BRE_AO5 AREA **OFFSHORE WINDFARM** **GEOPHYSICAL AND UXO SURVEY**	BRE_TEC_47_RESULTS REPORT – GEOPHYSICAL-UXO SURVEY – AO5 OWF AREA_1.1_A
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ABBREVIATIONS

AAA	Anti-Aircraft Artillery
ADCP	Acoustic Doppler Current Profiler
ALARP	As Low as Reasonable Practicable
cm	Centimetre
CoG	Center of Gravity
DGEC	Direction générale de l'énergie et du climat
DP	Dynamic Positioning
DTM	Digital Terrain Model
EC	Export Cable
EGN	Empirical Gain Normalization
FLO	Fisheries Liaison Officer
GEO	Geophysicist
GI	Borehole location
GIS	Geographic Information System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GRS	Geodetic Reference System

ABBREVIATIONS

h	Hour
IGRF	International Geomagnetic Reference Field
INERIS	L'Institut national de l'environnement industriel et des risques
INS	Inertial Navigation System
JSF	EdgeTech Sonar data file format
Kg	Kilogram
KHz	kilohertz
LAT	Low Astronomical Tide
LMA	Luftmine A
LMB	Luftmine B
LSA	Land Service Ammunition
m	Meters
M	Minutes
MAG	Magnetometer
MBES	Multibeam echosounder
mm	Millimetre
MMO	Marine Mammals Observation
MOB	Mobilisation
MRU	Motion Reference Unit
nT	nanoTesla
OSS	Offshore substation
OWF	Offshore windfarm
PC	Party Chief
PEP	Project Execution Plan
POB	Personnel On Board
PPP	Precise Point Positioning
PPS	Pulse Per Second
PPSU	Pulse Power Supply Unit
pUXO	Possible unexploded ordnance
QA	Quality Assurance

ABBREVIATIONS

QC	Quality Control
QGIS	Quantum GIS (Software)
QHSE	Quality, Health, Safety and Environment
RGB	Red, green, blue
ROTV	Remotely operated towed vehicle
ROV	Remotely Operated Vehicle
RTE	Réseau de Transport d'Electricité
RTK	Real Time Kinematics
s	Second
SHOM	Service hydrographique et océanographique de la Marine
SIT	Surrogate Item Trials
SRF	Ship's Reference Frame
SSS	Side Scan Sonar
SVP	Sound Velocity Profiler
SVS	Sound Velocity Sensor
TBC	To be confirmed
TXT	Standard text document file format
UHR	Ultra-High Resolution
USBL	Ultra-Short Base Line
UTC	Universal Time Coordinated or Coordinated Universal Time
UTM	Universal Transverse Mercator
UXO	Unexploded ordnance
VRF	Vertical Reference Frame
VSAT	Very Small Aperture Terminal
WGS84	World Geodetic System 1984
WT	Work time

1. INTRODUCTION

1.1. PROJECT OVERVIEW

Tecnoambiente carried out a geophysical survey across the proposed BRE_AO5 lot located in Morbihan, in the south of Brittany, close to the western coast of Belle-Île-en-Mer and the southern coast of Île de Groix. The site is under consideration for an offshore windfarm and associated offshore substation. This report summarises the survey operations and presents the results of the survey for the offshore windfarm area (OWF).

The area of interest is approximately 25 km x 13 km and, according to the SHOM bathymetry, the site is located in water depths ranging from 80 to 100m. The spatial surface area of the proposed wind farm is approximately 93.74 km^2.

The objective of this report is to present the data obtained in the geophysical/UXO phase of the BRE_AO5 work area, focusing only on the Offshore Windfarm (OWF).

The distribution of UXO boxes in the wind farm area of BRE_AO5 has been carried out over the previously acquired seismic lines in Phase I. Data were acquired across a total of 24 UXO boxes within the proposed offshore windfarm area. Figure 1-1 indicates the location of these boxes.

