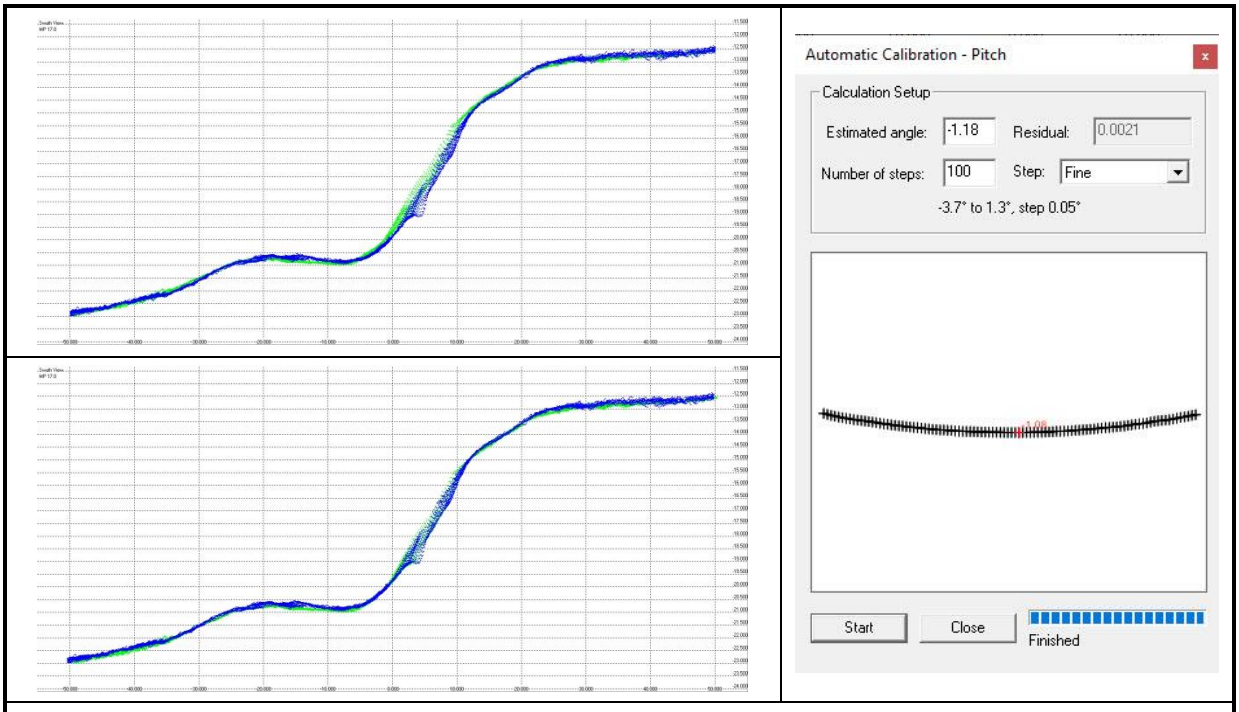
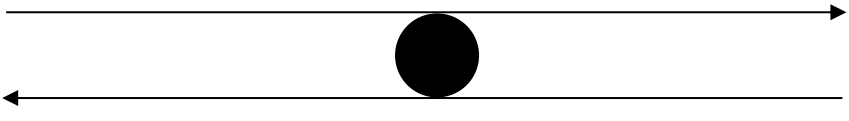


Figure 4: MBES calibration data showing transducer pitch bias (Up) and corrected with bias (Down)

5） Yaw Calibration – Port Head



2 parallel lines are set separately to make outer swath sweeping over an object or a slope with 100% overlap, running each line in opposite directions at the same speed

Water Depth: 12.5 – 23.0 m Speed: 5.5 knots

Line Separation: 10.0 m

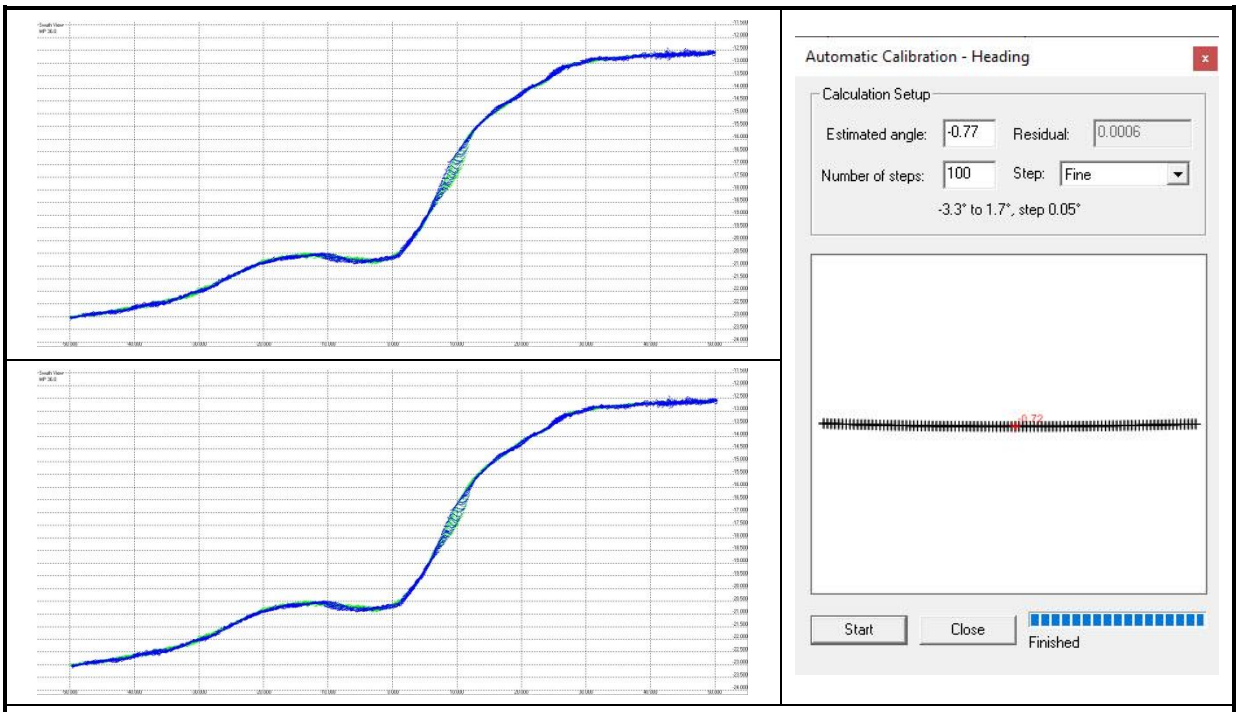
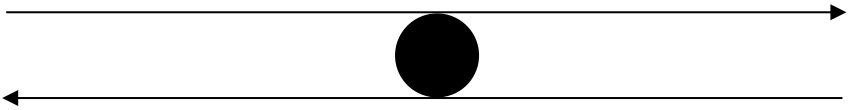


Figure 5: MBES calibration data showing transducer yaw bias (Up) and corrected with bias (Down)

6） Yaw Calibration – Starboard Head



2 parallel lines are set separately to make outer swath sweeping over an object or a slope with 100% overlap, running each line in opposite directions at the same speed

Water Depth: 12.5 – 23.0 m Speed: 5.5 knots

Line Separation: 10.0 m

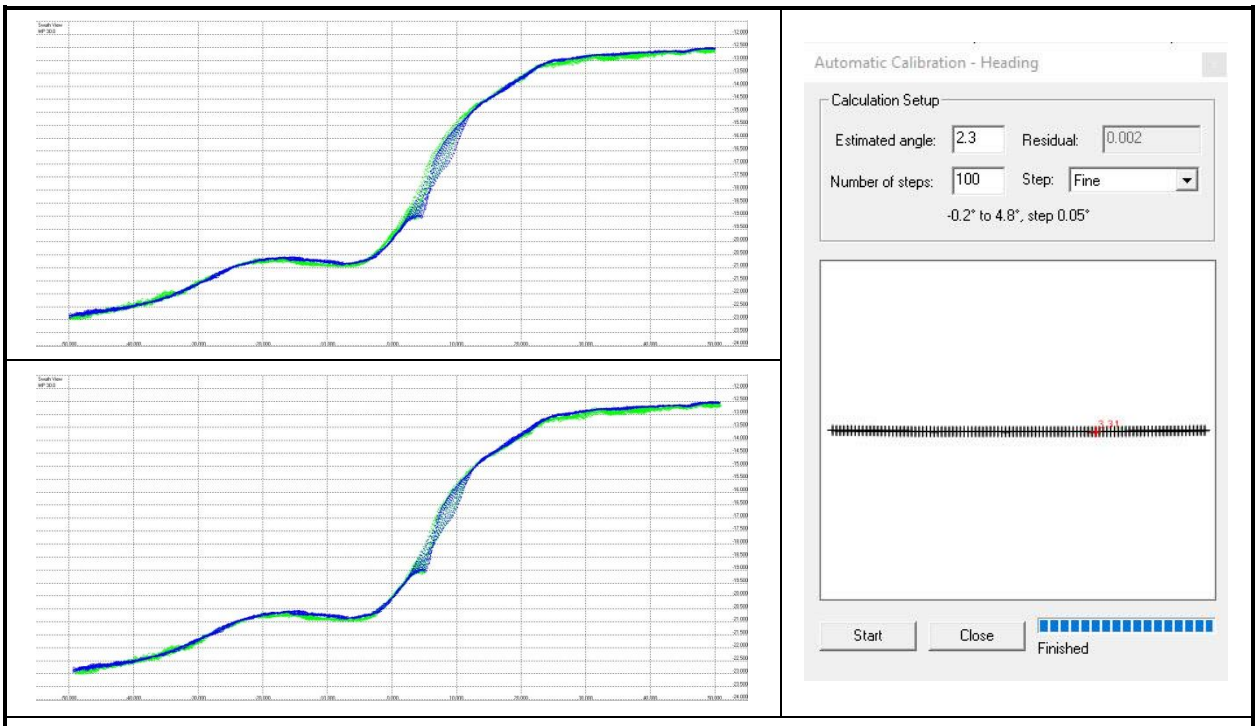
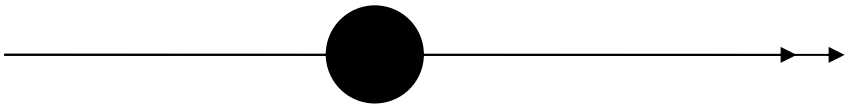


Figure 6: MBES calibration data showing transducer yaw bias (Up) and corrected with bias (Down)

7） Latency (Navigation Delay) Calibration



The line is set over an object or a slope; running with the same direction at different speeds (one at slowest possible speed and one at fastest possible speed)

Water Depth: 12.5 – 23.0 m Speed: 3.0 knots / 5.5knots

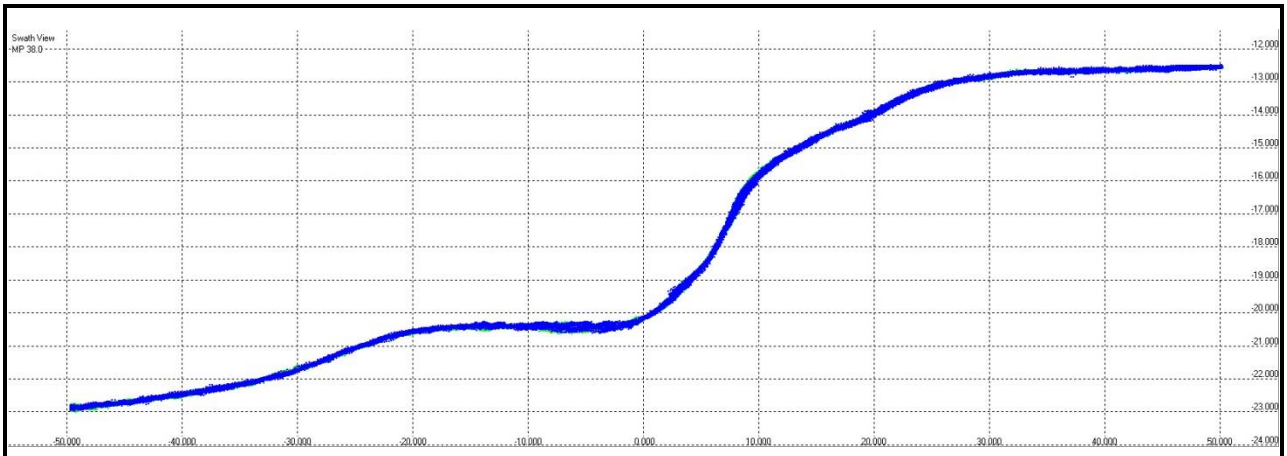


Figure 7: MBES calibration data showing negligible navigation delay error

Summary of MBES Calibration Results

The MBES calibration results are presented as follows:

Port		Starboard	
Roll:	3.00°	Roll:	3.58°
Pitch:	-1.12°	Pitch:	-1.18°
Yaw:	-0.77°	Yaw:	2.30°
Navigation Delay (Latency):		Negligible (because of 1pps)	

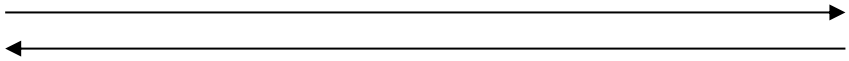
Table 1: Summary of EdgeTech 6205s combined bathymetry and side scan sonar calibration parameters

Task Order No. GE/2021/03.23 - Agreement No. CE 26/2022 (EP)
Development of Integrated Waste Management Facilities
Phase 2 - Investigation, Design and Construction (SA1)
Marine Geophysical Survey (GS)

EdgeTech 6205s Combined Bathymetry and Side Scan Sonar Calibration Report

The Patch Test for EdgeTech 6205s combined bathymetry and side scan sonar was carried out on 05th July 2023 and the result was illustrated below.

1） Roll Calibration – Port Head



The line is set over a flat seabed terrain; running in opposite directions at the same speed

Water Depth: 12.5 m Speed: 5.5 knots

Line Separation: 50.0 m

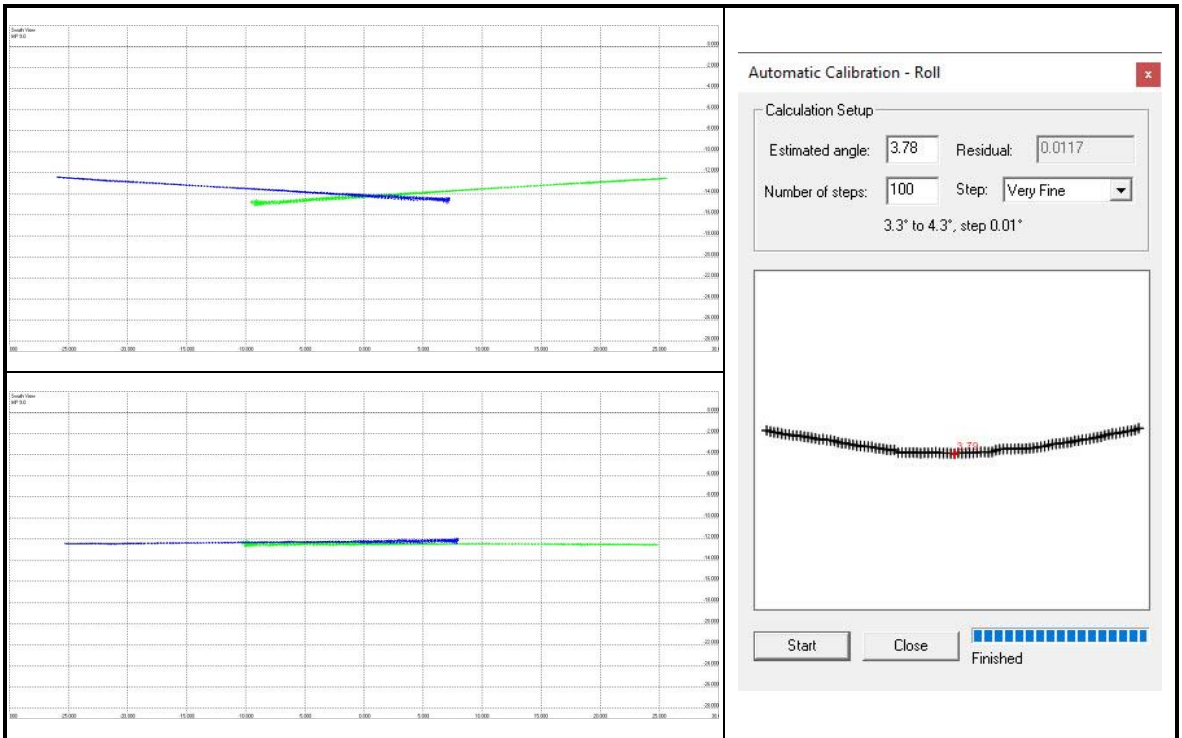
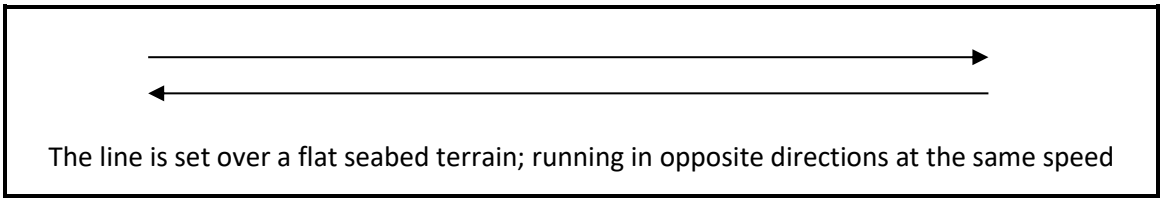


Figure 1: MBES calibration data showing transducer roll bias (Up) and corrected with bias (Down)

2） Roll Calibration – Starboard Head



The line is set over a flat seabed terrain; running in opposite directions at the same speed

Water Depth: 12.0 m Speed: 5.5 knots

Line Separation: 50.0 m

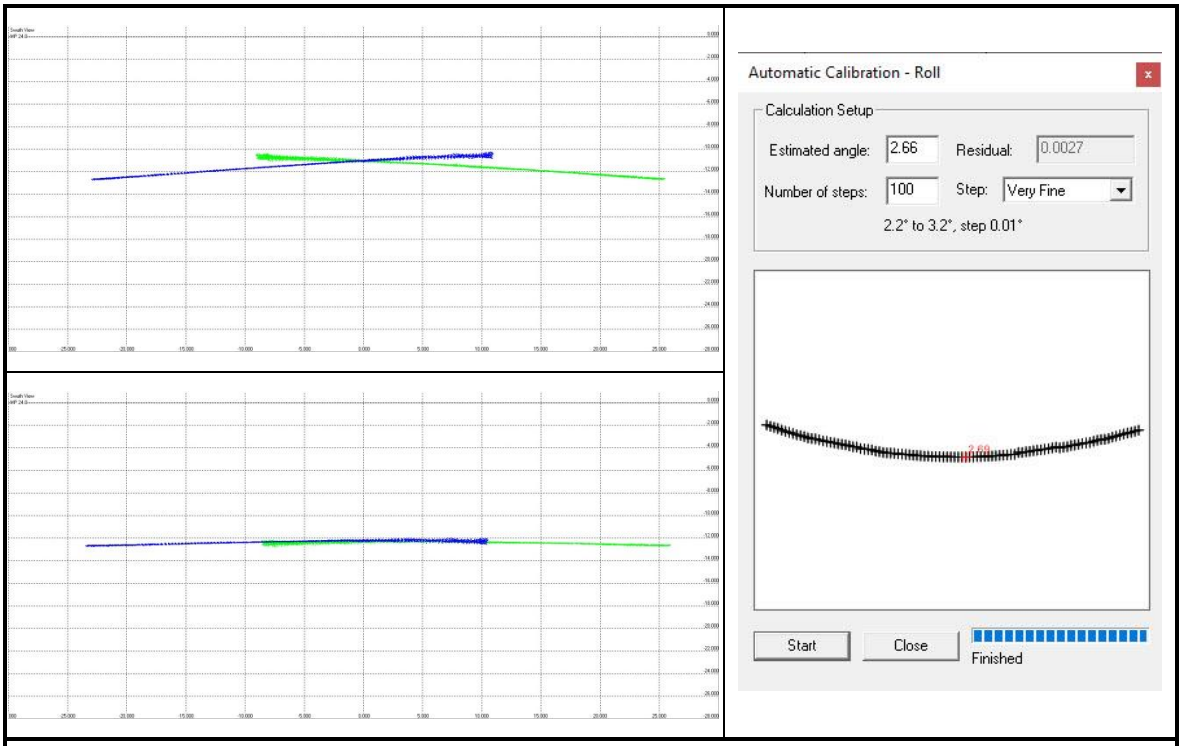
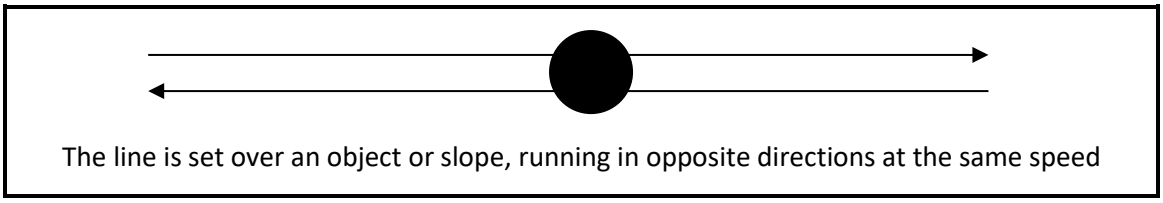


Figure 2: MBES calibration data showing transducer roll bias (Up) and corrected with bias (Down)

3） Pitch Calibration – Port Head



The line is set over an object or slope, running in opposite directions at the same speed

Water Depth: 12.5 – 23.0 m Speed: 5.5 knots

Line Separation: 30.0 m

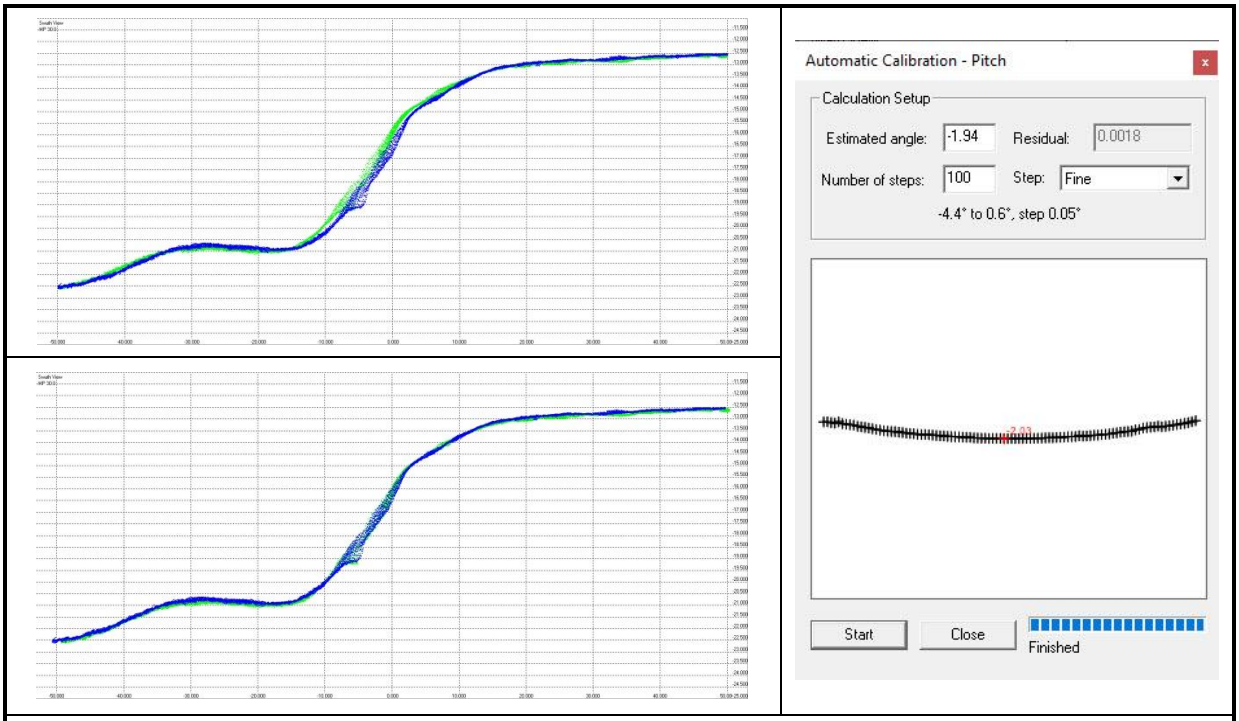
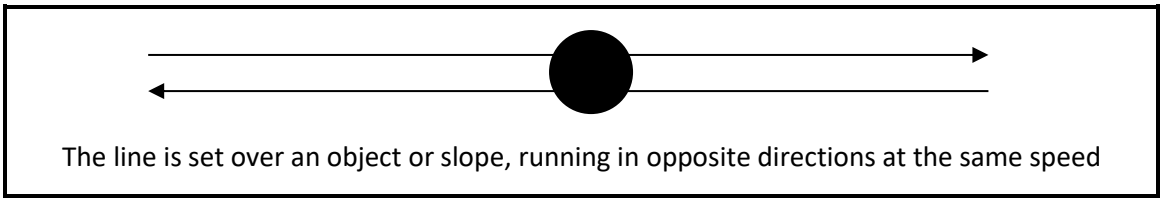


Figure 3: MBES calibration data showing transducer pitch bias (Up) and corrected with bias (Down)

4） Pitch Calibration – Starboard Head



The line is set over an object or slope, running in opposite directions at the same speed

Water Depth: 12.5 – 23.0 m Speed: 5.5 knots

Line Separation: 30.0 m

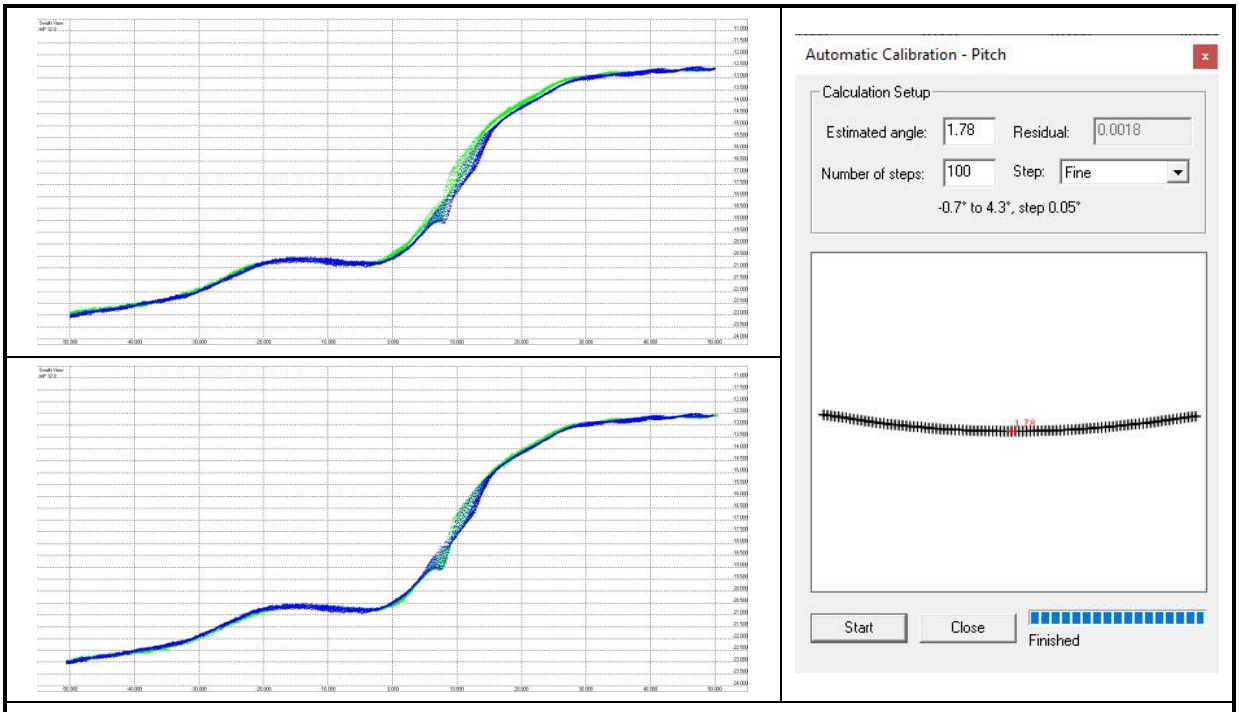
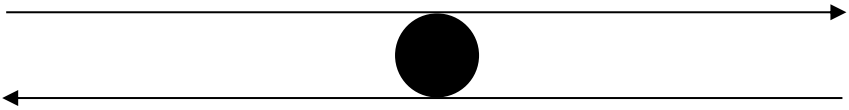


Figure 4: MBES calibration data showing transducer pitch bias (Up) and corrected with bias (Down)

5） Yaw Calibration – Port Head



2 parallel lines are set separately to make outer swath sweeping over an object or a slope with 100% overlap, running each line in opposite directions at the same speed

Water Depth: 12.5 – 23.0 m Speed: 5.5 knots

Line Separation: 10.0 m

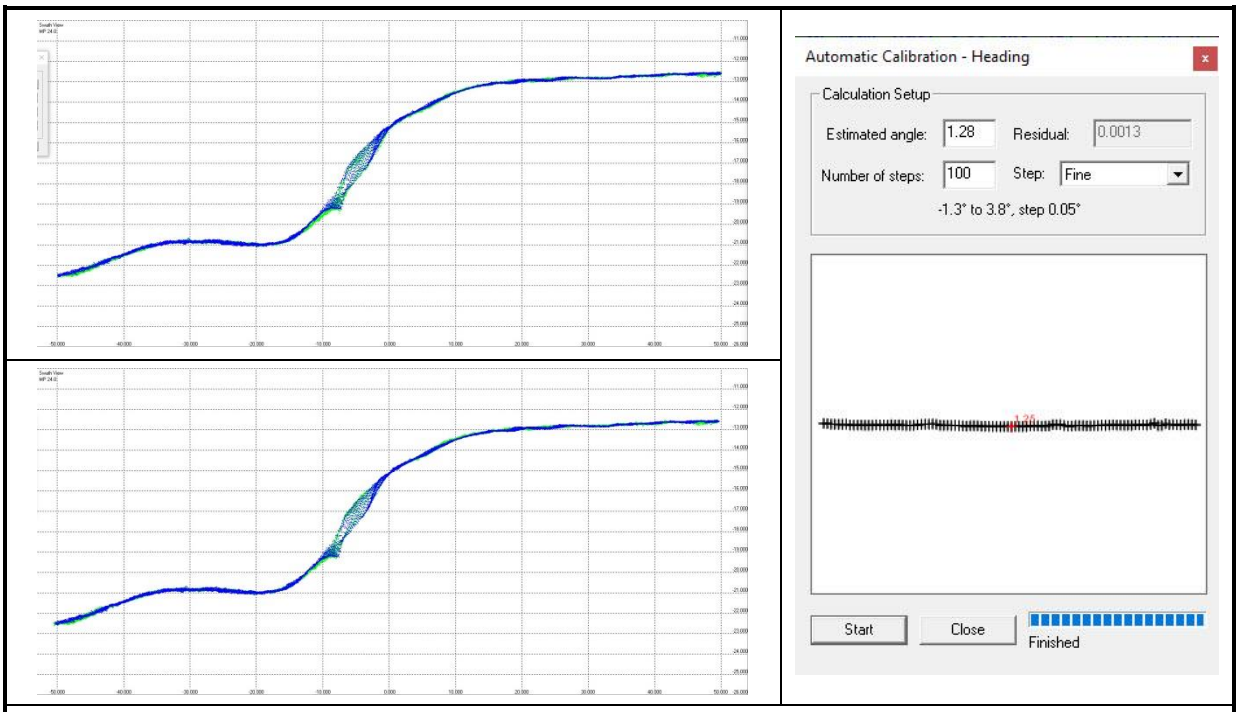
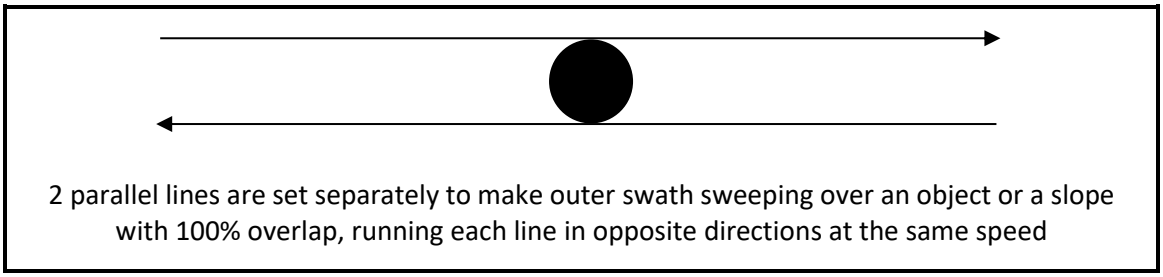


Figure 5: MBES calibration data showing transducer yaw bias (Up) and corrected with bias (Down)

6） Yaw Calibration – Starboard Head



2 parallel lines are set separately to make outer swath sweeping over an object or a slope with 100% overlap, running each line in opposite directions at the same speed

Water Depth: 12.5 – 23.0 m Speed: 5.5 knots

Line Separation: 10.0 m

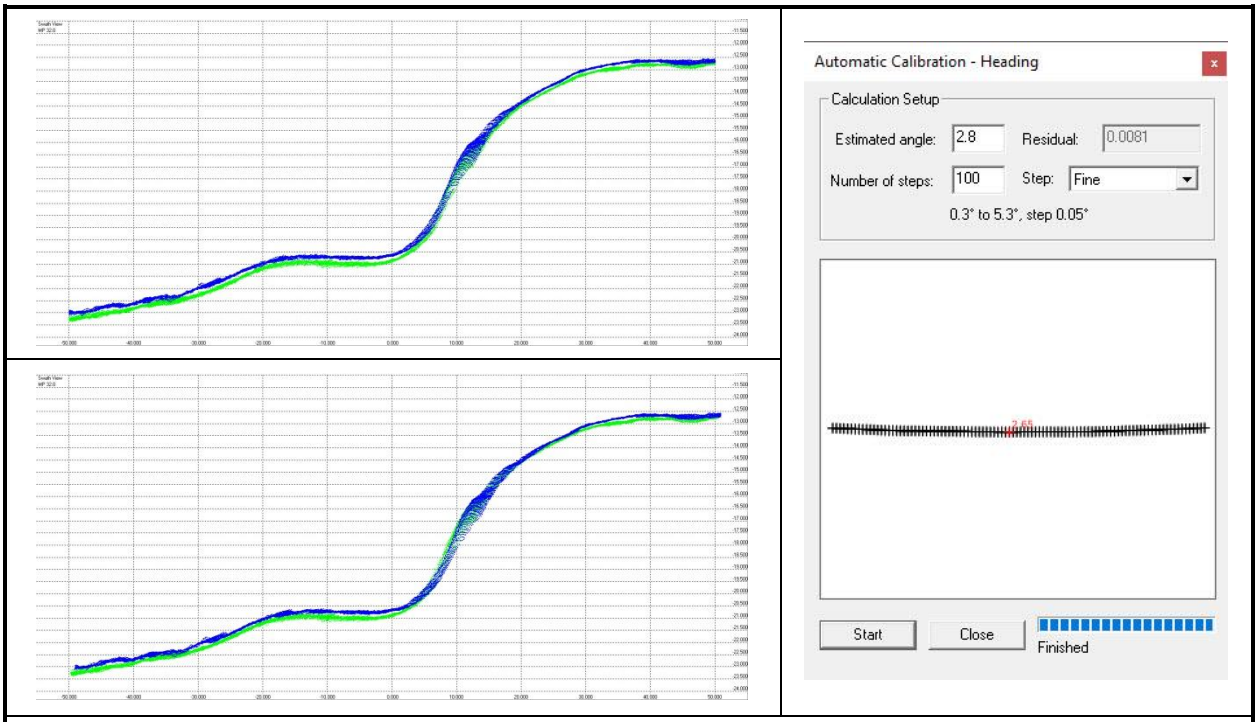
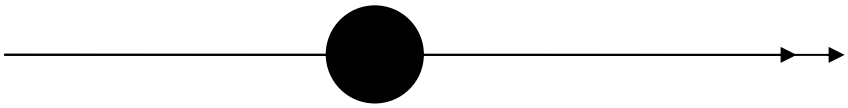


Figure 6: MBES calibration data showing transducer yaw bias (Up) and corrected with bias (Down)

7） Latency (Navigation Delay) Calibration



The line is set over an object or a slope; running with the same direction at different speeds (one at slowest possible speed and one at fastest possible speed)

Water Depth: 12.5 – 23.0 m Speed: 3.0 knots / 5.5knots

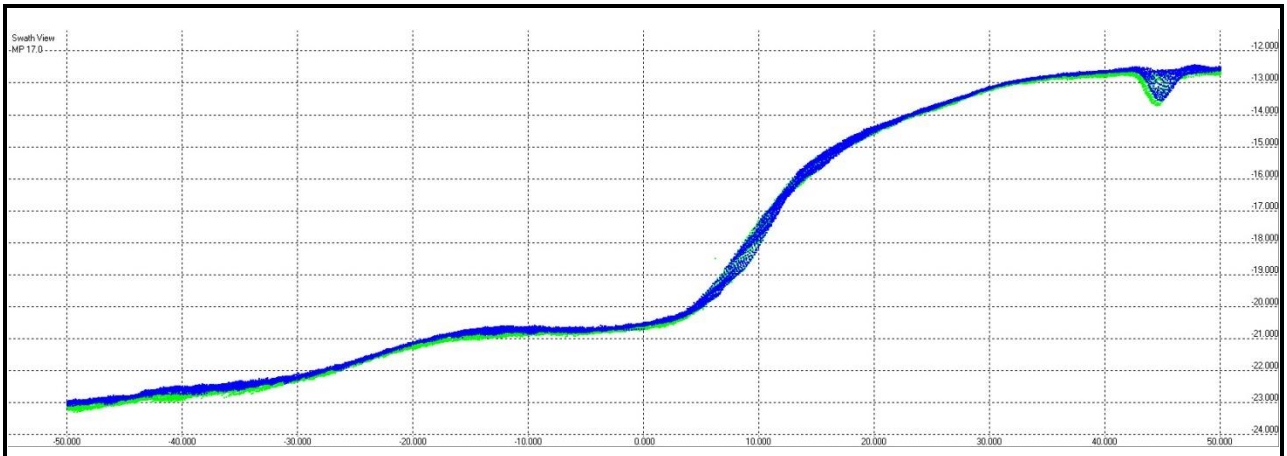


Figure 7: MBES calibration data showing negligible navigation delay error

Summary of MBES Calibration Results

The MBES calibration results are presented as follows:

Port		Starboard	
Roll:	3.78°	Roll:	2.66°
Pitch:	-1.94°	Pitch:	1.78°
Yaw:	1.28°	Yaw:	2.80°
Navigation Delay (Latency):		Negligible (because of 1pps)	

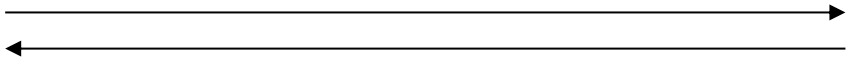
Table 1: Summary of EdgeTech 6205s combined bathymetry and side scan sonar calibration parameters

Task Order No. GE/2021/03.23 - Agreement No. CE 26/2022 (EP)
Development of Integrated Waste Management Facilities
Phase 2 - Investigation, Design and Construction (SA1)
Marine Geophysical Survey (GS)

EdgeTech 6205s Combined Bathymetry and Side Scan Sonar Calibration Report

The Patch Test for EdgeTech 6205s combined bathymetry and side scan sonar was carried out on 06th July 2023 and the result was illustrated below.