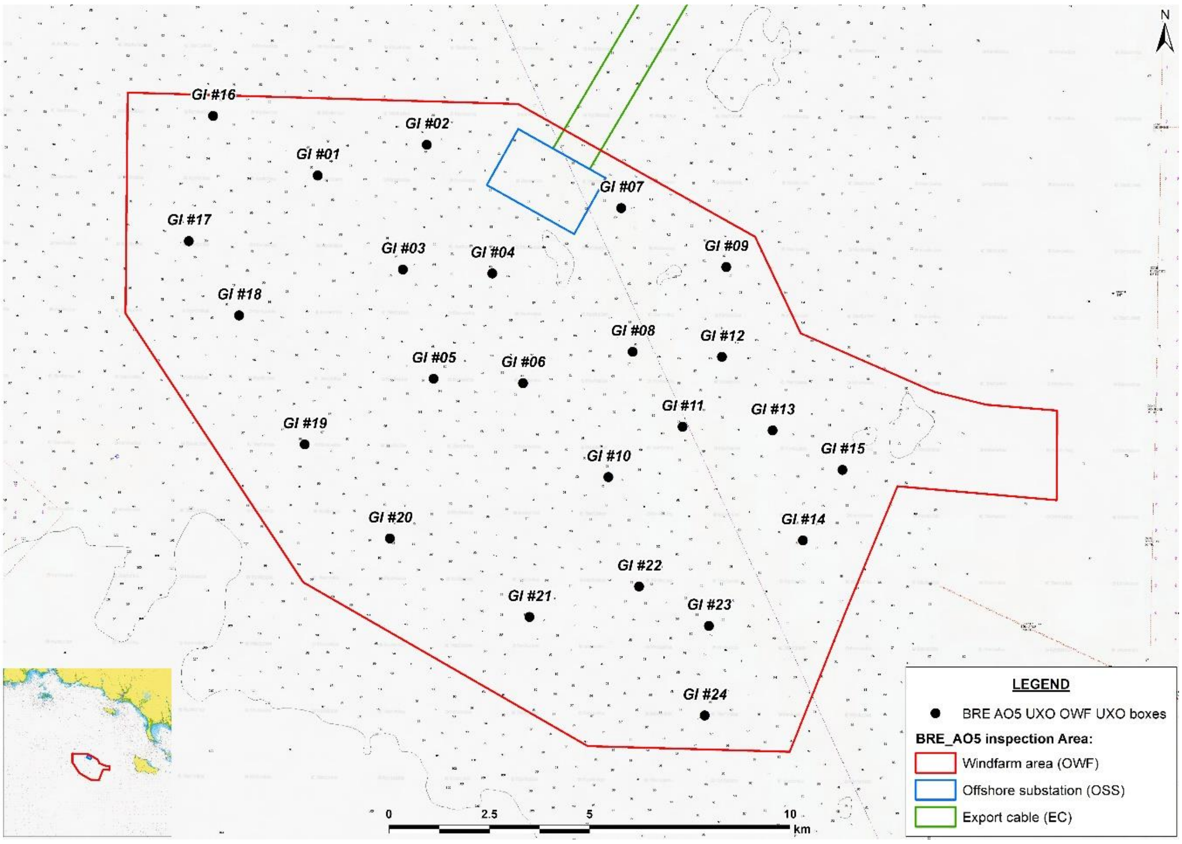


Figure 1-1: UXO boxes location and distribution at the BRE_AO5 Windfarm area (OWF).

Each of the UXO boxes comprises an area of 900 m^2 (30 m x 30 m), with a run in / run out length of 400 metres utilised for the acquisition optimization of the magnetometer's methodology. Figure 1-2 provides an example of the UXO survey boxes and Figure 1-3 illustrates the survey line plan layout at 6m separation.

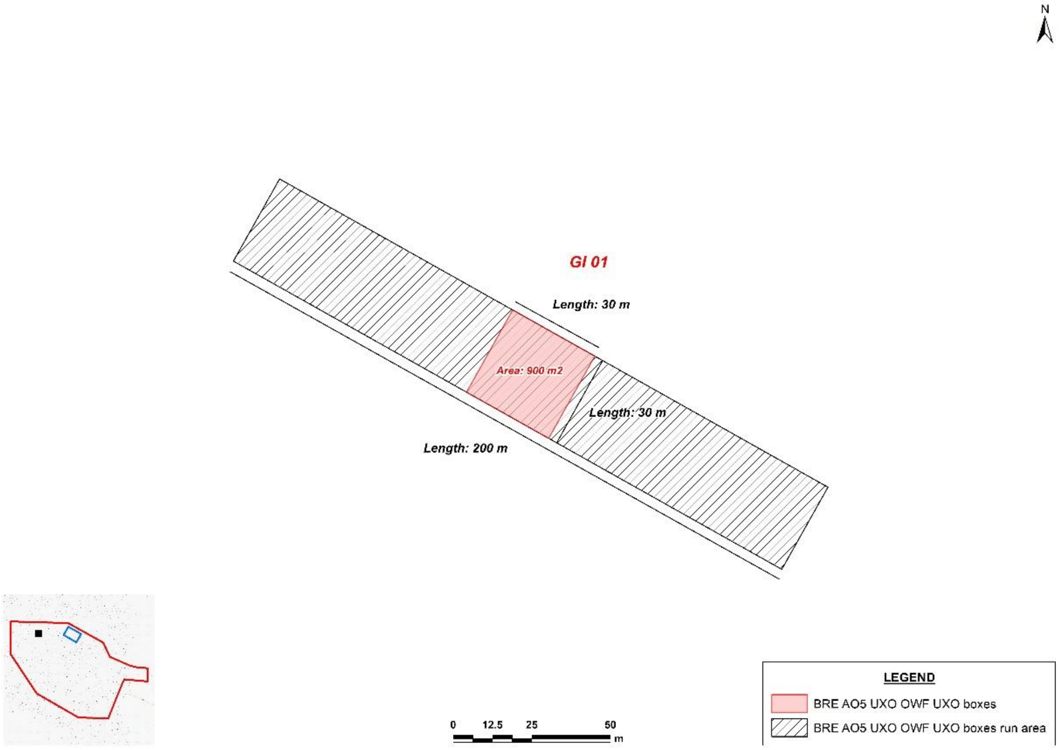


Figure 1-2: Example of UXO boxes dimensions within the BRE_AO5 Windfarm area (OWF).