1） Roll Calibration – Port Head



The line is set over a flat seabed terrain; running in opposite directions at the same speed

Water Depth: 8.0 m Speed: 5.5 knots

Line Separation: 50.0 m

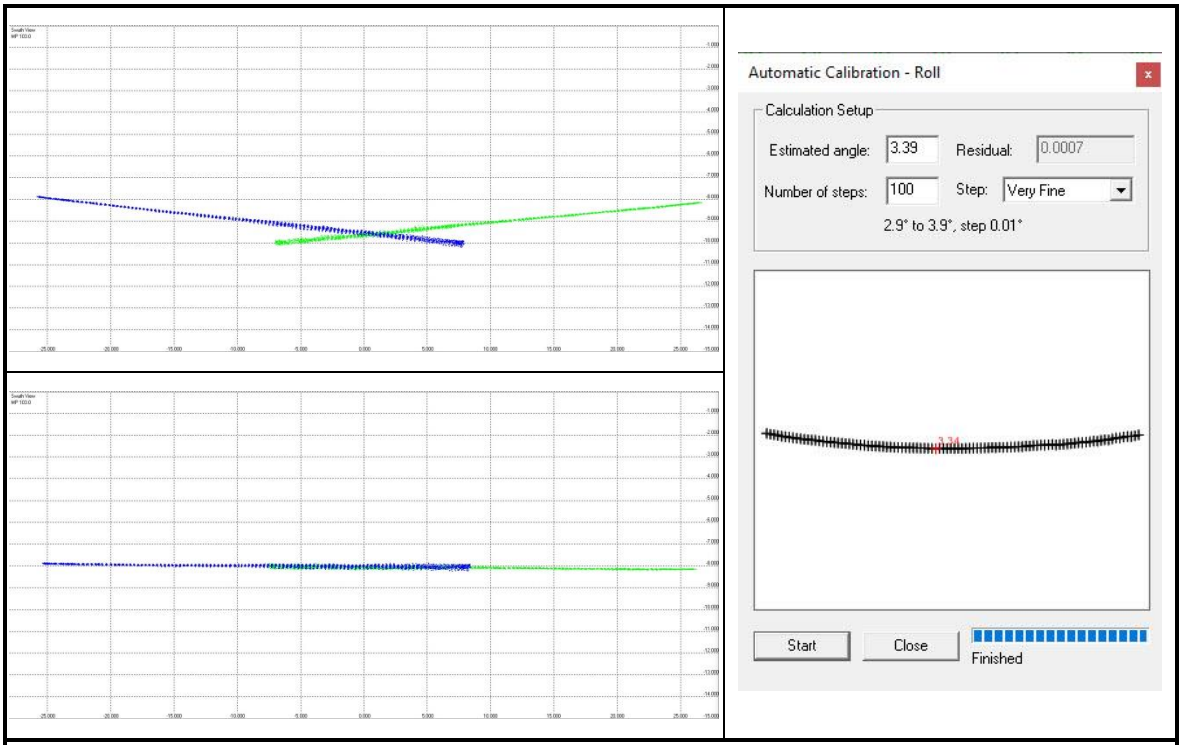
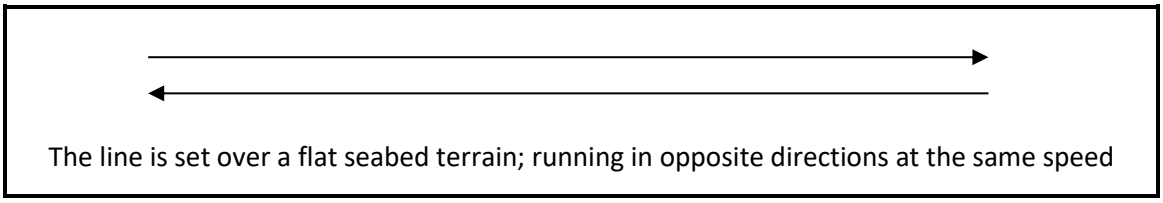


Figure 1: MBES calibration data showing transducer roll bias (Up) and corrected with bias (Down)

2） Roll Calibration – Starboard Head



The line is set over a flat seabed terrain; running in opposite directions at the same speed

Water Depth: 8.0 m Speed: 5.5 knots

Line Separation: 50.0 m

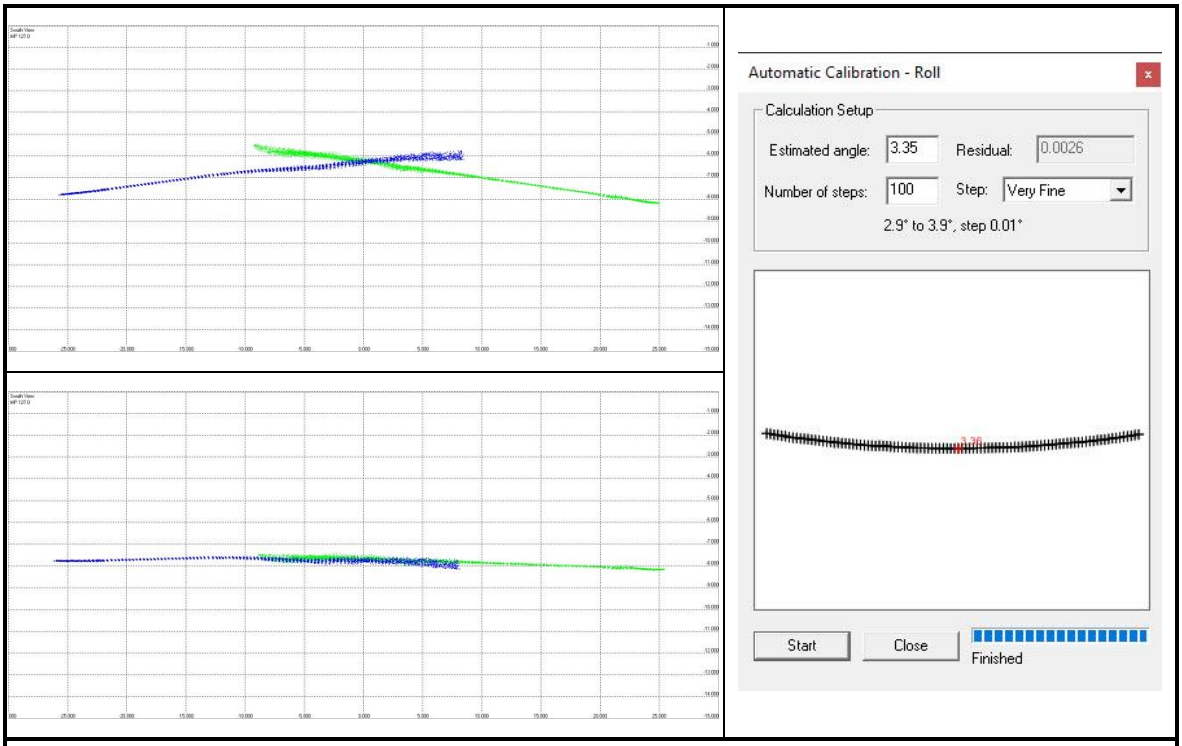
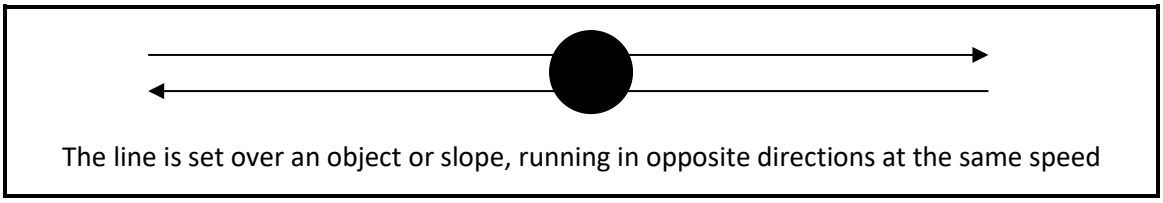


Figure 2: MBES calibration data showing transducer roll bias (Up) and corrected with bias (Down)

3） Pitch Calibration – Port Head



The line is set over an object or slope, running in opposite directions at the same speed

Water Depth: 7.4 – 9.4 m Speed: 5.5 knots

Line Separation: 30.0 m

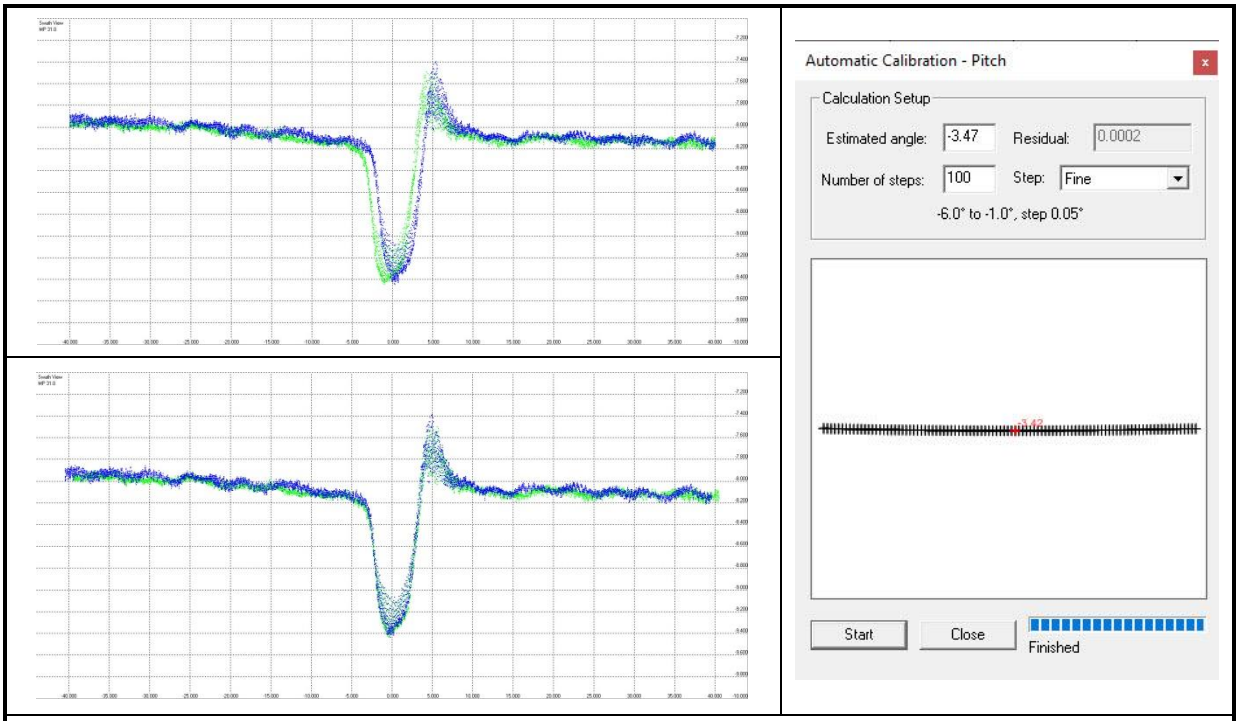
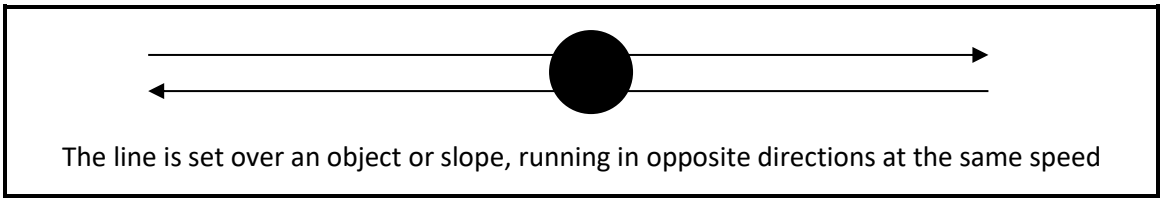


Figure 3: MBES calibration data showing transducer pitch bias (Up) and corrected with bias (Down)

4） Pitch Calibration – Starboard Head



Water Depth: 7.2 – 9.4 m Speed: 5.5 knots

Line Separation: 30.0 m

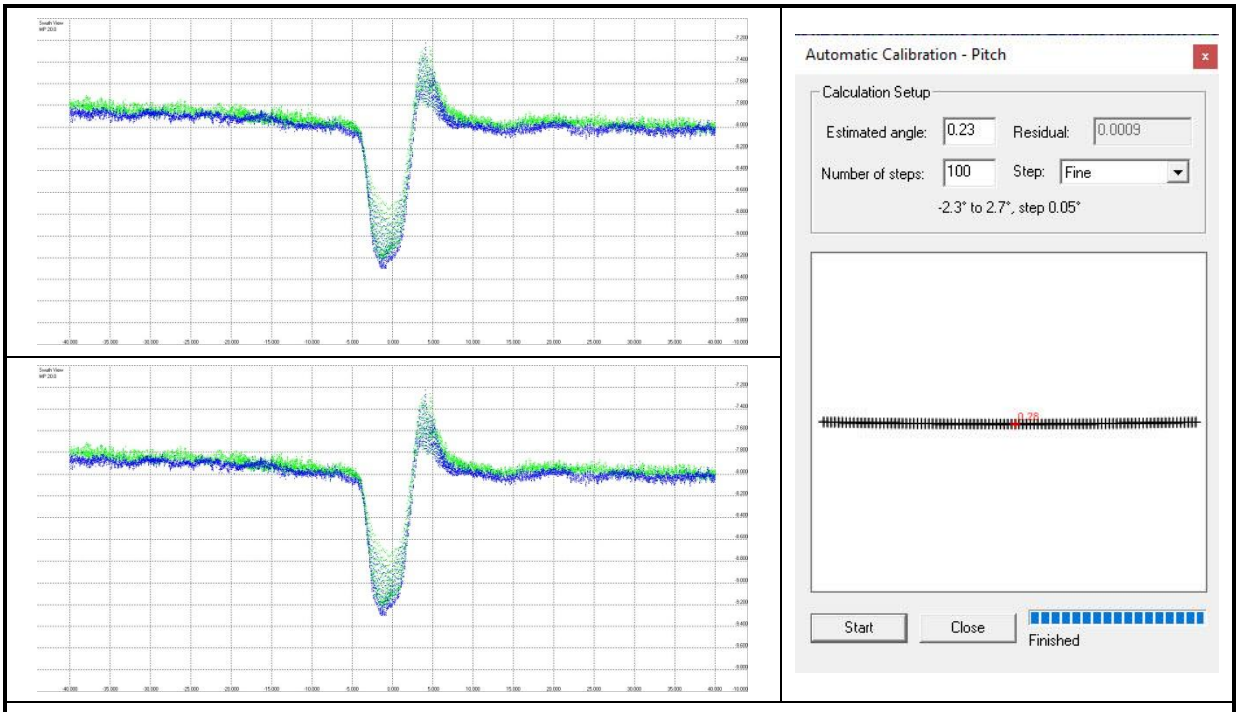
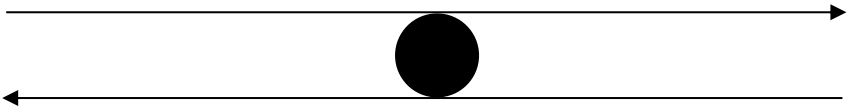


Figure 4: MBES calibration data showing transducer pitch bias (Up) and corrected with bias (Down)

5） Yaw Calibration – Port Head



2 parallel lines are set separately to make outer swath sweeping over an object or a slope with 100% overlap, running each line in opposite directions at the same speed

Water Depth: 7.8 – 9.4m Speed: 5.5 knots

Line Separation: 10.0 m

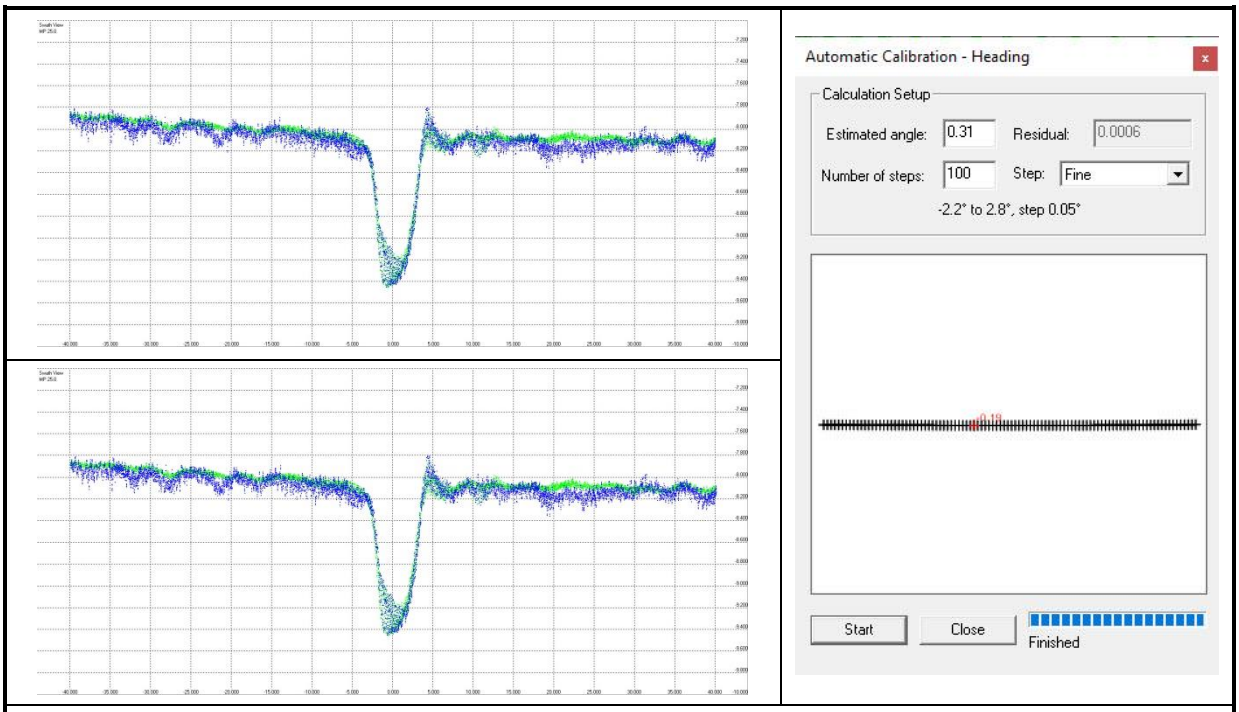
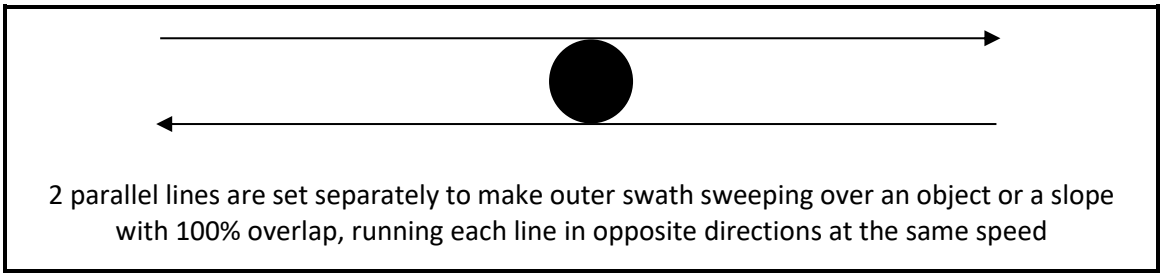


Figure 5: MBES calibration data showing transducer yaw bias (Up) and corrected with bias (Down)

6） Yaw Calibration – Starboard Head



2 parallel lines are set separately to make outer swath sweeping over an object or a slope with 100% overlap, running each line in opposite directions at the same speed

Water Depth: 7.6 – 9.4 m Speed: 5.5 knots

Line Separation: 10.0 m

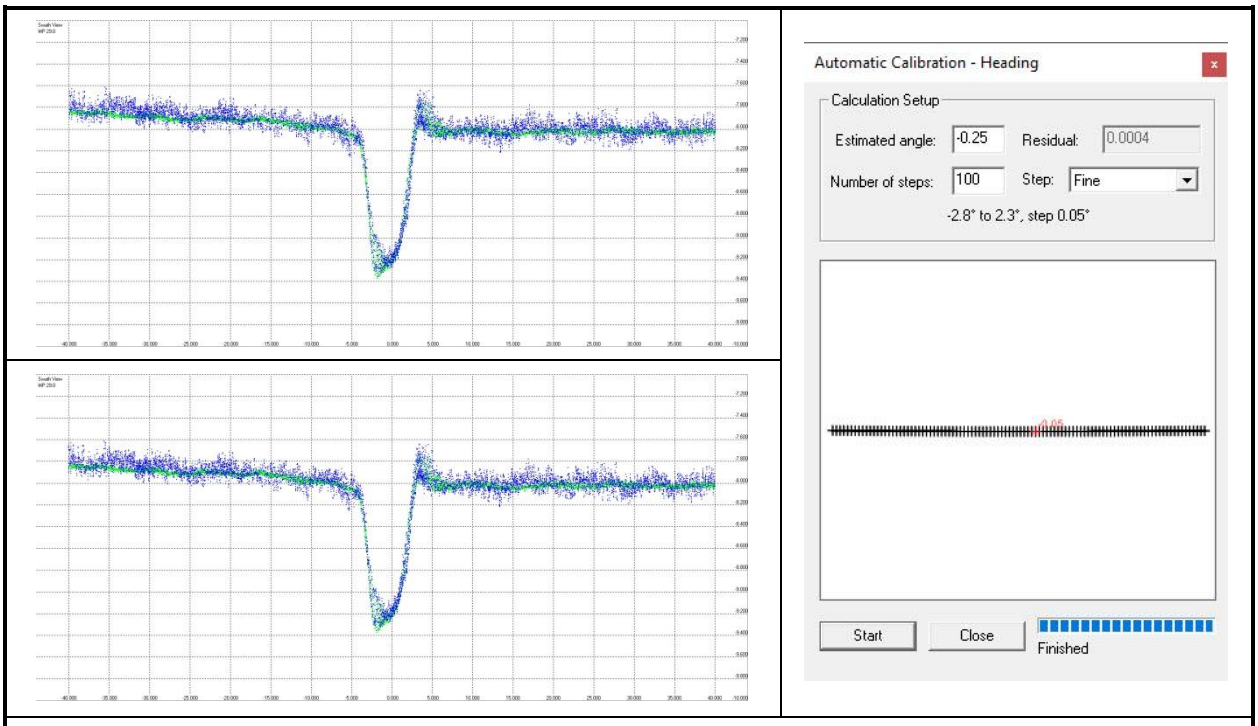
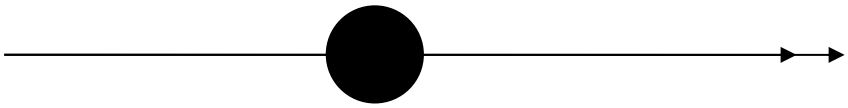


Figure 6: MBES calibration data showing transducer yaw bias (Up) and corrected with bias (Down)

7） Latency (Navigation Delay) Calibration



The line is set over an object or a slope; running with the same direction at different speeds (one at slowest possible speed and one at fastest possible speed)

Water Depth: 8.0 – 10.0 m Speed: 3.0 knots / 5.5knots

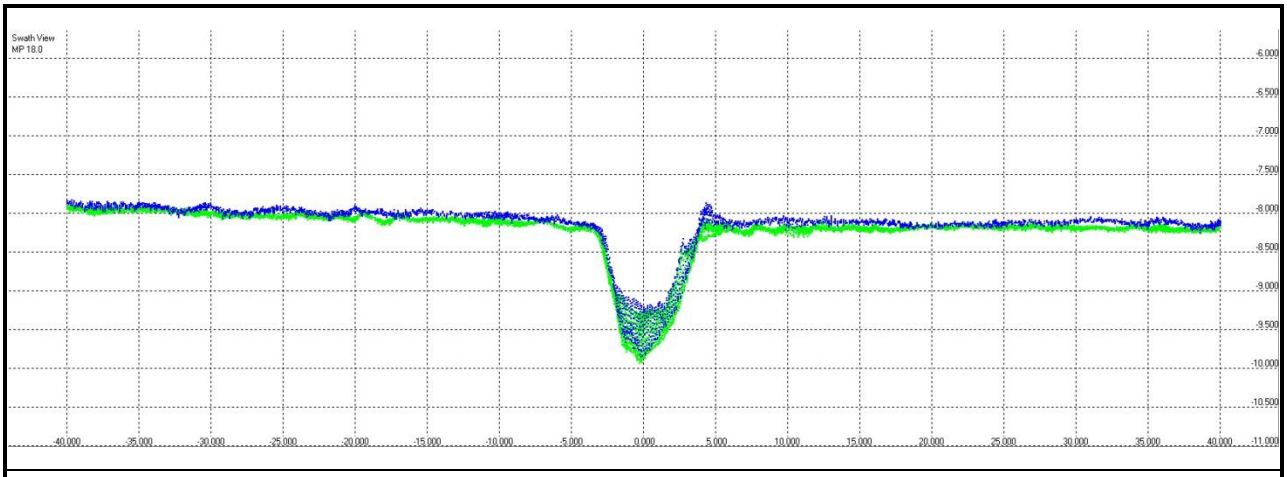


Figure 7: MBES calibration data showing negligible navigation delay error

Summary of MBES Calibration Results

The MBES calibration results are presented as follows:

Port		Starboard	
Roll:	3.39°	Roll:	3.35°
Pitch:	-3.47°	Pitch:	0.23°
Yaw:	0.31°	Yaw:	-0.25°
Navigation Delay (Latency):		Negligible (because of 1pps)	

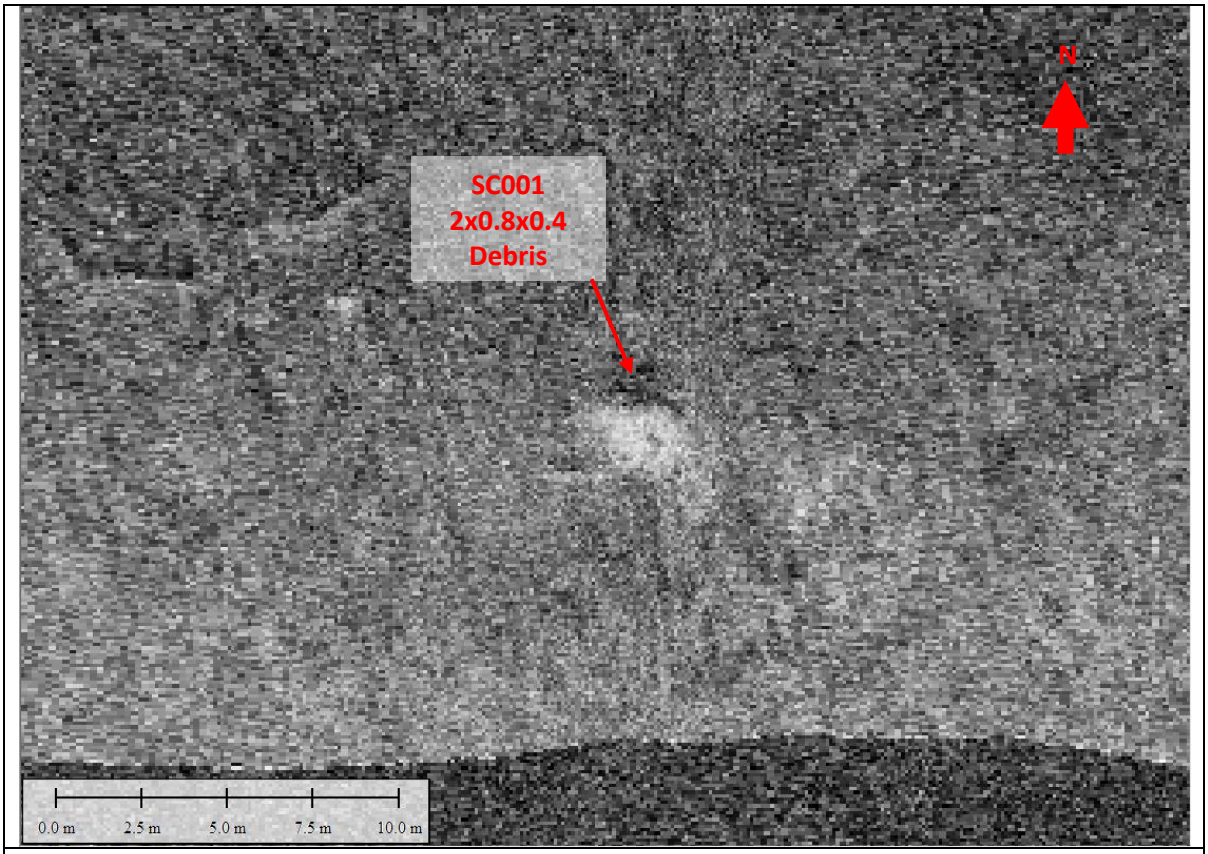
Table 1: Summary of EdgeTech 6205s combined bathymetry and side scan sonar calibration parameters

APPENDIX F

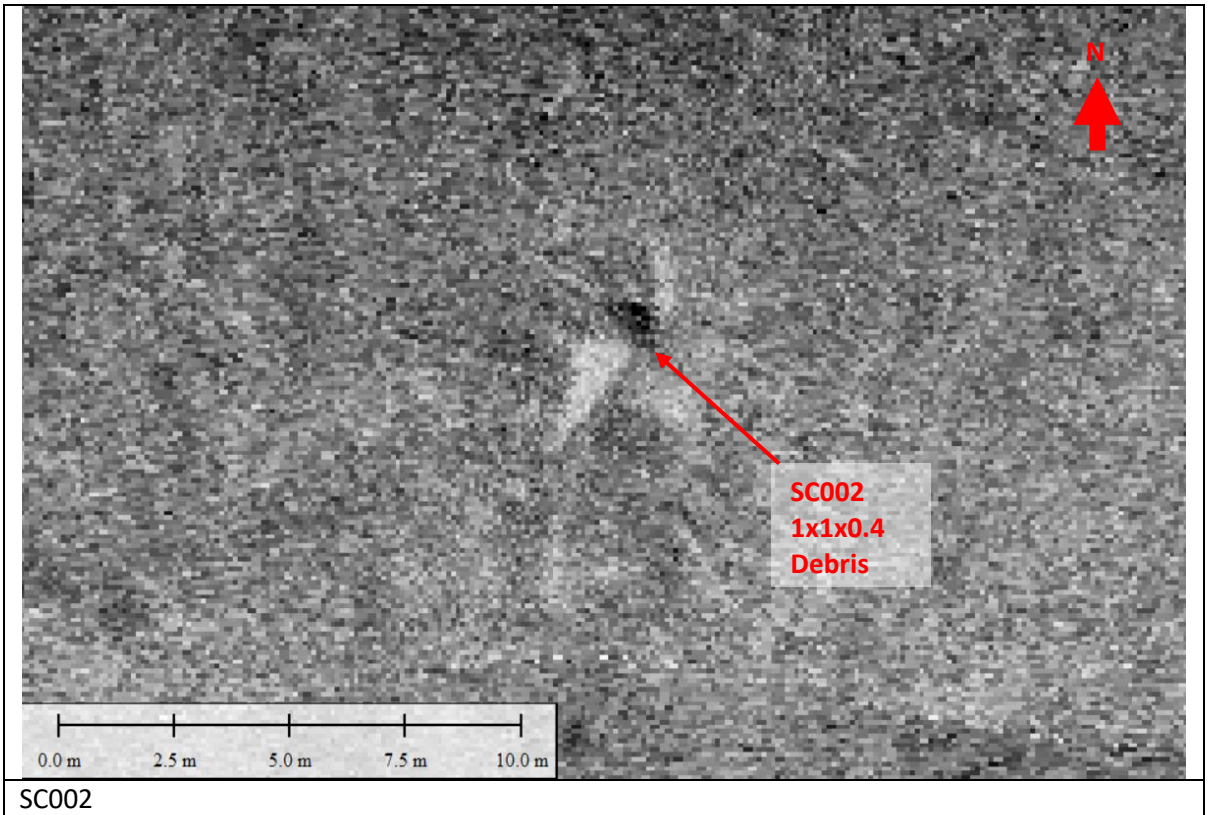
Contacts
(sonar contacts, seismic contacts and magnetic contacts)

Summary of Sonar Contacts

Contact number	Chart number	Latitude Longitude	Easting Northing	Water depth (m)	Dimensions (m)	Description
SA1-SC001	7.1	22° 25.512' N 113° 53.477' E	840228.6E 831643.1N	9.8	2x0.8x0.4	Debris
SA1-SC002	7.1	22° 25.428' N 113° 53.524' E	840226.9E 831408.1N	8.5	1x1x0.4	Debris
SA1-SC003	7.1	22° 25.539' N 113° 53.569' E	840189.0E 831394.2N	7.8	1.3x1x0.3	Debris
SA1-SC004	7.1	22° 25.589' N 113° 53.842' E	840269.7E 831177.5N	5.9	3.2x0.6x0.5	Debris
SA1-SC005	7.1	22° 25.616' N 113° 53.853' E	840240.0E 831137.1N	5.7	3x0.5x0.4	Debris
SA1-SC006	7.1	22° 25.594' N 113° 53.861' E	840263.6E 831124.5N	6.1	1.5x1.2x0.3	Debris
SA1-SC007	7.1	22° 25.530' N 113° 54.024' E	840176.8E 831083.0N	5.9	1.5x1.2x<0.3	Debris
SA1-SC008	7.1	22° 25.578' N 113° 54.059' E	840183.2E 830860.8N	5.9	2.5x1x0.3	Debris
SA1-SC009	7.2	22° 25.461' N 113° 54.487' E	840177.1E 830845.9N	5.5	1.8x1x0.6	Debris
SA1-SC010	7.2	22° 25.362' N 113° 54.764' E	840136.7E 830834.1N	5.1	4x1.5x0.3	Debris
SA1-SC011	7.2	22° 25.334' N 113° 54.788' E	840207.1E 830823.2N	5.5	5x1x1	Unknown object
SA1-SC012	7.2	22° 25.285' N 113° 54.811' E	840175.7E 830616.4N	5.6	9x<0.5x0.5	Unknown object
SA1-SC013	7.2, 7.3	22° 25.326' N 113° 54.883' E	840181.3E 830614.9N	6.4	3x2x0.8	Debris
SA1-SC014	7.3	22° 25.345' N 113° 54.943' E	840146.7E 830330.1N	6.6	2x0.5x0.4	Debris
SA1-SC015	7.3	22° 25.390' N 113° 55.037' E	840426.4E 829963.8N	5.7	1.2x0.5x0.3	Debris
SA1-SC016	7.3	22° 25.404' N 113° 55.157' E	840410.2E 829957.0N	6.1	2x1x0.5	Debris
SA1-SC017	7.3	22° 25.444' N 113° 55.258' E	840434.2E 829903.8N	5.5	2x1.2x0.5	Debris


N
SC001
2x0.8x0.4
Debris
0.0 m
2.5 m
5.0 m
7.5 m
10.0 m

SC001


N
SC002
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Debris
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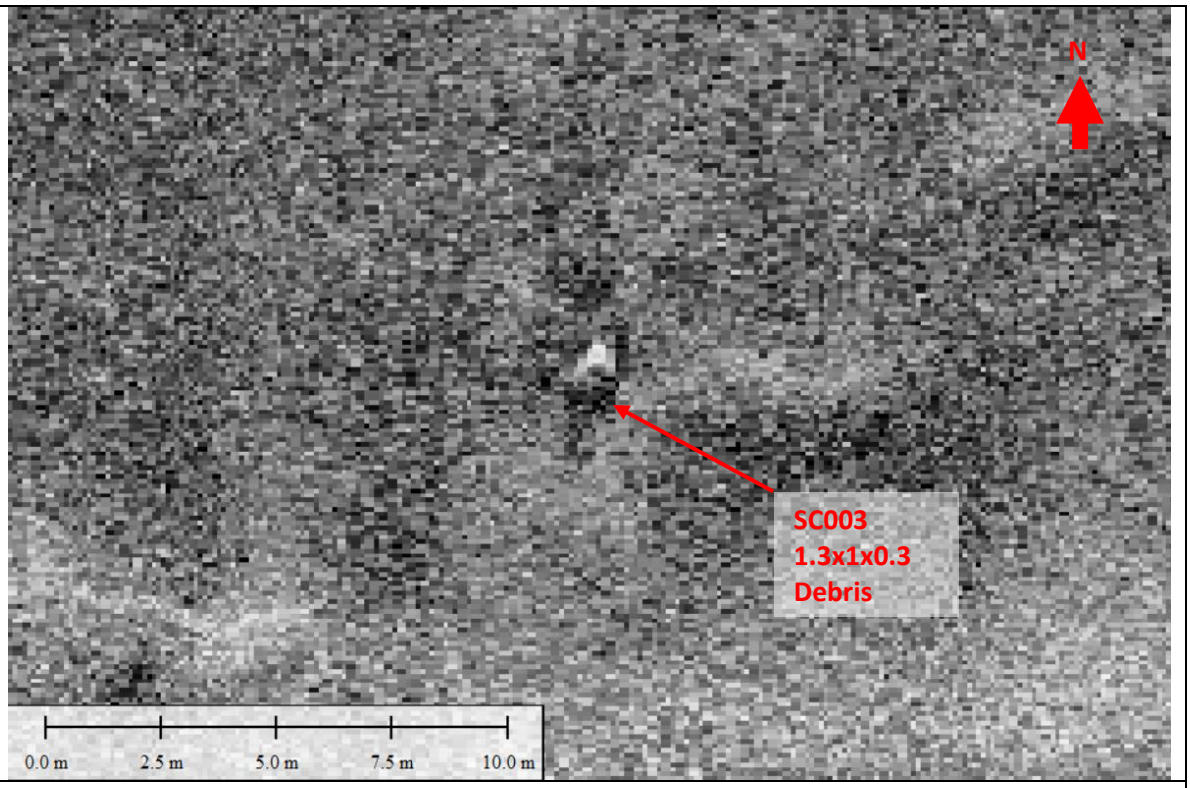
2.5 m
5.0 m
7.5 m
10.0 m

SC002


N
SC003
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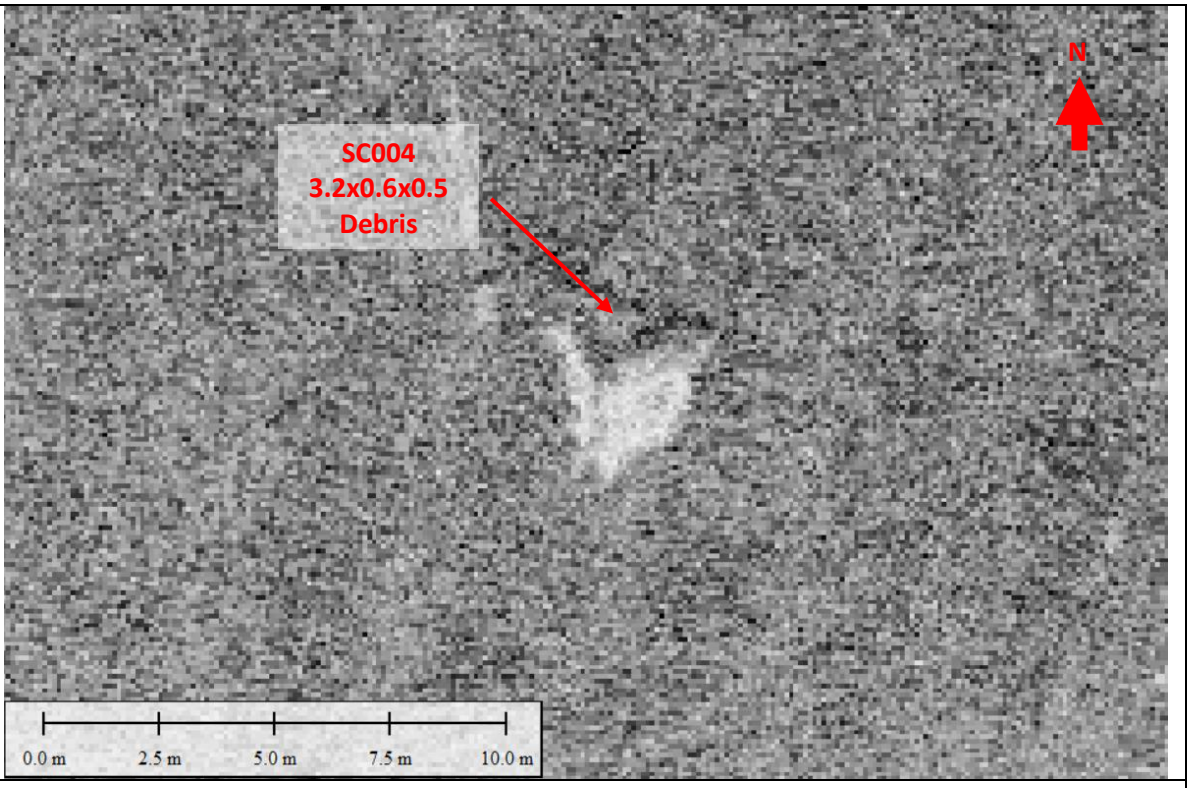
Debris
0.0 m
2.5 m
5.0 m
7.5 m
10.0 m

SC003


N
SC004
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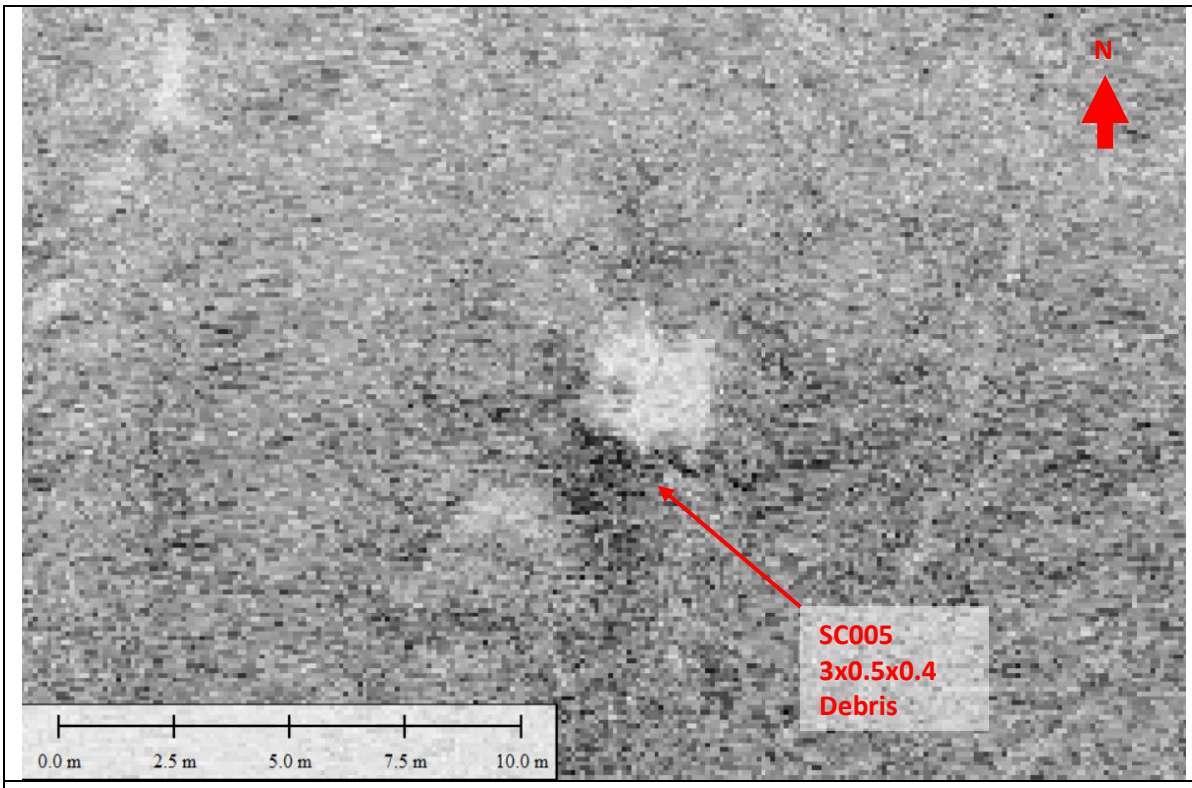
Debris
0.0 m
2.5 m
5.0 m
7.5 m
10.0 m

SC004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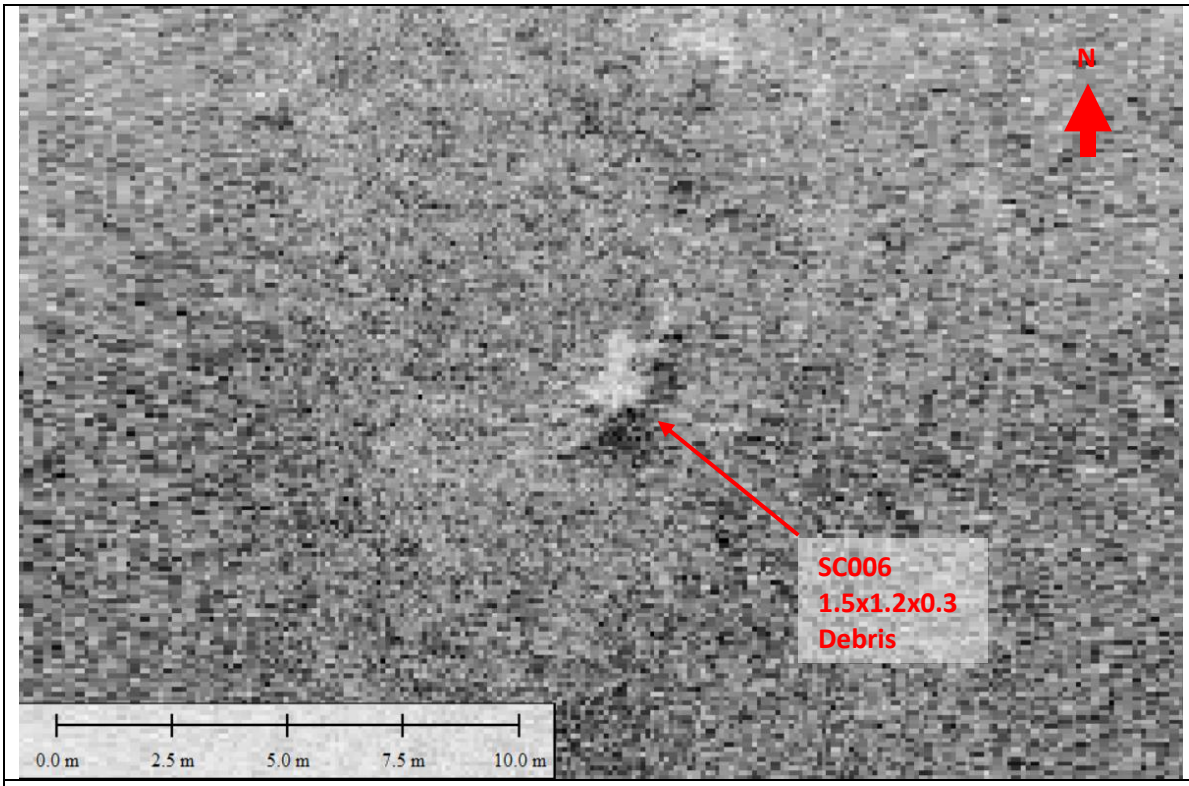
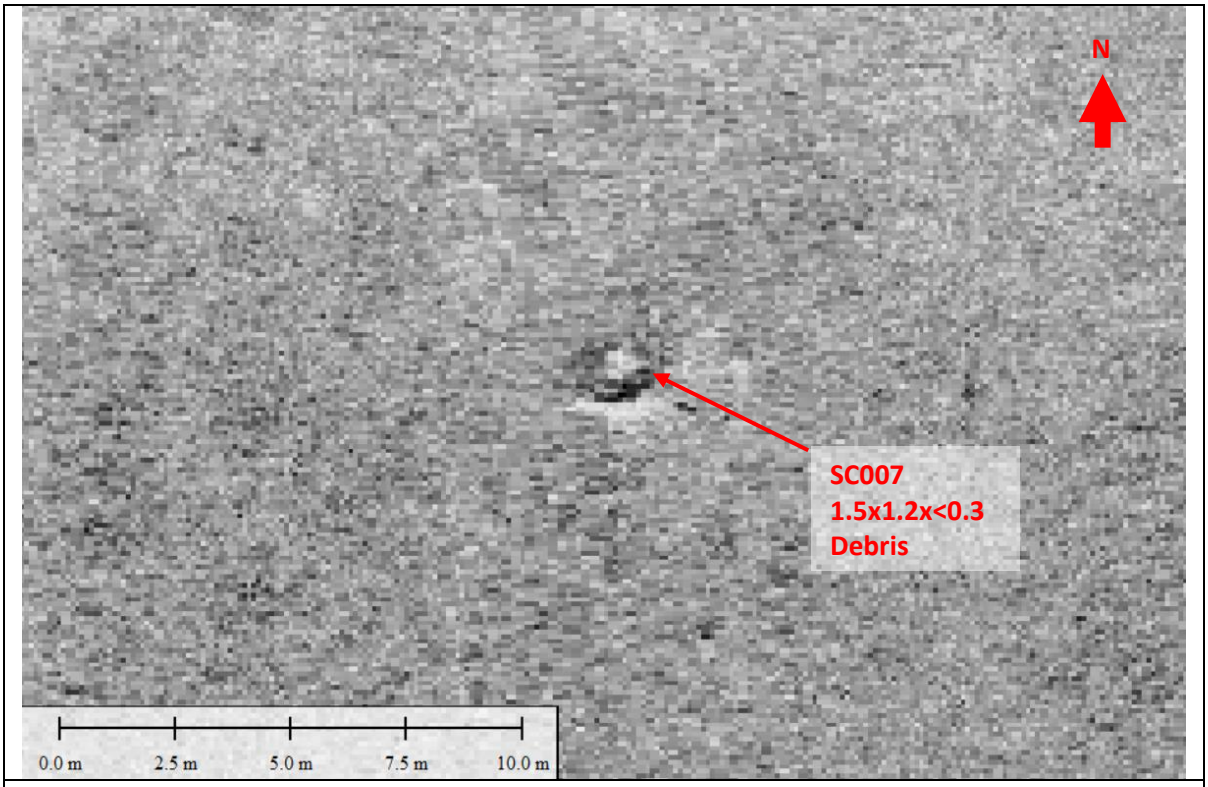
Debris
0.0 m
2.5 m
5.0 m
7.5 m
10.0 m

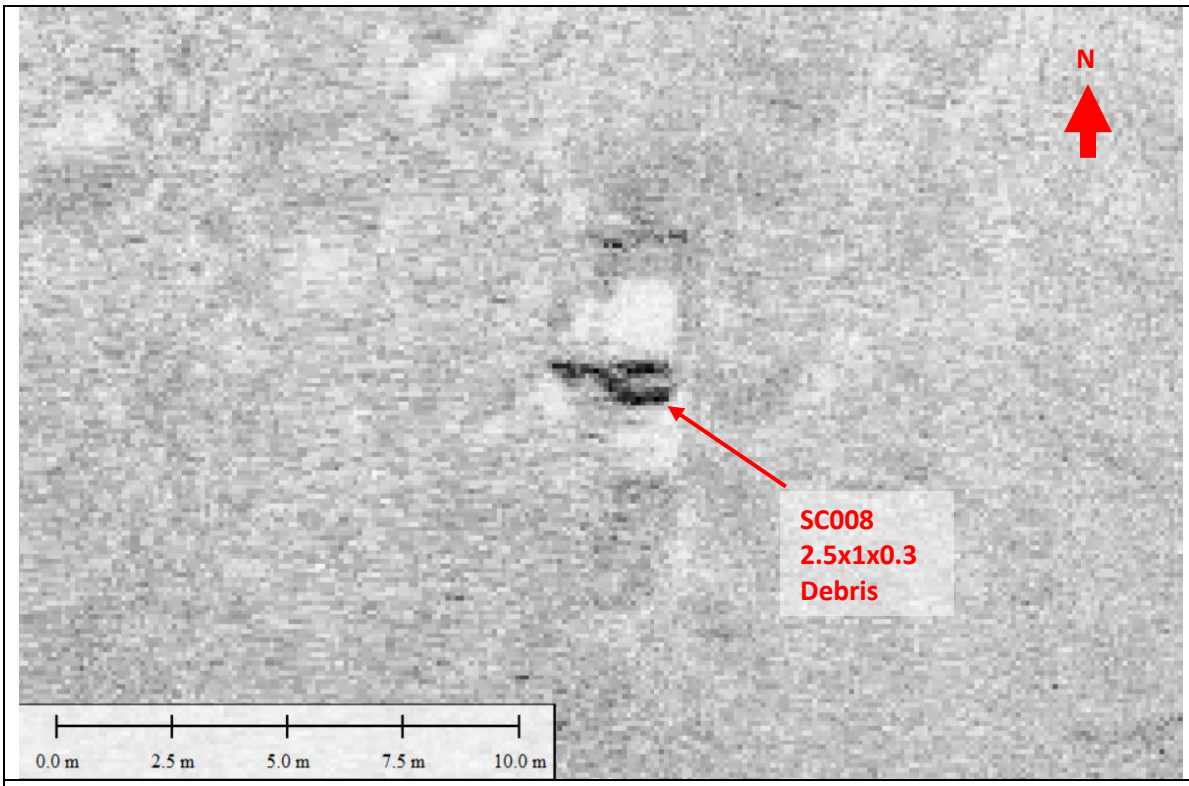
SC005


N
SC006
1.5x1.2x0.3
Debris
0.0 m
2.5 m
5.0 m
7.5 m
10.0 m

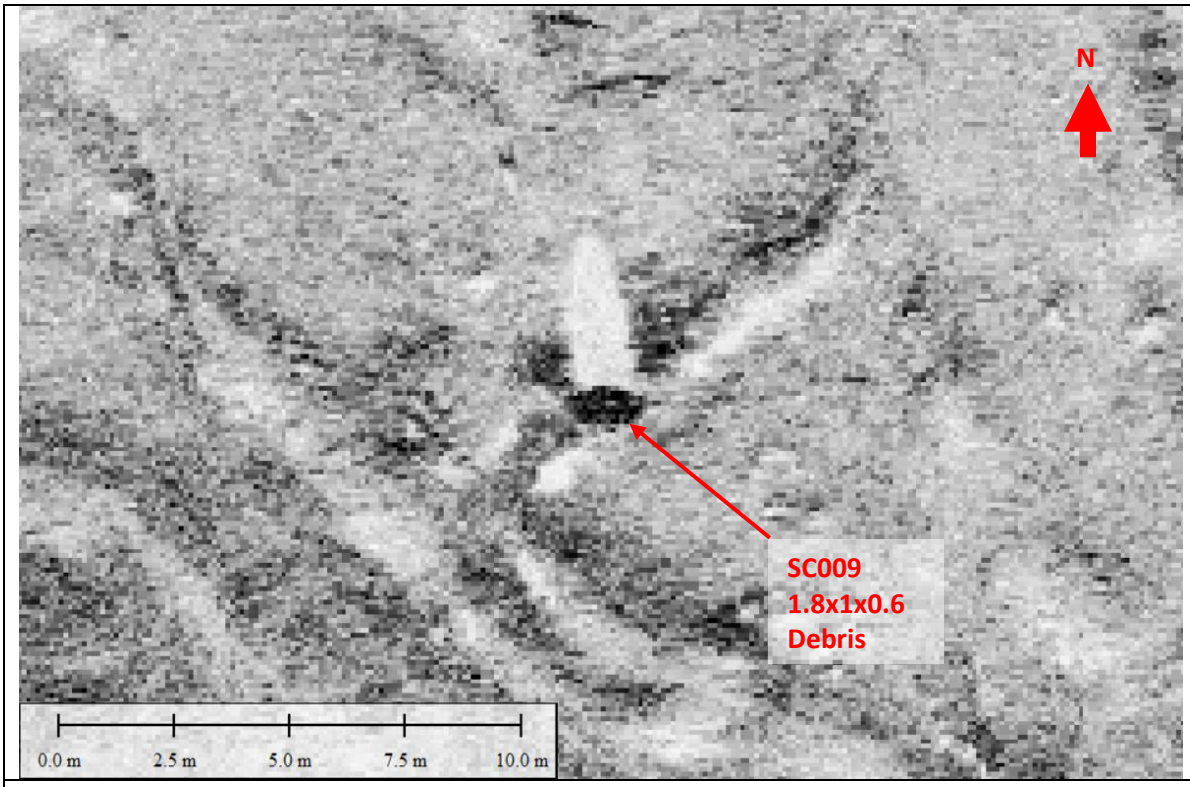
SC006


N
SC007
1.5x1.2x<0.3
Debris
0.0 m
2.5 m
5.0 m
7.5 m
10.0 m

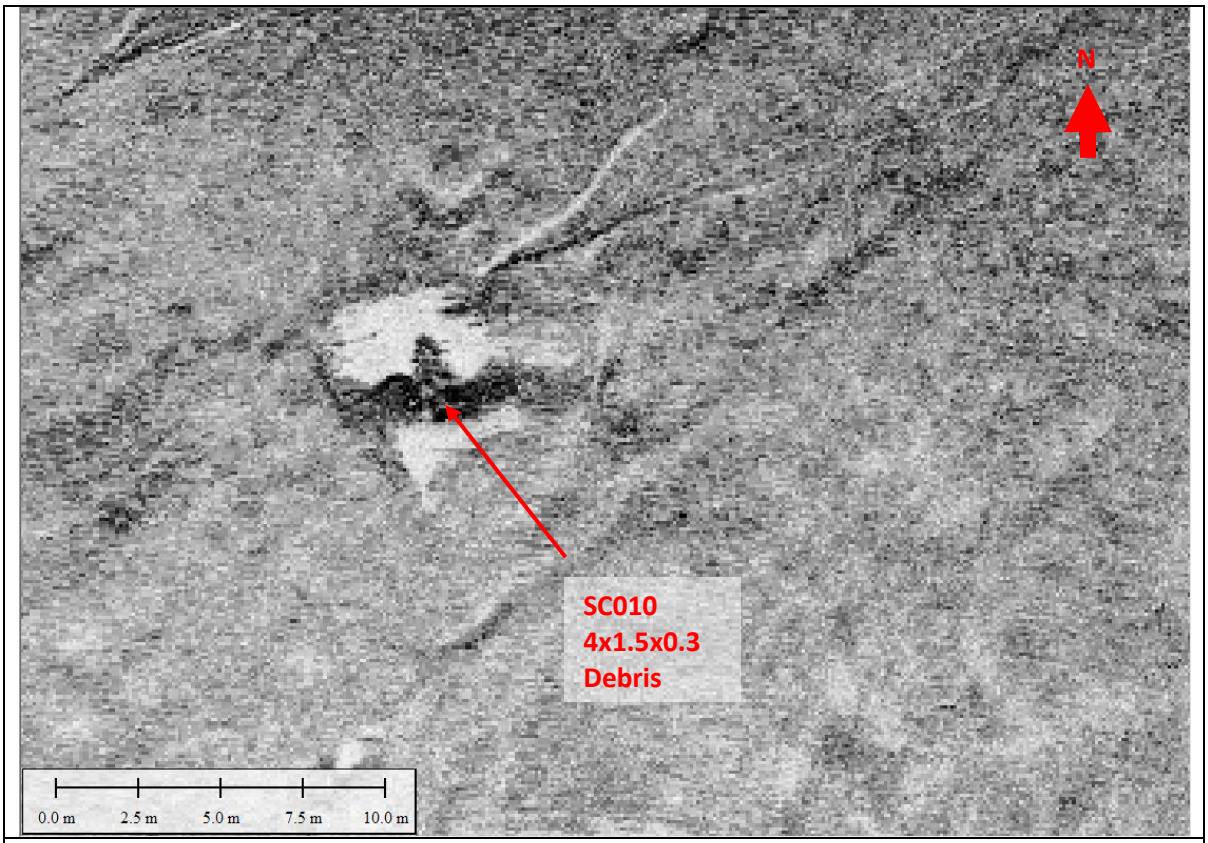
SC007


N
SC008
2.5x1x0.3
Debris
0.0 m
2.5 m
5.0 m
7.5 m
10.0 m

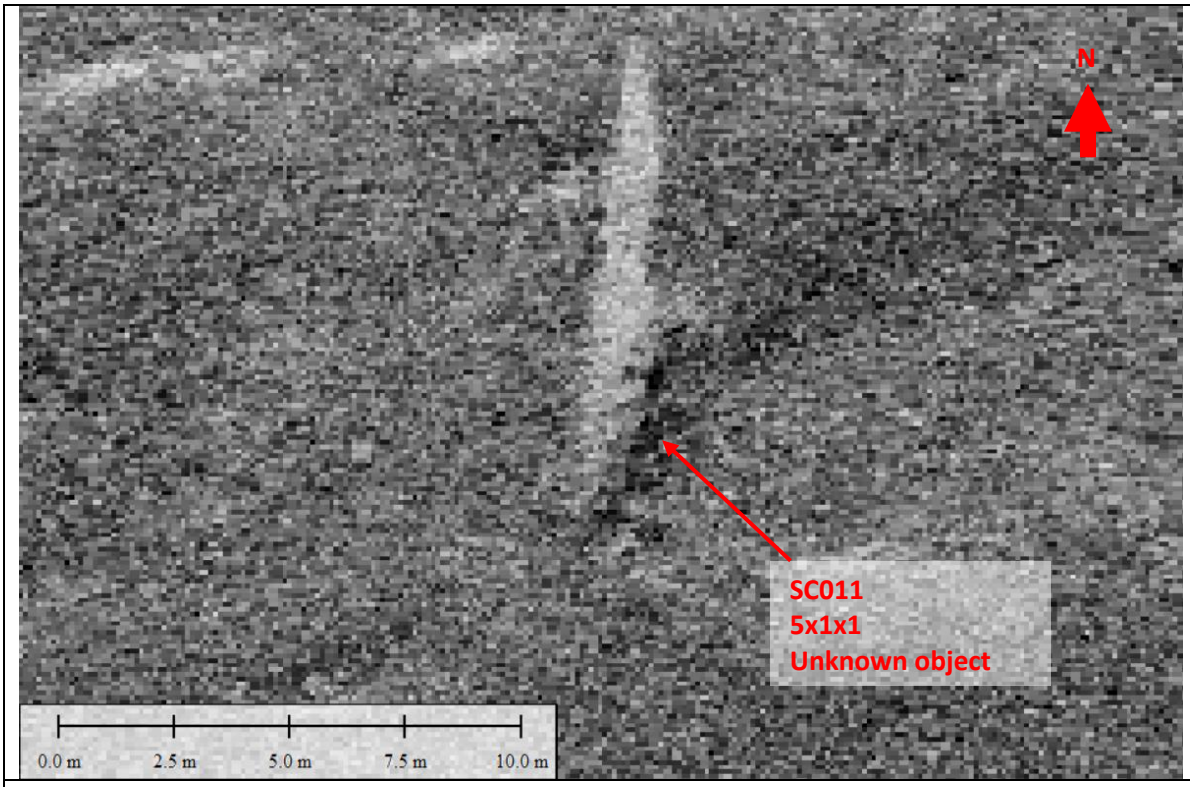
SC008


N
SC009
1.8x1x0.6
Debris
0.0 m
2.5 m
5.0 m
7.5 m
10.0 m

SC009


N
SC010
4x1.5x0.3
Debris
0.0 m
2.5 m
5.0 m
7.5 m
10.0 m

SC010


N
SC011
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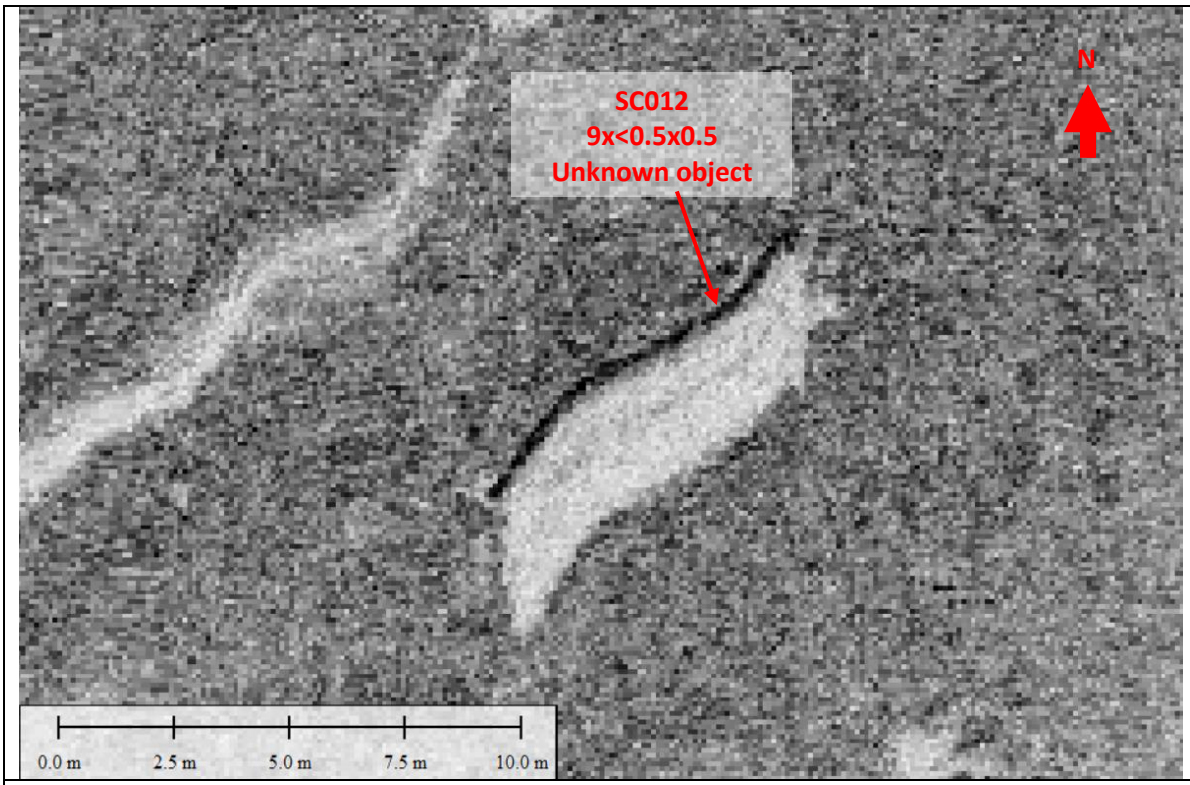
5.0 m
7.5 m
10.0 m

SC011


N
SC012
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Unknown object
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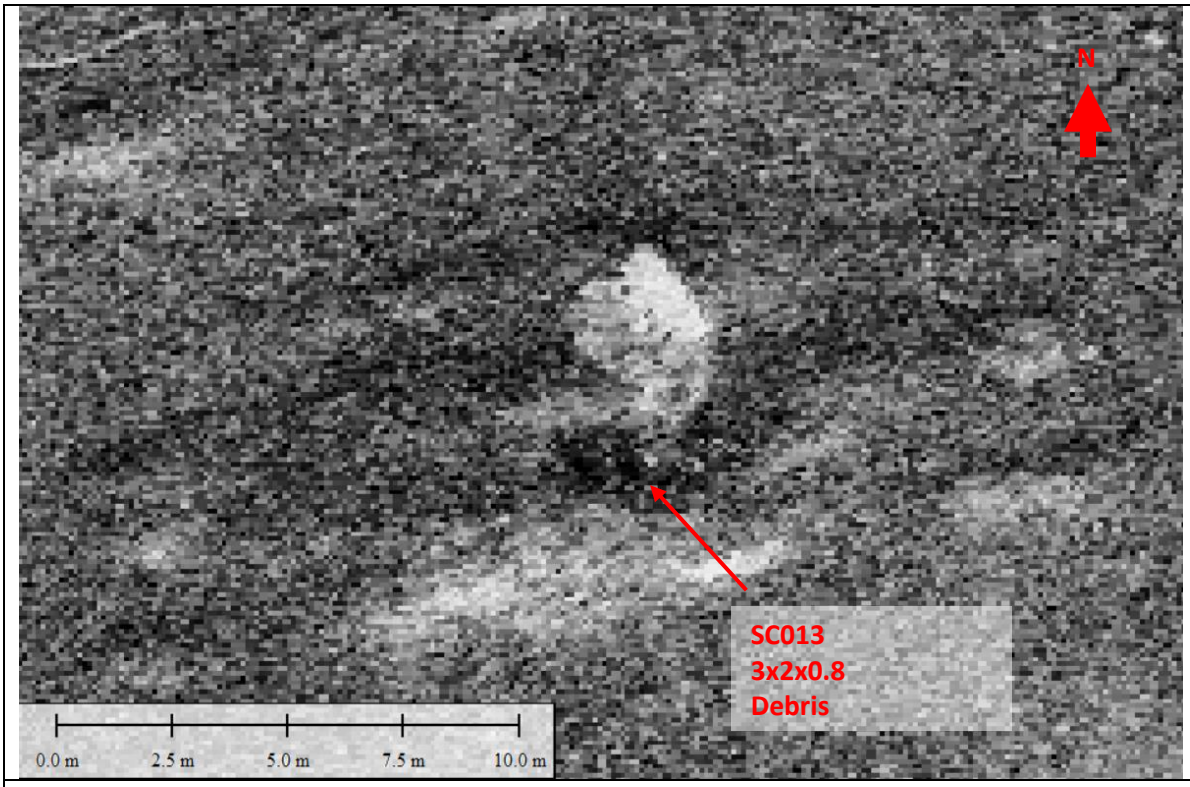
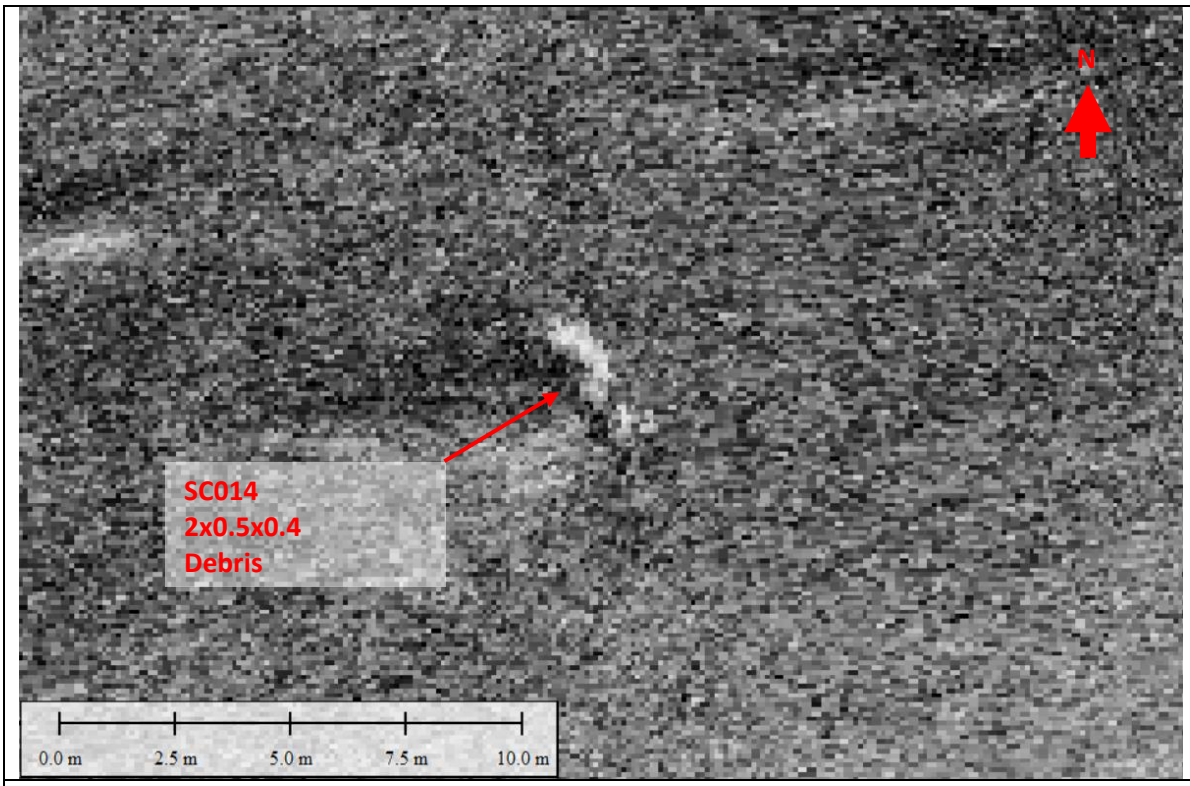
2.5 m
5.0 m
7.5 m
10.0 m

SC012


N
SC013
3x2x0.8
Debris
0.0 m
2.5 m
5.0 m
7.5 m
10.0 m

SC013


N
SC014
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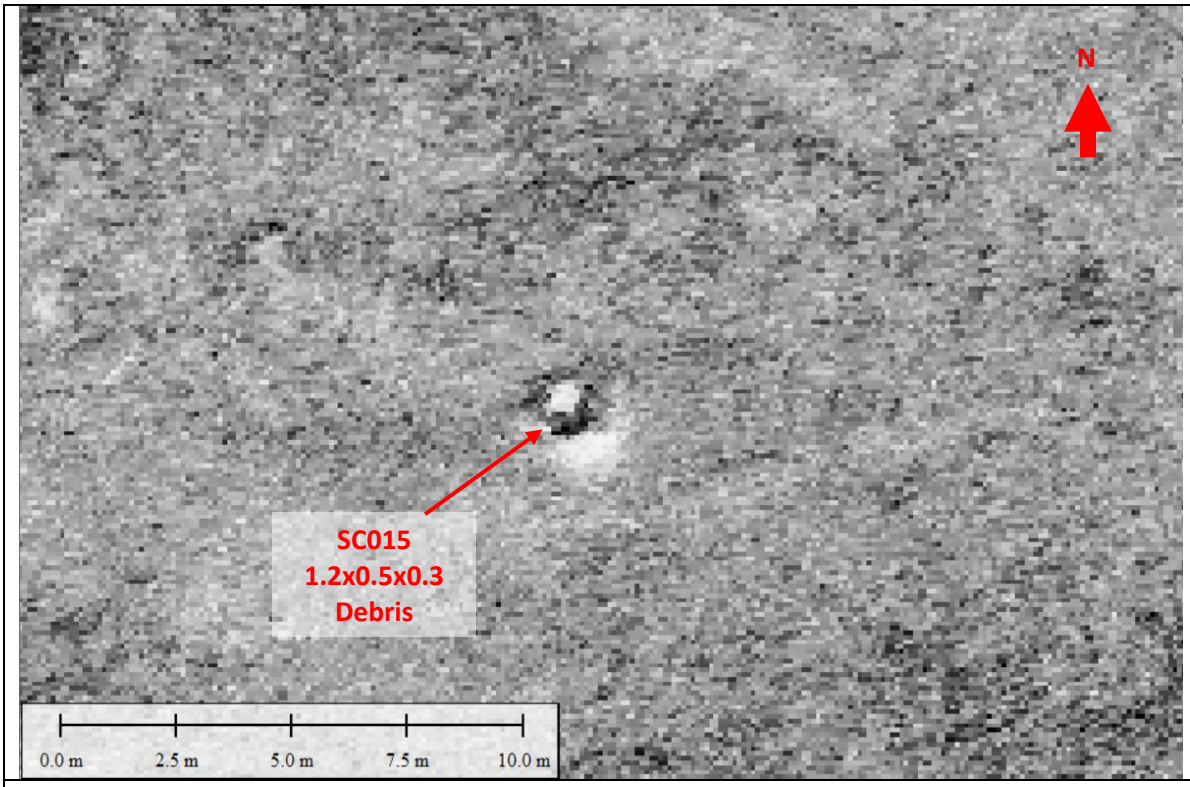
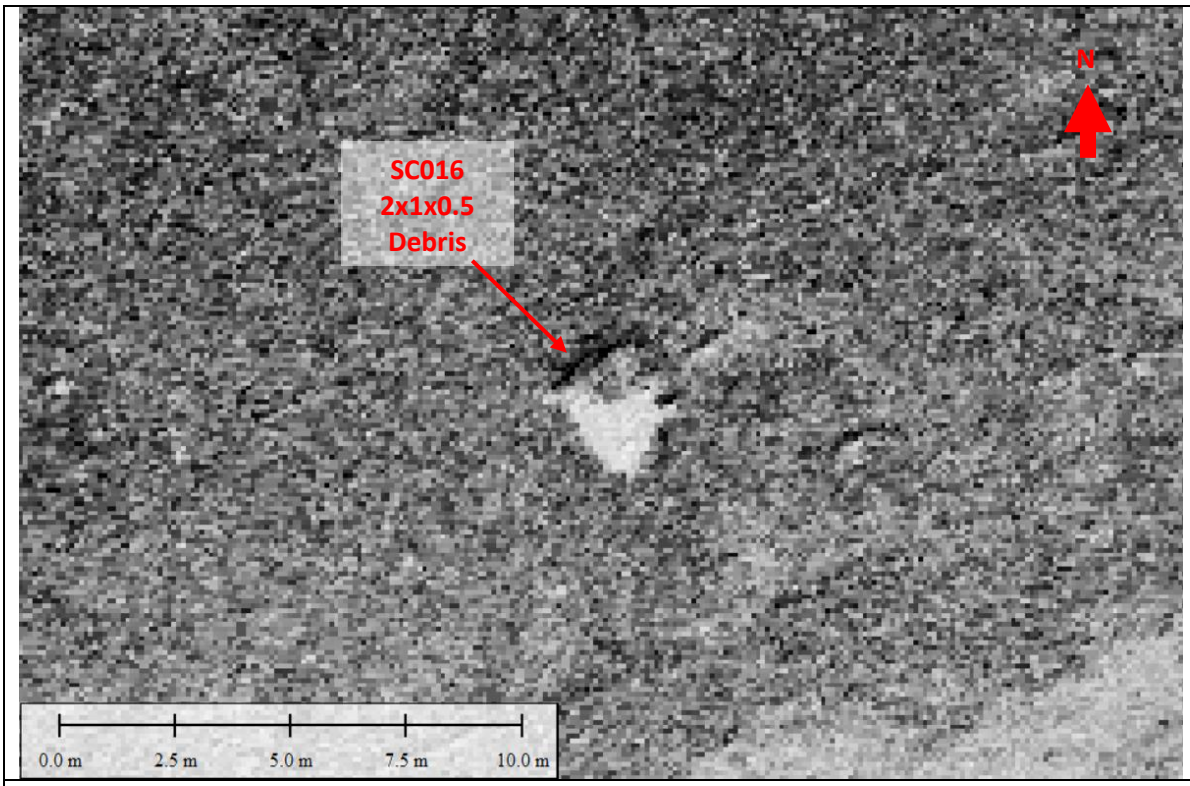
Debris
0.0 m
2.5 m
5.0 m
7.5 m
10.0 m

SC014


N
SC015
1.2x0.5x0.3
Debris
0.0 m
2.5 m
5.0 m
7.5 m
10.0 m
SC015


N
SC016
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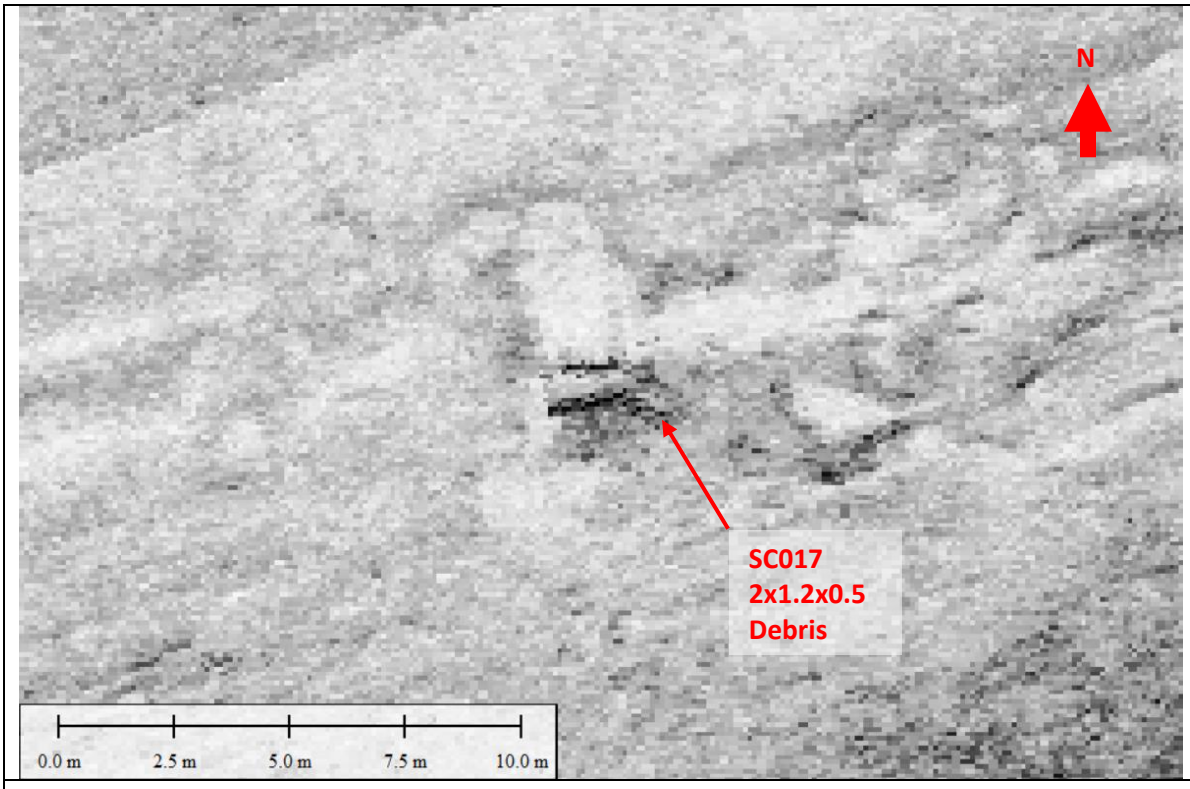
Debris
0.0 m
2.5 m
5.0 m
7.5 m
10.0 m
SC016



SC017

Summary of Seismic Contacts

Contact number	Chart number	Latitude Longitude	Easting Northing	Water depth (m)	Burial depth (m below seabed)	Description
SA1-SEI001	7.2	22° 25.251' N 113° 54.783' E	809106.6E 831301.9N	6	1.3	Top of backfill/ protection layer
SA1-SEI002	7.2	22° 25.263' N 113° 54.782' E	809104.5E 831323.3N	5.9	1.3	Top of backfill/ protection layer
SA1-SEI003	7.2	22° 25.284' N 113° 54.784' E	809107.7E 831362.9N	5.8	0.9	Top of backfill/ protection layer
SA1-SEI004	7.2	22° 25.300' N 113° 54.783' E	809106.2E 831392.1N	6	1.5	Top of backfill/ protection layer
SA1-SEI005	7.2	22° 25.331' N 113° 54.784' E	809107.8E 831449.3N	5.9	1.4	Top of backfill/ protection layer
SA1-SEI006	7.2	22° 25.331' N 113° 54.783' E	809106.9E 831450.5N	6	1.3	Top of backfill/ protection layer
SA1-SEI007	7.2	22° 25.344' N 113° 54.784' E	809108.3E 831473.6N	5.2	0.9	Top of backfill/ protection layer
SA1-SEI008	7.2	22° 25.367' N 113° 54.785' E	809109.2E 831515.4N	5.1	0.9	Top of backfill/ protection layer

Summary of Magnetic Contacts

Contact number	Chart number	Latitude Longitude	Easting Northing	Water depth (m)	Anomaly (nT)	Description
SA1-M001	7.1	22° 25.397' N 113° 53.480' E	806869.8E 831576.2N	10.2	2261	WEPII Pipeline
SA1-M002	7.1	22° 25.348' N 113° 53.498' E	806902.1E 831485.2N	10	101	Yacheng Pipeline
SA1-M003	7.1	22° 25.414' N 113° 53.537' E	806967.6E 831606.4N	8.5	3111	WEPII Pipeline
SA1-M004	7.1	22° 25.413' N 113° 53.538' E	806970.9E 831605.2N	8.5	570	WEPII Pipeline
SA1-M005	7.1	22° 25.365' N 113° 53.555' E	806998.9E 831517.1N	8.3	81	Yacheng Pipeline
SA1-M006	7.1	22° 25.430' N 113° 53.592' E	807062.4E 831635.6N	6.9	273	WEPII Pipeline
SA1-M007	7.1	22° 25.379' N 113° 53.608' E	807089.9E 831541.8N	7.6	184	Yacheng Pipeline
SA1-M008	7.1	22° 25.380' N 113° 53.609' E	807092.5E 831543.8N	7.4	46	Yacheng Pipeline
SA1-M009	7.1	22° 25.445' N 113° 53.648' E	807158.8E 831662.7N	6.8	1205	WEPII Pipeline
SA1-M010	7.1	22° 25.446' N 113° 53.648' E	807159.9E 831664.9N	6.7	907	WEPII Pipeline
SA1-M011	7.1	22° 25.395' N 113° 53.665' E	807188.0E 831571.8N	8	383	Yacheng Pipeline
SA1-M012	7.1	22° 25.396' N 113° 53.666' E	807189.0E 831572.2N	7.9	195	Yacheng Pipeline
SA1-M013	7.1	22° 25.460' N 113° 53.704' E	807254.4E 831691.6N	6.7	288	WEPII Pipeline
SA1-M014	7.1	22° 25.462' N 113° 53.704' E	807254.9E 831694.3N	6.5	241	WEPII Pipeline
SA1-M015	7.1	22° 25.412' N 113° 53.720' E	807283.0E 831602.4N	7.7	603	Yacheng Pipeline
SA1-M016	7.1	22° 25.412' N 113° 53.721' E	807283.8E 831601.5N	7.7	657	Yacheng Pipeline
SA1-M017	7.1	22° 25.474' N 113° 53.763' E	807355.7E 831715.8N	6.9	853	WEPII Pipeline
SA1-M018	7.1	22° 25.428' N 113° 53.775' E	807377.4E 831631.3N	6.3	292	Yacheng Pipeline
SA1-M019	7.1	22° 25.484' N 113° 53.822' E	807458.5E 831734.2N	6.6	1765	WEPII Pipeline
SA1-M020	7.1	22° 25.439' N 113° 53.829' E	807470.0E 831652.1N	6.2	569	Yacheng Pipeline
SA1-M021	7.1	22° 25.489' N 113° 53.882' E	807560.3E 831744.4N	6.4	367	WEPII Pipeline
SA1-M022	7.1	22° 25.449' N 113° 53.887' E	807569.8E 831670.0N	6	1074	Yacheng Pipeline
SA1-M023	7.1	22° 25.492' N 113° 53.941' E	807662.7E 831749.0N	7	594	WEPII Pipeline
SA1-M024	7.1	22° 25.453' N 113° 53.943' E	807665.8E 831677.5N	6.2	298	Yacheng Pipeline

Contact number	Chart number	Latitude Longitude	Easting Northing	Water depth (m)	Anomaly (nT)	Description
SA1-M025	7.1	22° 25.454' N 113° 53.999' E	807762.1E 831678.5N	5.7	445	Yacheng Pipeline
SA1-M026	7.1	22° 25.490' N 113° 54.003' E	807768.2E 831745.3N	6.2	615	WEPII Pipeline
SA1-M027	7.1	22° 25.452' N 113° 54.057' E	807860.8E 831675.3N	5.8	332	Yacheng Pipeline
SA1-M028	7.1	22° 25.485' N 113° 54.062' E	807869.4E 831735.1N	5.9	300	WEPII Pipeline
SA1-M029	7.1, 7.2	22° 25.445' N 113° 54.115' E	807959.7E 831662.2N	5.8	422	Yacheng Pipeline
SA1-M030	7.1, 7.2	22° 25.473' N 113° 54.120' E	807969.2E 831714.4N	5.6	862	WEPII Pipeline
SA1-M031	7.1, 7.2	22° 25.435' N 113° 54.168' E	808051.9E 831642.5N	5.4	652	Yacheng Pipeline
SA1-M032	7.2	22° 25.462' N 113° 54.176' E	808065.0E 831693.7N	6.7	126	WEPII Pipeline
SA1-M033	7.2	22° 25.419' N 113° 54.227' E	808151.8E 831613.6N	5.3	86	Yacheng Pipeline
SA1-M034	7.2	22° 25.443' N 113° 54.234' E	808164.8E 831658.6N	5.7	201	WEPII Pipeline
SA1-M035	7.2	22° 25.403' N 113° 54.280' E	808243.9E 831584.0N	5.6	141	Yacheng Pipeline
SA1-M036	7.2	22° 25.424' N 113° 54.290' E	808260.8E 831622.9N	5.5	189	WEPII Pipeline
SA1-M037	7.2	22° 25.381' N 113° 54.334' E	808335.9E 831543.6N	5.7	570	Yacheng Pipeline
SA1-M038	7.2	22° 25.401' N 113° 54.345' E	808355.1E 831580.6N	6.2	319	WEPII Pipeline
SA1-M039	7.2	22° 25.356' N 113° 54.385' E	808422.9E 831496.2N	6	116	Yacheng Pipeline
SA1-M040	7.2	22° 25.374' N 113° 54.396' E	808442.4E 831529.3N	6.3	925	WEPII Pipeline
SA1-M041	7.2	22° 25.327' N 113° 54.434' E	808507.4E 831443.8N	5.9	99	Yacheng Pipeline
SA1-M042	7.2	22° 25.342' N 113° 54.445' E	808526.4E 831471.7N	6.1	805	WEPII Pipeline
SA1-M043	7.2	22° 25.295' N 113° 54.479' E	808585.0E 831384.6N	6.3	392	Yacheng Pipeline
SA1-M044	7.2	22° 25.310' N 113° 54.491' E	808605.2E 831411.6N	5.7	664	WEPII Pipeline
SA1-M045	7.2	22° 25.272' N 113° 54.784' E	809107.8E 831340.9N	5.5	353	Possible power cable
SA1-M046	7.2	22° 25.285' N 113° 54.783' E	809106.4E 831363.9N	5.8	164	Possible power cable
SA1-M047	7.2	22° 25.359' N 113° 54.785' E	809109.6E 831500.9N	5.1	142	Possible power cable

APPENDIX G

Positions of High Magnetic Gradients

Positions of High Magnetic Gradients

Contact number	Chart number	Latitude Longitude	Easting Northing	Water depth (m)	Quasi-analytic Signal (nT/m)	Description
SA1-MC001	14.1	22° 25.512' N 113° 53.479' E	806869.9E 831788.3N	9.7	18	Debris
SA1-MC002	14.1	22° 25.584' N 113° 53.536' E	806968.0E 831920.5N	7.7	22	Unknown
SA1-MC003	14.1	22° 25.459' N 113° 53.607' E	807089.3E 831689.0N	6.6	16	Unknown
SA1-MC004	14.1	22° 25.615' N 113° 53.694' E	807238.6E 831977.5N	5.6	16	Unknown
SA1-MC005	14.1	22° 25.583' N 113° 53.720' E	807283.5E 831918.0N	5.7	12	Unknown
SA1-MC006	14.1	22° 25.626' N 113° 53.739' E	807315.8E 831998.1N	5.9	11	Unknown
SA1-MC007	14.1	22° 25.459' N 113° 53.849' E	807504.8E 831689.1N	6	19	Unknown
SA1-MC008	14.1	22° 25.616' N 113° 53.929' E	807642.5E 831978.1N	5.3	18	Unknown
SA1-MC009	14.1	22° 25.528' N 113° 54.025' E	807805.5E 831814.7N	5.8	26	Debris
SA1-MC010	14.2	22° 25.601' N 113° 54.282' E	808247.8E 831949.1N	5.3	31	Unknown
SA1-MC011	14.2	22° 25.524' N 113° 54.300' E	808278.4E 831807.8N	5.4	11	Unknown
SA1-MC012	14.2	22° 25.563' N 113° 54.391' E	808433.8E 831878.2N	5.3	34	Unknown
SA1-MC013	14.2	22° 25.530' N 113° 54.398' E	808447.0E 831817.4N	5.3	27	Unknown
SA1-MC014	14.2	22° 25.454' N 113° 54.372' E	808400.9E 831677.3N	5.6	11	Unknown
SA1-MC015	14.2	22° 25.410' N 113° 54.379' E	808413.5E 831597.2N	5.7	26	Unknown
SA1-MC016	14.2	22° 25.592' N 113° 54.458' E	808548.7E 831932.1N	5.2	13	Unknown
SA1-MC017	14.2	22° 25.574' N 113° 54.497' E	808616.7E 831899.1N	5.3	47	Unknown
SA1-MC018	14.2	22° 25.562' N 113° 54.469' E	808567.6E 831876.2N	5.3	12	Unknown
SA1-MC019	14.2	22° 25.557' N 113° 54.469' E	808568.9E 831868.2N	5.3	11	Unknown
SA1-MC020	14.2	22° 25.519' N 113° 54.486' E	808597.9E 831798.0N	5.5	16	Unknown
SA1-MC021	14.2	22° 25.509' N 113° 54.478' E	808583.4E 831779.1N	5.5	11	Unknown
SA1-MC022	14.2	22° 25.469' N 113° 54.482' E	808590.3E 831704.5N	5.7	37	Unknown
SA1-MC023	14.2	22° 25.461' N 113° 54.488' E	808600.7E 831690.7N	5.7	15	Debris
SA1-MC024	14.2	22° 25.472' N 113° 54.514' E	808644.3E 831710.3N	5.9	23	Unknown

Contact number	Chart number	Latitude Longitude	Easting Northing	Water depth (m)	Quasi-analytic Signal (nT/m)	Description
SA1-MC025	14.2	22° 25.488' N 113° 54.523' E	808660.6E 831739.3N	5.5	26	Unknown
SA1-MC026	14.2	22° 25.387' N 113° 54.490' E	808603.4E 831554.1N	6	20	Unknown
SA1-MC027	14.2	22° 25.408' N 113° 54.511' E	808639.9E 831592.0N	5.9	26	Unknown
SA1-MC028	14.2	22° 25.421' N 113° 54.579' E	808756.6E 831616.2N	5.4	13	Unknown
SA1-MC029	14.2	22° 25.367' N 113° 54.597' E	808787.0E 831517.2N	5.7	154	Unknown
SA1-MC030	14.2	22° 25.367' N 113° 54.614' E	808816.6E 831517.0N	5.7	13	Unknown
SA1-MC031	14.2	22° 25.346' N 113° 54.617' E	808820.6E 831477.3N	5	22	Unknown
SA1-MC032	14.2	22° 25.331' N 113° 54.571' E	808741.7E 831450.8N	5.8	15	Unknown
SA1-MC033	14.2	22° 25.319' N 113° 54.584' E	808765.3E 831428.3N	5.7	26	Unknown
SA1-MC034	14.2	22° 25.314' N 113° 54.575' E	808749.3E 831418.7N	5.9	26	Unknown
SA1-MC035	14.2	22° 25.298' N 113° 54.585' E	808766.3E 831390.0N	6	22	Unknown
SA1-MC036	14.2	22° 25.298' N 113° 54.591' E	808776.1E 831390.0N	5.9	18	Unknown
SA1-MC037	14.2	22° 25.374' N 113° 54.648' E	808875.2E 831529.4N	5.6	16	Unknown
SA1-MC038	14.2	22° 25.370' N 113° 54.658' E	808891.5E 831521.1N	5.5	33	Unknown
SA1-MC039	14.2	22° 25.376' N 113° 54.677' E	808923.8E 831533.9N	5.4	21	Unknown
SA1-MC040	14.2	22° 25.362' N 113° 54.700' E	808964.3E 831507.8N	5.4	51	Unknown
SA1-MC041	14.2	22° 25.354' N 113° 54.682' E	808932.7E 831491.5N	5.4	13	Unknown
SA1-MC042	14.2	22° 25.346' N 113° 54.671' E	808914.8E 831478.4N	5.4	10	Unknown
SA1-MC043	14.2	22° 25.347' N 113° 54.650' E	808877.9E 831479.2N	5.3	13	Unknown
SA1-MC044	14.2	22° 25.335' N 113° 54.648' E	808875.0E 831457.4N	5.4	12	Unknown
SA1-MC045	14.2	22° 25.319' N 113° 54.666' E	808904.8E 831428.0N	5.3	124	Unknown
SA1-MC046	14.2	22° 25.276' N 113° 54.626' E	808837.0E 831348.8N	6	13	Unknown
SA1-MC047	14.2	22° 25.270' N 113° 54.684' E	808935.6E 831337.1N	5.5	17	Unknown
SA1-MC048	14.2	22° 25.265' N 113° 54.712' E	808983.5E 831328.6N	5.3	39	Unknown
SA1-MC049	14.2	22° 25.281' N 113° 54.719' E	808996.7E 831356.9N	5.5	18	Unknown
SA1-MC050	14.2	22° 25.287' N 113° 54.749' E	809047.8E 831368.1N	5.3	22	Unknown

Contact number	Chart number	Latitude Longitude	Easting Northing	Water depth (m)	Quasi-analytic Signal (nT/m)	Description
SA1-MC051	14.2	22° 25.303' N 113° 54.737' E	809026.9E 831397.2N	5.4	10	Unknown
SA1-MC052	14.2	22° 25.308' N 113° 54.740' E	809031.6E 831407.1N	5.5	12	Unknown
SA1-MC053	14.2	22° 25.319' N 113° 54.740' E	809033.0E 831428.3N	5.3	15	Unknown
SA1-MC054	14.2	22° 25.314' N 113° 54.767' E	809078.8E 831418.5N	5.9	17	Unknown
SA1-MC055	14.2	22° 25.332' N 113° 54.788' E	809114.8E 831452.0N	5.5	300	Unknown
SA1-MC056	14.2	22° 25.354' N 113° 54.752' E	809052.5E 831491.7N	5.1	55	Unknown
SA1-MC057	14.2	22° 25.352' N 113° 54.765' E	809075.6E 831488.1N	5.2	27	Navigation beacon
SA1-MC058	14.2	22° 25.364' N 113° 54.763' E	809072.6E 831510.1N	5.1	35	Debris
SA1-MC059	14.2	22° 25.373' N 113° 54.761' E	809068.4E 831526.6N	4.7	26	Unknown
SA1-MC060	14.2	22° 25.367' N 113° 54.780' E	809101.7E 831515.7N	5.1	13	Unknown
SA1-MC061	14.2	22° 25.366' N 113° 54.788' E	809114.5E 831513.3N	5.1	11	Unknown
SA1-MC062	14.2	22° 25.362' N 113° 54.781' E	809103.7E 831507.0N	5.1	11	Unknown
SA1-MC063	14.2, 14.3	22° 25.352' N 113° 54.842' E	809207.7E 831487.6N	5.2	22	Unknown
SA1-MC064	14.2, 14.3	22° 25.331' N 113° 54.846' E	809214.0E 831448.5N	6.4	10	Unknown
SA1-MC065	14.2, 14.3	22° 25.299' N 113° 54.816' E	809163.3E 831389.9N	6.1	23	Navigation beacon
SA1-MC066	14.2	22° 25.283' N 113° 54.809' E	809150.3E 831360.6N	5.4	405	Unknown
SA1-MC067	14.2	22° 25.276' N 113° 54.783' E	809105.8E 831348.4N	5.7	13	Possible power cable
SA1-MC068	14.2	22° 25.254' N 113° 54.779' E	809099.0E 831307.0N	5.7	12	Unknown

APPENDIX H

Borehole Records

(10)A

PRELIMINARY

SITE INVESTIGATION REPORT
JOB NO. 955

CASTLE PEAK POWER STATIONS
SITE INVESTIGATION STUDY
TSANG TSUI TO URMSTON ROAD
VOLUME III
TSANG TSUI MARINE SURVEY AREA

CLIENT
CHINA LIGHT & POWER CO. LTD.
8/F., TSIM SHA TSUI CENTRE
6 CHING YEE ROAD
TSIM SHA TSUI
KOWLOON

MAIN CONTRACTOR
KIER-GAMMON JOINT VENTRE
P.O.BOX 163
TUSN MUN SAN HUI
POST OFFICE, N.T.

SUB-CONTRACTOR
GAMMON (HONG KONG) LIMITED
33rd HOPEWELL CENTRE
183 QUEEN'S ROAD EAST
HONG KONG

Gammon (Hong Kong) Limited
CIVIL ENGINEERS & CONTRACTORS
33rd Floor, Hopewell Centre, 183 Queen's Road, East, Hong Kong.
Tel: 5-283941 Cables: GAMMONCO Telex: HX 73826

Contract CAPS 'B' - C6
Client Office C. L. P

~~Borehole~~/Drillhole No. A5

Sheet 1 of 3

Job No & Location: Castle Peak Power Station, Tsang Tsui Marine Survey Area
Method: Wash Boring / Bailing from Marine Barge Seabed Level: -3.12 m P.D. Coords E. 9800.01
Machine: DCP-160 Orientation: Vertical N. 31670.18
Hole dia.: 0.0 — 180mm — 8.0m — 160mm — 27.55 m Date: from 2.6 to 3.6.1984

Drilling progress	Casing depth size	Water Level	Water recovery %	Core recovery %	R.Q.D. %	Fracture index	Tests	Samples	Depth metres	Reduced Level	Legend	Description	Grade	Zone
										-3.12				
2.6.1984	Sx						N=0	1	0.55		U	Very soft, dark grey. Silty CLAY with occasional shell fragments & some sand below 2.8m (MARINE DEPOSIT)		
							N=0	2	2.55		U			
							N=1.0, 1.1, 2, 3 = 6 B=39	3	3.0		U			
								4	5.55	-7.12	X	Firm, Brownish yellow, Silty CLAY and fine GRAVEL with firm multi-coloured CLAY with fine Gravel at 5.55m. (ALLUVIUM)		
							N=4, 6, 6, 5, 3, 2 = 16 B=10	5	6.0	-9.12	X	Loose, Brownish yellow, light grey & light yellow Silty SAND & fine Gravel (ALLUVIUM)		
	8.0m Px							6	6.35		X			
							N=1.1, 2.1, 2.2 = 9 B=11	7	7.0		X	Stiff to Firm, dark grey slightly organic silty CLAY. (ALLUVIUM)		
								8	7.55		X			
								*	8.0		X			
								9	9.0		X	Loose, dark grey, Silty SAND with traces of organic matter. (ALLUVIUM)		
	10.0m								9.55		X			
									10.0	-13.12	X	As sheet 2 of 3		

Legend
Samples:
- Small disturbed
- Large disturbed
- U40 undisturbed
- U100 undisturbed
- Mazier
- Liner sample
- Water sample
- Standard penetration test
- Permeability test
- U76 undisturbed
- B Nos. of blows

Remarks * No recovery in U100 Sample taken at 9.55 m to 10.0m

NOTE : TYPE 'B' BOREHOLE.

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Contract CPPS'B'-66
Client Office C. L. P.

~~Borehole~~/Drillhole No. A 5

Sheet 2 of 3

Job No & Location: Castle Peak Power Station, Tsang Tsui Marine Survey Area.
Method: Wash Boring / Bailing from Marine Barge Seabed Level: -3.12 m P.D. Coords E. 9800.01
Machine: DP 16 Orientation: Vertical N. 31670.18
Hole dia.: 0.0 — 180mm — 8.0m — 140mm — 22.55m Date: from 2.6 to 3.6.1984

Drilling progress	Casing depth size	Water Level	Water recovery %	Core recovery %	R.Q.D. %	Fracture index	Tests	Samples	Depth metres	Reduced Level	Legend	Description	Grade	Zone
										-13.12				
	PX						N=2.2, 2.3.3.3, =11 B=16	• 10	10.55			Medium to coarse SAND & fine GRAVEL in light grey & white silty CLAY matrix. Becoming greyish white sandy very silty CLAY near base. (ALLUVIUM)		
								■ • 11	11.0					
									11.55					
									12.0					
									12.55					
								□ • 12	12.7	-15.82		Medium dense / dense, yellowish brown, slightly silty SAND. (ALLUVIUM)		
							N=2.2, 6.8.8.9, N=30 B=35	• 13	13.0					
									13.55	-16.67		Light brown, fine to medium SAND and sub-round quartz in silty clay matrix. (ALLUVIUM)		
								■ * • 14	14.0					
								• 15	14.2					
									14.55	-17.67		Dense, yellowish brown, silty SAND and fine to medium GRAVEL. (ALLUVIUM)		
								□ • 16	15.0					
									15.55					
							N=8,9, 9,12,13,14, =48 B=203	■ • 17	16.0					
									16.55	-19.67		Medium dense, light grey & brownish yellow, Sandy SILT with fine Gravel. (C.D.G.)		
								□ • 18	17.0					
							N=2.2, 4.4.4.6, =18							
									18.55					
								□ • 19	19.0					
							N=2.3, 4.5,7,7 =25							
	20.0m									-23.12				

Legend
Samples:
- • Small disturbed
- Large disturbed
- U40 undisturbed
- ■ U100 undisturbed
- Mazier
- Liner sample
- Water sample
- Standard penetration test
- Permeability test
- U76 undisturbed
- B Max. of blows

Remarks
C. D. G.: Completely Decomposed GRANITE.
* No recovery in U100 sample taken at 13.55m to 14.0m.

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Contract CPPS 'B' C6
Client Office C. L. P.

Borehole/Drillhole No. A5
Sheet 3 of 3

Job No & Location: Castle Peak power station, Tsang Tsui Marine Survey area
Method: Wash Boring / Bailing from Marine Barge Seabed Level: -3.12 m P.D. Coords E. 9800.01
Machine: DF-160 Orientation: Vertical N. 31670.18
Hole dia.: o.o 180mm — 8.0m — 140mm — 22.55m Date: from 2.6 to 3.6.1984

Drilling progress	Casing depth size	Water Level	Water recovery %	Core recovery %	R.Q.D. %	Fracture index	Tests	Samples	Depth metres	Reduced Level	Legend	Description	Grade	Zone
										-23.12				
	PX 22.55m						N=2,5, 7,8,8,13, =36	• 20	20.55			Medium dense to dense, brownish yellow, light pink & light grey, Silty SAND with fine Gravel. (C. D. G.)	V	
							N=7,9, 9,11,11,20 =51	• 21	22.55 23.0	-26.12		Operation stopped at 23.0m.		

Legend
Samples:
- Small disturbed
- Large disturbed
- U40 undisturbed
- U100 undisturbed
- Mazier
- Liner sample
- Water sample
- Standard penetration test
- Permeability test
- U 76 undisturbed

Remarks
C. D. G. : Completely Decomposed GRANITE

Gammon (Hong Kong) Limited
CIVIL ENGINEERS & CONTRACTORS
33rd Floor, Hopewell Centre, 183 Queen's Road, East, Hong Kong.
Tel: 5-283941 Cables: GAMMONCO Telex: HX 73826

P.W.D. Contract CPPS 'B'-C6
Client Office CLP

Borehole/Drillhole No. B4

Sheet 1 of 3

Job No & Location: CASTLE PEAK POWER STATION, TSANG TSUI MARINE SURVEY AREA
Method: Wash-Boring/Bailing from Marine Barge SEABED Level: -3.36 m p.d. Coords E. 9600.17
Machine: D19-160 Orientation: VERTICAL N. 31569.73
Hole dia.: 0.0 180mm 8.0m 140mm 26.0m Date: from 23-5 to 24-5-1984

Drilling progress	Casing depth size	Water Level	Water recovery %	Core recovery %	R.Q.D. %	Fracture index	Tests	Samples	Depth metres	Reduced Level	Legend	Description	Grade	Zone
									0.0	-3.36				
23-5-1984	SX						N=0	1	1.0			Very soft, dark grey, Silty CLAY with Shell fragments		
							N=0	2	2.0					
									3.0			becoming Silty CLAY and Shelly sub-rounded GRAVEL near base.		
									4.0			(MARINE DEPOSIT)		
							N=1.9 0.00 0. =1.	3	5.0	-8.36		Medium dense, Silty medium to coarse SAND and fine sub-round GRAVEL		
								4 5 6	6.40			(ALLUVIUM)		
							N=2-3, 3,3,6,6, =18	7	6.45	-9.81				
	8.0m PX								6.8 7.0 7.35			Firm, multi-coloured Silty CLAY.		
								8	8.0 8.45			(ALLUVIUM)		
							N=1, 2, 3, 3, 3, 3 =12		9.0					
	10.0m								10.0	-13.36				

Legend
Samples:
- Small disturbed
- Large disturbed
- Standard penetration test
- Permeability test
- U100 undisturbed
- U76 undisturbed
- Mazier
- Liner sample
- PISTON SAMPLE

Remarks

NOTE: Type 'B' Borehole.

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P.W.D. Contract CPPS 'B'-C6
Client Office CLP

Borehole/Drillhole No. B4

Sheet 2 of 3

Job No & Location: CASTLE PEAK POWER STATION, TSANG TSUI MARINE SURVEY AREA
Method: Wash-Boring/Bailing from Marine Barge SEABED Level: -3.36 m.P.D. Coords E. 9600.7
Machine: D19-160 Orientation: VERTICAL N. 31569.73
Hole dia.: 0.0m 180mm 8.0m 140mm 26.0m Date: from 23-5 to 24-5-1984

Drilling progress	Casing depth size	Water Level	Water recovery %	Core recovery %	R.Q.D. %	Fracture index	Tests	Samples	Depth metres	Reduced Level	Legend	Description	Grade	Zone
									10.0	-13.36				
23-5-1984	PX						N=1.2, 1.2.2.3, =8	9	10.45			Firm, dark grey, organic silty CLAY (ALLUVIUM)		
									11.0	-14.36				
							N=2.2, 3.4.5.7, =19	10	12.0			Medium dense, light grey, silty medium to coarse SAND, becoming and fine GRAVEL below 13.5m (ALLUVIUM)		
									12.45					
									13.0					
									14.0					
							N=3.4, 5.5.6.9, =25	11	14.45					
									15.0	-18.36				
24-5-1984									16.0			Medium dense, light greyish green, & white, Clayey SILT with some coarse sand and fine gravel (RESIDUAL SOIL)		VI
							N=3.3, 4.5.5.7, =21	12	16.45					
									17.0					
									18.0					
							N=2.2, 2.2.3.3, =10	13	18.45					
									19.0					
	20.0m								20.0	-23.36				

Legend
Samples:
- Small disturbed
- Large disturbed
- U40 undisturbed
- U100 undisturbed
- Mazier
- Liner sample
- Water sample
- Standard penetration test
- Permeability test
- U 76 undisturbed

Remarks

Gammon (Hong Kong) Limited
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P.W.D. Contract CPPS 'B'-C6
Client Office CLP

Borehole/Drillhole No. B4

Sheet 3 of 3

Job No & Location CASTLE PEAK POWER STATION, TSANG TSUI MARINE SURVEY AREA
Method: Wash-Boring / Bailing from Marine Barge SEABED Level: -3.36 m.p.d. Coords E. 9600.17
Machine: D19-160 Orientation: Vertical N. 31569.73
Hole dia.: 0.0m 180mm 8.0m 140mm 26.0m Date: from 23-5 to 24-5-1984

Drilling progress	Casing depth size	Water Level	Water recovery %	Core recovery %	R.Q.D. %	Fracture index	Tests	Samples	Depth metres	Reduced Level	Legend	Description	Grade	Zone
									20.0	-23.36				
24-5-1984	PX						N=3,3,4,5,7,9 =25	14	20.45			AS SHEET 2 OF 3	IV	
									21.0	-24.36				
							N=4,4,5,7,8,10 =30	15	22.0			Medium dense to dense, greyish green & brownish yellow, Clayey SILT with some coarse sand & fine gravel. (C.D.G.)	V	
									22.45					
									23.0					
									24.0					
							N=6.9, 12,13,16,19 = 70	16	24.45					
	26.0m								25.0			Dense, reddish brown, Clayey SILT with a little fine gravel. (C.D.G.)	V	
							N=5,11, 11,16, 22,43 =92	17	26.45	-29.81				
												OPERATION STOPPED AT 26.45m		
									27.0					
									28.0					
									29.0					
									30.0					

Legend
Samples:
- Small disturbed
- Large disturbed
- U40 undisturbed
- U100 undisturbed
- Mazier
- Liner samples
- Standard penetration test
- Permeability test
- U76 undisturbed

Remarks

C.D.G.: COMPLETELY DECOMPOSED GRANITE

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Contract CPPS'B'-C6
Client Office C.L.P

~~Borehole~~/Drillhole No. BS

Job No & Location: Marine Survey Area, Castle Peak Power Station, Tsang Tsai
Sheet 1 of 4

Method: Wash-Boring/Bailing from Marine Barge Seabed Level: -4.08 M.P.D. Coords E. 9799.84
Machine: DA-160 Orientation: Vertical N. 31570.13
Hole dia.: 0.0 — 180mm — 9.0m — 140mm — 30.7m Date: from 30.5 to 6.1.1984

Drilling progress	Casing depth size	Water Level	Water recovery %	Core recovery %	R.Q.D. %	Fracture index	Tests	Samples	Depth metres	Reduced Level	Legend	Description	Grade	Zone
										-4.08				
	5x							1	0.5			Very soft, dark grey, Silty CLAY with some shell fragments. (MARINE DEPOSIT)		
							X BS-1		1.1					
							X BS-2		2.5					
								2	3.1	-7.48				
								3	3.5	-8.08		Dark grey, Silty fine SAND with some shell fragments.		
									4.55			Loose, grey and brownish yellow, medium to coarse SAND and fine GRAVEL. (ALLUVIUM)		
							N=1,0, 1,1,1,2, =5	4	5.0					
							B=7	* 5	5.55					
									6.0					
									6.55	-10.63				
								6	6.7			Firm to stiff, multi-coloured Silty CLAY with some fine Gravel & Sand. (ALLUVIUM)		
							N=1,2, 2,2,2,3, =9	7	7.0					
									7.3					
								8	7.6					
									8.55	-12.78				
	9.0m PV							9	8.7			Generally, soft & firm, grey, Silty Gravelly CLAY. (RESIDUAL SOIL?)	VI	
							N=2,2, 2,2,3,3, =10	10	9.0					
								11	9.5					
	10.0m									-14.08				

31.5.84 30

Legend
Samples:
- Small disturbed
- Large disturbed
- U100 undisturbed
- Mazier
- Liner sample
- Water sample
- Standard penetration test
- Permeability test
- U 76 undisturbed
- piston sample

Remarks
* No recovery in U100 sample at 5.55 – 6.0m.

NOTE: TYPE 'A' BOREHOLE

Gammon (Hong Kong) Limited
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Contract CPPS 'B'-C6
Client Office C.L.P.

Borehole/Drillhole No. B5

Job No & Location: Castle Peak Power Station, Tsang Tsui Marine Survey Area
Sheet 2 of 4

Method: Wash-Boring/Bailing from Marine Barge Seabed Level: -4.08 mP.D. Coords E. 9799.84

Machine: DY-16a Orientation: Vertical N. 31570.13

Hole dia.: 0.0 – 18.0m – 9.0m 140mm – 30.7m Date: from 30.5 to 1.6.1984

Drilling progress	Casing depth size	Water Level	Water recovery %	Core recovery %	R.Q.D. %	Fracture index	Tests	Samples	Depth metres	Reduced Level	Legend	Description	Grade	Zone
	PX									-4.08				
									10.55			As sheet 1 of 4	VI	
							N=1,1, 2,1,2,2, =7	12	11.0	-15.08				
							B=15	13	11.55			White, mottled light green, very silty CLAY and clayey SILT with some fine sub-angular quartz Gravel. (RESIDUAL SOIL)	VI	
							N=2,2, 2,2,2,3, =9	14	12.0					
									12.55					
									13.0					
									14.55					
							N=2,2, 3,3,3,3, =12	15	14.8	-18.88				
								16	15.0					
									16.55			Medium dense, brownish yellow, dark greyish green and pink, clayey Sandy SILT with some fine Gravel. (C. D. G.)	V	
							N=3,4, 4,4,5,6, =23	17	17.0					
									18.55					
							N=2,3, 3,4,4,6, =17	18	19.0					
10.0m										-24.08				

Legend
Samples:
- Small disturbed
- Large disturbed
- Standard penetration test
- Permeability test
- U100 undisturbed
- U76 undisturbed
- Mazier
- Liner sample

Remarks C. D. G. : Completely Decomposed GRANITE

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Contract CPPS 'B'-C6
Client Office C. L. P.

~~Borehole~~/Drillhole No. B5

Job No & Location: Castle Peak power station, Tsang Tsui Marine Survey Area
Sheet 3 of 5

Method: Wash-Boring/Bailing from Marine Barge Sea bed Level: -4.0B Coords E. 9799.84
Machine: DA-160 Orientation: Vertical N. 21570.13
Hole dia.: 0.0 — 180mm — 9.0m — 140mm — 30.7m — — — 31.3m Date: from 30.5 to 1.6.1984

Drilling progress	Casing depth size	Water Level	Water recovery %	Core recovery %	R.Q.D. %	Fracture index	Tests	Samples	Depth metres	Reduced Level	Legend	Description	Grade	Zone
1.6 31.5.1984 1.6	PX 30.0m						N=3,4,5,6,8,12 =31	19	-24.0B 20.55 21.0			Medium dense, Generally brown, Sandy SILT with some fine Gravel. (C. D. G.)	V	
							N=4,6,9,10,14,19, =52	20	22.55 23.0					
							N=5,10,10,12,16,22, =62	21	24.55 25.0	-29.0B		Dense, brownish yellow, dark greyish green and pink, silty SAND with fine Gravel, (C. D. G.) becoming (C. D. G./H. D. G.) below 28.5m.	V / IV	
							N=5,11,13,18,25,31, =86	22	26.55 27.0					
							N=8,16,20,29,41,61, =155	23	28.55 29.0	-34.0B				

Legend
Samples:
- Small disturbed
- Large disturbed
- Standard penetration test
- Permeability test
- U100 undisturbed
- U76 undisturbed
- Mazier
- Liner sample

Remarks
C. D. G. : Completely Decomposed GRANITE

Gammon (Hong Kong) Limited
CIVIL ENGINEERS & CONTRACTORS
33rd Floor, Hopewell Centre, 183 Queen's Road, East, Hong Kong.
Tel: 5-283941 Cables: GAMMONCO Telex: HX 73826

Contract CPPS 'B'-C6
Client Office C. L. P.

~~Borehole~~/Drillhole No. . B 5

Job No & Location: Castle Peak power station, Tsang Tsui Marine Survey Area

Sheet 4 of 4

Method: Wash-Boring/Bailing from Marine Barge Seabed Level: - 4.08 m P.D. Coords E. 9799.84

Machine: DIP-160 Orientation: Vertical N. 31570.13

Hole dia.: 0.0 – 180mm – 9.0m – 140mm – 30.7m – – – – 31.3m Date: from 30.5 to 1.6.1984

Drilling progress	Casing depth size	Water Level	Water recovery %	Core recovery %	R.Q.D. %	Fracture index	Tests	Samples	Depth metres	Reduced Level	Legend	Description	Grade	Zone
										-34.08				
1.6.1984	PX 30.7m						N=264/120	● 24	30.55 30.67	-34.78	: : :	Very dense, brownish yellow & dark grayish green, coarse SAND & fine GRAVEL (H.DG)	IV	
				100	100	0			30.7		+ + +	Very strong, dark greyish green, light pink & light grey, coarse grained, Fresh to slightly decomposed GRANITE. widely spaced joint.	I/II	
									31.3	-35.38	+ + +			

Operation stopped at 31.3m

Legend
Samples:
- ● Small disturbed
- ▲▼ Large disturbed
- ▼ Standard penetration test
- Permeability test
- ■ U100 undisturbed
- ◪ U76 undisturbed
- ▨ Mazier
- □ Liner sample

Remarks

* No recovery in SPT Liner Sample at 30.55 – 30.67m

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P.W.D. Contract CPPS 'B'-C6
Client Office CLP

Borehole/Drillhole No. C2

Sheet 1 of 3

Job No & Location: CASTLE PEAK POWER STATION, TSANG TSUI MARINE SURVEY AREA
Method: Wash Boring / Bailing from Marine Barge Seabed Level: -6.04 m P.D. Coords E. 9200.29
Machine: D19-160 Orientation: VERTICAL N. 31470.06
Hole dia.: 0.0m 180 mm 11.0m 140mm 24.6m Date: from 24-6 to 27-6-1984

Drilling progress	Casing depth size	Water Level	Water recovery %	Core recovery %	R.Q.D. %	Fracture index	Tests	Samples	Depth metres	Reduced Level	Legend	Description	Grade	Zone
24-6-1984	5X						C2-1	1	0.0	-6.04		Very soft, dark grey, Silty CLAY with Shell fragments. (MARINE DEPOSIT)		
							C2-2	2	1.0 / 1.1					
							C2-3	3	2.0					
									3.0 / 3.1					
									4.0					
									5.0 / 5.1	-10.14		Dense, brownish yellow & light grey, clayey Silty coarse SAND. (ALLUVIUM)		
26-6-1984							N=4,5, 6,6,8,11 =31 B=30	4	6.0					
								5	7.0			Stiff, multi-coloured Silty CLAY. (ALLUVIUM)		
							N=5,5, 6,7,7,10 =30 B=12	6	8.0					
	7.0m							7	9.0			Firm, dark grey, Silty CLAY. (ALLUVIUM)		
									10.0	-15.04				

Legend
Samples:
- Small disturbed
- Large disturbed
- Piston Sample
- U100 undisturbed
- Mazier
- Lines sample
- Standard penetration test
- Permeability test
- U76 undisturbed
- X VANE SHEAR TEST

Remarks

PENETRATION VANE SHEAR TESTS WERE CARRIED OUT AT 1.5m, 2.5m AND 3.5m, ADJACENT TO THE BOREHOLE POSITION.

NOTE: ...

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Tel: 5-283941 Cables: GAMMONCO Telex: HX 73826

P.W.D. Contract CPPS'B'-C6
Client Office CLP

Borehole/Drillhole No. C2

Job No & Location: CASTLE PEAK POWER STATION, TSANG TSUI MARINE SURVEY AREA

Sheet 2 of 3

Method: Wash Boring / Bailing from Marine Barge Sea bed Level: -5.04 m P.D. Coords E. 9200.29

Machine: D19-160 Orientation: VERTICAL N. 31470.06

Hole dia.: 0.0m 180mm 11.0m 140mm 24.6m Date: from 24-6 to 27-6-1984

Drilling progress	Casing depth size	Water Level	Water recovery %	Core recovery %	R.Q.D. %	Fracture index	Tests	Samples	Depth metres	Reduced Level	Legend	Description	Grade	Zone
									10.0	-15.04				
26-6	SX 11.0m PX						N=1,2, 2,2,2, =8 B=11	8	11.0		X X X	AS SHEET 1 of 3		
								9	12.0		X X X	Loose to medium dense, dark grey, Clayey Silty fine SAND (ALLUVIUM)		
							N=1,2, 1,2,2,2 =7 B=12	10	13.0	-18.04	X X X	Firm, light greyish white, Silty CLAY (ALLUVIUM)		
								* 11	14.0					
								12	14.5		X X X	Medium dense, light grey, Silty Coarse SAND (ALLUVIUM)		
27-6-1984							N=3,4, 4,3,4,6, =17	13	15.0					
									16.0	-21.04				
							N=3,8, 12,14,14,17 =57	14	17.0			Very dense, light grey, medium to coarse SAND and fine gravel. (ALLUVIUM)		
								15	18.0					
							N=5,7, 10,14,15,15 =54	* 16	18.5					
	20.0m								19.0					
									20.0	-25.04				

Legend

Samples:
- Small disturbed
- Large disturbed
- Standard penetration test
- Permeability test
- U100 undisturbed
- U76 undisturbed
- Mazier
- Liner sample
- Water sample

Remarks

* SAMPLES NOT RECOVERED AT 13.55m & 19.0m

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P.W.D. Contract CPPS 'B'-C6
Client Office CLP

Borehole/Drillhole No. C2

Sheet 3 of 3

Job No & Location: CASTLE PEAK POWER STATION, TSANG TSUI MARINE SURVEY AREA

Method: Wash-Boring / Bailing from Marine Barge Ground Level: -5.04 M.P.D. Coords E. 9200.29

Machine: D19-160 Orientation: VERTICAL N. 31470.06

Hole dia.: 0.0m 180mm 11.0m 140mm 24.55m Date: from 24-6 to 27-6-1984

Drilling progress	Casing depth size	Water Level	Water recovery %	Core recovery %	R.Q.D. %	Fracture index	Tests	Samples	Depth metres	Reduced Level	Legend	Description	Grade	Zone
										-25.04				
27-6-1984	PX						N=33, 7.9,11,12, =39	17	21.0		X D X D X	Medium dense to dense, brownish yellow, silty SAND with fine gravel. (C.D.G.)	V	
							N=10,12, 12,13,14, 15, =54	18	22.0			becoming H.D.G. below 24.0m		
	24.55m						N=200/50	* 19	23.0 24.0 24.5	-29.64	X X X		IV	
									25.0			OPERATION STOPPED AT 24.5m.		
									26.0 27.0 28.0 29.0 30.0					

Legend

Samples:

- Small disturbed
- Large disturbed
- Standard penetration test
- Permeability test
- U100 undisturbed
- U76 undisturbed
- Mazier
- Liner sample
- Water sample

Remarks

C.D.G.: Completely decomposed GRANITE,
H.D.G.: Highly decomposed GRANITE.

* SAMPLE NOT RECOVERED IN S.P.T. SAMPLE AT 24.55m

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Contract CPPS/B-C6
Client Office C. & P.

~~Borehole~~/Drillhole No. C3

Sheet 1 of 3

Job No & Location: Castle Peak power station, Tsang Tsui
Marine Survey Area
Method: Wash-Boring/Boring from Marine Barge Seabed Level: -3.81 m P.D. Coords E. 9399.72
Machine: D19-160 Orientation: Vertical N. 31469.95
Hole dia.: O.D 180mm 6.0m 120mm 19.0m 120mm 24.55m Date: from 16.5 to 17.5.1984

Drilling progress	Casing depth size	Water Level	Water recovery %	Core recovery %	R.Q.D. %	Fracture index	Tests	Samples	Depth metres	Reduced Level	Legend	Description	Grade	Zone
										-3.81				
16.5.1984	SY						N=0	1	0.55			Very soft, dark grey, silty CLAY with shell fragments (MARINE DEPOSIT)		
								2	1.0					
									1.5					
									2.1					
									2.55					
							N=0	3	3.0					
									4.1	-7.91		Loose, Silty SAND & fine GRAVEL. (ALLUVIUM)		
									4.55					
							N=1,2,3,2,2,2=9	4	5.0	-8.81		Stiff, multi-coloured silty CLAY. (ALLUVIUM)		
	6.0m PX						B63	5	5.55					
									6.0					
									6.55					
							N=3,4,6,6,9,11=32	6	7.0					
									8.55					
							N=3,4,5,6,7,13=28	7	9.0					
	10.3m								10.3	-14.11				

Legend
Samples:
- Small disturbed
- Large disturbed
- U100 undisturbed
- Mazier
- Liner sample
- Water sample
- Standard penetration test
- Permeability test
- U76 undisturbed
- piston sample
- B Nos. 3 blows

Remarks
NOTE : TYPE 'B' BOREHOLE

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Contract CPPS 'B' - C6
Client Office C.L.P.

~~Borehole~~/Drillhole No. C 3

Sheet 2 of 3

Job No & Location: Castle Peak Power Station, Tsang Tsui
Marine Survey Area
Method: Wash - Boring / Bailing from Marine Barge Seabed Level: -3.81 mPD. Coords E. 9399.72
N. 31469.95
Machine: DG-160 Orientation: Vertical
Hole dia.: 0.0 — 180mm 6.0m 140mm 19.0m 120mm 24.5m Date: from 16.5 to 17.5.1984

Drilling progress	Casing depth size	Water Level	Water recovery %	Core recovery %	R.Q.D. %	Fracture index	Tests	Samples	Depth metres	Reduced Level	Legend	Description	Grade	Zone
16.5.1984	PX						N=1,2,1,2,2,3, =8	8	10.3	-14.11				
									10.55			Soft, grey, very silty CLAY with little organic debris. (ALLUVIUM)		
									11.0	-15.81				
							N=3,3,3,4,4,4, =15	9	12.55	-16.81		Medium dense, slightly clayey silty fine SAND. (ALLUVIUM)		
									13.0					
							N=4,7,9,11,18,22, =60	10	14.55					
									15.0			Very dense. fine to medium SAND becoming medium SAND and then medium to coarse SAND & fine GRAVEL with depth. (ALLUVIUM)		
17.5.1984							N=4,9,14,18,24,29, =86	11	16.55					
									17.0					
	19.0m 106								18.55					
							N=4,8,8,12,14,16 =56	12	19.0					
	20.3m								20.3	-24.11				

Legend
Samples:
- Small disturbed
- Large disturbed
- U40 undisturbed
- U100 undisturbed
- Mazier
- Liner sample
- Water sample
- Standard penetration test
- Permeability test
- U76 undisturbed

Remarks * No recovery in SPT Liner sample at 18.55-19.0m

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Contract CPPS 'B'-C6
Client Office C. L. P.

~~Borehole~~/Drillhole No. C 3

Sheet 3 of 3

Job No & Location: Marine Survey Area, Castle Peak Power Station, Tsang Tsui

Method: Wash-Boring Bailing from Marine Barge Seabed Level: -3.81 m.P.D. Coords E. 9399.72

Machine: DIG-160 Orientation: Vertical N. 31469.95

Hole dia.: 0.0 — 180mm — 6.0m — 140mm — 9.0m — 120mm — 24.55m Date: from 16. 5 to 17. 5. 1984

Drilling progress	Casing depth size	Water Level	Water recovery %	Core recovery %	R.Q.D. %	Fracture index	Tests	Samples	Depth metres	Reduced Level	Legend	Description	Grade	Zone
									20.3	-24.11				
17. 5. 1984	106						N=11,15, 16,16,31 =92	13	20.55			Dense, brownish yellow, light pink & greyish green, Silty SAND with fine Gravel. (C. D. G.)	V	
	24.55m						N=9,12, 15,17,22 =90	14	22.55					
							N=8,12, 14,19,30 =94	15	24.55					
									25.0	-28.81		Operation stopped at 25.0m.		

Legend
Samples:
- Small disturbed
- Large disturbed
- U40 undisturbed
- U100 undisturbed
- Mazier
- Liner sample
- Water sample
- Standard penetration test
- Permeability test
- U 76 undisturbed

Remarks C. D. G.: Completely Decomposed GRANITE

Gammon (Hong Kong) Limited
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Tel: 5-283941 Cables: GAMMONCO Telex: HX 73826

Contract CPPS 'B'-C6
Client Office C. L. P.

~~Borehole~~/Drillhole No. C4

Sheet 1 of 2

Job No & Location: Castle Peak Power Station, Tsang Tsui Marine Survey Area.

Method: Wash-Boring/Bailing from Marine Barge Seabed Level: -3.55 m P.D. Coords E. 9600.08

Machine: DP. 160 Orientation: Vertical N. 31469.91

Hole dia.: 0.0 — 180mm — 5.0m — 140mm — 18.55m Date: from 25.5 to 28.5.1984

Drilling progress	Casing depth size	Water Level	Water recovery %	Core recovery %	R.Q.D. %	Fracture index	Tests	Samples	Depth metres	Reduced Level	Legend	Description	Grade	Zone
										-3.55				
25.5.1984	5x							1	0.5			Loose, grey + brownish yellow, coarse SAND and GRAVEL with shells		
								2	1.0	-4.75				
							C4-1	3	1.5			Very soft, dark grey, Silty CLAY with some shell fragments and becoming more with depth. (MARINE DEPOSIT)		
							C4-2	4	2.5					
									3.0					
									4.0	-7.55				
	5.0m							5	4.55			Brownish yellow, gravelly Sandy CLAY. (ALLUVIUM)		
	Px						N=1,2,2,3,3,4, =12		5.0	-9.55				
26.5.1984								6	6.55			Firm, multi-coloured Silty CLAY with some fine Gravel below 8.5m (ALLUVIUM)		
							N=1,2,2,3,4,4, =13	7	7.0					
							B=20	* 8	7.55					
									8.0					
									8.55					
							N=3,3,4,3,4,4, =15	9	9.0					
	9.7m								9.7	-9.25				

Legend

Samples:
- Small disturbed
- Large disturbed
- U100 undisturbed
- Mazier
- Liner sample
- Water sample
- Standard penetration test
- Permeability test
- X Vane Shear Test.
- U76 undisturbed
- Piston Sample
- B Nos. of blows

Remarks * No recovery in U100 Sample taken at 7.55 - 8.0m

Penetration Vane Shear Tests were carried out at 1.9m and 2.9m adjacent to the borehole

NOTE: TYPE 'A' BOREHOLE

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P.W.D. Contract CPPS 'B' - C6
Client Office C. L. P.,

Borehole/Drillhole No. C 4

Sheet 2 of 2

Job No & Location: Castle Peak Power Station, Tsang Tsui Marine Survey Area

Method: Wash-Boring / Bailing from Marine Barge Seabed Level: -3.55 m P.D. Coords E. 96 ... .08

Machine: DH-100 Orientation: Vertical N. 31469.91

Hole dia.: 0.0 — 180mm — 5.0m 140mm 18.55m Date: from 25.5 to 28.5.1984

Drilling progress	Casing depth size	Water Level	Water recovery %	Core recovery %	R.Q.D. %	Fracture index	Tests	Samples	Depth metres	Reduced Level	Legend	Description	Grade	Zone
26.5.1984	PX						N=2, 2, 2, 3, 3, 4, = 12	• 10	9.7 9.8	-12.25		Firm, white gravelly very Silty CLAY (RESIDUAL SOIL)	VI	
								• 11	10.55					
									11.0	-15.05				
							N=2, 3, 3, 4, 4, 5, = 16	• 12	12.55			Medium dense, light brownish yellow + light grey, Clayey SILT with some fine Gravel. (C. D. G.)	V	
									13.0					
							N=3, 4, 4, 6, 7, 8, = 25	• 13	14.55					
									15.0	-19.55				
28.5.1984	18.55m						N=3, 6, 6, 6, 7, 9, = 27	• 14	16.55			Medium dense, light pink, light grey + light brownish yellow, clayey SILT with some fine Gravel. (C. D. G.)	V	
									17.0					
									18.55	-22.55				
							N=4, 4, 6, 6, 8, 11, = 30	• 16	19.0			Operation stopped at 19.0m		

Legend
Samples:
- • Small disturbed
- ▲ Large disturbed
- ▼ Standard penetration test
- Permeability test
- U100 undisturbed
- U76 undisturbed
- Mazier
- Liner sample
- Water sample

Remarks C. D. G. : Completely Decomposed Granite.

16442

HAU HOI WAN
(DEEP BAY)

CESD CONTRACT NO. GC/91/08

SITE INVESTIGATION – MARINE WORKS

(TERM CONTRACT)

WORKS ORDER NO. PW 7/2/34.2

TUEN MUN PORT DEVELOPMENT STUDY

FINAL REPORT

VOLUME I

Gammon Construction Limited

Gammon Construction Limited
Geotechnical Contracting Department

CONTRACT NO.: GC/91/08
CLIENT : G.E.O
DRILLHOLE NO.: 90830/1D
SHEET 1 OF 2

JOB NO. & LOCATION: J1340 PW7/2/34.2 TUEN MUN PORT DEVELOPMENT STUDY

METHOD: ROTARY/BORING
MACHINE: GAMMON 17
GROUND LEVEL: -5.50 mPD
ORIENTATION: VERTICAL
COORDS E. 809158.44
N. 831377.23

HOLE DIA: 0.00m 219mm 10.00m 168mm 12.70m 140mm 15.30m 101mm 19.50m
DATE: 13/02 TO 13/02/92

Drilling progress	Casing depth size	Water level	Total core recovery %	Solid core recovery %	R.Q.D. %	Fracture Index	Tests	Samples	Depth (m)	Reduced Level	Legend	Description	Grade	Zone
13/02 (Overnight)	ZX								0.00	-5.50				
							V	1	1.00			Very soft dark grey silty CLAY with occasional shell fragments. (MARINE DEPOSIT)		
			100				H.V = 0.00							
							H.V = 3.50	2	2.50					
									3.00					
							V	3	3.50					
							H.V = 5.00		4.00	-9.50		Very soft to soft dark yellowish brown mottled grey sandy silty CLAY with a little fine subangular gravel. (ALLUVIUM)		
			100				H.V = 16.0	4	5.00					
							(1,1 1,2,2,3) N=8	5	5.95 6.00					
			100						6.50	-12.00		Soft light reddish brown sandy silty CLAY. (ALLUVIUM)		
								6	7.00 7.50					
							(2,2 3,3,3,4) N=13	7	8.00	-13.50		Soft to firm yellowish brown mottled grey sandy silty CLAY with some fine subangular to angular gravel. (ALLUVIUM)		
			0						8.45 9.00					
	10.00m							8	10.00	-15.50				

Legend
Samples:
- Small disturbed
- Large disturbed
- U76 undisturbed
- U100 undisturbed
- Mazier
- Liner sample
- Piston sample
- Water sample
- Standard penetration test
- Permeability test
- Piezometer test
- Standpipe test
- Water table
- V Field vane shear test

Remarks:
H.V = Hand vane reading in kPa
Field vane shear tests were carried out at 1.00m and 3.50m.

Logged by : SOC
Checked by : KSL

Gammon Construction Limited
Geotechnical Contracting Department

CONTRACT NO.: GC/91/08		DRILLHOLE NO.: 90830/1D
CLIENT : G.E.O		SHEET 2 OF 2

JOB NO. & LOCATION: J1340 PW7/2/34.2 TUEN MUN PORT DEVELOPMENT STUDY

METHOD: ROTARY/BORING	GROUND LEVEL: -5.50 mPD	COORDS E. 809158.44
MACHINE: GAMMON 17	ORIENTATION: VERTICAL	N. 831377.23

HOLE DIA: 0.00m 219mm 10.00m 168mm 12.70m 140mm 15.30m 101mm 19.50m

DATE: 13/02 TO 13/02/92

Drilling progress	Casing depth size	Water level	Total core recovery %	Solid core recovery %	R.Q.D. %	Fracture Index	Tests	Samples	Depth (m)	Reduced Level	Legend	Description	Grade	Zone
13/02 (Overnight)	SX		0					9	10.00	-15.50		As sheet 1 of 2.		
							(3,6 10,11,13,15) N=49	10	10.80	-16.30		Extremely weak greenish grey mottled pink completely decomposed coarse grained GRANITE. (Very silty medium to coarse SAND)	V	
	12.70m PX								11.00					
			41	29	29	NA			11.95					
						NR			12.00					
			47	22	0	10.0			12.70	-18.20		Strong greyish pink streaked green moderately to highly decomposed coarse grained META GRANITE. (Corestone?)	III/II	
			98	73	73	1			13.00					
	15.30m					13			13.11	-18.61				
			99	89	89	0			13.49	-18.99		Weak? greenish grey mottled pink completely to highly decomposed coarse grained META-GRANITE.	V / IV	
			100	37	37	15.0		T2101	13.90					
			99	85	86				14.00					
						9.6			14.09	-19.59				
			100	73	72				14.30			Strong greyish pink streaked green slightly decomposed coarse grained META-GRANITE, with closely to medium, locally widely spaced limonite stained rough joints, dipping at 45° and 60°. Granite has laminated structure.	II	
			100	65	65	7.5			15.00					
			98	81	81	6.0			15.30					
									16.00					
									16.20					
									16.60					
									17.00					
									17.39					
									18.00					
									18.27					
									18.67					
									19.00					
									19.50	-25.00		End of hole at 19.50m		

Legend

Samples:

- Small disturbed
- Large disturbed
- U76 undisturbed
- U100 undisturbed
- Mazier
- Liner sample
- Piston sample
- Water sample
- Standard penetration test
- Permeability test
- Piezometer test
- Standpipe test
- Water table

Remarks:

Core loss in 12.70m to 13.90m and 13.90m to 14.30m core runs assumed to be Grade V/IV granite.

NA: Not applicable

NR: No recovery

Logged by : SOC

Checked by : KSL

BACHY SOLETANCHE

BACHY SOLETANCHE GROUP
SOIL & FOUNDATIONS SPECIALISTS

DRILLHOLE RECORD

W. O. _____

HOLE No. ODB/3

CONTRACT PAA5/90

DATE from 25/5/91 to 26/5/91

PROJECT: CHEK LAP KOK NEW AIRPORT MARINE S.I. V.O. NO. 01/91 DEEP BAY AND OUTER DEEP BAY AREA

SHEET 1 OF 4

METHOD	CO-ORDINATES	ROCK COREBIT
CABLE TOOL BORING/ROTARY	E 807168.90	/
MACHINE & No.	N 831879.30	**HOLE DIA.**
HELEN		0.00m–35.50m SX
FLUSHING MEDIUM	**ORIENTATION**	**GROUND-LEVEL**
SEA WATER	VERTICAL	–5.93mPD

Drilling Progress	Casing depth/ size	Water level/ time/ date	Water Recovery %	Total core Recovery %	Solid core Recovery %	R. Q. D.	Fracture Index. /m	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Zone	Description
25/5/91		7.30m 08:00		100				HV= 0.5Kpa	1		1.00				Very soft, dark greenish grey clayey SILT. (MARINE DEPOSIT)
								HV= 0.5Kpa	2		2.00				
				100				HV= 2.5Kpa	3		3.00				
								HV= 5.0Kpa	4		4.00				
				100				HV= 5.0Kpa	5		5.00				
								HV= 10.0Kpa	6		6.00				
				100				HV= 12.5Kpa	7		7.00				
								HV= 15.0Kpa	8		8.00				
				100				HV= 16.0Kpa	9		9.00				
								HV= 20.0Kpa	10		10.00				

- SMALL DISTURBED SAMPLE
- BULK DISTURBED SAMPLE
- S.P.T. LINER SAMPLE
- U 100 UNDISTURBED SAMPLE
- U 76 UNDISTURBED SAMPLE
- MAZIER SAMPLE (76mm)
- WATER SAMPLE
- WATER LEVEL
- STANDARD PENETRATION TEST
- PISTON SAMPLE
- PERMEABILITY TEST

LOGGED M.Y.LEE DATE 28/5/91

CHECKED _____ DATE _____

REMARKS

HV= Hand Vane Shear Value

BACHY SOLETANCHE

BACHY SOLETANCHE GROUP
SOIL & FOUNDATIONS SPECIALISTS

DRILLHOLE RECORD

W. O. _____

HOLE No. ODB/3

CONTRACT PAA5/90

DATE from 25/5/91 to 26/5/91

PROJECT: CHEK LAP KOK NEW AIRPORT MARINE S.I. V.O. NO. 01/91 DEEP BAY AND OUTER DEEP BAY AREA

SHEET 2 OF 4

METHOD	CO-ORDINATES	ROCK COREBIT
CABLE TOOL BORING/ROTARY	E 807168.90	/
MACHINE & No.	N 831879.30	HOLE DIA.
HELEN		0.00m–35.50m SX
FLUSHING MEDIUM	ORIENTATION	GROUND–LEVEL
SEA WATER	VERTICAL	–5.93mPD

Drilling Progress	Casing depth/ size	Water level/ time/ date	Water Recovery %	Total core Recovery %	Solid core Recovery %	R. Q. D.	Fracture Index. /m	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Zone	Description
11				100				HV= 21.5Kpa HV= 24.0Kpa	11		11.00				(MARINE DEPOSIT) See sheet 1 of 4
12				100				8 BLOWS 2,3,3. 1,1, 1,2, 2,3, N=8	12 13	–17.93	12.00 12.45				Loose, light greyish brown clayey fine SAND. (ALLUVIUM)
13	25/5/91								14		12.50 12.95 13.00				
14				100				11 BLOWS 3,4,4. 2,2, 3,3, 4,5, N=15	15 16		14.00 14.45 14.50				
15									17		14.95 15.00				Medium dense, light brown silty fine to coarse SAND with subangular fine gravel. (ALLUVIUM)
16		7.30m 19:00		67				19 BLOWS 5,7,7, 2,2, 3,4, 6,9, N=22	18 19		16.00 16.45				
17									20	–22.93	16.50 16.95 17.00				
18	25/5/91			100				7 BLOWS 2,2,3, 1,1, 1,1, 1,2, N=5	21 22		18.00 18.45				Soft, dark grey clayey SILT with organic material. (SWAMP DEPOSIT)
19									23		18.50 18.95 19.00				
20									24		20.00				

- SMALL DISTURBED SAMPLE
- BULK DISTURBED SAMPLE
- S.P.T. LINER SAMPLE
- U 100 UNDISTURBED SAMPLE
- U 76 UNDISTURBED SAMPLE
- MAZIER SAMPLE (76mm)
- WATER SAMPLE
- WATER LEVEL
- STANDARD PENETRATION TEST
- PISTON SAMPLE
- PERMEABILITY TEST

LOGGED M.Y.LEE DATE 28/5/91

CHECKED _____ DATE _____

REMARKS

BACHY SOLETANCHE

BACHY SOLETANCHE GROUP
SOIL & FOUNDATIONS SPECIALISTS

DRILLHOLE RECORD

W. O. _____

HOLE No. ODB/3

CONTRACT PAA5/90

DATE from 25/5/91 to 26/5/91

PROJECT: CHEK LAP KOK NEW AIRPORT MARINE S.I. V.O. NO. 01/91 DEEP BAY AND OUTER DEEP BAY AREA

SHEET 3 OF 4

METHOD	CO-ORDINATES	ROCK COREBIT
CABLE TOOL BORING/ROTARY	E 807168.90	/
MACHINE & No.	N 831879.30	**HOLE DIA.**
HELEN		0.00m–35.50m SX
FLUSHING MEDIUM	**ORIENTATION**	**GROUND–LEVEL**
SEA WATER	VERTICAL	–5.93mPD

Drilling Progress	Casing depth/ size	Water level/ time/ date	Water Recovery %	Total core Recovery %	Solid core Recovery %	R. Q. D.	Fracture Index. /m	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Zone	Description
25/5/91		7.10m 07:00		100				7 BLOWS 2,2,3, 1,1, 1,1, 2,2, N=6	25 26		20.45 20.50 20.95 21.00				(SWAMP DEPOSIT) See sheet 2 of 4
				78				22 BLOWS 5,8,9, 3,3, 4,5, 5,8, N=22	27 28 29	–27.93	22.00 22.45 22.50 22.95 23.00				Medium dense, light pink and brown clayey fine SAND. (ALLUVIUM)
				100				8 BLOWS 2,3,3, 1,7, 2,3, 3,4, N=12	30 31 32		24.00 24.45 24.50 24.95 25.00				Medium dense, light yellowish brown to brown very clayey fine to coarse SAND with subangular fine gravel. (ALLUVIUM)
				100				9 BLOWS 2,3,4, 1,1, 2,3, 3,3, N=11	33 34 35		26.00 26.45 26.50 26.95 27.00				Firm, light grey sandy clayey SILT. (ALLUVIUM) Medium dense, light yellowish brown to brown very clayey fine to coarse SAND. (ALLUVIUM)
				100				11 BLOWS 3,4,4, 2,2, 3,3, 4,4, N=14	36 37 38 39		28.00 28.45 28.50 28.95 29.00 30.00				Firm, light grey clayey SILT. (ALLUVIUM) Medium dense, light grey very clayey fine to coarse SAND with subangular fine gravel. (ALLUVIUM)

- SMALL DISTURBED SAMPLE
- BULK DISTURBED SAMPLE
- S.P.T. LINER SAMPLE
- U 100 UNDISTURBED SAMPLE
- U 76 UNDISTURBED SAMPLE
- MAZIER SAMPLE (76mm)
- WATER SAMPLE
- WATER LEVEL
- STANDARD PENETRATION TEST
- PISTON SAMPLE
- PERMEABILITY TEST

LOGGED M.Y.LEE DATE 28/5/91

CHECKED _____ DATE _____

REMARKS

BACHY SOLETANCHE

BACHY SOLETANCHE GROUP

SOIL & FOUNDATIONS SPECIALISTS

DRILLHOLE RECORD

W. O. _____

HOLE No. ODB/3

CONTRACT PAA5/90

DATE from 25/5/91 to 26/5/91

PROJECT: CHEK LAP KOK NEW AIRPORT MARINE S.I. V.O. NO. 01/91 DEEP BAY AND OUTER DEEP BAY AREA

SHEET 4 OF 4

METHOD	CO-ORDINATES	ROCK COREBIT
CABLE TOOL BORING/ROTARY	E 807168.90	/
MACHINE & No.	N 831879.30	**HOLE DIA.**
HELEN		0.00m–35.50m SX
FLUSHING MEDIUM	**ORIENTATION**	**GROUND-LEVEL**
SEA WATER	VERTICAL	–5.93mPD

Drilling Progress	Casing depth/ size	Water level/ time/ date	Water Recovery %	Total core Recovery %	Solid core Recovery %	R. Q. D.	Fracture Index. /m	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Zone	Description
31	26/5/91	8.80m 08:00		100				7 BLOWS 2,2,3, 1,1, 2,3, 4,4, N=13	40 41		30.45 30.50 30.95				See sheet 3 of 4
32				100				29 BLOWS 7,10,12, 3,4, 5,8, 10,13, N=36	42 43 44		31.00 32.00 32.45 32.50 32.95				Medium dense to dense light yellowish brown slightly clayey fine to coarse SAND with subangular fine gravel. (ALLUVIUM)
33											33.00				Dense, light grey and white fine to coarse SAND with subangular fine gravel. (ALLUVIUM)
34				100				18 BLOWS 2,6,10,	45 46		34.00 34.45				Medium dense, light green spotted white clayey fine to coarse SAND with subangular fine gravel and occasional medium gravel. (ALLUVIUM)
35				100					47	–41.43	34.50 35.50				Medium dense, dark grey and red silty fine to coarse SAND with some subangular fine gravel. (ALLUVIUM)
36															End of the drillhole at 35.50m.
37															
38															
39															
40															

- SMALL DISTURBED SAMPLE
- BULK DISTURBED SAMPLE
- S.P.T. LINER SAMPLE
- U 100 UNDISTURBED SAMPLE
- U 76 UNDISTURBED SAMPLE
- MAZIER SAMPLE (76mm)
- WATER SAMPLE
- WATER LEVEL
- STANDARD PENETRATION TEST
- PISTON SAMPLE
- PERMEABILITY TEST

LOGGED M.Y.LEE DATE 28/5/91

CHECKED _____ DATE _____

REMARKS

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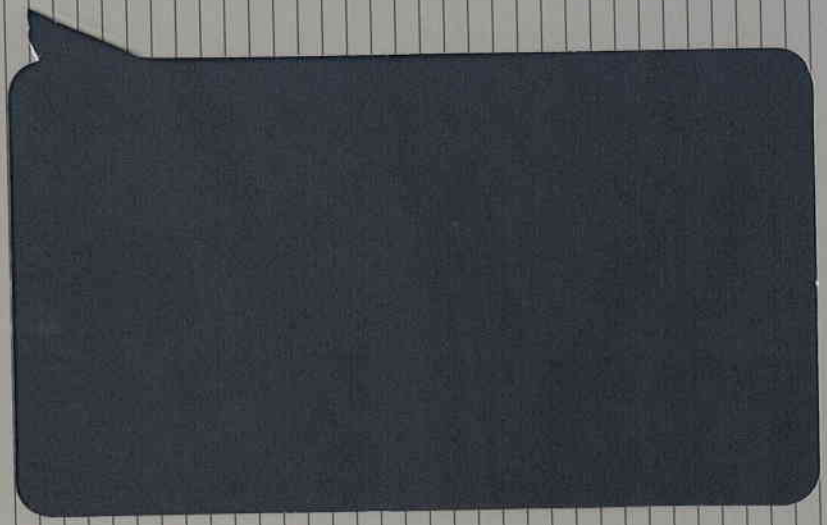

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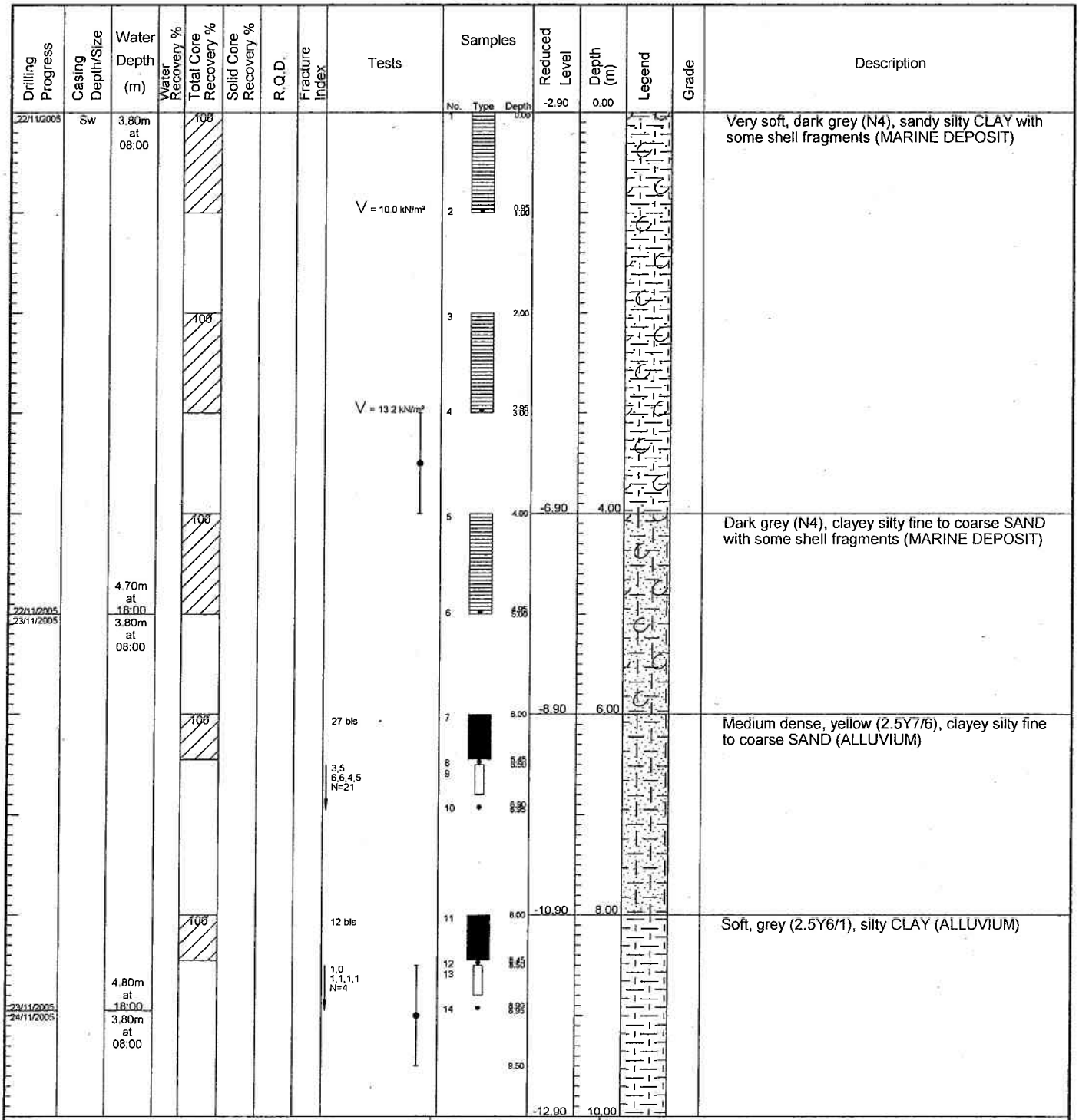
DRILLHOLE RECORD

Lam	DRILLHOLE No. **STF-B1**
CONTRACT NO. GE/2003/14	SHEET **1** of **4**

JOB TITLE **Agreement No. CE 28/2003 (EP) Sludge Treatment Facilities - Feasibility Study - Marine Ground Investigation**

METHOD **W+RC**	CO-ORDINATES	WORKS ORDER No. **GE/2003/14.9**
MACHINE & No. **BR4**	E **809872.60** N **831671.90**	DATE from **22/11/2005** to **05/12/2005**
FLUSHING MEDIUM **Sea Water**	ORIENTATION **Vertical**	SEABED LEVEL **-2.90** mPD



- Small Disturbed Sample
- Water Sample
- SPT Liner Sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- Piston Sample
- Packer Test
- Piezometer / Standpipe Tip
- Standard Penetration Test
- Pressuremeter Test
- Permeability Test
- Impression Packer / Televiewer Test
- In-situ Vane Shear Test

LOGGED **H.K.Fung**

DATE **09/12/2005**

CHECKED **M.Davies**

DATE **09/12/2005**

REMARKS

1. Constant head permeability tests carried out at 3.00-4.00m and 8.50-9.50m depths.
2. Impression packer tests carried out at 32.20-33.70m and 33.40-34.90m depths.
3. Vane shear test carried out adjacent to drillhole at 1.00m and 3.00m depths.
4. Drillhole backfilled with bentonite cement grout.

DRILLHOLE RECORD

CONTRACT NO. GE/2003/14

DRILLHOLE No. **STF-B1**

SHEET **2** of **4**

JOB TITLE **Agreement No. CE 28/2003 (EP) Sludge Treatment Facilities - Feasibility Study - Marine Ground Investigation**

METHOD **W+RC**	CO-ORDINATES	WORKS ORDER No. **GE/2003/14.9**
MACHINE & No. **BR4**	E **809872.60** N **831671.90**	DATE from **22/11/2005** to **05/12/2005**
FLUSHING MEDIUM **Sea Water**	ORIENTATION **Vertical**	SEABED LEVEL **-2.90** mPD

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Recovery %	Total Core Recovery %	Solid Core Recovery %	R.Q.D.	Fracture Index	Tests	Samples No. Type Depth	Reduced Level	Depth (m)	Legend	Grade	Description
									-12.90		10.00			
		4.70m at 18:00		0				127 blows	15 10.00–10.45					Light grey (N7), coarse SAND with many fine gravel sized quartz fragments (ALLUVIUM)
24/11/2005										-13.40	10.50			
25/11/2005		3.90m at 08:00		100				34 blows	16 10.50–10.95					Medium dense, yellow (2.5Y7/6), clayey very silty fine to coarse SAND (ALLUVIUM)
								3,4 5,7,6,5 N=23	17 10.95–11.40 18 19 11.40–11.85	-13.90	11.00			11.00-12.50m: light grey (N7)
										-15.40	12.50			
				82				52 blows	20 12.50–12.95					Firm, light grey (N7), slightly clayey SILT (ALLUVIUM)
								2,2 1,1,4,7 N=13	21 12.95–13.40 22 23 13.40–13.85	-15.90	13.00			13.00-14.50m: yellow (2.5Y7/6)
										-17.40	14.50			
				100				18 blows	24 14.50–14.95					Soft to firm, grey (N6), silty CLAY (ALLUVIUM) 14.50-15.00m: with wood fragments
								2,1 2,2,2,2 N=8	25 14.95–15.40 26 27 15.40–15.85	-17.90	15.00			
				100				33 blows	28 16.50–16.80					
								0,0 1,1,1,2 N=5	29 16.80–16.90 30 16.90–17.00 31 17.40–17.85					
										-21.40	18.50			
			90	100				84 blows	32 18.50–18.95					Medium dense, yellow (10YR7/8), slightly clayey very silty fine to coarse SAND (ALLUVIUM)
								2,2 3,2,4,7 N=16	33 18.95–19.00 34 35 19.40–19.85					
25/11/2005		4.90m at 18:00												
25/11/2005		3.90m at 08:00								-22.90	20.00			

- Small Disturbed Sample
- Water Sample
- SPT Liner Sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- Piston Sample
- Packer Test
- Piezometer / Standpipe Tip
- Standard Penetration Test
- Pressuremeter Test
- Permeability Test
- Impression Packer / Televiewer Test
- In-situ Vane Shear Test

LOGGED H.K.Fung

DATE 09/12/2005

CHECKED M.Davies

DATE 09/12/2005

REMARKS

DRILLHOLE RECORD

DRILLHOLE No. **STF-B1**

CONTRACT NO. GE/2003/14

SHEET 3 of 4

JOB TITLE **Agreement No. CE 28/2003 (EP) Sludge Treatment Facilities - Feasibility Study - Marine Ground Investigation**

METHOD **W+RC**	CO-ORDINATES	WORKS ORDER No. **GE/2003/14.9**
MACHINE & No. **BR4**	E **809872.60** N **831671.90**	DATE from **22/11/2005** to **05/12/2005**
FLUSHING MEDIUM **Sea Water**	ORIENTATION **Vertical**	SEABED LEVEL **-2.90** mPD

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Recovery %	Total Core Recovery %	Solid Core Recovery %	R.Q.D.	Fracture Index	Tests	Samples No. Type Depth	Reduced Level	Depth (m)	Legend	Grade	Description
										-22.90	20.00			As sheet 2 of 4
				100				78 bls	36 20.50	-23.40	20.50			Yellow (2.5Y7/6), very silty fine SAND (ALLUVIUM)
								3,4 5,5,6,6 N=22	37 20.95 38 21.00 39 21.40 21.45	-23.90	21.00			Medium dense, yellowish brown (10YR5/8), slightly clayey silty fine to coarse SAND with some angular to subangular fine to coarse gravel sized strong rock and quartz fragments (ALLUVIUM)
	Sw 23.00			82				312 bls	40 22.50					
	Pw	4.90m at 18:00						7,6 6,9,4,4 N=23	41 22.95 42 23.00 43 23.40 23.45					
26/11/2005 28/11/2005		3.60m at 08:00												
	Pw 24.50													
	Hw			56				494 bls	44 24.50	-27.40	24.50		V	Extremely weak, light greenish grey (5G8/1) spotted white, red and brown, completely decomposed coarse grained GRANITE (Firm, slightly clayey fine sandy SILT)
28/11/2005 29/11/2005		4.10m at 18:00							45 24.95 46 25.00					
		3.70m at 08:00		84				236 bls	47 25.45 48 25.50	-28.40	25.50		V	Extremely weak, yellowish brown (10YR5/8) spotted grey and pink, completely decomposed MYLONITE (Stiff, slightly clayey sandy SILT with some fine gravel sized moderately strong rock fragments)
		4.40m at 18:00						6,6 11,12,15,27 N=65	49 25.90 25.95					
29/11/2005 03/12/2005		3.70m at 08:00												
				80					50 27.00					
								6,9 11,10,12,16 N=49	51 28.00 52 28.10 53 28.50 28.55					
				58					54 29.00	-31.90	29.00		V	Extremely weak, yellowish brown (10YR5/8) spotted grey and pink, completely decomposed mylonitic GRANITE (Stiff, slightly clayey sandy SILT with some fine gravel sized moderately strong rock fragments)
										-32.90	30.00			

- Small Disturbed Sample
- Water Sample
- SPT Liner Sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- Piston Sample
- Packer Test
- Piezometer / Standpipe Tip
- Standard Penetration Test
- Pressuremeter Test
- Permeability Test
- Impression Packer / Televiewer Test
- In-situ Vane Shear Test

LOGGED **H.K.Fung**

DATE **09/12/2005**

CHECKED **M.Davies**

DATE **09/12/2005**

REMARKS

DRILLHOLE RECORD

CONTRACT NO. GE/2003/14	DRILLHOLE No. **STF-B1**
	SHEET 4 of 4

JOB TITLE **Agreement No. CE 28/2003 (EP) Sludge Treatment Facilities - Feasibility Study - Marine Ground Investigation**

METHOD **W+RC**	CO-ORDINATES	WORKS ORDER No. **GE/2003/14.9**
MACHINE & No. **BR4**	E **809872.60** N **831671.90**	DATE from **22/11/2005** to **05/12/2005**
FLUSHING MEDIUM **Sea Water**	ORIENTATION **Vertical**	SEABED LEVEL **-2.90** mPD

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Recovery %	Total Core Recovery %	Solid Core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
										-32.90	30.00			
				0				29,21/15mm 100/15mm 100bls/15mm	No. 55 Type Depth 30.00 30.10 56 31.10 57 31.20 31.27 58 31.365					As sheet 3 of 4
	Hw 32.01			100	81	64	4.3		32.01	-34.91	32.01		III/II	Strong, grey mottled pink, streaked black, slightly decomposed mylonitic GRANITE with closely to medium, locally very closely spaced, smooth and rough, planar and undulating, kaolin and chlorite coated joints, dipping at 0°-10°, 30°-40°, 50°-60° and 65°-75°
		4.20m at 17:00							32.20					
03/12/2005									T2101					
05/12/2005		3.40m at 08:00		100	0	0	17.3		32.70	-35.77	32.87			32.01-33.22m: moderately strong to strong and moderately to slightly decomposed
									T2101					
				100	100	80	2.6		33.22	-36.12	33.22		II	32.01-32.87m: with subvertical to vertical joints
							16.7		33.40					32.01-32.05m: highly fractured
							5.9		T2101					
				100	100	97			33.70					
									T2101					
									34.10					
									T2101					
				100	94	79			34.90 35.01					
									T2101					
									36.32	-39.22	36.32		III/II	36.32-36.92m: moderately strong to strong and moderately to slightly decomposed
				100	90	71	>20			-39.50	36.60			36.60-36.65m: highly fractured
							NI			-39.55	36.65			
							8.3		T2101	-39.82	36.92		II	
05/12/2005		3.80m at 18:00							37.49	-40.39	37.49			End of investigation hole at 37.49m
											40.00			

- Small Disturbed Sample
- Water Sample
- SPT Liner Sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- Piston Sample
- Packer Test
- Piezometer / Standpipe Tip
- Standard Penetration Test
- Pressuremeter Test
- Permeability Test
- Impression Packer / Televiewer Test
- In-situ Vane Shear Test

LOGGED H.K.Fung

DATE 09/12/2005

CHECKED M.Davies

DATE 09/12/2005

REMARKS

DRILLHOLE RECORD

Lam	DRILLHOLE No. **STF-B2**
CONTRACT NO. GE/2003/14	SHEET 1 of 5

JOB TITLE **Agreement No. CE 28/2003 (EP) Sludge Treatment Facilities - Feasibility Study - Marine Ground Investigation**

METHOD **W+RC**	CO-ORDINATES	WORKS ORDER No. **GE/2003/14.9**
MACHINE & No. **BR4**	E **809913.80** N **831684.10**	DATE from **08/12/2005** to **15/12/2005**
FLUSHING MEDIUM **Sea Water**	ORIENTATION **Vertical**	SEABED LEVEL **-2.80** mPD

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Recovery %	Total Core Recovery %	Solid Core Recovery %	R.Q.D.	Fracture Index	Tests	Samples (No. Type Depth)	Reduced Level	Depth (m)	Legend	Grade	Description
08/12/2005	Sw	3.80m at 13:00		90					1 0.00	-2.80	0.00			Very soft, dark grey (N4), silty CLAY with some shell fragments (MARINE DEPOSIT)
								V = 4.6 kN/m²	2 0.95 1.00					
				100					3 2.00					
								V = 7.0 kN/m²	4 3.85 3.90					
				100					5 4.00					
									6 4.70 4.75	-7.50	4.70			
				100				29 blows	7 5.00	-7.80	5.00			Firm, red (10R5/8), silty CLAY (ALLUVIUM) 5.00-5.50m: yellowish brown (10YR5/8)
		4.20m at 18:00						1,3 3,4,5,5 N=17	8 5.45 5.50	-8.30	5.50			
08/12/2005									9					
09/12/2005		3.40m at 08:00							10 5.90 5.95					
				100				47 blows	11 7.00					
								3,3 3,5,6,6 N=20	12 7.45 7.50					
									13					
									14 7.90 7.95					
				100				25 blows	15 9.00					
									16 9.45 9.50	-12.30	9.50			
								2,2 2,2,2,2 N=8	17					Firm, light grey (10YR7/1), silty CLAY (ALLUVIUM)
									18 9.90 9.95	-12.80	10.00			

- Small Disturbed Sample
- Water Sample
- SPT Liner Sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- Piston Sample
- Packer Test
- Piezometer / Standpipe Tip
- Standard Penetration Test
- Pressuremeter Test
- Permeability Test
- Impression Packer / Televiewer Test
- In-situ Vane Shear Test

LOGGED H.K.Fung

DATE 19/12/2005

CHECKED M.Davies

DATE 21/12/2005

REMARKS

1. Constant head permeability test carried out at 26.70-27.70m depth.
2. Impression packer tests carried out at 40.50-42.00m and 41.70-43.20m depths.
3. Packer test carried out at 39.80-43.74m depth.
4. Vane shear tests carried out adjacent to drillhole at 1.00m and 3.00m depths.
5. Drillhole backfilled with bentonite cement grout.

DRILLHOLE RECORD

DRILLHOLE No. **STF-B2**

CONTRACT NO. GE/2003/14

SHEET **2** of **5**

JOB TITLE **Agreement No. CE 28/2003 (EP) Sludge Treatment Facilities - Feasibility Study - Marine Ground Investigation**

METHOD **W+RC**	CO-ORDINATES	WORKS ORDER No. **GE/2003/14.9**
MACHINE & No. **BR4**	E **809913.80** N **831684.10**	DATE from **08/12/2005** to **15/12/2005**
FLUSHING MEDIUM **Sea Water**	ORIENTATION **Vertical**	SEABED LEVEL **-2.80** mPD

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Recovery %	Total Core Recovery %	Solid Core Recovery %	R.Q.D.	Fracture Index	Tests	Samples No. Type Depth	Reduced Level	Depth (m)	Legend	Grade	Description
										-12.80	10.00			As sheet 1 of 5
				100				26 bls	19 11.00					
								9,8 6,7,7,7 N=27	20 11.50 21 22 11.90	-14.30	11.50			Medium dense, grey (10YR6/1), slightly clayey silty fine to coarse SAND (ALLUVIUM)
				100				48 bls	23 13.00					
								3,5 6,6,8,8 N=28	24 13.50 25 26 13.90	-16.30	13.50			Medium dense, yellow (10YR7/6), slightly clayey silty fine to coarse SAND with some angular to subangular fine to coarse gravel sized quartz fragments (ALLUVIUM)
09/12/2005 10/12/2005		4.80m at 18:00 4.50m at 08:00												
				69				167 bls	27 15.00					
								2,2 5,7,7,6 N=25	28 15.45 29 30 15.90					
				84				50 bls	31 17.00					
								3,3 2,2,3,3 N=10	32 17.45 33 34 17.90	-20.30	17.50		V	Extremely weak, yellowish brown (10YR5/6) and pink (2.5YR8/4) spotted brown, green and white, completely decomposed mylonitic GRANITE (Stiff, slightly clayey sandy SILT)
	Sw 19.00 Hw			100				103 bls	35 19.00					
								5,9 11,12,15,18 N=56	36 18.45 37 38 18.90	-22.80	20.00			

- Small Disturbed Sample
- Water Sample
- SPT Liner Sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- Piston Sample
- Packer Test
- Piezometer / Standpipe Tip
- Standard Penetration Test
- Pressuremeter Test
- Permeability Test
- Impression Packer / Televiewer Test
- In-situ Vane Shear Test

LOGGED H.K.Fung

DATE 19/12/2005

CHECKED M.Davies

DATE 21/12/2005

REMARKS

DRILLHOLE RECORD

DRILLHOLE No.	STF-B2
CONTRACT NO. GE/2003/14	SHEET 3 of 5

JOB TITLE **Agreement No. CE 28/2003 (EP) Sludge Treatment Facilities - Feasibility Study - Marine Ground Investigation**

METHOD **W+RC**	CO-ORDINATES	WORKS ORDER No. **GE/2003/14.9**
MACHINE & No. **BR4**	E **809913.80** N **831684.10**	DATE from **08/12/2005** to **15/12/2005**
FLUSHING MEDIUM **Sea Water**	ORIENTATION **Vertical**	SEABED LEVEL **-2.80** mPD

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Recovery %	Total Core Recovery %	Solid Core Recovery %	R.Q.D.	Fracture Index	Tests	Samples No. Type Depth	Reduced Level	Depth (m)	Legend	Grade	Description
										-22.80	20.00			As sheet 2 of 5
10/12/2005 12/12/2005		3.70m at 18:00 4.30m at 08:00	90	100 93 25 68 65 45				4,4 6,9,10,14 N=39 11,16 20,25,31,24/45mm 100bls/270mm 7,9 10,11,16,27 N=64	39 21.00 40 22.00 41 22.10 42 22.50 22.55 43 23.00 44 24.00 45 24.10 46 24.47 24.52 47 25.00 48 26.00 49 26.10 26.70 50 27.10 51 27.20 52 27.80 27.85 27.70 53 28.10 54 29.10 55 29.20					
12/12/2005 13/12/2005		3.70m at 18:00 4.50m at 08:00								-32.80	30.00			

- Small Disturbed Sample
- Water Sample
- SPT Liner Sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- Piston Sample
- Packer Test
- Piezometer / Standpipe Tip
- Standard Penetration Test
- Pressuremeter Test
- Permeability Test
- Impression Packer / Televiewer Test
- In-situ Vane Shear Test

LOGGED H.K.Fung

DATE 19/12/2005

CHECKED M.Davies

DATE 21/12/2005

REMARKS

DRILLHOLE RECORD

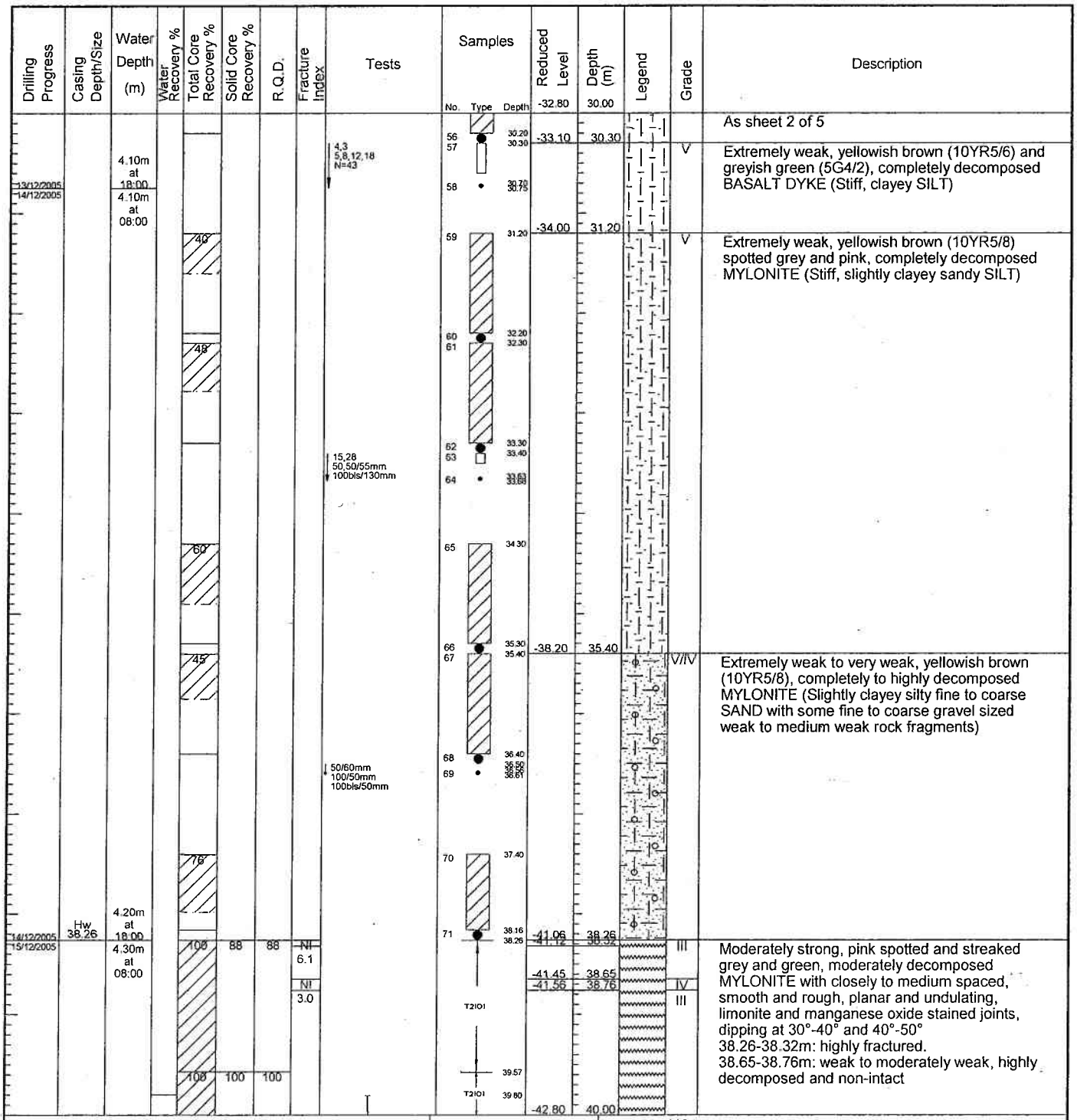
DRILLHOLE No. **STF-B2**

CONTRACT NO. GE/2003/14

SHEET 4 of 5

JOB TITLE **Agreement No. CE 28/2003 (EP) Sludge Treatment Facilities - Feasibility Study - Marine Ground Investigation**

METHOD **W+RC**	CO-ORDINATES	WORKS ORDER No. **GE/2003/14.9**
MACHINE & No. **BR4**	E **809913.80** N **831684.10**	DATE from **08/12/2005** to **15/12/2005**
FLUSHING MEDIUM **Sea Water**	ORIENTATION **Vertical**	SEABED LEVEL **-2.80** mPD



- Small Disturbed Sample
- Water Sample
- SPT Liner Sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- Piston Sample
- Packer Test
- Piezometer / Standpipe Tip
- Standard Penetration Test
- Pressuremeter Test
- Permeability Test
- Impression Packer / Televiewer Test
- In-situ Vane Shear Test

LOGGED H.K.Fung

DATE 19/12/2005

CHECKED M.Davies

DATE 21/12/2005

REMARKS

DRILLHOLE RECORD

DRILLHOLE No. **STF-B2**

CONTRACT NO. GE/2003/14

SHEET **5** of **5**

JOB TITLE **Agreement No. CE 28/2003 (EP) Sludge Treatment Facilities - Feasibility Study - Marine Ground Investigation**

METHOD **W+RC**	CO-ORDINATES	WORKS ORDER No. **GE/2003/14.9**
MACHINE & No. **BR4**	E **809913.80** N **831684.10**	DATE from **08/12/2005** to **15/12/2005**
FLUSHING MEDIUM **Sea Water**	ORIENTATION **Vertical**	SEABED LEVEL **-2.80** mPD

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Recovery %	Total Core Recovery %	Solid Core Recovery %	R.Q.D.	Fracture Index	Tests	Samples No. Type Depth	Reduced Level	Depth (m)	Legend	Grade	Description
										-42.80	40.00			
							6.0		T2IO1 40.50	-42.87 -43.27 -43.50 -43.77	40.07 40.47 40.70 40.97		III	Moderately strong, pink spotted and streaked grey and green, moderately decomposed mylonitic GRANITE with closely to medium spaced, smooth and rough, planar and undulating, limonite and manganese oxide stained joints, dipping at 30°-40° and 40°-50° 40.07-40.47m: moderately weak to moderately strong and moderately decomposed 40.70-40.97m: moderately weak to moderately strong and moderately decomposed
				100	100	95			41.02					
									T2IO1 41.70					
									42.00	-45.02	42.22		II	42.22-43.74m: strong and slightly decomposed
				100	100	93			42.35					
									T2IO1 43.20					
15/12/2005		4.20m at 18:00							43.74	-46.54	43.74			End of investigation hole at 43.74m.
											50.00			

- Small Disturbed Sample
- Water Sample
- SPT Liner Sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- Piston Sample
- Packer Test
- Piezometer / Standpipe Tip
- Standard Penetration Test
- Pressuremeter Test
- Permeability Test
- Impression Packer / Televiewer Test
- In-situ Vane Shear Test

LOGGED **H.K.Fung**

DATE **19/12/2005**

CHECKED **M.Davies**

DATE **21/12/2005**

REMARKS

DRILLHOLE RECORD

CONTRACT NO. GE/2003/14	DRILLHOLE No. **STF-B3**
	SHEET **1** of **4**

JOB TITLE **Agreement No. CE 28/2003 (EP) Sludge Treatment Facilities - Feasibility Study - Marine Ground Investigation**

METHOD **W+RC**	CO-ORDINATES	WORKS ORDER No. **GE/2003/14.9**
MACHINE & No. **BR8**	E **809976.70** N **831700.80**	DATE from **20/12/2005** to **24/12/2005**
FLUSHING MEDIUM **Sea Water**	ORIENTATION **Vertical**	SEABED LEVEL **-3.90** mPD

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Recovery %	Total Core Recovery %	Solid Core Recovery %	R.Q.D.	Fracture Index	Tests	Samples No.	Type	Depth	Reduced Level	Depth (m)	Legend	Grade	Description
20/12/2005	Sw	4.90m at 13:00		100					1		0.00	-3.90	0.00			Very soft, dark grey (N4), silty CLAY (MARINE DEPOSIT)
									2		0.95 1.00					
				100					3		2.00	-5.90	2.00			Dark greenish grey (N4), clayey silty fine to coarse SAND with occasional angular to subangular fine gravel sized rock and some shell fragments (MARINE DEPOSIT)
									4		3.95 4.00					
		5.30m at 18:00		85				34 bls	5		4.00	-7.90	4.00			Yellow (10YR7/8), silty clayey fine to coarse SAND with some subangular to subrounded fine gravel sized quartz fragments (ALLUVIUM)
20/12/2005 21/12/2005		4.20m at 08:00						1,1 1,2,2,3 N=8	6		4.45	-8.40	4.50			
									7							Stiff, light grey (N7/1) mottled yellow, silty CLAY (ALLUVIUM)
									8		4.90 4.95					
				100				37 bls	9		6.00	-9.90	6.00			Firm, dark grey (N4/1), slightly sandy silty CLAY (ALLUVIUM)
								1,1 2,1,2,1 N=6	10		6.45 6.50					
									11							
									12		6.90 6.95					
				100				132 bls	13		8.00	-11.90	8.00			Stiff, light grey (N7/1) mottled yellow, sandy silty CLAY with occasional subangular fine gravel sized quartz fragments (ALLUVIUM)
								1,1 1,3,4,4 N=12	14		8.45	-12.40	8.50			Stiff, grey (N6/1), silty CLAY with occasional subangular fine gravel sized quartz fragments (ALLUVIUM)
									15							
									16		8.90 8.95					
												-13.90	10.00			

- Small Disturbed Sample
- Water Sample
- SPT Liner Sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- Piston Sample
- Packer Test
- Piezometer / Standpipe Tip
- Standard Penetration Test
- Pressuremeter Test
- Permeability Test
- Impression Packer / Televiewer Test
- In-situ Vane Shear Test

LOGGED C.M.Ting

DATE 29/12/2005

CHECKED M.Davies

DATE 03/01/2006

REMARKS

1. Constant head permeability test carried out at 16.20-17.20m depth.
2. Impression packer tests carried out at 34.10m-35.60m and 35.30-36.80m depths.

DRILLHOLE RECORD

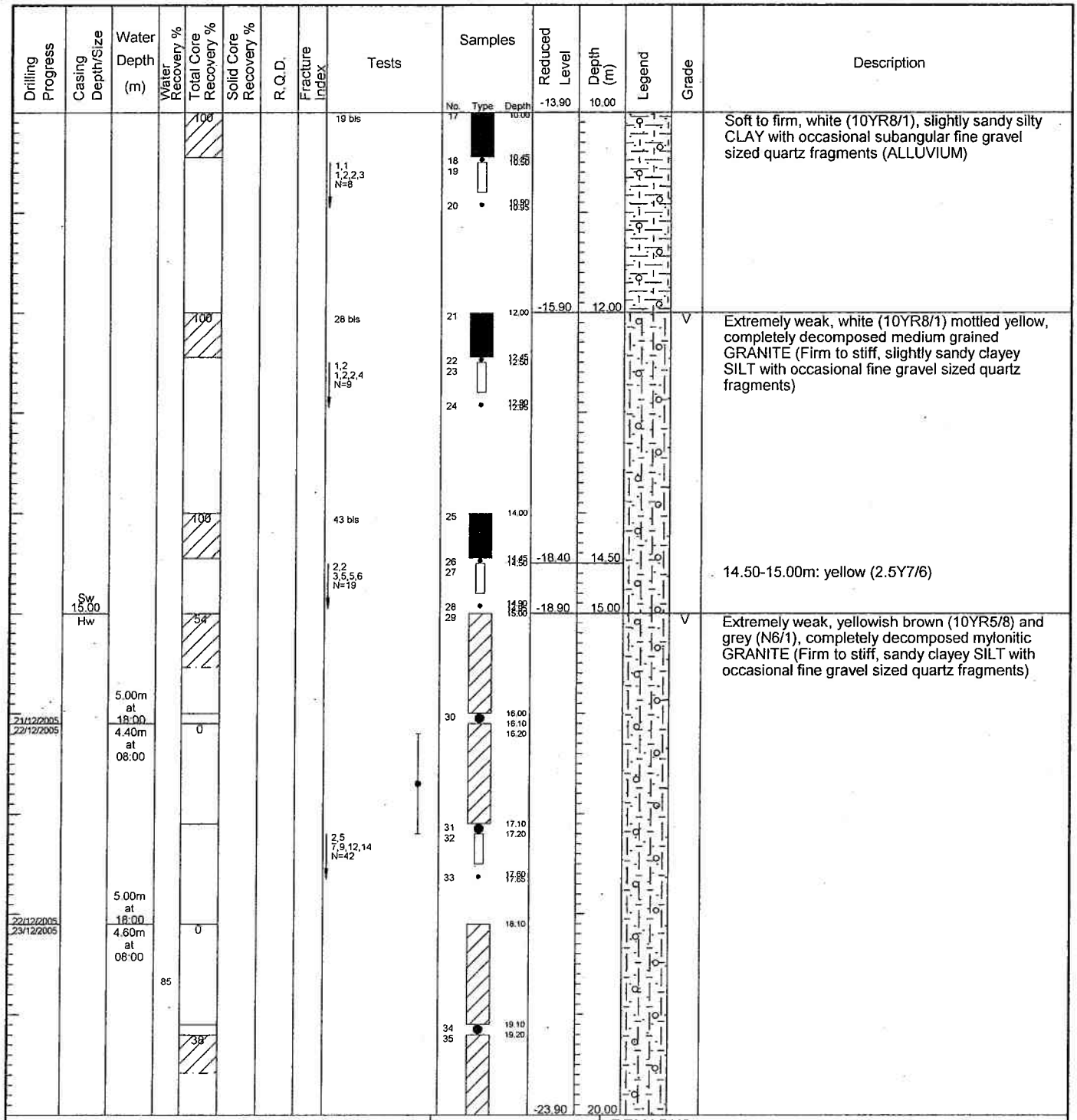
DRILLHOLE No. **STF-B3**

CONTRACT NO. GE/2003/14

SHEET 2 of 4

JOB TITLE **Agreement No. CE 28/2003 (EP) Sludge Treatment Facilities - Feasibility Study - Marine Ground Investigation**

METHOD **W+RC**	CO-ORDINATES	WORKS ORDER No. **GE/2003/14.9**
MACHINE & No. **BR8**	E **809976.70** N **831700.80**	DATE from **20/12/2005** to **24/12/2005**
FLUSHING MEDIUM **Sea Water**	ORIENTATION **Vertical**	SEABED LEVEL **-3.90** mPD



- Small Disturbed Sample
- Water Sample
- SPT Liner Sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- Piston Sample
- Packer Test
- Piezometer / Standpipe Tip
- Standard Penetration Test
- Pressuremeter Test
- Permeability Test
- Impression Packer / Televiewer Test
- In-situ Vane Shear Test

LOGGED C.M.Ting

DATE 29/12/2005

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DATE 03/01/2006

REMARKS

DRILLHOLE RECORD

DRILLHOLE No. **STF-B3**

CONTRACT NO. GE/2003/14

SHEET 3 of 4

JOB TITLE **Agreement No. CE 28/2003 (EP) Sludge Treatment Facilities - Feasibility Study - Marine Ground Investigation**

METHOD **W+RC**	CO-ORDINATES E **809976.70** N **831700.80**	WORKS ORDER No. **GE/2003/14.9**
MACHINE & No. **BR8**		DATE from **20/12/2005** to **24/12/2005**
FLUSHING MEDIUM **Sea Water**	ORIENTATION **Vertical**	SEABED LEVEL **-3.90** mPD

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Recovery %	Total Core Recovery %	Solid Core Recovery %	R.Q.D.	Fracture Index	Tests	Samples No.	Type	Depth	Reduced Level	Depth (m)	Legend	Grade	Description
												-23.90	20.00			As sheet 2 of 4
				0				3,5 9,11,13,16 N=49	36 37		20.20 20.30					
									38		20.70 20.75					
											21.20	-25.10	21.20		V	No recovery inferred to be completely decomposed mylonite GRANITE
				32					39		22.20	-26.20	22.30		V	
									40		22.30					Extremely weak, pinkish brown (7.5YR6/2), completely decomposed mylonitic GRANITE (Stiff, sandy clayey SILT with occasional fine gravel sized rock fragments)
								3,7 9,13,15,17 N=54	41 42		23.30 23.40					
									43		23.80 23.85					
				0							24.30	-28.20	24.30		V	Extremely weak, yellowish brown (10YR5/8), completely decomposed mylonitic GRANITE with quartz veins (Slightly clayey silty fine to coarse SAND with many fine to coarse gravel sized quartz fragments)
				0					44		25.30 25.40					
									45		26.40	-30.40	26.50		V	Extremely weak, pinkish brown (7.5YR6/2) mottled grey and dappled white, completely decomposed MYLONITE (Stiff, sandy clayey SILT with occasional fine gravel sized rock fragments)
								6,13 18,23,30,29/260mm 100bls/260mm	46		26.50					
									47		26.86 26.91					
				35					48		27.40					
									49		28.40					
				58					50		28.50					
									51		29.50					
								12,23 37,40,23/170mm 100bls/170mm	52		29.60					
									53		29.87 29.92	-33.90	30.00			

- Small Disturbed Sample
- Water Sample
- SPT Liner Sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- Piston Sample
- Packer Test
- Piezometer / Standpipe Tip
- Standard Penetration Test
- Pressuremeter Test
- Permeability Test
- Impression Packer / Televiewer Test
- In-situ Vane Shear Test

LOGGED C.M.Ting

DATE 29/12/2005

CHECKED M.Davies

DATE 03/01/2006

REMARKS

DRILLHOLE RECORD

DRILLHOLE No. **STF-B3**

CONTRACT NO. GE/2003/14

SHEET 4 of 4

JOB TITLE **Agreement No. CE 28/2003 (EP) Sludge Treatment Facilities - Feasibility Study - Marine Ground Investigation**

METHOD **W+RC**	CO-ORDINATES	WORKS ORDER No. **GE/2003/14.9**
MACHINE & No. **BR8**	E **809976.70** N **831700.80**	DATE from **20/12/2005** to **24/12/2005**
FLUSHING MEDIUM **Sea Water**	ORIENTATION **Vertical**	SEABED LEVEL **-3.90** mPD

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Recovery %	Total Core Recovery %	Solid Core Recovery %	R.Q.D.	Fracture Index	Tests	Samples No. Type Depth	Reduced Level -33.90	Depth (m) 30.00	Legend	Grade	Description
										-34.40	30.50			As sheet 3 of 4
		5.40m at 18:00		58					54 30.50				V	Extremely weak, grey (10YR6/1) streaked white and brown, completely decomposed MYLONITE (Clayey silty fine to coarse SAND with occasional fine gravel sized rock fragments)
23/12/2005 24/12/2005		4.40m at 08:00		69					55 31.50 56 31.60	-35.50	31.60		V/IV	Extremely weak to weak, brown (10YR4/3) mottled black, completely to highly decomposed MYLONITE (Sandy fine to coarse GRAVEL and COBBLE sized rock fragments)
	Hw 32.10			98	70	63	NI		57 31.92 32.02 32.10	-36.00	32.10		IV/III	
							>20			-36.15	32.25		III	Strong to very strong, mottled pink and streaked black, slightly decomposed MYLONITE with closely to medium, locally very closely to extremely closely spaced, rough undulating, limonite stained joints, dipping at 0°-10°, 30°-40° and 70°-80°
							6.7		T2101	-36.60	32.70		IV	
										-36.68	32.78		III	
							0.8			-36.80	32.90		II	
				100	97	83			33.12					32.10-32.25m: moderately weak and highly to moderately decomposed
										-37.45	33.55		II	32.25-32.70m: moderately strong to strong, pinkish brown and moderately decomposed
									T2101					32.70-32.78m: weak, brown and highly decomposed
							10.0		34.10					32.78-32.90m: moderately strong to strong, pinkish brown and moderately decomposed
							2.5		34.55					Strong to very strong, mottled pink and streaked black, slightly decomposed mylonitic GRANITE with closely to medium, locally very closely to extremely closely spaced, rough undulating, limonite stained joints, dipping at 0°-10°, 30°-40° and 70°-80°
				100	100	100			T2101					
									35.30 35.39 35.60					
				100	100	100			T2101					
									36.53 36.80					
				100	85	44	>20		T2101					
							7.9			-41.00	37.10		III	
24/12/2005		5.40m at 18:00							37.41	-41.31	37.41			37.10-37.41m: moderately strong to strong, brownish pink and moderately decomposed
											40.00			End of investigation hole at 37.41m

- Small Disturbed Sample
- Water Sample
- SPT Liner Sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- Piston Sample
- Packer Test
- Piezometer / Standpipe Tip
- Standard Penetration Test
- Pressuremeter Test
- Permeability Test
- Impression Packer / Televiewer Test
- In-situ Vane Shear Test

LOGGED C.M.Ting

DATE 29/12/2005

CHECKED M.Davies

DATE 03/01/2006

REMARKS

DRILLHOLE RECORD

Lam	DRILLHOLE No. **STF-B4**
CONTRACT NO. GE/2003/14	SHEET 1 of 4

JOB TITLE **Agreement No. CE 28/2003 (EP) Sludge Treatment Facilities - Feasibility Study - Marine Ground Investigation**

METHOD **W+RC**	CO-ORDINATES	WORKS ORDER No. **GE/2003/14.9**
MACHINE & No. **BR8**	E **810014.60** N **831709.10**	DATE from **10/12/2005** to **16/12/2005**
FLUSHING MEDIUM **Sea Water**	ORIENTATION **Vertical**	SEABED LEVEL **-2.80** mPD

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Recovery %	Total Core Recovery %	Solid Core Recovery %	R.Q.D.	Fracture Index	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
10/12/2005	Sw	5.00m at 13:00		90				V = 4.5 kN/m²	1 0.00 2 0.85 1.00	-2.80	0.00			Very soft, dark grey (N4), silty CLAY (MARINE DEPOSIT)
				100					3 2.00 4 3.55 3.95	-4.80	2.00			Greenish grey (5GY5/1), clayey silty fine to coarse SAND with some shell fragments (MARINE DEPOSIT)
10/12/2005		5.30m at 18:00												
12/12/2005		5.50m at 08:00												
				100				48 bls 2,3 3,6,9,11 N=29	5 4.00 6 4.45 7 8 4.90 4.95	-6.80	4.00			Medium dense, light bluish grey (5PB8/1), clayey silty fine to coarse SAND (ALLUVIUM)
				100				11 bls 1,1 1,0,0,1 N=2	9 6.00 10 6.45 6.50 11 12 6.90 6.95	-8.80	6.00			Soft, bluish grey (10B6/1), silty CLAY with some decayed plant fragments (ALLUVIUM)
				87				178 bls 2,2 2,4,4,5 N=15	13 8.00 14 8.45 8.50 15 16 8.90 8.95	-10.60 -11.30 -12.80	8.00 8.50 10.00			Medium dense, light bluish grey (10B7/1), slightly clayey silty coarse SAND (ALLUVIUM) 8.50-10.00m: dark bluish grey (10B4/1)

- Small Disturbed Sample
- Water Sample
- SPT Liner Sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- Piston Sample
- Packer Test
- Piezometer / Standpipe Tip
- Standard Penetration Test
- Pressuremeter Test
- Permeability Test
- Impression Packer / Televiewer Test
- In-situ Vane Shear Test

LOGGED H.K.Fung

DATE 19/12/2005

CHECKED M.Davies

DATE 22/12/2005

REMARKS

1. Constant head permeability test carried out at 10.00-11.00m depth.
2. Impression packer tests carried out at 34.30-35.80m and 35.50-37.00m depths.
3. Vane shear test carried out adjacent to drillhole at 1.00m depth.

DRILLHOLE RECORD

DRILLHOLE No. **STF-B4**

CONTRACT NO. GE/2003/14

SHEET 2 of 4

JOB TITLE **Agreement No. CE 28/2003 (EP) Sludge Treatment Facilities - Feasibility Study - Marine Ground Investigation**

METHOD **W+RC**	CO-ORDINATES	WORKS ORDER No. **GE/2003/14.9**
MACHINE & No. **BR8**	E **810014.60** N **831709.10**	DATE from **10/12/2005** to **16/12/2005**
FLUSHING MEDIUM **Sea Water**	ORIENTATION **Vertical**	SEABED LEVEL **-2.80** mPD

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Recovery %	Total Core Recovery %	Solid Core Recovery %	R.Q.D.	Fracture Index	Tests	Samples (No. Type Depth)	Reduced Level	Depth (m)	Legend	Grade	Description
										-12.80	10.00			
				100				19 bls 1,2 1,0,1,1 N=3	17 10.00 18 19 10.45 10.50 20 10.90 11.00					Soft, light bluish grey (5PB8/1), slightly sandy silty CLAY (ALLUVIUM)
				89				51 bls 5,8 4,3,4,14 N=25	21 12.00 22 23 12.45 12.50 24 12.90 12.95	-14.80 -15.30	12.00 12.50			Yellow (10YR8/6), silty fine to coarse SAND with some fine to coarse gravel sized quartz fragments (ALLUVIUM)
													V	Extremely weak, yellow (10YR7/6) mottled green, completely decomposed medium grained GRANITE (Firm, slightly clayey sandy SILT)
				100				48 bls 2,2 3,3,6,9 N=21	25 14.00 26 27 14.45 14.50 28 14.90 15.00					
12/12/2005 13/12/2005	Sw 15.00 Hw	4.40m at 18:00 5.60m at 08:00		0										
				0					29 16.00 16.10					
									30 17.10 17.20	-20.00	17.20		V	Extremely weak, yellow (10YR7/6) mottled green, completely decomposed mylonitic GRANITE (Firm, slightly clayey sandy SILT)
								2,2 3,4,4,8 N=19	31 32 17.60 17.65					
				30					33 18.10					
			70						34 19.10 35 19.20					
				83						-22.80	20.00			

- Small Disturbed Sample
- Water Sample
- SPT Liner Sample
- U76 Undisturbed Sample
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- Piston Sample
- Packer Test
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- Standard Penetration Test
- Pressuremeter Test
- Permeability Test
- Impression Packer / Televiewer Test
- In-situ Vane Shear Test

LOGGED H.K.Fung

DATE 19/12/2005

CHECKED M.Davies

DATE 22/12/2005

REMARKS

DRILLHOLE RECORD

DRILLHOLE No. **STF-B4**

CONTRACT NO. GE/2003/14

SHEET 3 of 4

JOB TITLE **Agreement No. CE 28/2003 (EP) Sludge Treatment Facilities - Feasibility Study - Marine Ground Investigation**

METHOD **W+RC**	CO-ORDINATES	WORKS ORDER No. **GE/2003/14.9**
MACHINE & No. **BR8**	E **810014.60** N **831709.10**	DATE from **10/12/2005** to **16/12/2005**
FLUSHING MEDIUM **Sea Water**	ORIENTATION **Vertical**	SEABED LEVEL **-2.80** mPD

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Recovery %	Total Core Recovery %	Solid Core Recovery %	R.Q.D.	Fracture Index	Tests	Samples No.	Type	Depth	Reduced Level	Depth (m)	Legend	Grade	Description
												-22.80	20.00			As sheet 2 of 4
				90				4,5 8,11,15,28 N=62	36 37		20.20 20.30					
									38		20.70 20.75					
									39		21.20					
		4.50m at 18:00							40		22.20	-25.10	22.30			
13/12/2005 14/12/2005		5.20m at 08:00						5,6 10,11,10,11 N=42	41		22.30				V	Extremely weak, yellowish brown (10YR5/8) spotted green, completely decomposed mylonitic GRANITE (Stiff, slightly clayey sandy SILT)
									42		23.70 23.75					
				100					43		23.20					
									44		24.20					
								3,4 7,9,11,20 N=47	45		24.30					
									46		24.70 24.75					
												-28.00	25.20			
				100					47		25.20				V	Extremely weak, reddish yellow (5YR7/6) spotted brown, completely decomposed mylonitic GRANITE (Slightly clayey very silty fine to coarse SAND)
									48		26.20 26.30					
								20,27 33,67/65mm 100bls/140mm	49		26.59					
				65					50		27.20					
									51		28.20					
				48					52		28.30					
									53		29.30 29.40					
								11,17 53,47/35mm 100bls/110mm	54		29.66					
												-32.80	30.00			

- Small Disturbed Sample
- Water Sample
- SPT Liner Sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- Piston Sample
- Packer Test
- Piezometer / Standpipe Tip
- Standard Penetration Test
- Pressuremeter Test
- Permeability Test
- Impression Packer / Televiewer Test
- In-situ Vane Shear Test

LOGGED H.K.Fung

DATE 19/12/2005

CHECKED M.Davies

DATE 22/12/2005

REMARKS

DRILLHOLE RECORD

CONTRACT NO. GE/2003/14

DRILLHOLE No. **STF-B4**

SHEET **4** of **4**

JOB TITLE **Agreement No. CE 28/2003 (EP) Sludge Treatment Facilities - Feasibility Study - Marine Ground Investigation**

METHOD **W+RC**	CO-ORDINATES E **810014.60** N **831709.10**	WORKS ORDER No. **GE/2003/14.9**
MACHINE & No. **BR8**		DATE from **10/12/2005** to **16/12/2005**
FLUSHING MEDIUM **Sea Water**	ORIENTATION **Vertical**	SEABED LEVEL **-2.80** mPD

Drilling Progress	Casing Depth/Size	Water Depth (m)	Water Recovery %	Total Core Recovery %	Solid Core Recovery %	R.Q.D.	Fracture Index	Tests	Samples No. Type Depth	Reduced Level	Depth (m)	Legend	Grade	Description
										-32.80	30.00			As sheet 3 of 4
		4.80m at 18:00		73					55	-33.10	30.30		V/IV	Extremely weak to very weak, brown (10YR5/3), completely to highly decomposed mylonitic GRANITE (Fine to coarse GRAVEL sized moderately weak to moderately strong rock fragments)
14/12/2005									56					
15/12/2005		5.10m at 08:00		0					57	-33.93	31.13		III	
	Hw 31.13			94	13	0	NI		T2101	-34.26	31.46			Moderately strong, pink spotted grey, moderately decomposed mylonitic GRANITE with very closely to medium spaced, smooth and rough, planar and undulating, iron oxide and manganese oxide stained, chlorite and kaolin coated joints, dipping at 30°-40°, 40°-50° and 60°-70°
							>20			-34.46	31.66			31.13-31.46m: non-intact
				95	8	0	NI		31.66	-34.70	31.90		IV	31.66-31.90m: weak to moderately weak and highly decomposed
							>20							
							NI		T2101	-34.94	32.14		III	32.14-32.50m: non-intact
				100	61	23	12.2		32.46	-35.30	32.50			
									T2101					
				100	48	44			33.07	-36.12	33.32			33.32-33.57m: non-intact
							NI		T2101	-36.37	33.57			
				100	88	46	>20		33.69					
							6.4		T2101					
				100	79	54			34.36 34.36					
							14.7		T2101					
				100	91	49			34.93					
									T2101					
				100	91	57			35.50					
							5.6		T2101 35.80					
		4.70m at 18:00							36.20					
15/12/2005														
16/12/2005		5.03m at 08:00		100	88	73			T2101					
							7.0		37.00					
		5.13m at 13:00					14.3			-40.17	37.37			37.37-37.58m: brown, with slickensided undulating joints
16/12/2005									37.58	-40.38	37.58			End of investigation hole at 37.58m
											40.00			

- Small Disturbed Sample
- Water Sample
- SPT Liner Sample
- U76 Undisturbed Sample
- U100 Undisturbed Sample
- Mazier Sample
- Piston Sample
- Packer Test
- Piezometer / Standpipe Tip
- Standard Penetration Test
- Pressuremeter Test
- Permeability Test
- Impression Packer / Televiewer Test
- In-situ Vane Shear Test

LOGGED H.K.Fung

DATE 19/12/2005

CHECKED M.Davies

DATE 22/12/2005

REMARKS

FUGRO GEOTECHNICAL SERVICES LTD

VIBROCORE RECORD

HOLE No. **MS2**

CONTRACT No.: **GE/2005/28**

SHEET: **1** of **1**

PROJECT: **Agreement No. CE 43/2006(EP)**
West New Territories (WENT) Landfill Extensions - Feasibility Study

METHOD: **Vibrocoring**

MACHINE & No.: **Wharf**

FLUSHING MEDIUM: **Water**

CO-ORDINATES:
E **809410.04**
N **831421.77**

ORIENTATION: **Vertical**

WORKS ORDER No. **GE/2005/28.18**

DATE from: **15/01/2008** to **15/01/2008**

SEABED LEVEL **-4.00** mPD

Drilling Progress	Casing depth/size	Water Level (m) Shift start/ end	Water Return %	T C R %	S C R %	R Q D %	F I	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
15/01/2008		5.20m at 10:00		100					No. 1 Type V100 Depth 0.00; 2 1.45 1.50	-4.00	0.00			Very soft, dark grey(5YR/4/1), silty CLAY with occasional fine shell fragments. (MARINE DEPOSIT)
										-5.50	1.50			End of investigation hole at 1.50m.
											10.00			

- Small Disturbed Sample
- Piston sample
- U76 Undisturbed Sample
- Vibrocore sample
- Vibrocore sub-sample
- SPT Liner Sample
- Water Sample
- Standard Penetration Test
- In-situ Vane Shear Test
- Permeability Test
- Impression Packer Test
- Packer Test
- Piezometer Tip
- Standpipe

LOGGED **P. Zhang**

DATE **23/01/2008**

CHECKED **S. C. Wong**

DATE **24/01/2008**

REMARKS

1. 20L of sediment grab samples were collected on 15/1/2008.
2. 16.75L of water sample was collected on 15/1/2008.
3. Vibrocore sample was delivered to laboratory on 15/1/2008.

FGS Job No.: 05 0460 05 18

FUGRO GEOTECHNICAL SERVICES LTD

VIBROCORE RECORD

HOLE No. **MS3**

CONTRACT No.: **GE/2005/28**

SHEET: **1** of **1**

PROJECT: **Agreement No. CE 43/2006(EP)**
West New Territories (WENT) Landfill Extensions - Feasibility Study

METHOD: **Vibrocoring**

CO-ORDINATES:
E **809498.99**
N **831532.50**

WORKS ORDER No. **GE/2005/28.18**

MACHINE & No.: **Wharf**

DATE from: **15/01/2008** to **15/01/2008**

FLUSHING MEDIUM: **Water**

ORIENTATION: **Vertical**

SEABED LEVEL **-4.60** mPD

Drilling Progress	Casing depth/size	Water Level (m) Shift start/ end	Water Return %	T C R %	S C R %	R Q D %	F I	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
15/01/2008		6.10m at 12:00		100					No. 1 Type V100 Depth 0.00; No. 2 Depth 1.45 / 1.50	-4.60	0.00			Very soft, dark grey(5YR/4/1), sandy CLAY with some fine shell fragments. (MARINE DEPOSIT)
										-6.10	1.50			End of investigation hole at 1.50m.
											10.00			

- Small Disturbed Sample
- Piston sample
- U76 Undisturbed Sample
- Vibrocore sample
- Vibrocore sub-sample
- SPT Liner Sample
- Water Sample
- Standard Penetration Test
- In-situ Vane Shear Test
- Permeability Test
- Impression Packer Test
- Packer Test
- Piezometer Tip
- Standpipe

LOGGED **P. Zhang**

DATE **10/01/2008**

CHECKED **S. C. Wong**

DATE **24/01/2008**

REMARKS

1. 20L of sediment grab samples were collected on 15/1/2008.
2. 16.75L of water sample was collected on 15/1/2008.
3. Vibrocore sample was delivered to laboratory on 15/1/2008.

FGS Job No.: 05 0460 05 18

FUGRO GEOTECHNICAL SERVICES LTD

VIBROCORE RECORD

HOLE No. **MS6**

CONTRACT No.: **GE/2005/28**

SHEET: **1** of **1**

PROJECT: **Agreement No. CE 43/2006(EP)**
West New Territories (WENT) Landfill Extensions - Feasibility Study

METHOD: **Vibrocoring**	CO-ORDINATES:	WORKS ORDER No. **GE/2005/28.18**
MACHINE & No.: **Wharf**	E **809746.52** N **831528.30**	DATE from: **16/01/2008** to **16/01/2008**
FLUSHING MEDIUM: **Water**	ORIENTATION: **Vertical**	SEABED LEVEL **-3.70** mPD

Drilling Progress	Casing depth/size	Water Level (m) Shift start/ end	Water Return %	T C R %	S C R %	R Q D %	F I	Tests	Samples No.	Type	Depth	Reduced Level	Depth (m)	Legend	Grade	Description
16/01/2008		4.70m at 10:00		100					1	V100	0.00	-3.70	0.00			Very soft, dark grey(5YR/4/1), silty CLAY with occasional shell fragments. (MARINE DEPOSIT)
									2		1.45 1.50	-5.20	1.50			End of investigation hole at 1.50m.
													10.00			

Small Disturbed Sample
Piston sample
U76 Undisturbed Sample
Vibrocore sample
Vibrocore sub-sample
SPT Liner Sample
Water Sample
Standard Penetration Test
In-situ Vane Shear Test
Permeability Test
Impression Packer Test
Packer Test
Piezometer Tip
Standpipe

LOGGED **P. Zhang**
DATE **10/01/2008**
CHECKED **S. C. Wong**
DATE **24/01/2008**

REMARKS
1. 20L of sediment grab samples were collected on 16/1/2008.
2. 16.75L of water sample was collected on 16/1/2008.
3. Vibrocore sample was delivered to laboratory on 16/1/2008.

FGS Job No.: 05 0460 05 18

FUGRO GEOTECHNICAL SERVICES LTD	**VIBROCORE RECORD**	HOLE No. **MS7**
	CONTRACT No.: **GE/2005/28**	SHEET: **1** of **1**

PROJECT: **Agreement No. CE 43/2006(EP)**
West New Territories (WENT) Landfill Extensions - Feasibility Study

METHOD: **Vibrocoring**	CO-ORDINATES:	WORKS ORDER No. **GE/2005/28.18**
MACHINE & No.: **Wharf**	E **809787.22** N **831612.52**	DATE from: **15/01/2008** to **15/01/2008**
FLUSHING MEDIUM: **Water**	ORIENTATION: **Vertical**	SEABED LEVEL **-5.00** mPD

Drilling Progress	Casing depth/size	Water Level (m) Shift start/ end	Water Return %	T C R %	S C R %	R Q D %	F I	Tests	Samples	Reduced Level	Depth (m)	Legend	Grade	Description
15/01/2008		7.00m at 15:00		100					No. 1 Type V100 Depth 0.00	-5.00	0.00			Very soft, dark grey(5YR/4/1), sandy CLAY with occasional fine shell fragments. (MARINE DEPOSIT)
									2 1.45/1.50	-6.50	1.50			End of investigation hole at 1.50m.
											10.00			

- Small Disturbed Sample
- Piston sample
- U76 Undisturbed Sample
- Vibrocore sample
- Vibrocore sub-sample
- SPT Liner Sample
- Water Sample
- Standard Penetration Test
- In-situ Vane Shear Test
- Permeability Test
- Impression Packer Test
- Packer Test
- Piezometer Tip
- Standpipe

LOGGED **P. Zhang**
DATE **10/01/2008**
CHECKED **S. C. Wong**
DATE **24/01/2008**

REMARKS
1. 20L of sediment grab samples were collected on 15/1/2008.
2. 16.75L of water sample was collected on 15/1/2008.
3. Vibrocore sample was delivered to laboratory on 15/1/2008.

FGS Job No.: 05 0460 05 18

FUGRO GEOTECHNICAL SERVICES LTD	**VIBROCORE RECORD**	HOLE No. **MS9**
	CONTRACT No.: **GE/2005/28**	SHEET: **1** of **1**

PROJECT: **Agreement No. CE 43/2006(EP)**
West New Territories (WENT) Landfill Extensions - Feasibility Study

METHOD: **Vibrocoring**	CO-ORDINATES:	WORKS ORDER No. **GE/2005/28.18**
MACHINE & No.: **Wharf**	E **809971.26** N **831671.12**	DATE from: **16/01/2008** to **16/01/2008**
FLUSHING MEDIUM: **Water**	ORIENTATION: **Vertical**	SEABED LEVEL **-5.95** mPD

Drilling Progress	Casing depth/size	Water Level (m) Shift start/ end	Water Return %	T C R %	S C R %	R Q D %	F I	Tests	Samples No.	Samples Type	Samples Depth	Reduced Level	Depth (m)	Legend	Grade	Description
15/01/2008		7.30m at 12:00		100					1	V100	0.00	-5.95	0.00			Very soft, dark grey(5YR/4/1), sandy CLAY with occasional fine shell fragments. (MARINE DEPOSIT)
									2		1.45 1.50	-7.40 -7.45	1.45 1.50			Light yellowish brown(2.5Y/6/4) to yellowish grey(10YR/5/6), clayey, fine to coarse SAND with some fine quartz gravel. (ALLUVIUM) End of investigation hole at 1.50m.
													10.00			

- Small Disturbed Sample
- Piston sample
- U76 Undisturbed Sample
- V76 Vibrocore sample
- Vibrocore sub-sample
- SPT Liner Sample
- Water Sample
- Standard Penetration Test
- In-situ Vane Shear Test
- Permeability Test
- Impression Packer Test
- Packer Test
- Piezometer Tip
- Standpipe

LOGGED **P. Zhang**
DATE **10/01/2008**
CHECKED **S. C. Wong**
DATE **24/01/2008**

REMARKS
1. 20L of sediment grab samples were collected on 16/1/2008.
2. 16.75L of water sample was collected on 16/1/2008.
3. Vibrocore sample was delivered to laboratory on 16/1/2008.

FGS Job No.: 05 0460 05 18

DIGITAL DATA DVD

Digital Copy of Survey Report

DRAWINGS

E 869500 E 870000 E 870500 E 871000 E 871500 E 872000 E 872500

N 832200

N 832000

N 831800

N 831600

N 831400

N 831200

19102_ODB/3

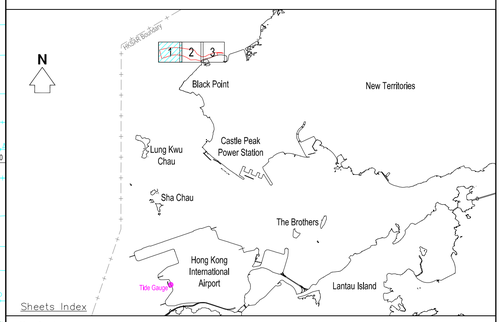
Second West East Gas Pipeline (WEP II)

Yacheng Pipeline

BPPS Pipeline

Legend :

5718_A5	Existing borehole position
*510 *508	Multi-beam echo sounding track with fix positions
	Survey boundary
	Existing pipe from marine chart
	As-laid power cable from EGS job number HK197505
	Conical buoy / Beacon in general
	Chart overlap



Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 1.1

Drawing Title :

SWATH TRACK PLOT (SHEET 1 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GEO1 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C–Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C–Boom low voltage boomer (LVB) system
   EdgeTech 3400–OTS sub–bottom profiler
   Innomar SES–2000 medium–100 sub–bottom profiler
   Geometrics G–882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
0	31/07/2023	Agnes Siu	Howard Wang	Margie Chen	Preliminary
1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

CEDD Civil Engineering and Development Department

Surveyor :

EGS (ASIA) LIMITED
15th FLOOR, NORTH POINT INDUSTRIAL BUILDING,
499 KING'S ROAD,
NORTH POINT, HONG KONG
Tel: (852) 28948622
Fax: (852) 25763590
Web: www.egssurvey.com
EARTH SCIENCES & SURVEYING

JOB NO. : HK268623

E 829200
E 829400
E 829600
E 829800
E 830000
E 830200
E 830400

N 832200
N 832000
N 831800
N 831600
N 831400
N 831200

N

Shekou-Yuen Power Cable

Oyster Farms

Oyster Farms

Oyster Farms

Shenzhen West East Gas Pipeline (WEPII)

Yacheng Pipeline

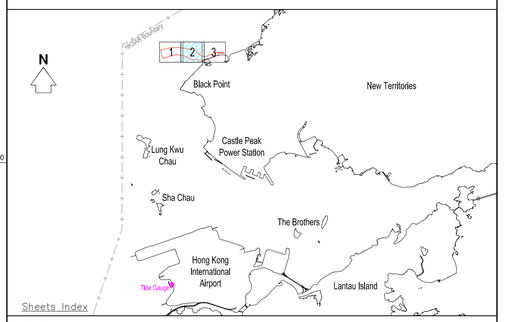
SPPS Pipeline

5718_C2

16442_90830/1D

Legend :

- 5718_A5 — Existing borehole position
- *870 *808 — Multi-beam echo sounding track with fix positions
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 1.2

Drawing Title :

SWATH TRACK PLOT (SHEET 2 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GEO1 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
0	31/07/2023	Agnes Siu	Howard Wang	Margie Chen	Preliminary
1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1: 2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

EGS (ASIA) LIMITED
15th FLOOR, NORTH POINT INDUSTRIAL BUILDING,
499 KING'S ROAD,
NORTH POINT, HONG KONG
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Web: www.egssurvey.com
EARTH SCIENCES & SURVEYING

JOB NO. : HK268623

E 828500 E 828600 E 828700 E 828800 E 828900 E 829000 E 829100 E 829200

N 832200 N 832000 N 831800 N 831600 N 831400 N 831200

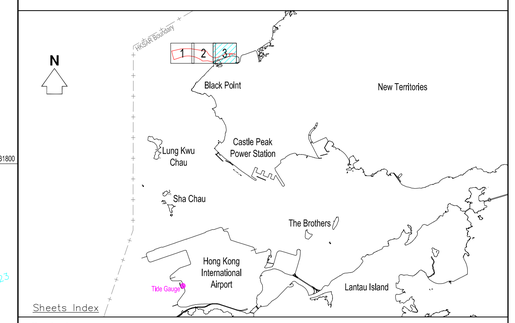
Castle Peak Power Cable

5718_A5 5718_B4 5718_B5 5718_C2 5718_C3 5718_C4
43156_STF-B1 43156_STF-B2 43156_STF-B3 43156_STF-B4
47257_MS2 47257_MS3 47257_MS6 47257_MS7 47257_MS9
16442_90830/1D

Ash Lagoon
(Nim Wan)

Legend :

- 5718_A5 — Existing borehole position
- *870 *808 — Multi-beam echo sounding track with fix positions
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Sheets Index

Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 1.3

Drawing Title :

SWATH TRACK PLOT (SHEET 3 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GEO1 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C–Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C–Boom low voltage boomer (LVB) system
   EdgeTech 3400–OTS sub–bottom profiler
   Innomar SES–2000 medium–100 sub–bottom profiler
   Geometrics G–882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
0	31/07/2023	Agnes Siu	Howard Wang	Margie Chen	Preliminary
1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

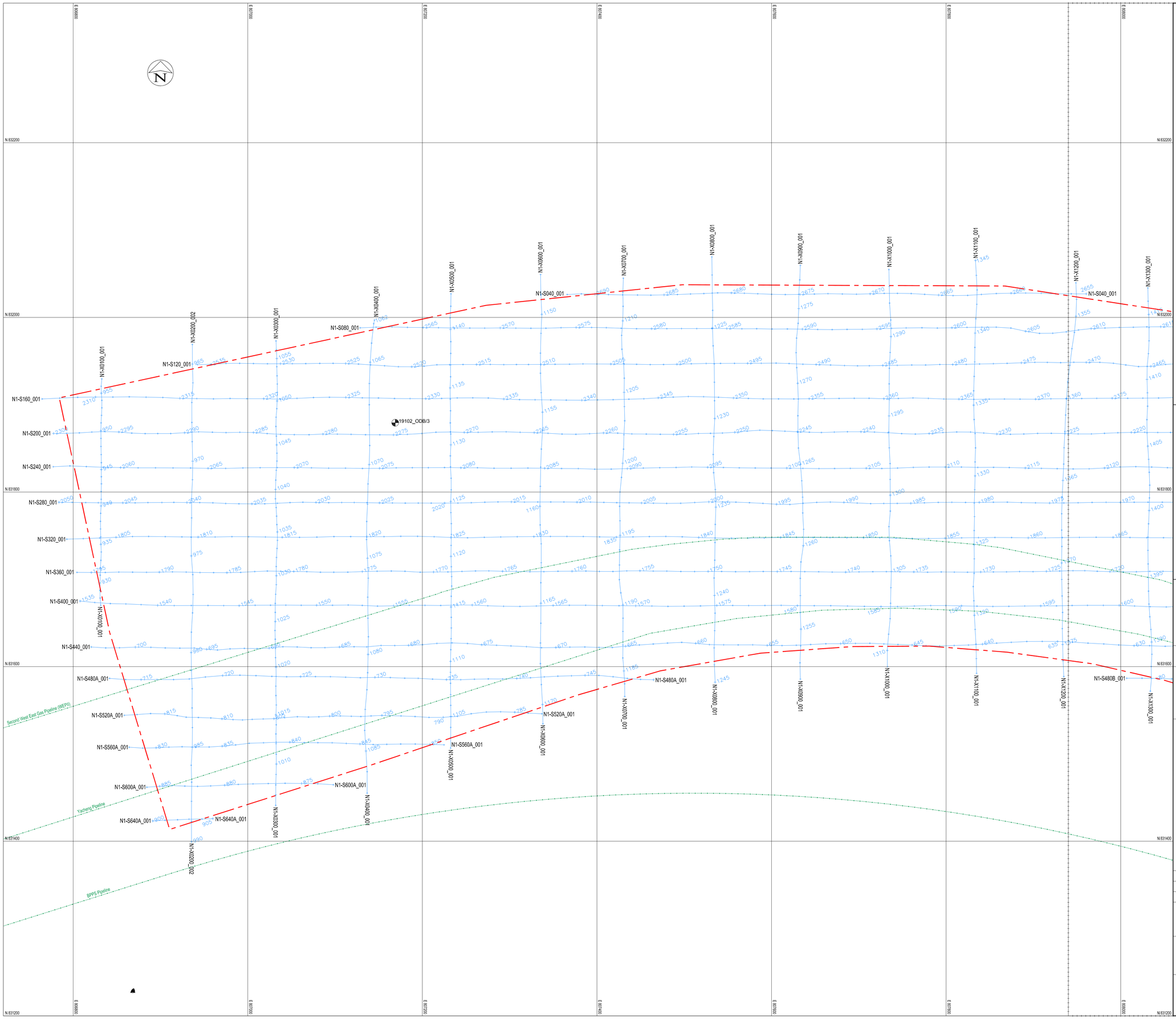
Client :

Civil Engineering and Development Department

Surveyor :

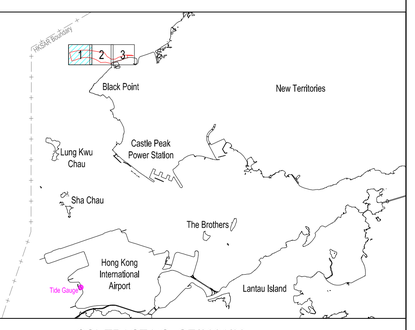
EGS (ASIA) LIMITED
13th FLOOR, NORTH POINT INDUSTRIAL BUILDING,
499 KING'S ROAD,
NORTH POINT, HONG KONG
Tel: (852) 28948622
Fax: (852) 25763590
Web: www.egssurvey.com
EARTH SCIENCES & SURVEYING

JOB NO. : HK268623



Legend :

- 5718_A5 — Existing borehole position
- 260 Line No. — Hydrophone track with fix positions and line number
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 2.1

Drawing Title :

HYDROPHONE TRACK PLOT (SHEET 1 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
0	31/07/2023	Agnes Siu	Howard Wang	Margie Chen	Preliminary
1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

EGS (ASIA) LIMITED
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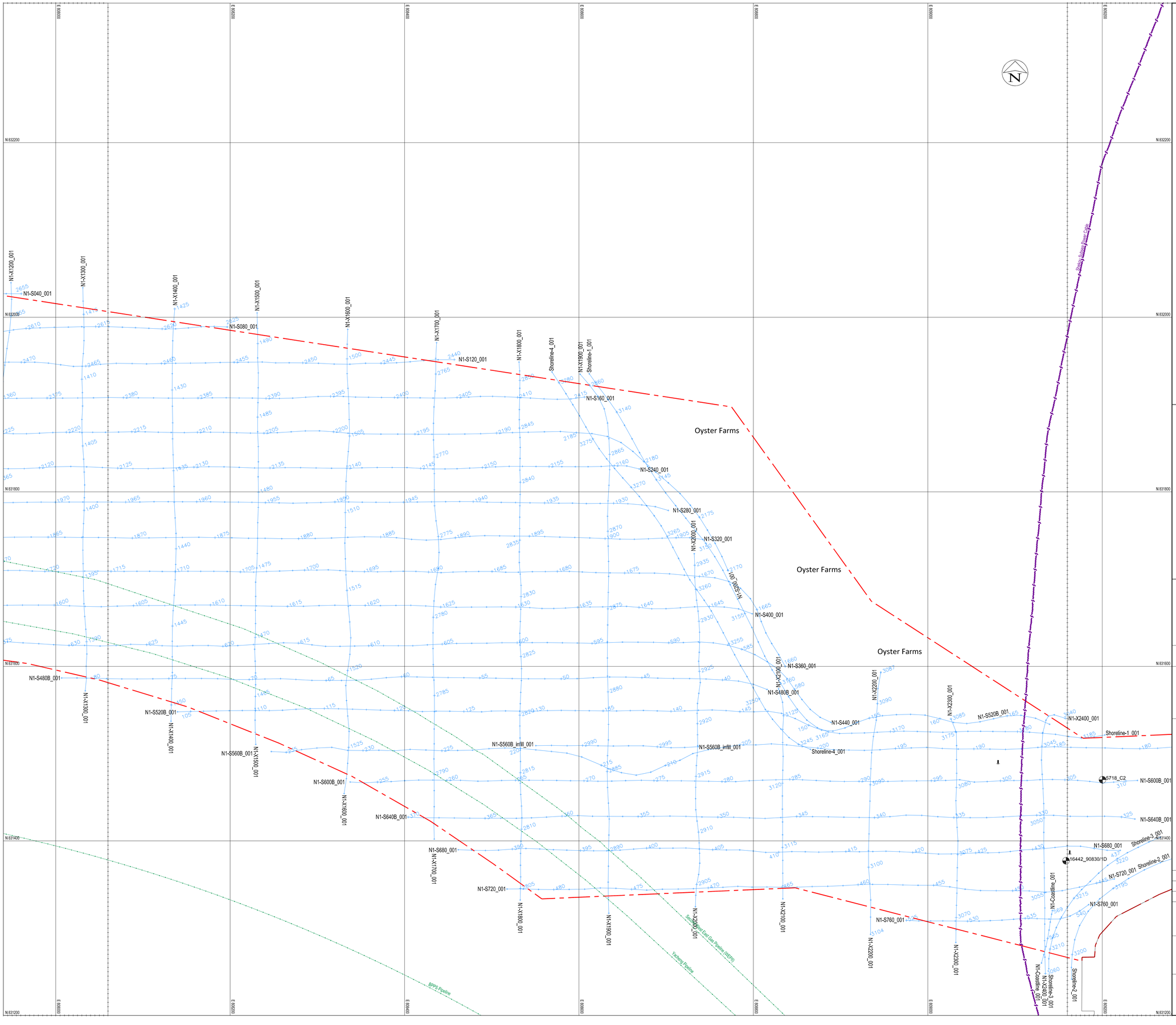
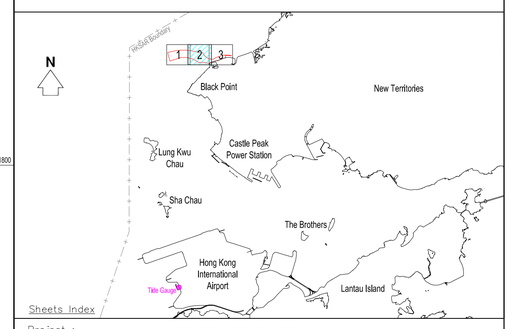
Tel: (852) 28948622
Fax: (852) 25763590
Web: www.egssurvey.com
EARTH SCIENCES & SURVEYING

JOB NO. : HK268623



Legend :

- 5718_A5 — Existing borehole position
- 260 Line No. — Hydrophone track with fix positions and line number
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 2.2

Drawing Title :

HYDROPHONE TRACK PLOT (SHEET 2 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
0	31/07/2023	Agnes Siu	Howard Wang	Margie Chen	Preliminary
1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1: 2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

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JOB NO. : HK268623

E 828200
E 828400
E 828600
E 828800
E 829000
E 829200
N 832200
N 832000
N 831800
N 831600
N 831400
N 831200
Shoreline-1_001
Shoreline-2_001
Shoreline-3_001
N1-X2400_001
N1-S560B_001
N1-S600B_001
N1-S640B_001
N1-S680_001
N1-S720_001
N1-S760_001
16442_90830/1D
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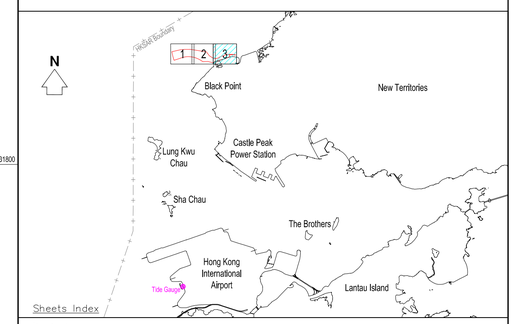
5718_B4
5718_B5
5718_C2
5718_C3
5718_C4
43156_STF-B1
43156_STF-B2
43156_STF-B3
43156_STF-B4
47257_MS2
47257_MS3
47257_MS6
47257_MS7
47257_MS9
Ash Lagoon
(Nim Wan)

Legend :

- 5718_A5 — Existing borehole position
- 260 Line No. — Hydrophone track with fix positions and line number
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

CONTRACT NO. GE/2021/03
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AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 2.3

Drawing Title :

HYDROPHONE TRACK PLOT (SHEET 3 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
0	31/07/2023	Agnes Siu	Howard Wang	Margie Chen	Preliminary
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METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

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15th FLOOR, NORTH POINT INDUSTRIAL BUILDING,
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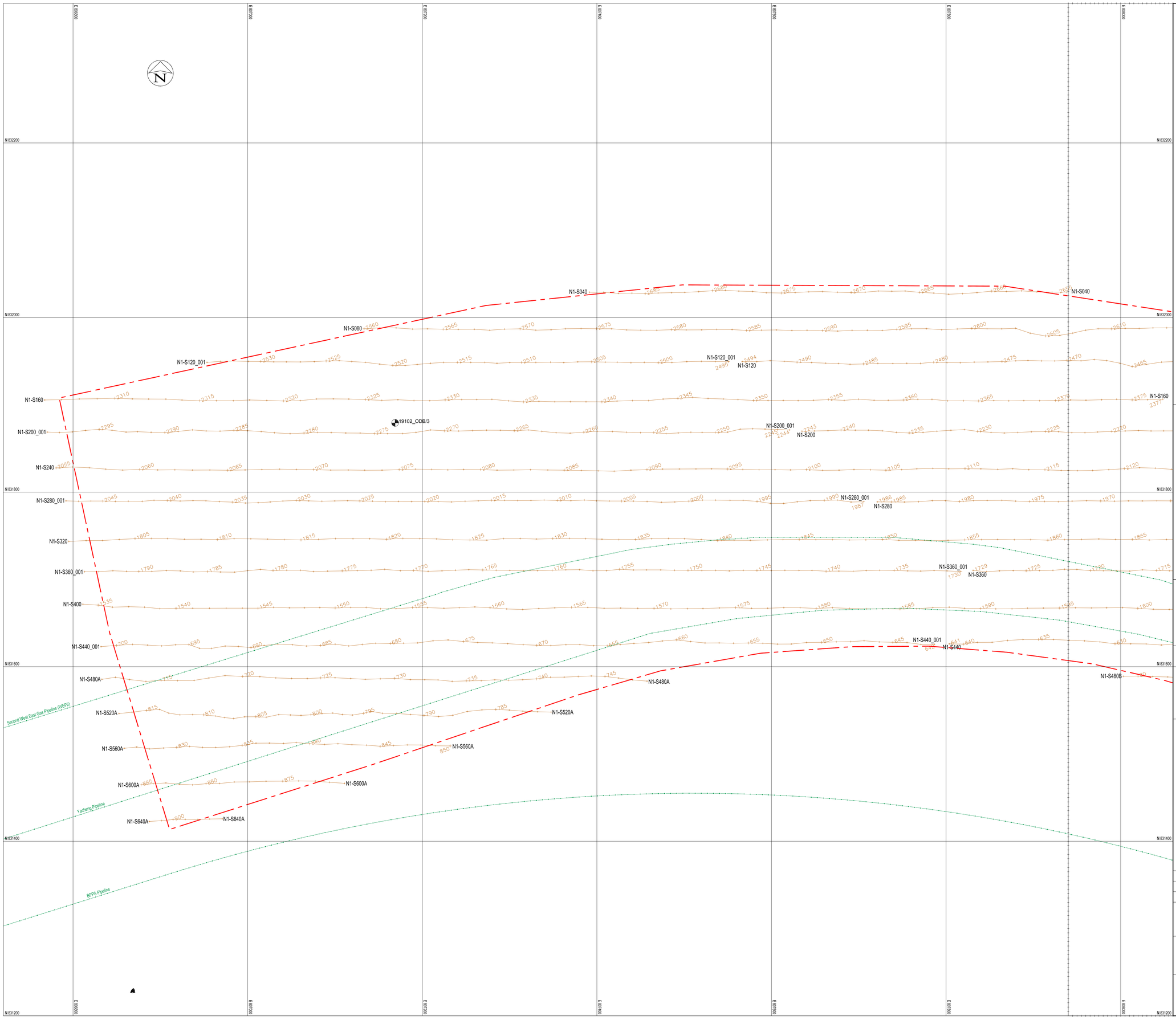
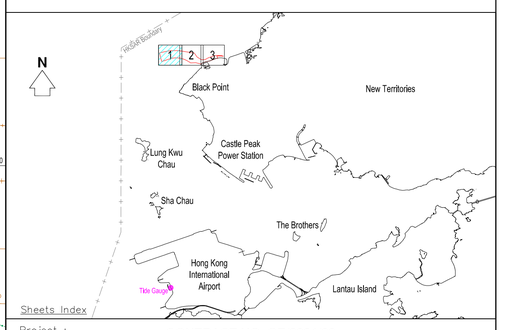
EARTH SCIENCES & SURVEYING

JOB NO. : HK268623



Legend :

- 5718_A5 — Existing borehole position
- 260 Line No. — Side scan sonar track with fix positions and line number
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 3.1

Drawing Title :

SIDE SCAN SONAR TRACK PLOT (SHEET 1 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GEO1 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C–Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C–Boom low voltage boomer (LVB) system
   EdgeTech 3400–OTS sub–bottom profiler
   Innomar SES–2000 medium–100 sub–bottom profiler
   Geometrics G–882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
0	31/07/2023	Agnes Siu	Howard Wang	Margie Chen	Preliminary
1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

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15th FLOOR, NORTH POINT INDUSTRIAL BUILDING,
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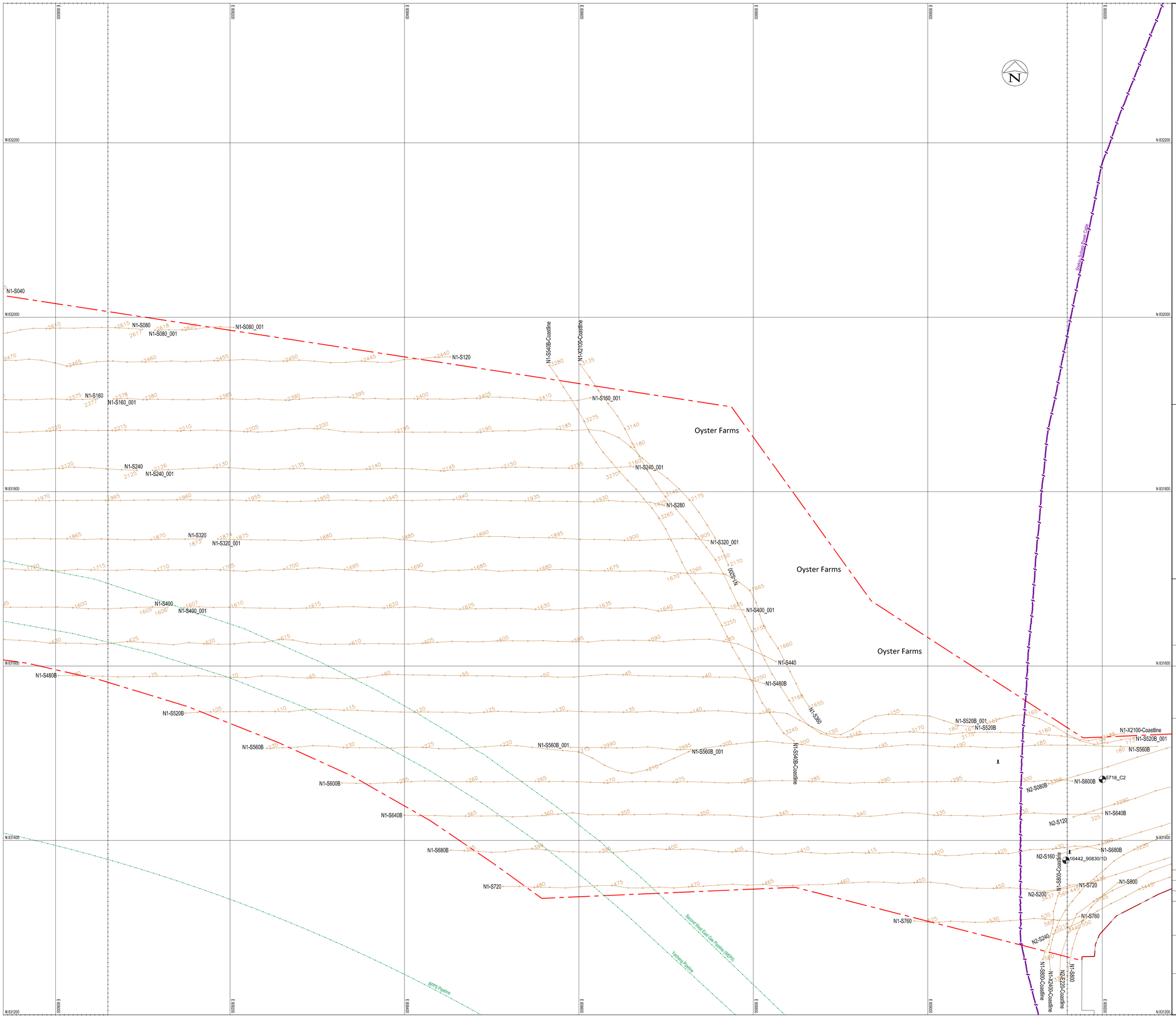
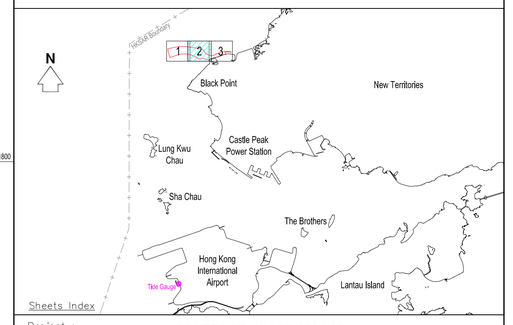
EARTH SCIENCES & SURVEYING

JOB NO. : HK268623



Legend :

- 5718_A5 — Existing borehole position
- 260 Line No. — Side scan sonar track with fix positions and line number
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 3.2

Drawing Title :

SIDE SCAN SONAR TRACK PLOT (SHEET 2 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
0	31/07/2023	Agnes Siu	Howard Wang	Margie Chen	Preliminary
1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1: 2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

EGS (ASIA) LIMITED
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JOB NO. : HK268623

E 808500 E 808900 E 809300 E 809700 E 810100 E 810500 E 810900

N 832200 N 832000 N 831800 N 831600 N 831400 N 831200

Black Point Power Cable

N2-S040 N2-E490 N2-S500 N2-S080B N2-S120 N2-S160 N2-S200 N2-E220-Coastline N2-S240

43156_STF-B1 43156_STF-B2 43156_STF-B3 43156_STF-B4 47257_MS9 47257_MS7 47257_MS6 47257_MS3 47257_MS2

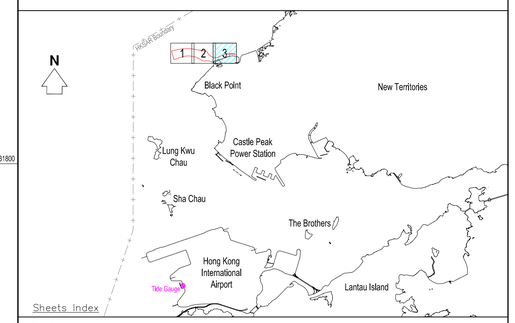
5718_A5 5718_B4 5718_B5 5718_C2 5718_C3 5718_C4

N1-X2100-Coastline N1-S520B_001 N1-S560B N1-S600B N1-S640B N1-X2400-Coastline N1-S680B 16442_90830/1D N1-S720 N1-S800 N1-S760 N1-S920

Ash Lagoon
(Nim Wan)

Legend :

- 5718_A5 — Existing borehole position
- 260 Line No. — Side scan sonar track with fix positions and line number
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 3.3

Drawing Title :

SIDE SCAN SONAR TRACK PLOT (SHEET 3 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C–Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C–Boom low voltage boomer (LVB) system
   EdgeTech 3400–OTS sub–bottom profiler
   Innomar SES–2000 medium–100 sub–bottom profiler
   Geometrics G–882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
0	31/07/2023	Agnes Siu	Howard Wang	Margie Chen	Preliminary
1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

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13th FLOOR, NORTH POINT INDUSTRIAL BUILDING,
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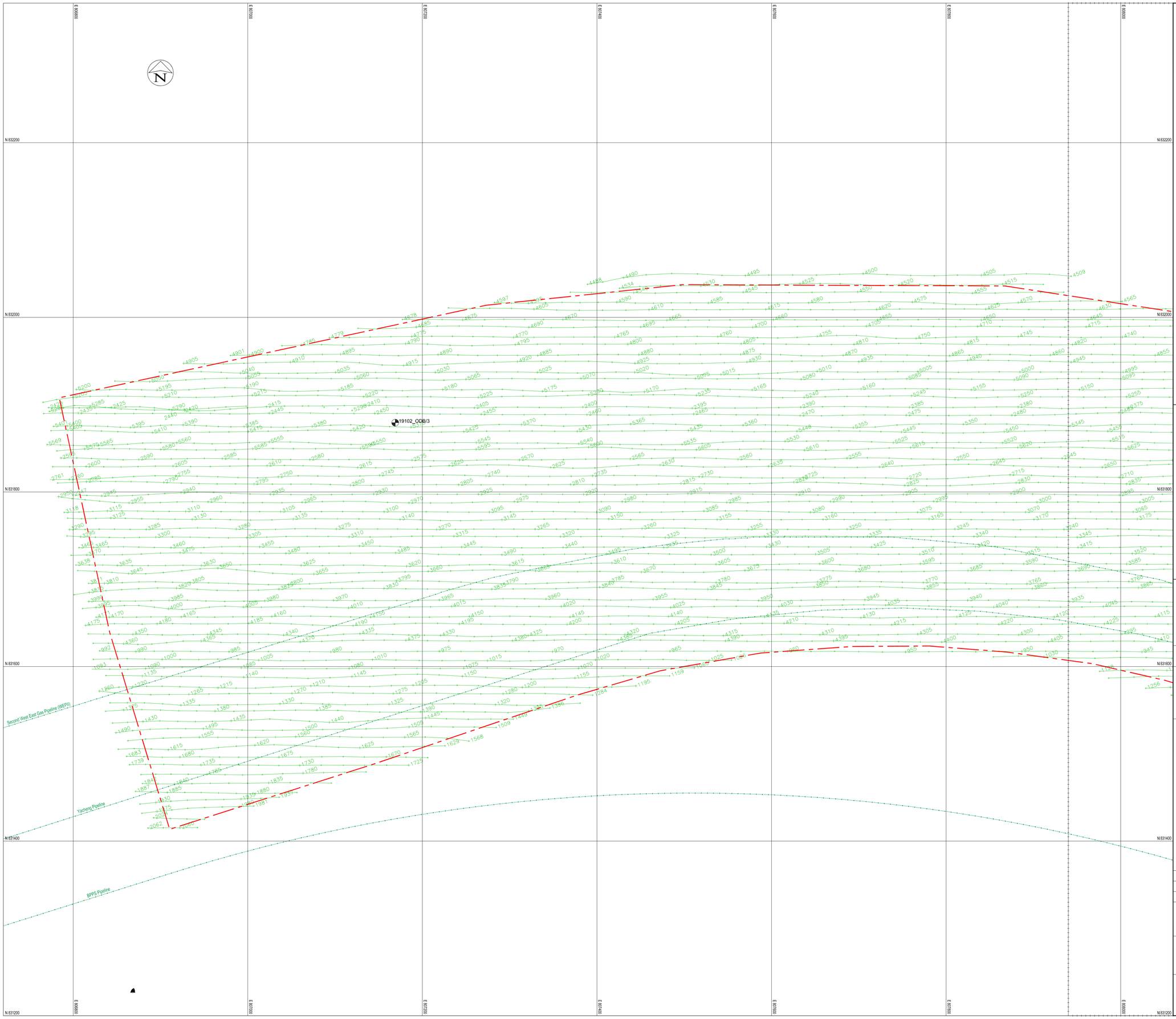
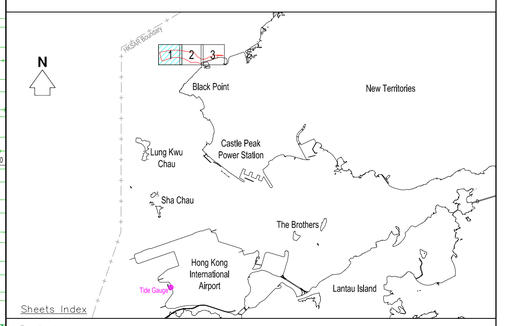
EARTH SCIENCES & SURVEYING

JOB NO. : HK268623



Legend :

5718_A5	Existing borehole position
1384 1386	Magnetic track with fix positions
	Survey boundary
	Existing pipe from marine chart
	As-laid power cable from EGS job number HK197505
	Conical buoy / Beacon in general
	Chart overlap



Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 4.1

Drawing Title :

MAGNETOMETER TRACK PLOT (SHEET 1 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C–Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C–Boom low voltage boomer (LVB) system
   EdgeTech 3400–OTS sub–bottom profiler
   Innomar SES–2000 medium–100 sub–bottom profiler
   Geometrics G–882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
0	31/07/2023	Agnes Siu	Howard Wang	Margie Chen	Preliminary
1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

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JOB NO. : HK268623

E 808200 E 808400 E 808600 E 808800 E 809000 E 809200 E 809400 E 809600 E 809800 E 810000 E 810200

N 832200 N 832000 N 831800 N 831600 N 831400 N 831200

Oyster Farms

Oyster Farms

Oyster Farms

Shorecrest West East Gas Pipeline (WEPII)

Yachang Pipeline

BPPS Pipeline

Shekou Nanhai Power Cable

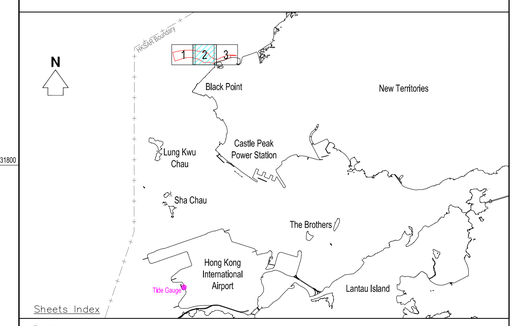
5718_C2

16442_90830/1D

N

Legend :

- 5718_A5 — Existing borehole position
- 1384 — 1386 — Magnetic track with fix positions
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
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PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 4.2

Drawing Title :

MAGNETOMETER TRACK PLOT (SHEET 2 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

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1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

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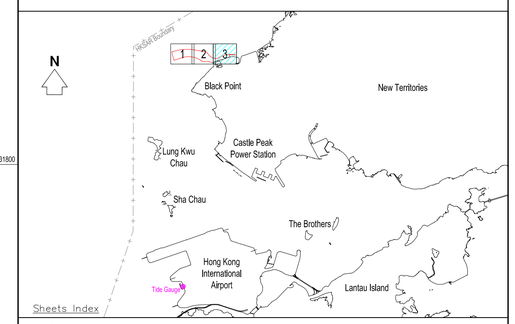
JOB NO. : HK268623

E 809200
E 809400
E 809600
E 809800
E 810000
E 810200
E 810400
N 832200
N 832000
N 831800
N 831600
N 831400
N 831200
Shiu Ping Power Cable
43156_STF-B4
43156_STF-B3
43156_STF-B2
43156_STF-B1
47257_MS9
5718_A5
47257_MS7
5718_B4
5718_B5
47257_MS3
47257_MS6
5718_C2
5718_C3
5718_C4
47257_MS2
16442_90830/1D
Ash Lagoon
(Nim Wan)

Legend :

- 5718_A5 — Existing borehole position
- 1384 1386 — Magnetic track with fix positions
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

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PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 4.3

Drawing Title :

MAGNETOMETER TRACK PLOT (SHEET 3 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
0	31/07/2023	Agnes Siu	Howard Wang	Margie Chen	Preliminary
1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

EGS (ASIA) LIMITED
15th FLOOR, NORTH POINT INDUSTRIAL BUILDING,
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Web: www.egssurvey.com
EARTH SCIENCES & SURVEYING

JOB NO. : HK268623

E 869500
E 870000
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E 871000
E 871500
E 872000
E 872500

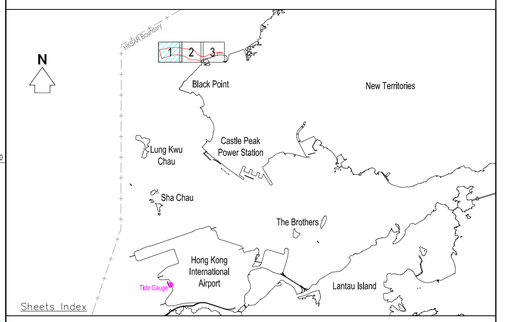
N 832200
N 832000
N 831800
N 831600
N 831400
N 831200

19102_ODB/3

Second West East Gas Pipeline (WEP II)
Yacheng Pipeline
BPPS Pipeline

Legend :

- 5718_A5 — Existing borehole position
- 1395 — Magnetic track with fix positions
- 5045 — Seismic track (Innomar) with fix positions
- 135 — Seismic track (EdgeTech 3400) with fix positions
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Sheets Index

Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 5.1

Drawing Title :

UTILITY SURVEY TRACK PLOT (SHEET 1 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GEO1 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

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METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

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E 808000
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E 808800
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E 809600
E 810000
E 810400

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N 832000
N 831800
N 831600
N 831400
N 831200

N

Oyster Farms

Oyster Farms

Oyster Farms

Sheung Shudi Power Cable

Second West East Gas Pipeline (WEPII)

Yacheng Pipeline

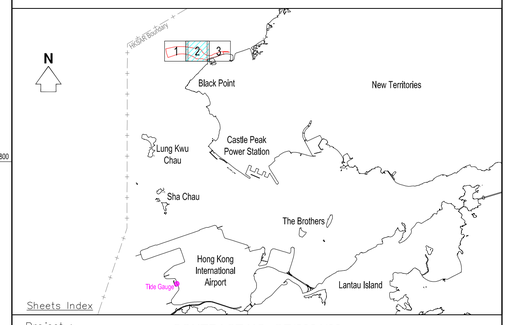
BPPS Pipeline

5718_C2

16442_90830_1D

Legend :

- 5718_A5 — Existing borehole position
- 1395 — Magnetic track with fix positions
- 5045 — Seismic track (Innomar) with fix positions
- 135 — Seismic track (EdgeTech 3400) with fix positions
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 5.2

Drawing Title :

UTILITY SURVEY TRACK PLOT (SHEET 2 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GEO1 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
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   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

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METRIC SCALE 1: 2000

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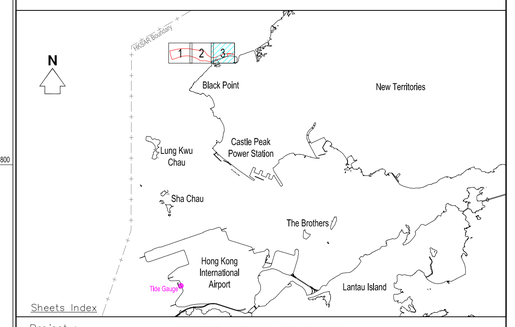
E 828500
E 828900
E 829300
E 829700
E 830100
E 830500
E 830900
N 832200
N 832000
N 831800
N 831600
N 831400
N 831200
Shell Nakika Power Cable
5718_A5
43156_STF-B1
43156_STF-B2
43156_STF-B3
43156_STF-B4
47257_MS9
47257_MS7
5718_B4
5718_B5
47257_MS3
47257_MS6
5718_C2
5718_C3
5718_C4
47257_MS2
16442_908301D
Ash Lagoon
(Nim Wan)

Legend :

- 5718_A5 — Existing borehole position
- 1395 — Magnetic track with fix positions
- 5045 — Seismic track (Innomar) with fix positions
- 135 — Seismic track (EdgeTech 3400) with fix positions
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

CONTRACT NO. GE/2021/03
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AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 5.3

Drawing Title :

UTILITY SURVEY TRACK PLOT (SHEET 3 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

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1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

CEDD Civil Engineering and Development Department

Surveyor :

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E 809200 E 810000 E 810800 E 811600 E 812400 E 813200 E 814000

N 832200 N 832000 N 831800 N 831600 N 831400 N 831200

19102_0024

Second West East Gas Pipeline (WEP II)

Yacheng Pipeline

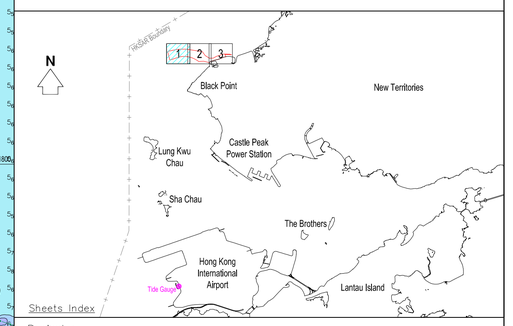
BPPS Pipeline

Legend :

- 5718_A5 — Existing borehole position
- 5 / 25 — Multibeam echo sounding data in metres above/below HKPD
- Contour at 1m interval
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap

Metres above / below HKPD

-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12



Project :

CONTRACT NO. GE/2021/03
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AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 6.1

Drawing Title :

CONTOURED SWATH BATHYMETRY PLAN (SHEET 1 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
0	31/07/2023	Agnes Siu	Howard Wang	Margie Chen	Preliminary
1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

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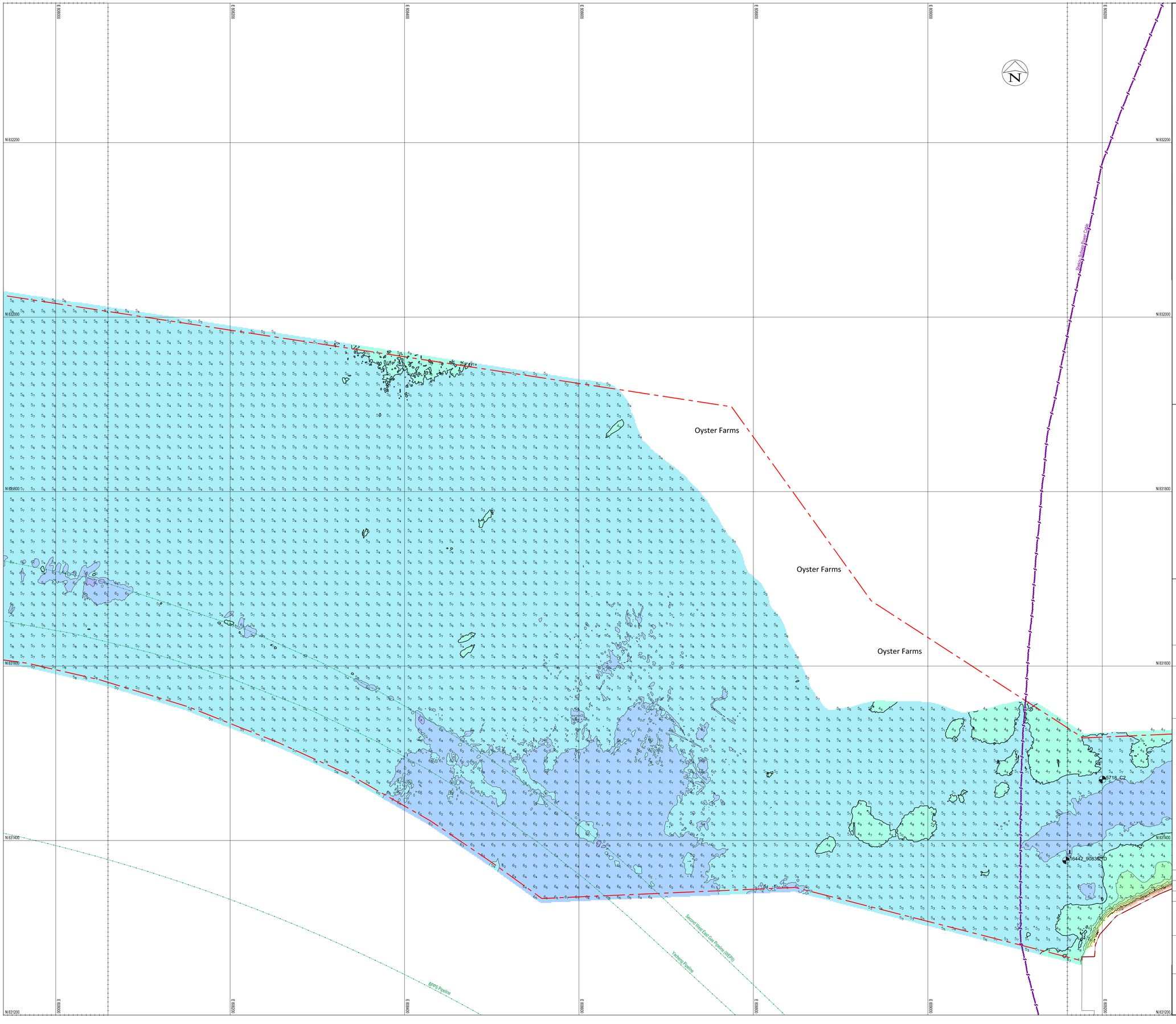
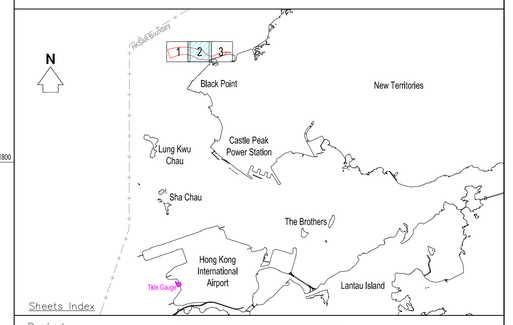


Legend :

- 5718_A5 — Existing borehole position
- 5 / 25 — Multibeam echo sounding data in metres above/below HKPD
- Contour at 1m interval
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap

Metres above / below HKPD

-3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 11 12



Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 6.2

Drawing Title :

CONTOURED SWATH BATHYMETRY PLAN (SHEET 2 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

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1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

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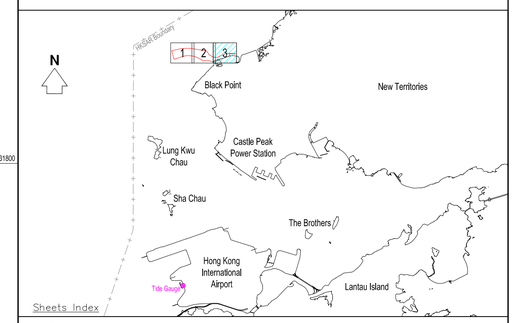
E 810400
N 832200
N 832000
N 831800
N 831600
N 831400
N 831200
Shekou Sewage Pumping Cable
5718_A5
5718_B4
5718_B5
5718_C2
5718_C3
5718_C4
43156_STF-B1
43156_STF-B2
43156_STF-B3
43156_STF-B4
47257_MS2
47257_MS3
47257_MS6
47257_MS7
47257_MS9
16442_908362TD
Ash Lagoon
(Nim Wan)

Legend :

- 5718_A5 — Existing borehole position
- 5 / 24 — Multibeam echo sounding data in metres above/below HKPD
- Contour at 1m interval
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap

Metres above / below HKPD

-3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 11 12



Project :

CONTRACT NO. GE/2021/03
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AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 6.3

Drawing Title :

CONTOURED SWATH BATHYMETRY PLAN (SHEET 3 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
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   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

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1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

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E 871000
E 871500
N 832200
N 832000
N 831800
N 831600
N 831400
N 831200

Sandy CLAY/SILT with scattered scars, depressions (diameter: <3m, depth: <0.5m) and debris/tyres (general height: <0.3m)

CLAY/SILT with scattered debris/boulders (general height: <0.3m), scattered depressions (diameter: <3m, depth: <0.5m), localised patches of dumped materials (only prominent ones were outlined) and scattered to numerous scars

19102_ODB/3

SA1-SC001 2x0.8x0.4 Debris
SA1-SC002 1x1x0.4 Debris
SA1-SC003 1.3x1x0.3 Debris
SA1-SC004 3.2x0.6x0.5 Debris
SA1-SC005 3x0.5x0.4 Debris
SA1-SC006 1.5x1.2x0.3 Debris
SA1-SC007 1.5x1.2x0.3 Debris
SA1-SC008 2.5x1x0.3 Debris

SA1-M001 209 WEPII Pipeline
SA1-M002 101 Yacheng Pipeline
SA1-M003 311 WEPII Pipeline
SA1-M004 570 WEPII Pipeline
SA1-M005 81 Yacheng Pipeline
SA1-M006 273 WEPII Pipeline
SA1-M007 184 Yacheng Pipeline
SA1-M008 46 Yacheng Pipeline
SA1-M009 1205 WEPII Pipeline
SA1-M010 907 WEPII Pipeline
SA1-M011 383 Yacheng Pipeline
SA1-M012 195 Yacheng Pipeline
SA1-M013 495 WEPII Pipeline
SA1-M014 241 WEPII Pipeline
SA1-M015 603 Yacheng Pipeline
SA1-M016 657 Yacheng Pipeline
SA1-M017 993 WEPII Pipeline
SA1-M018 292 Yacheng Pipeline
SA1-M019 1765 WEPII Pipeline
SA1-M020 569 Yacheng Pipeline
SA1-M021 367 WEPII Pipeline
SA1-M022 1074 Yacheng Pipeline
SA1-M023 594 WEPII Pipeline
SA1-M024 298 Yacheng Pipeline
SA1-M025 445 Yacheng Pipeline
SA1-M026 615 WEPII Pipeline
SA1-M027 332 Yacheng Pipeline
SA1-M028 306 WEPII Pipeline
SA1-M029 422 Yacheng Pipeline
SA1-M030 262 WEPII Pipeline
SA1-M031 652 Yacheng Pipeline

Sandy CLAY/SILT with scattered scars, depressions (diameter: <3m, depth: <0.5m) and debris/tyres (general height: <0,3m)

As-found Second-West-East-Gas-PipeLine (WEPII) by MAG

Second West East Gas Pipeline (WEPII)

Yacheng Pipeline

BPPS Pipeline

As-found Yacheng Pipeline by MAG

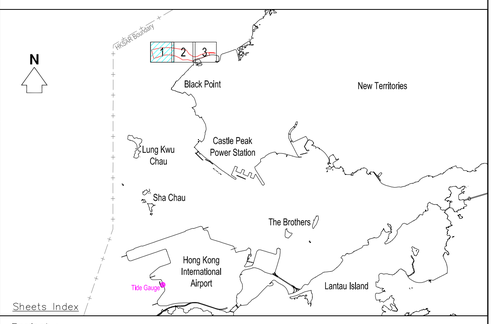
Sandy CLAY/SILT with scattered scars and depressions (diameter: <3m, depth: <0.5m)

Armour rock along Yacheng Pipeline

Sandy CLAY/SILT with scattered to numerous pockmarks/depressions (diameter: <1.5m, depth: <0.3m)

Legend :

- 5718_A5 — Existing borehole position
- Depression / Pockmark
- SA1-SEI002 1.3 Top of backfill protection layer — Seismic contact with reference number, burial depth (metres below ambient seabed from the top of hyperbolic reflection), and description
- SA1-SC015 1.2x0.5x0.3 Debris — Sonar contact with reference number, dimension (length x width x height in metres where measurable; nmh = no measurable height), and description
- SA1-SC012 5x<0.5x0.5 Unknown object — Linear sonar contact with reference number, dimension (length x width x height in metres where measurable; nmh = no measurable height), and description
- SA1-M044 664 WEPII Pipeline — Cable/pipeline position, as determined by magnetometer, with reference number and anomaly size (in nano-Tesla)
- Fine sediments (SILT/CLAY)
- ROCK
- Dumped materials
- Scar
- Limit of side scan sonar coverage
- Sediment boundary
- As-found cable position
- As-found pipeline position
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

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PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 7.1

Drawing Title :

SEABED FEATURES
(SHEET 1 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GEO1 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
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   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
0	31/07/2023	Agnes Siu	Howard Wang	Margie Chen	Preliminary
1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

CEDD Civil Engineering and Development Department

Surveyor :

EGS (ASIA) LIMITED
15th FLOOR, NORTH POINT INDUSTRIAL BUILDING,
101 ORMS ROAD,
NORTH POINT, HONG KONG
Tel: (852) 28948622
Fax: (852) 25763590
Web: www.egssurvey.com
EARTH SCIENCES & SURVEYING

JOB NO. : HK268623

E 829600 E 829800 E 830000 E 830200 E 830400 E 830600 E 830800 E 831000

N 832200 N 832000 N 831800 N 831600 N 831400 N 831200

CLAY/SILT with scattered debris/boulders (general height: <0.3m), scattered depressions (diameter: <3m, depth: <0.5m), localised patches of dumped materials (only prominent ones were outlined) and scattered to numerous scars

Sandy CLAY/SILT

Oyster Farms

CLAY/SILT with scattered debris (general height: <0.3m) and scattered to numerous pockmarks/depressions (diameter: <1.5m, depth: <0.3m)

Sandy CLAY/SILT with scattered to numerous pockmarks/depressions (diameter: <1.5m, depth: <0.3m)

Sandy CLAY/SILT with scattered scars, depressions (diameter: <3m, depth: <0.5m) and debris/tyres (general height: <0.3m)

SA1-M030 802 WEPII Pipeline

SA1-M032 58 WEPII Pipeline

SA1-M029 422 Yacheng Pipeline

SA1-M031 652 Yacheng Pipeline

SA1-M034 201 WEPII Pipeline

SA1-M033 86 Yacheng Pipeline

SA1-M036 109 WEPII Pipeline

SA1-M035 141 Yacheng Pipeline

SA1-M038 318 WEPII Pipeline

SA1-M037 570 Yacheng Pipeline

SA1-M039 116 Yacheng Pipeline

SA1-M040 805 WEPII Pipeline

SA1-M042 805 WEPII Pipeline

SA1-M041 99 Yacheng Pipeline

SA1-M043 392 Yacheng Pipeline

SA1-M044 805 WEPII Pipeline

SA1-SC009 4.5x1.0x0.6 Debris

Sandy CLAY/SILT with scattered debris/boulders (general height: <0.3m) and scars

As-found Shekou power cable by MBES, SBP and MAG

Sandy CLAY/SILT with scattered to numerous debris/boulders (general height: <0.5m) and scattered scars

SA1-SEI008 1.3 Top of backfill protection layer

SA1-SC010 4x1.5x0.3 Debris

SA1-M047 142 Possible power cable

SA1-SEI007 0.9 Top of backfill protection layer

SA1-SC011 3x1x1 Unknown object

SA1-SEI006 1.3 Top of backfill protection layer

SA1-SEI005 1.4 Top of backfill protection layer

SA1-SC013 3x2x0.8 Debris

5718_C2

SA1-SEI004 1.3 Top of backfill protection layer

SA1-SC012 9x4.5x0.5 Unknown object

16442_90830/1D

SA1-M046 164 Possible power cable

SA1-SEI003 0.9 Top of backfill protection layer

SA1-M045 353 Possible power cable

SA1-SEI002 1.3 Top of backfill protection layer

SA1-SEI001 1.3 Top of backfill protection layer

Rubble mound seawall

Armour rock along Yacheng Pipeline

CLAY/SILT with scattered scars

Dumped materials, possibly related to the installation of Yacheng Pipeline

As-found Second-West-East-Gas-PipeLine (WEPII) by MAG

Sandy CLAY/SILT with scattered to numerous debris/boulders (general height: <0.5m) and scattered scars

CLAY/SILT with scattered to numerous pockmarks/depressions (diameter: <1.5m, depth: <0.3m)

Backfilled trench of WEPII Pipeline, with scattered to numerous armour rock

As-found Yacheng Pipeline by MAG

Shenzhen West East Gas Pipeline (WEPII)

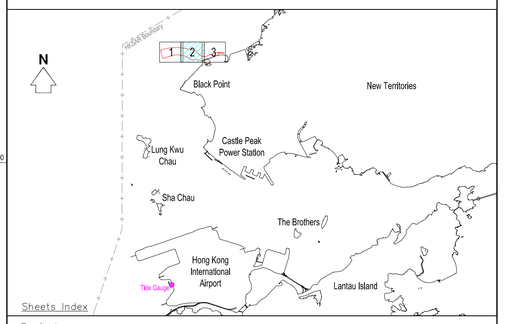
Yacheng Pipeline

SPPS Pipeline

Shekou Power Cable

Legend :

- 5718_A5 — Existing borehole position
- Depression / Pockmark
- SA1-SEI002 1.3 Top of backfill protection layer — Seismic contact with reference number, burial depth (metres below ambient seabed from the top of hyperbolic reflection), and description
- SA1-SC015 1.2x0.5x0.3 Debris — Sonar contact with reference number, dimension (length x width x height in metres where measurable; nmh = no measurable height), and description
- SA1-SC012 9x4.5x0.5 Unknown object — Linear sonar contact with reference number, dimension (length x width x height in metres where measurable; nmh = no measurable height), and description
- SA1-M044 664 WEPII Pipeline — Cable/pipeline position, as determined by magnetometer, with reference number and anomaly size (in nano-Tesla)
- Fine sediments (SILT/CLAY)
- ROCK
- Dumped materials
- Scar
- Limit of side scan sonar coverage
- Sediment boundary
- As-found cable position
- As-found pipeline position
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 7.2

Drawing Title :

SEABED FEATURES
(SHEET 2 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GEO1 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
0	31/07/2023	Agnes Siu	Howard Wang	Margie Chen	Preliminary
1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

EGS (ASIA) LIMITED
15th FLOOR, NORTH POINT INDUSTRIAL BUILDING,
499 KING'S ROAD,
NORTH POINT, HONG KONG
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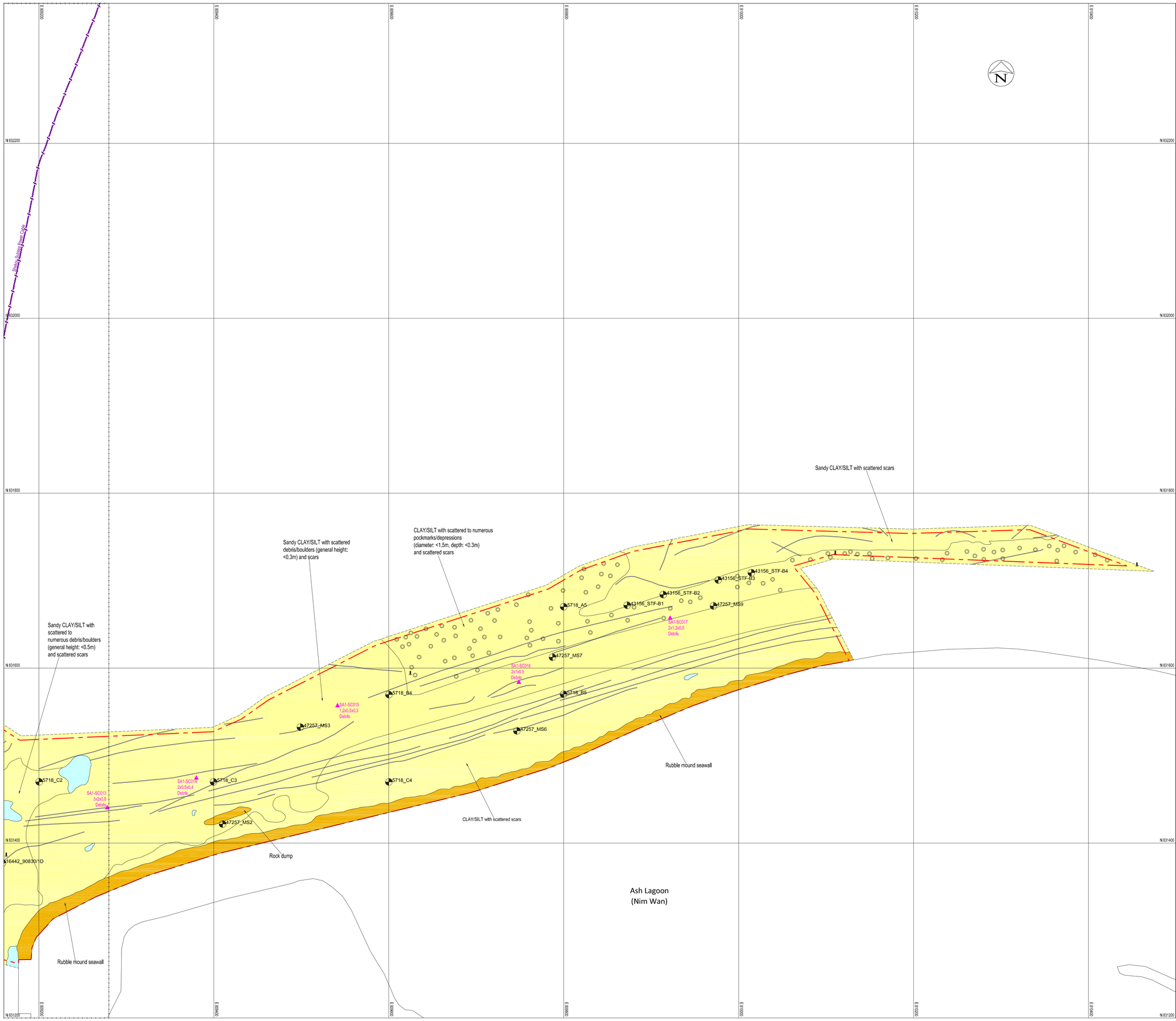
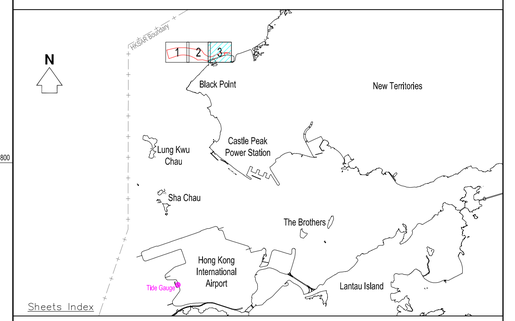
EARTH SCIENCES & SURVEYING

JOB NO. : HK268623



Legend :

5718_A5	Existing borehole position
	Depression / Pockmark
SA1-SEI002 ■1.3 Top of backfill protection layer	Seismic contact with reference number, burial depth (metres below ambient seabed from the top of hyperbolic reflection), and description
SA1-SC015 ▲1.2x0.5x0.3 Debris	Sonar contact with reference number, dimension (length x width x height in metres where measurable; nmh = no measurable height), and description
SA1-SC012 1x<0.5x0.5 Unknown object	Linear sonar contact with reference number, dimension (length x width x height in metres where measurable; nmh = no measurable height), and description
SA1-M044 664 WEPII Pipeline	Cable/pipeline position, as determined by magnetometer, with reference number and anomaly size (in nano-Tesla)
	Fine sediments (SILT/CLAY)
	ROCK
	Dumped materials
**********	Scar
----------	Limit of side scan sonar coverage
	Sediment boundary
	As-found cable position
	As-found pipeline position
	Survey boundary
	Existing pipe from marine chart
	As-laid power cable from EGS job number HK197505
	Conical buoy / Beacon in general
	Chart overlap



Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 7.3

Drawing Title :

SEABED FEATURES (SHEET 3 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C–Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C–Boom low voltage boomer (LVB) system
   EdgeTech 3400–OTS sub–bottom profiler
   Innomar SES–2000 medium–100 sub–bottom profiler
   Geometrics G–882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

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METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

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EARTH SCIENCES & SURVEYING

JOB NO. : HK268623

E 809300 E 807700 E 806100 E 804500 E 802900 E 801300 E 799700

N 832200 N 832000 N 831800 N 831600 N 831400 N 831200

19102_ODB/3

Second West East Gas Pipeline (WEP II)

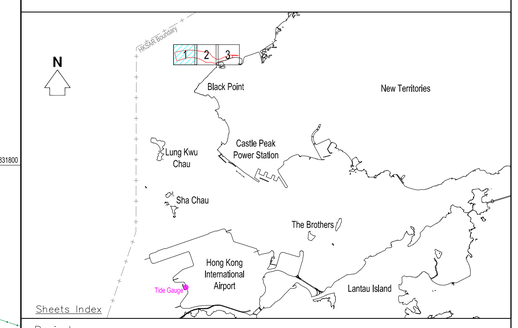
Yacheng Pipeline

BPPS Pipeline

Tide Gauge

Legend :

- 5718_A5 — Existing borehole position
- 12·5 — Spot value in metres below HKPD
- Contour at 1m interval
- Doubtful or projected contour
- Masking area
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 8.1

Drawing Title :

CONTOURED LEVELS AT THE BASE OF MARINE DEPOSITS (SHEET 1 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
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1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

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NORTH POINT, HONG KONG
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Web: www.egssurvey.com
EARTH SCIENCES & SURVEYING

JOB NO. : HK268623

E 808200 E 808400 E 808600 E 808800 E 809000 E 809200

N 832200 N 832000 N 831800 N 831600 N 831400 N 831200

Shekou Nanhai Power Cable

Oyster Farms

Oyster Farms

Oyster Farms

Second West East Gas Pipeline (WEP2)

Yacheng Pipeline

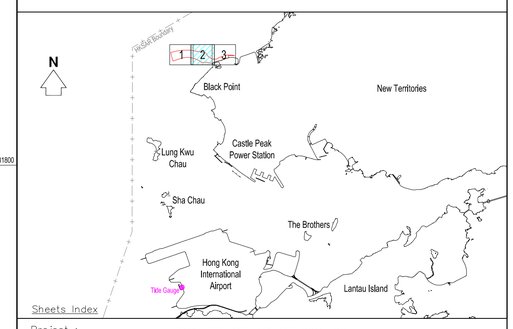
BPPS Pipeline

5718_C2

16442_90850/1D

Legend :

- 5718_A5 — Existing borehole position
- 12·5 — Spot value in metres below HKPD
- Contour at 1m interval
- Doubtful or projected contour
- Masking area
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 8.2

Drawing Title :

CONTOURED LEVELS AT THE BASE OF MARINE DEPOSITS (SHEET 2 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

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1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1: 2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

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15th FLOOR, NORTH POINT INDUSTRIAL BUILDING,
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EARTH SCIENCES & SURVEYING

JOB NO. : HK268623

E 826200
E 826400
E 826600
E 826800
E 827000
E 827200
E 827400

N 832200
N 832000
N 831800
N 831600
N 831400
N 831200

Shiraz Subsea Power Cable

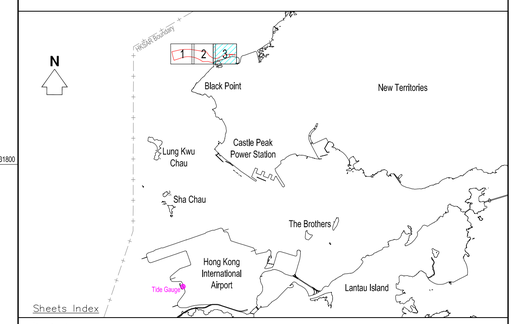
43156_STF-B4
43156_STF-B3
43156_STF-B2
43156_STF-B1
47257_MS9
5718_A5
47257_MS7
5718_B4
5718_B5
47257_MS3
47257_MS6
5718_C2
5718_C3
5718_C4
47257_MS2
16442_90630/1D

10-1
10-3
10-4
9-5
10
0-2

Ash Lagoon
(Nim Wan)

Legend :

- 5718_A5 — Existing borehole position
- 12·5 — Spot value in metres below HKPD
- Contour at 1m interval
- Doubtful or projected contour
- Masking area
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 8.3

Drawing Title :

CONTOURED LEVELS AT THE BASE OF MARINE DEPOSITS (SHEET 3 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
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METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

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15th FLOOR, NORTH POINT INDUSTRIAL BUILDING,
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NORTH POINT, HONG KONG
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Fax: (852) 25763590
Web: www.egssurvey.com
EARTH SCIENCES & SURVEYING

JOB NO. : HK268623

E 869500 E 870000 E 870500 E 871000 E 871500 E 872000 E 872500

N 832200

N 832000

N 831800

N 831600

N 831400

N 831200

19102_ODB/3

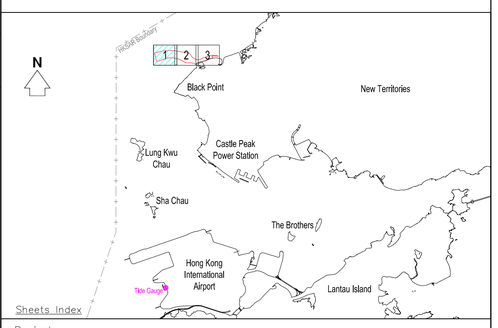
Second West East Gas Pipeline (WEP II)

Yacheng Pipeline

BPPS Pipeline

Legend :

5718_A5	Existing borehole position
12.5	Spot value in metres below HKPD
	Contour at 2m intervals
	Doubtful or projected contour
	Masking area
	Survey boundary
	Existing pipe from marine chart
	As-laid power cable from EGS job number HK197505
	Conical buoy / Beacon in general
	Chart overlap



Project :

CONTRACT NO. GE/2021/03
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AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 9.1

Drawing Title :

CONTOURED LEVELS ON TOP OF ROCK IN ANY STATE OF DECOMPOSITION (SHEET 1 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GEO1 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C–Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C–Boom low voltage boomer (LVB) system
   EdgeTech 3400–OTS sub–bottom profiler
   Innomar SES–2000 medium–100 sub–bottom profiler
   Geometrics G–882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
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1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

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EARTH SCIENCES & SURVEYING

JOB NO. : HK268623

E 808000
E 809000
E 810000
E 811000
E 812000
E 813000
E 814000

N 832200
N 832000
N 831800
N 831600
N 831400
N 831200

N

Oyster Farms
Oyster Farms
Oyster Farms

Sheung Shui-Castle Peak Cable

Second West East Gas Pipeline (WEP2)
Yaotong Pipeline
BPPS Pipeline

5718_C2
16442_90830/1D

Legend :

- 5718_A5 — Existing borehole position
- 12·5 — Spot value in metres below HKPD
- Contour at 2m intervals
- Doubtful or projected contour
- Masking area
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap

N

1 2 3

Black Point
New Territories
Castle Peak Power Station
Lung Kwu Chau
Sha Chau
The Brothers
Hong Kong International Airport
Lantau Island
Tide Gauge
Sheets Index

Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 9.2

Drawing Title :

CONTOURED LEVELS ON TOP OF ROCK IN ANY STATE OF DECOMPOSITION (SHEET 2 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
0	31/07/2023	Agnes Siu	Howard Wang	Margie Chen	Preliminary
1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1: 2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

EGS (ASIA) LIMITED
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Web: www.egssurvey.com
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E 829500
E 829600
E 829700
E 829800
E 829900
E 830000
E 830100

N 832200
N 832000
N 831800
N 831600
N 831400
N 831200

Black Point Power Cable

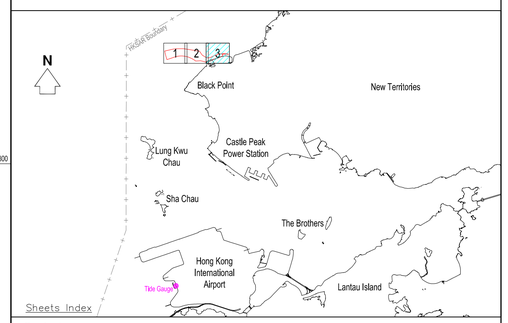
43156_STF-B4
43156_STF-B3
43156_STF-B2
43156_STF-B1
47257_MS9
5718_A5
47257_MS7
5718_B4
5718_B5
47257_MS3
47257_MS6
5718_C2
5718_C3
5718_C4
47257_MS2
16442_00830/1D

28
28·3
26
25·3
24
22
21·1
20
18·2
18
16·6
16
14

Ash Lagoon
(Nim Wan)

Legend :

- 5718_A5 — Existing borehole position
- 12·5 — Spot value in metres below HKPD
- Contour at 2m intervals
- Doubtful or projected contour
- Masking area
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 9.3

Drawing Title :

CONTOURED LEVELS ON TOP OF ROCK IN ANY STATE OF DECOMPOSITION (SHEET 3 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C–Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C–Boom low voltage boomer (LVB) system
   EdgeTech 3400–OTS sub–bottom profiler
   Innomar SES–2000 medium–100 sub–bottom profiler
   Geometrics G–882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

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1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

CEDD Civil Engineering and Development Department

Surveyor :

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13th FLOOR, NORTH POINT INDUSTRIAL BUILDING,
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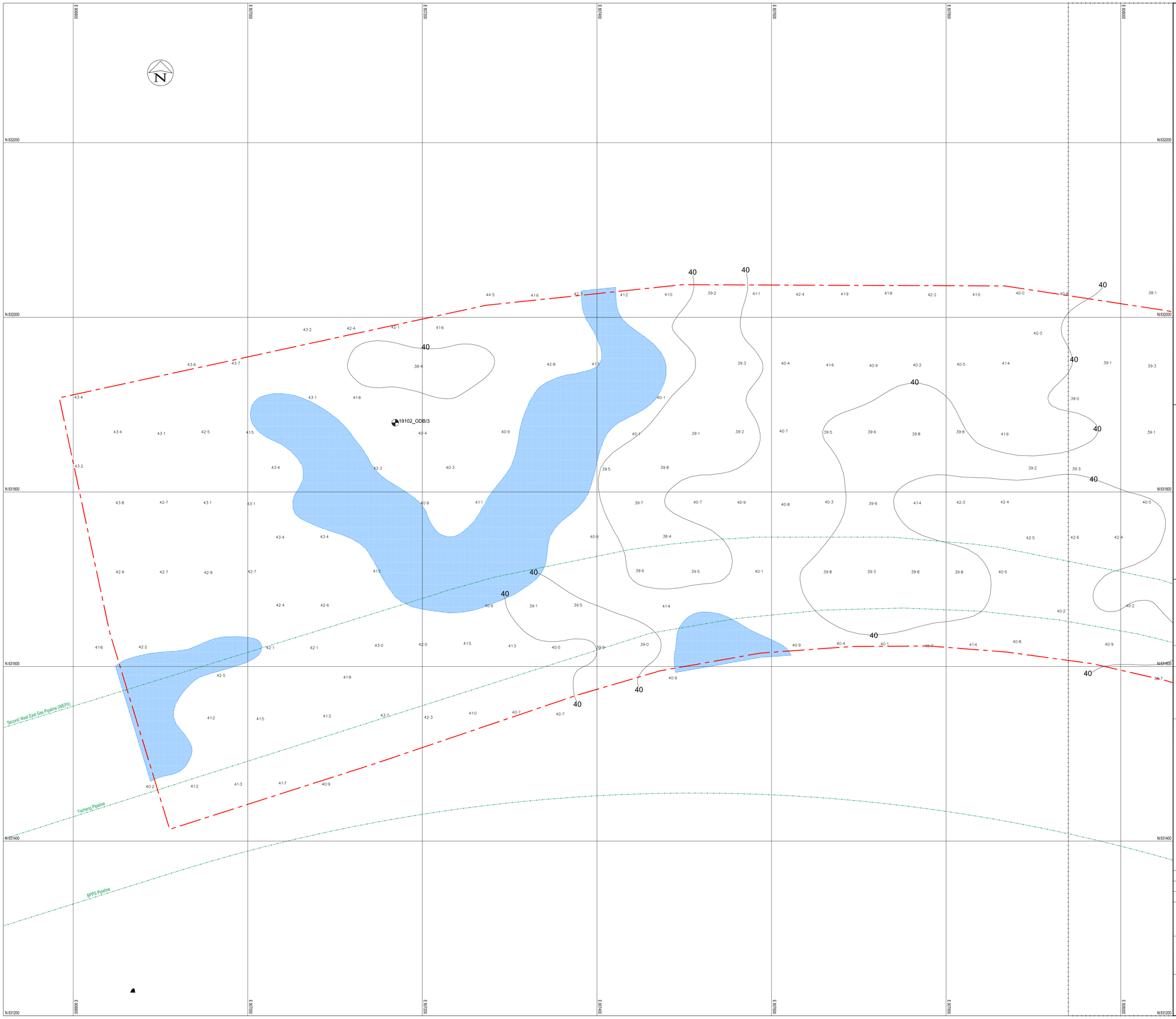
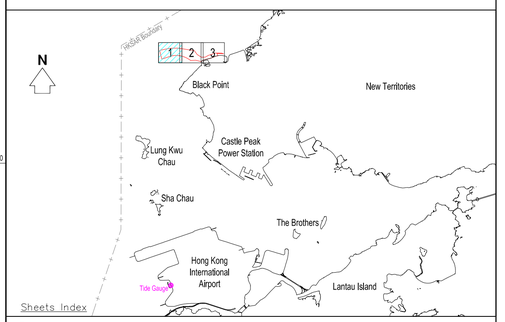
JOB NO. : HK268623



Legend :

- 5718_A5 — Existing borehole position
- 12·5 — Spot value in metres below HKPD
- Contour at 5m intervals
- Doubtful or projected contour
- Masking area
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

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AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 10.1

Drawing Title :

CONTOURED LEVELS ON TOP OF PRESUMED MODERATELY DECOMPOSED ROCK (SHEET 1 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

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METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

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JOB NO. : HK268623

E 808200 E 808400 E 808600 E 808800 E 809000 E 809200 E 809400 E 809600 E 809800 E 810000

N 832200 N 832000 N 831800 N 831600 N 831400 N 831200

Oyster Farms

Oyster Farms

Oyster Farms

Shiu Ping Kompo Power Cable

Second West East Gas Pipeline (WEPH)

Yaulong Pipeline

BPPS Pipeline

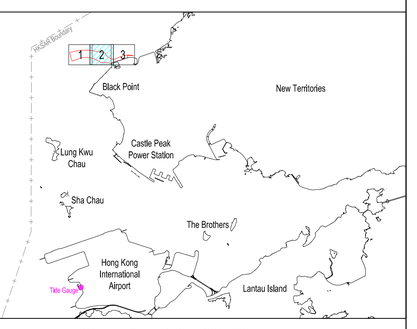
5718_C2

16442_90830/1D

Legend :

- 5718_A5 — Existing borehole position
- 12·5 — Spot value in metres below HKPD
- Contour at 5m intervals
- Doubtful or projected contour
- Masking area
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap

N



Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 10.2

Drawing Title :

CONTOURED LEVELS ON TOP OF PRESUMED MODERATELY DECOMPOSED ROCK (SHEET 2 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

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METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

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E 809200 E 809400 E 809600 E 809800 E 810000 E 810200 E 810400

N 832200 N 832000 N 831800 N 831600 N 831400 N 831200

Shekou Sewage Pumping Station

16442_90830/1D

5718_A5 43156_STF-B1 43156_STF-B2 43156_STF-B3 43156_STF-B4 47257_MS9 47257_MS7 5718_B4 5718_B5 47257_MS3 47257_MS6 5718_C2 5718_C3 5718_C4 47257_MS2

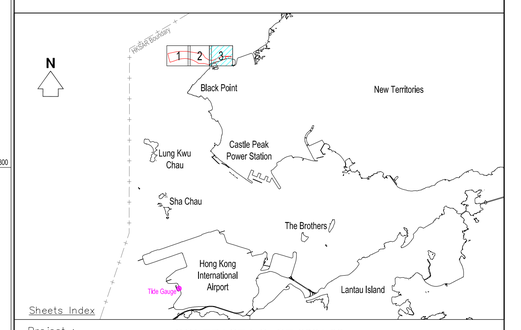
16-6 27-9 29-8 29-5 33-7

35 30 25 20 30 30

Ash Lagoon
(Nim Wan)

Legend :

- 5718_A5 — Existing borehole position
- 12·5 — Spot value in metres below HKPD
- Contour at 5m intervals
- Doubtful or projected contour
- Masking area
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 10.3

Drawing Title :

CONTOURED LEVELS ON TOP OF PRESUMED MODERATELY DECOMPOSED ROCK (SHEET 3 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C–Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C–Boom low voltage boomer (LVB) system
   EdgeTech 3400–OTS sub–bottom profiler
   Innomar SES–2000 medium–100 sub–bottom profiler
   Geometrics G–882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
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1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

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15th FLOOR, NORTH POINT INDUSTRIAL BUILDING,
499 KING'S ROAD,
NORTH POINT, HONG KONG
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JOB NO. : HK268623

E 808500 E 807000 E 805500 E 804000 E 802500 E 801000 E 799500

N 832200 N 832000 N 831800 N 831600 N 831400 N 831200

19102_ODB/3

Second West East Gas Pipeline (WEP II)

Yacheng Pipeline

BPPS Pipeline

Legend :

5718_A5	Existing borehole position
4·5	Isopachs value in metres
	Contour at 1m interval
	Doubtful or projected contour
	Masking area
	Survey boundary
	Existing pipe from marine chart
	As-laid power cable from EGS job number HK197505
	Conical buoy / Beacon in general
	Chart overlap

N

Tuen Mun

1 2 3

Black Point

New Territories

Lung Kwu Chau

Castle Peak Power Station

Sha Chau

The Brothers

Hong Kong International Airport

Tide Gauge

Lantau Island

Sheets Index

Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 11.1

Drawing Title :

CONTOURED ISOPACHS OF MARINE DEPOSITS (SHEET 1 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
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   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

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METRIC SCALE 1:2000

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Client :

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E 808000 E 809000 E 810000 E 811000 E 812000 E 813000 E 814000

N 832200 N 832000 N 831800 N 831600 N 831400 N 831200

N

Oyster Farms

Oyster Farms

Oyster Farms

Shekou Power Cable

Second West East Gas Pipeline (WEPII)

Yaotang Pipeline

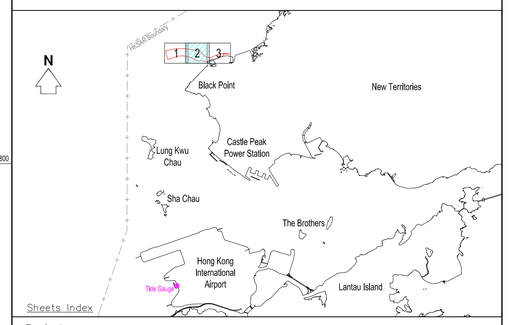
SPPS Pipeline

5718_C2

16442_90830/1D

Legend :

- 5718_A5 — Existing borehole position
- 4·5 — Isopachs value in metres
- Contour at 1m interval
- Doubtful or projected contour
- Masking area
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

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DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 11.2

Drawing Title :

CONTOURED ISOPACHS OF MARINE DEPOSITS (SHEET 2 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GEO1 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C–Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
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   Kongsberg EA440 single beam echo sounder system
   C–Boom low voltage boomer (LVB) system
   EdgeTech 3400–OTS sub–bottom profiler
   Innomar SES–2000 medium–100 sub–bottom profiler
   Geometrics G–882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

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METRIC SCALE 1: 2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

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E 828000 E 828500 E 829000 E 829500 E 830000 E 830500 E 831000 E 831500 E 832000

N 832200 N 832000 N 831800 N 831600 N 831400 N 831200

Castle Peak Power Cable

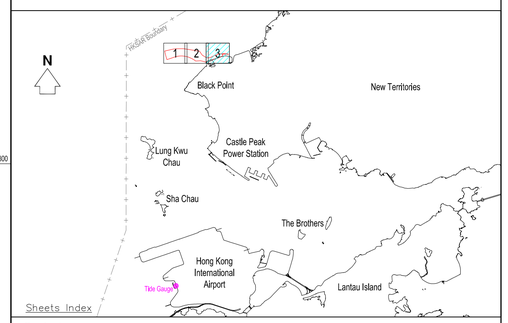
43156_STF-B4
43156_STF-B3
43156_STF-B2
43156_STF-B1
47257_MS9
5718_A5
47257_MS7
5718_B4
5718_B5
47257_MS3
47257_MS6
5718_C2
5718_C3
5718_C4
47257_MS2
16442_90830/1D

5-1 5-7 5-0 3-7 4-3 4-7 4-5 5-7 4-6 5-5

Ash Lagoon
(Nim Wan)

Legend :

- 5718_A5 — Existing borehole position
- 4-5 — Isopachs value in metres
- Contour at 1m interval
- Doubtful or projected contour
- Masking area
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

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DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 11.3

Drawing Title :

CONTOURED ISOPACHS OF MARINE DEPOSITS (SHEET 3 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C–Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
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   Kongsberg EA440 single beam echo sounder system
   C–Boom low voltage boomer (LVB) system
   EdgeTech 3400–OTS sub–bottom profiler
   Innomar SES–2000 medium–100 sub–bottom profiler
   Geometrics G–882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

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METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

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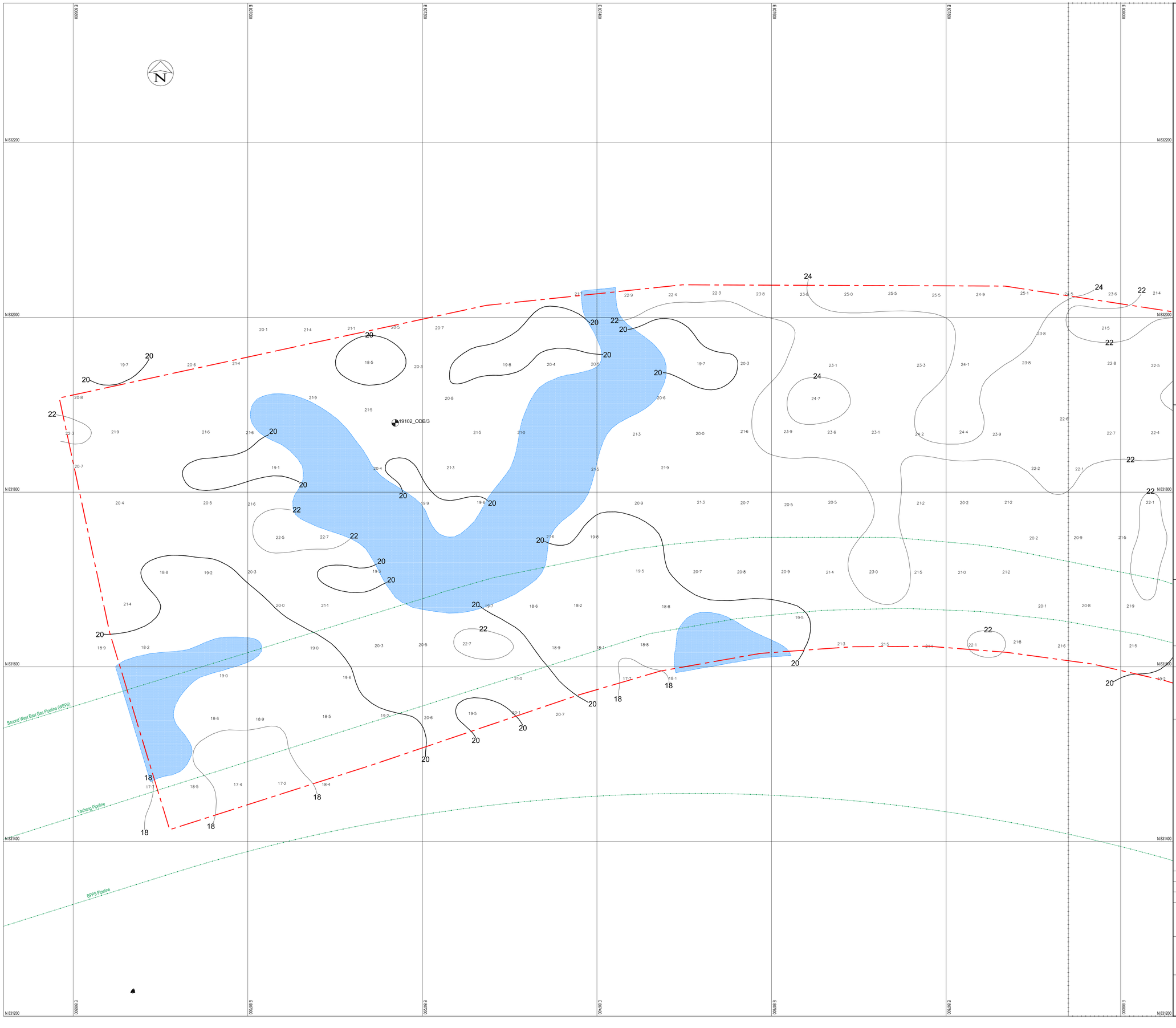
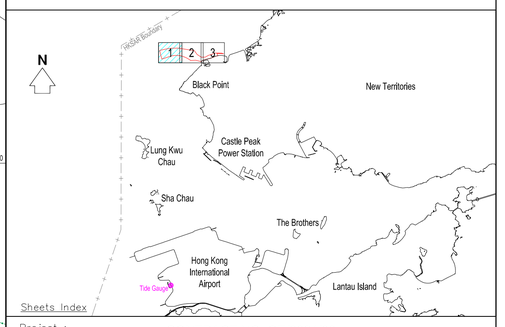


Legend :

- 5718_A5 — Existing borehole position
- 4·5 — Isopachs value in metres
- Contour at 2m intervals
- Doubtful or projected contour
- Masking area
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

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PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 12.1

Drawing Title :

CONTOURED ISOPACHS OF ALLUVIUM (SHEET 1 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
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   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

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METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

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JOB NO. : HK268623

E 808200 E 808400 E 808600 E 808800 E 809000 E 809200 E 809400

N 832200 N 832000 N 831800 N 831600 N 831400 N 831200

Oyster Farms

Oyster Farms

Oyster Farms

Sheung Wan Electricity Cable

Second West East Gas Pipeline (WEP2)

Yadanna Pipeline

BPSS Pipeline

5718_A5

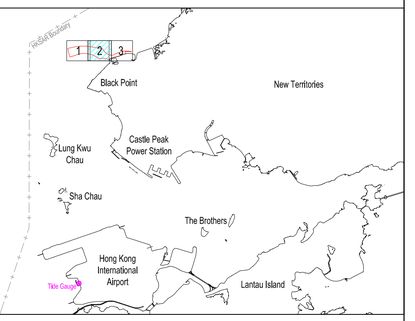
5718_C2

16442_90830/1D

Legend :

- 5718_A5 — Existing borehole position
- 4·5 — Isopachs value in metres
- Contour at 2m intervals
- Doubtful or projected contour
- Masking area
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap

N



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Project :

CONTRACT NO. GE/2021/03
TASK ORDER NO. GE/2021/03.23
AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 12.2

Drawing Title :

CONTOURED ISOPACHS OF ALLUVIUM
(SHEET 2 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GEO1 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C–Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C–Boom low voltage boomer (LVB) system
   EdgeTech 3400–OTS sub–bottom profiler
   Innomar SES–2000 medium–100 sub–bottom profiler
   Geometrics G–882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
0	31/07/2023	Agnes Siu	Howard Wang	Margie Chen	Preliminary
1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

CEDD Civil Engineering and Development Department

Surveyor :

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Fax: (852) 25763590
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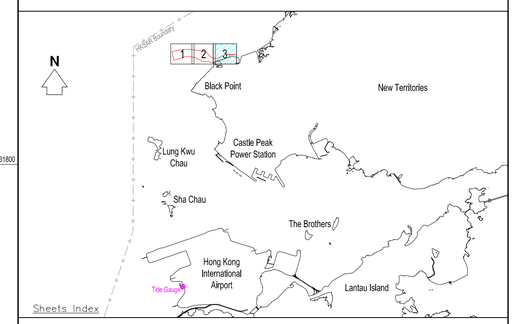
JOB NO. : HK268623

E 828200
E 828400
E 828600
E 828800
E 829000
E 829200
E 829400
N 832200
N 832000
N 831800
N 831600
N 831400
N 831200
Shiraz Subsea Power Cable
16442_90830/10
5718_A5
5718_B4
5718_B5
5718_C2
5718_C3
5718_C4
43156_STF-B1
43156_STF-B2
43156_STF-B3
43156_STF-B4
47257_MS2
47257_MS3
47257_MS6
47257_MS7
47257_MS9
16
14
12
10
8
6
4
17·4
11·0
9·2
6·9
2·7
Ash Lagoon
(Nim Wan)

Legend :

- 5718_A5 — Existing borehole position
- 4-5 — Isopachs value in metres
- Contour at 2m intervals
- Doubtful or projected contour
- Masking area
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

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MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 12.3

Drawing Title :

CONTOURED ISOPACHS OF ALLUVIUM (SHEET 3 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C–Nav 3050 GNSS system
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   C–Boom low voltage boomer (LVB) system
   EdgeTech 3400–OTS sub–bottom profiler
   Innomar SES–2000 medium–100 sub–bottom profiler
   Geometrics G–882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

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METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

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JOB NO. : HK268623

E 806500 E 807000 E 807500 E 808000 E 808500 E 809000

N 832200 N 832000 N 831800 N 831600 N 831400 N 831200

19102_ODB/3

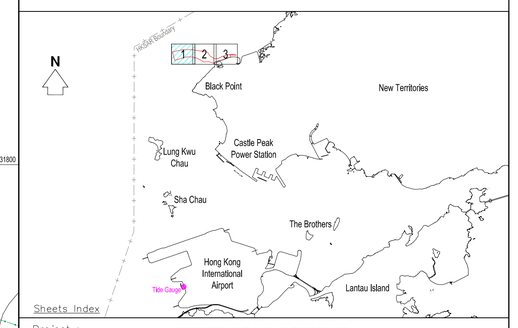
Second West East Gas Pipeline (WEP II)

Yacheng Pipeline

BPPS Pipeline

Legend :

5718_A5	Existing borehole position
4·5	Isopachs value in metres
	Contour at 5m intervals
	Doubtful or projected contour
	Masking area
	Survey boundary
	Existing pipe from marine chart
	As-laid power cable from EGS job number HK197505
	Conical buoy / Beacon in general
	Chart overlap



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PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 13.1

Drawing Title :

CONTOURED ISOPACHS OF ROCK IN ANY STATE OF DECOMPOSITION (SHEET 1 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C–Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
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   C–Boom low voltage boomer (LVB) system
   EdgeTech 3400–OTS sub–bottom profiler
   Innomar SES–2000 medium–100 sub–bottom profiler
   Geometrics G–882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

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METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

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E 808000 E 809000 E 810000 E 811000 E 812000 E 813000 E 814000

N 832200 N 832000 N 831800 N 831600 N 831400 N 831200

Oyster Farms

Oyster Farms

Oyster Farms

Shekou Nanhai Power Cable

Second West East Gas Pipeline (WEPII)

Yaotsing Pipeline

SPPS Pipeline

5718_C2

16442_90830/1D

Legend :

- 5718_A5 — Existing borehole position
- 4·5 — Isopachs value in metres
- Contour at 5m intervals
- Doubtful or projected contour
- Masking area
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap

N

1 2 3

Tide Gauge

Black Point

New Territories

Lung Kwu Chau

Castle Peak Power Station

Sha Chau

The Brothers

Hong Kong International Airport

Lantau Island

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MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 13.2

Drawing Title :

CONTOURED ISOPACHS OF ROCK IN ANY STATE OF DECOMPOSITION (SHEET 2 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GEO1 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C–Nav 3050 GNSS system
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METRIC SCALE 1: 2000

100 80 60 40 20 0 100 200

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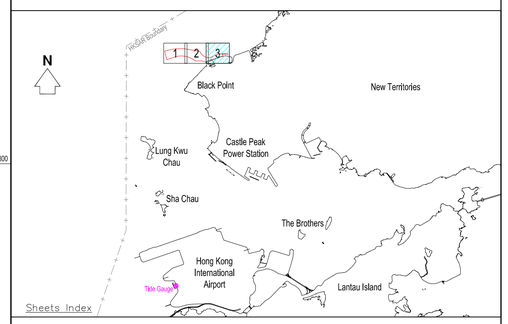
E 828500
E 828600
E 828700
E 828800
E 828900
E 829000
E 829100
E 829200
E 829300
N 832200
N 832000
N 831800
N 831600
N 831400
N 831200
Black Point Power Cable
5718_A5
43156_STF-B1
43156_STF-B2
43156_STF-B3
43156_STF-B4
47257_MS9
47257_MS7
5718_B4
5718_B5
47257_MS3
47257_MS6
5718_C2
5718_C3
5718_C4
47257_MS2
16442_90830/1D
9-1
6-5
5
10
11-4
15
12-9
16-7
15
15
18-4
Ash Lagoon
(Nim Wan)

Legend :

- 5718_A5 — Existing borehole position
- 4-5 — Isopachs value in metres
- Contour at 5m intervals
- Doubtful or projected contour
- Masking area
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap



Project :

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MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 13.3

Drawing Title :

CONTOURED ISOPACHS OF ROCK IN ANY STATE OF DECOMPOSITION (SHEET 3 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C–Nav 3050 GNSS system
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7. Tide Gauge : Hong Kong International Airport West
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METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

CEDD Civil Engineering and Development Department

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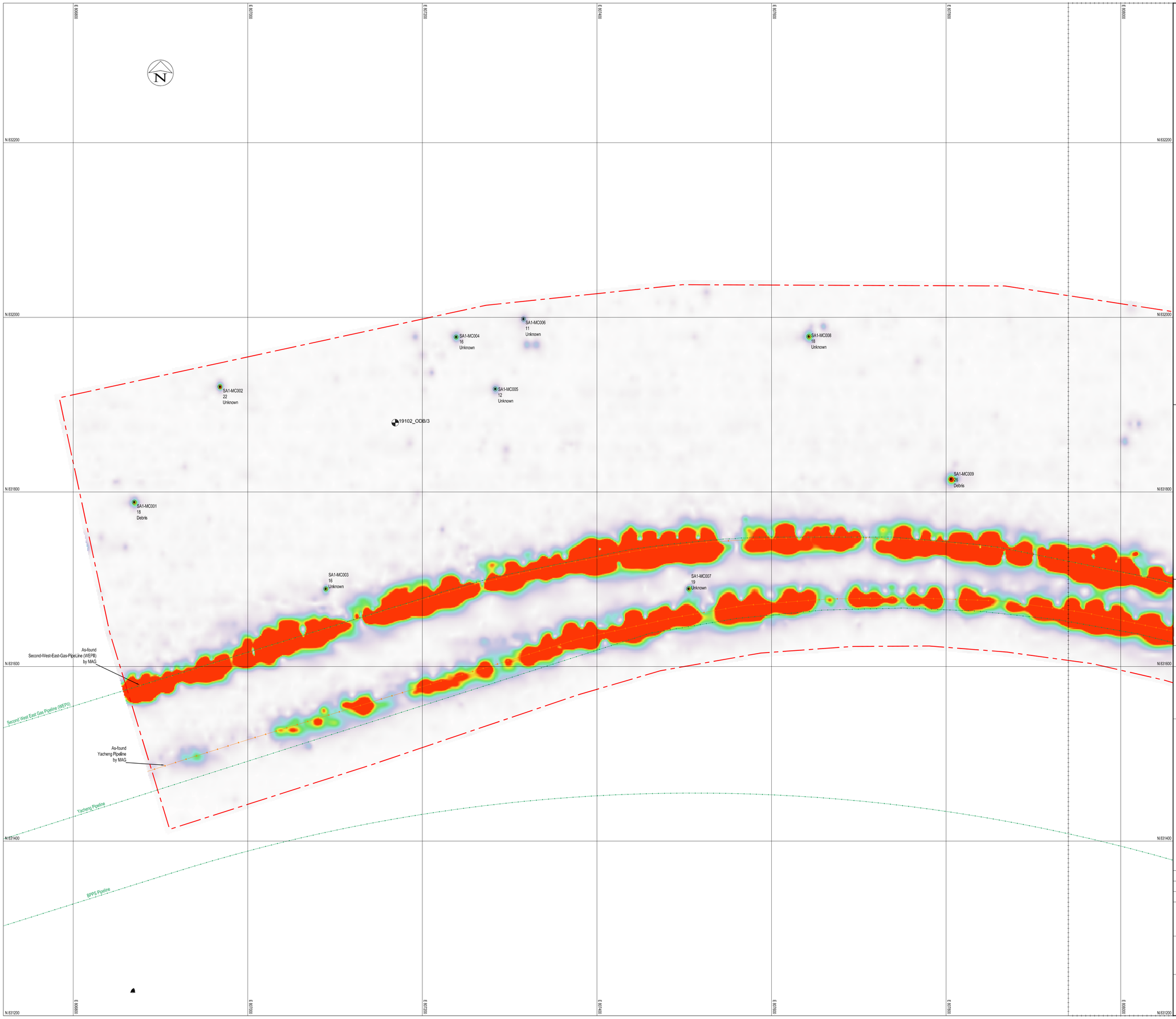
JOB NO. : HK268623

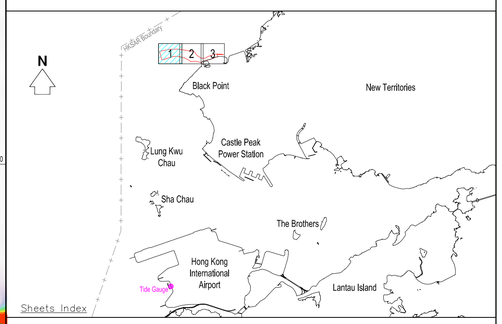


Legend :

- 5718_A5 — Existing borehole position
- MC002 / 5 / Debris — Magnetic anomaly with reference number and gradient (in nano-Tesla/meter)
- As-found pipeline
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap

Quasi-analytic Signal (nT/m)

0 2 4 6 8 10 12 14 16 18 20



Project :

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AGREEMENT NO. CE 26/2022 (EP)
DEVELOPMENT OF INTEGRATED WASTE MANAGEMENT FACILITIES
PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 14.1

Drawing Title :

MAGNETIC ANALYTIC SIGNAL PLAN (SHEET 1 OF 3)

Notes :

1. Survey Date : 26-29 June and 03-06 July 2023
2. Survey Vessel : GEO1 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

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METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

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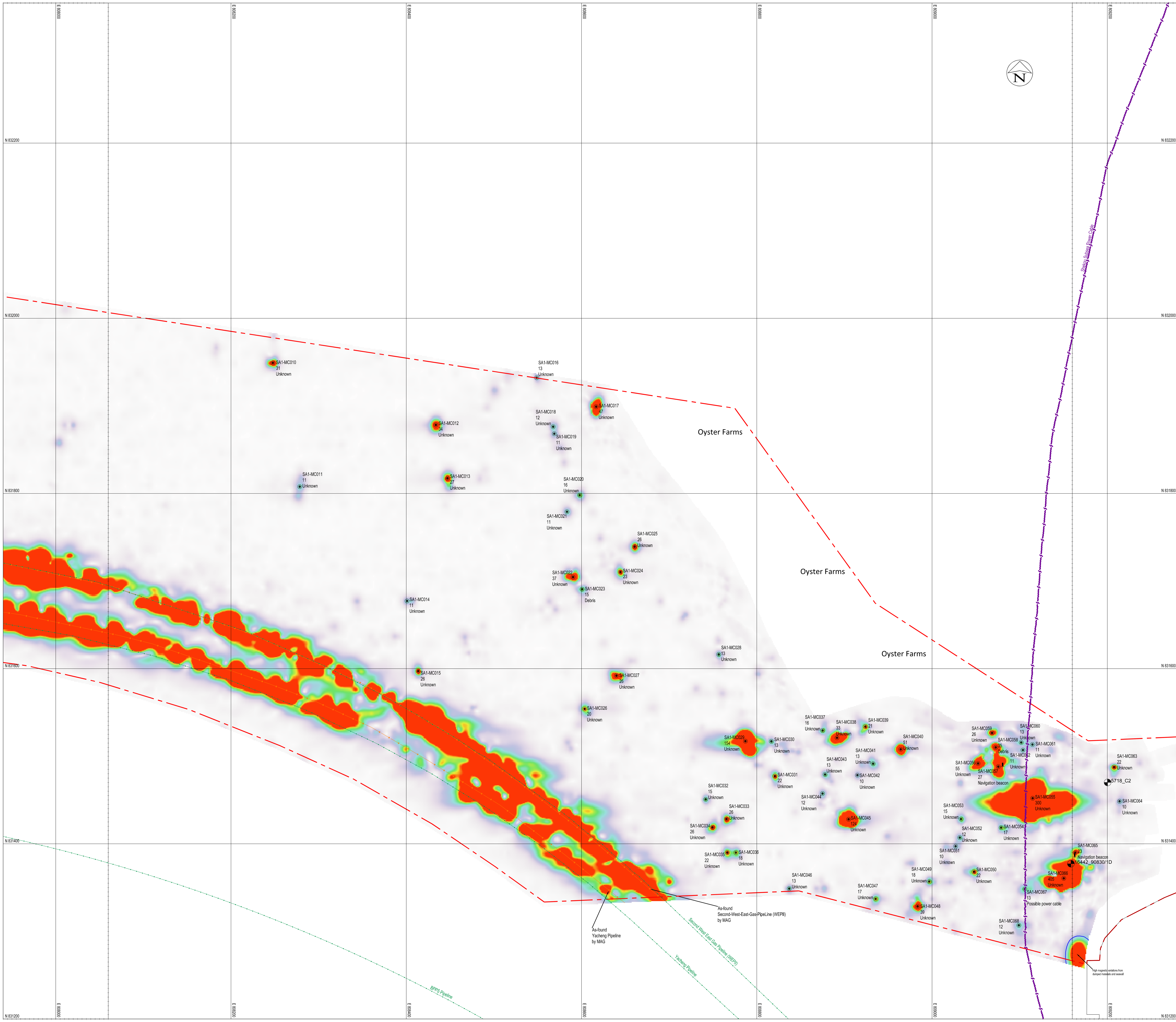
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E 808600
E 808800
E 809000
E 809200
N 832200
N 832000
N 831800
N 831600
N 831400
N 831200
SA1-MC010 31 Unknown
SA1-MC011 11 Unknown
SA1-MC012 34 Unknown
SA1-MC013 27 Unknown
SA1-MC014 11 Unknown
SA1-MC015 26 Unknown
SA1-MC016 13 Unknown
SA1-MC017 47 Unknown
SA1-MC018 12 Unknown
SA1-MC019 11 Unknown
SA1-MC020 16 Unknown
SA1-MC021 11 Unknown
SA1-MC022 37 Unknown
SA1-MC023 15 Debris
SA1-MC024 23 Unknown
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SA1-MC028 13 Unknown
SA1-MC029 154 Unknown
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SA1-MC046 13 Unknown
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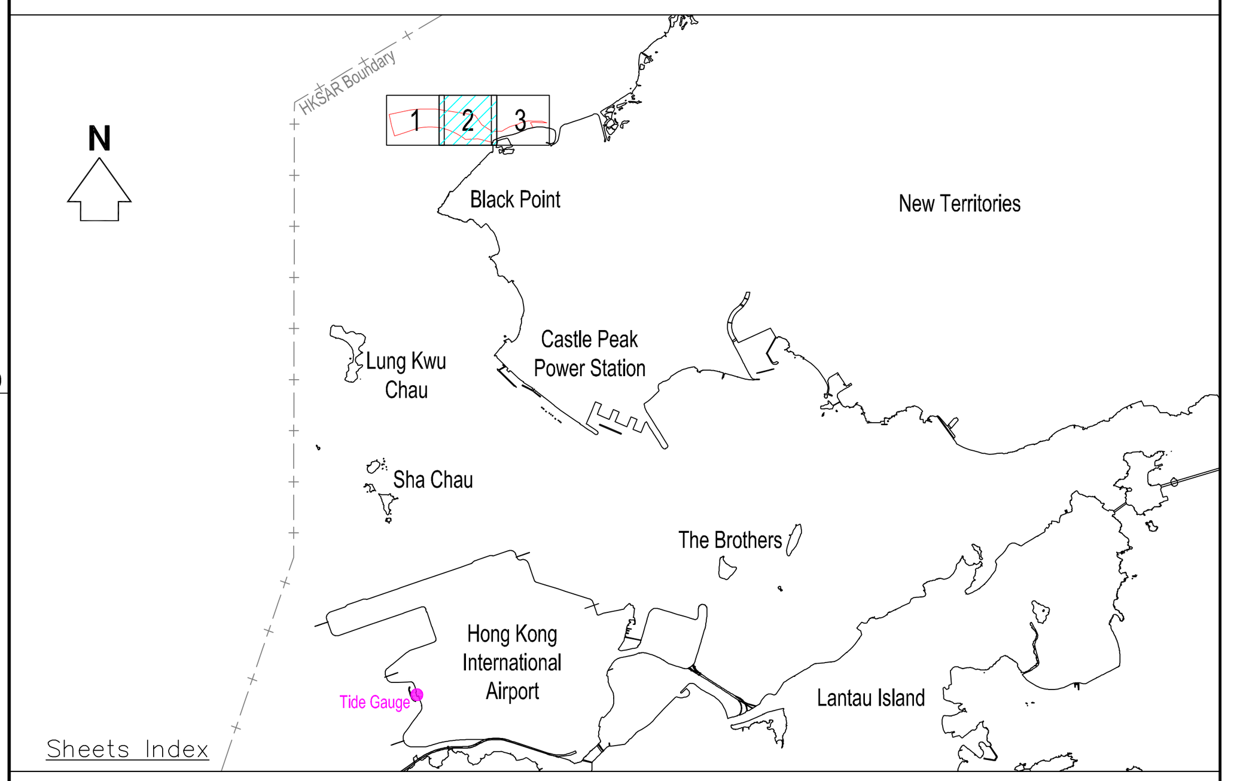
SA1-MC048 39 Unknown
SA1-MC049 18 Unknown
SA1-MC050 22 Unknown
SA1-MC051 10 Unknown
SA1-MC052 12 Unknown
SA1-MC053 15 Unknown
SA1-MC054 17 Unknown
SA1-MC055 300 Unknown
SA1-MC056 55 Unknown
SA1-MC057 27 Navigation beacon
SA1-MC058 35 Debris
SA1-MC059 26 Unknown
SA1-MC060 13 Unknown
SA1-MC061 11 Unknown
SA1-MC062 11 Unknown
SA1-MC063 22 Unknown
SA1-MC064 10 Unknown
SA1-MC065 23 Navigation beacon
SA1-MC066 405 Unknown
SA1-MC067 13 Possible power cable
SA1-MC068 12 Unknown
5718_C2
16442_90830/1D
Oyster Farms
Oyster Farms
Oyster Farms
Shekou Subsea Power Cable
BPPS Pipeline
Yacheng Pipeline
Second West East Gas Pipeline (WEPII)
As-found Yacheng Pipeline by MAG
As-found Second-West-East-Gas-PipeLine (WEPII) by MAG
High magnetic variations from dumped materials and seawall

Legend :

Symbol	Description
5718_A5	Existing borehole position
MC002 5 Debris	Magnetic anomaly with reference number and gradient (in nano–Tesla/meter)
	As–found pipeline
	Survey boundary
	Existing pipe from marine chart
	As–laid power cable from EGS job number HK197505
	Conical buoy / Beacon in general
	Chart overlap

Quasi-analytic Signal (nT/m)

0 2 4 6 8 10 12 14 16 18 20



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PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 14.2

Drawing Title :

MAGNETIC ANALYTIC SIGNAL PLAN (SHEET 2 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GEO1 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C–Nav 3050 GNSS system
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   Innomar SES–2000 medium–100 sub–bottom profiler
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METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client : Civil Engineering and Development Department

Surveyor :

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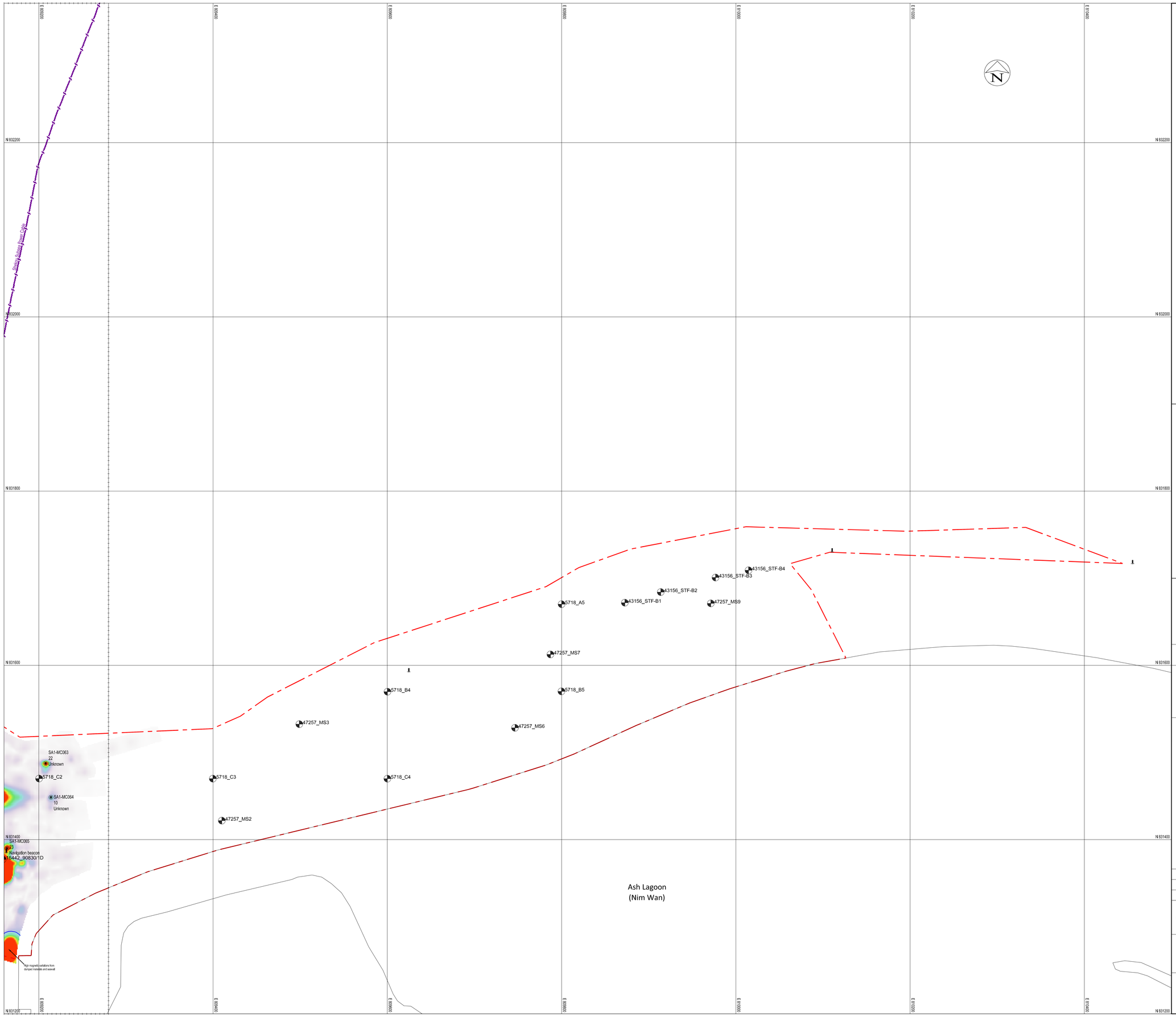
EARTH SCIENCES & SURVEYING

JOB NO. : HK268623

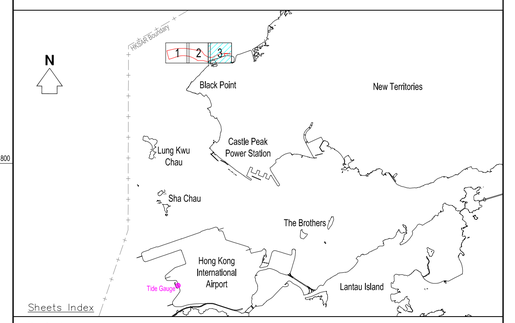


Legend :

- 5718_A5 — Existing borehole position
- MC002 / 5 / Debris — Magnetic anomaly with reference number and gradient (in nano-Tesla/meter)
- As-found pipeline
- Survey boundary
- Existing pipe from marine chart
- As-laid power cable from EGS job number HK197505
- Conical buoy / Beacon in general
- Chart overlap

Quasi-analytic Signal (nT/m)

0 2 4 6 8 10 12 14 16 18 20



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PHASE 2 - INVESTIGATION, DESIGN AND CONSTRUCTION (SA1)
MARINE GEOPHYSICAL SURVEY (GS)

CHART NUMBER : 14.3

Drawing Title :

MAGNETIC ANALYTIC SIGNAL PLAN (SHEET 3 OF 3)

Notes :

1. Survey Date : 26–29 June and 03–06 July 2023
2. Survey Vessel : GE01 / WH2
3. Survey Grid : Hong Kong 1980 Grid System
4. Vertical Datum : Hong Kong Principal Datum
5. Positioning : NovAtel PwrPak7 GNSS system/C-Nav 3050 GNSS system
6. Equipment : EdgeTech 6205s combined bathymetry and side scan sonar system
   Odom Echotrac MK III single beam echo sounder system
   Kongsberg EA440 single beam echo sounder system
   C-Boom low voltage boomer (LVB) system
   EdgeTech 3400-OTS sub-bottom profiler
   Innomar SES-2000 medium-100 sub-bottom profiler
   Geometrics G-882 marine magnetometer
7. Tide Gauge : Hong Kong International Airport West
8. Coastline taken from 1:1,000 Survey Sheets, Survey and Mapping Office, Lands Department

Revision No.	Date	Drawn by	Checked by	Approved by	Remarks
0	31/07/2023	Agnes Siu	Howard Wang	Margie Chen	Preliminary
1	12/09/2023	Agnes Siu	Howard Wang	Margie Chen	Final

METRIC SCALE 1:2000

100 80 60 40 20 0 100 200

Client :

Civil Engineering and Development Department

Surveyor :

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