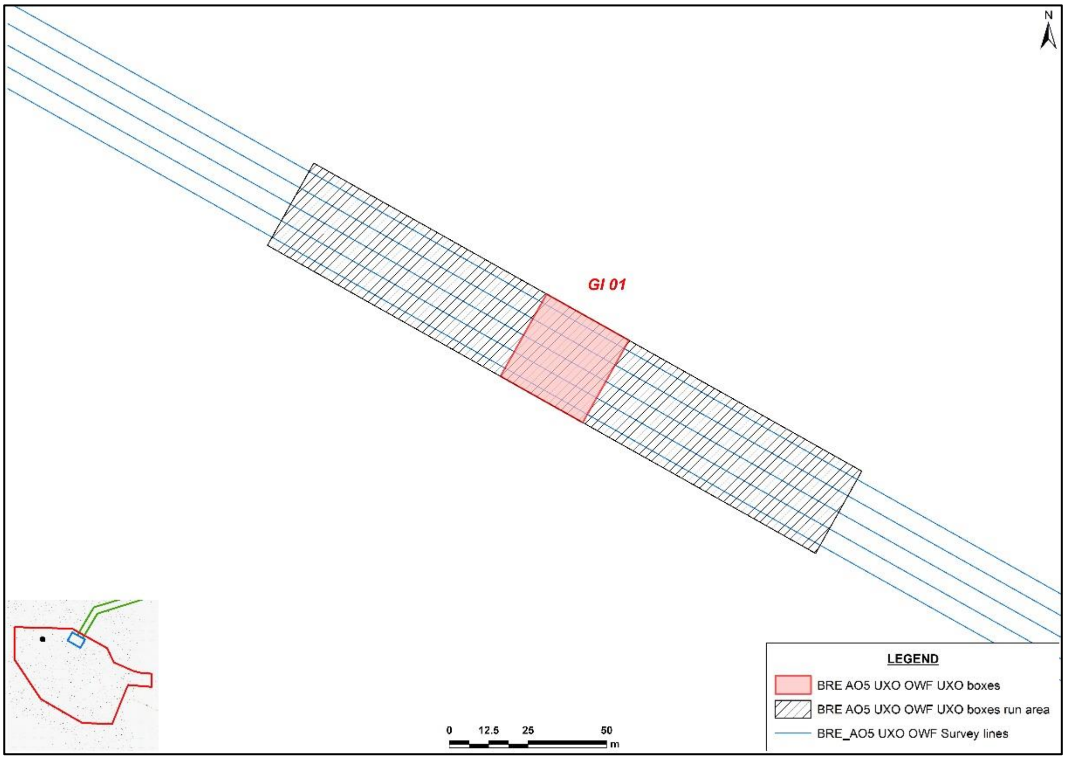


Figure 1-3: Example of UXO boxes survey line plan within the BRE_AO5 Windfarm area (OWF).

1.2. SCOPE OF WORKS

The objective of the site survey was to perform a geophysical and UXO survey across each of the proposed UXO GI points (Borehole locations) within the OWF site, comprising MBES, SSS and MAG datasets. The purpose of this was:

- To define the final location of the GI points on the proposed box
- To detect magnetometer anomalies, and side scan and MBES contacts
- To review proposed borehole locations for geohazards

The main purpose of the study was to provide an ALARP certificate for intrusive geotechnical sampling over the BRE_AO5 OWF area.

1.3. GEODETIC PARAMETERS

1.3.1. Survey datum

These parameters are detailed below.

Table 1: Datum parameters table

DATUM	
Survey Datum:	WGS 84
Spheroid	GRS 1980
Semi-Major Axis (a)	6,378,137.000
Semi-Minor Axis (b)	6,356,752.31424
Inverse Flattening (1/f)	1/298.257223563

Table 2: Projection parameters table.

PROJECTION	
Projection	UTM
False Easting	500000
False Northing	0
Latitude of Origin	0º00'00.000000''
Central Meridian	3º00'00.000000''
UTM Zone	30 N
Scale Factor on CM	0.9996
Units:	Meters

1.3.2. Vertical datum

Vertical datum used by the Qinsy software is LAT Bathyelli v2 geoid published by the SHOM in December 2013. The Bathyelli LAT (SHOM 2013) is a surface based on the GRS 1980 spheroid. The same geoid model was used for the AO5 area during the 2021 survey.

1.3.3. Tidal reduction

To carry out the survey as accurately as possible, Tecnoambiente utilised MarineStar PPP corrections via satellite signal. When using an accurate GNSS system (RTK correction), the tidal corrections are carried out in real-time through Qinsy computations, as shown in Figure 1-4.

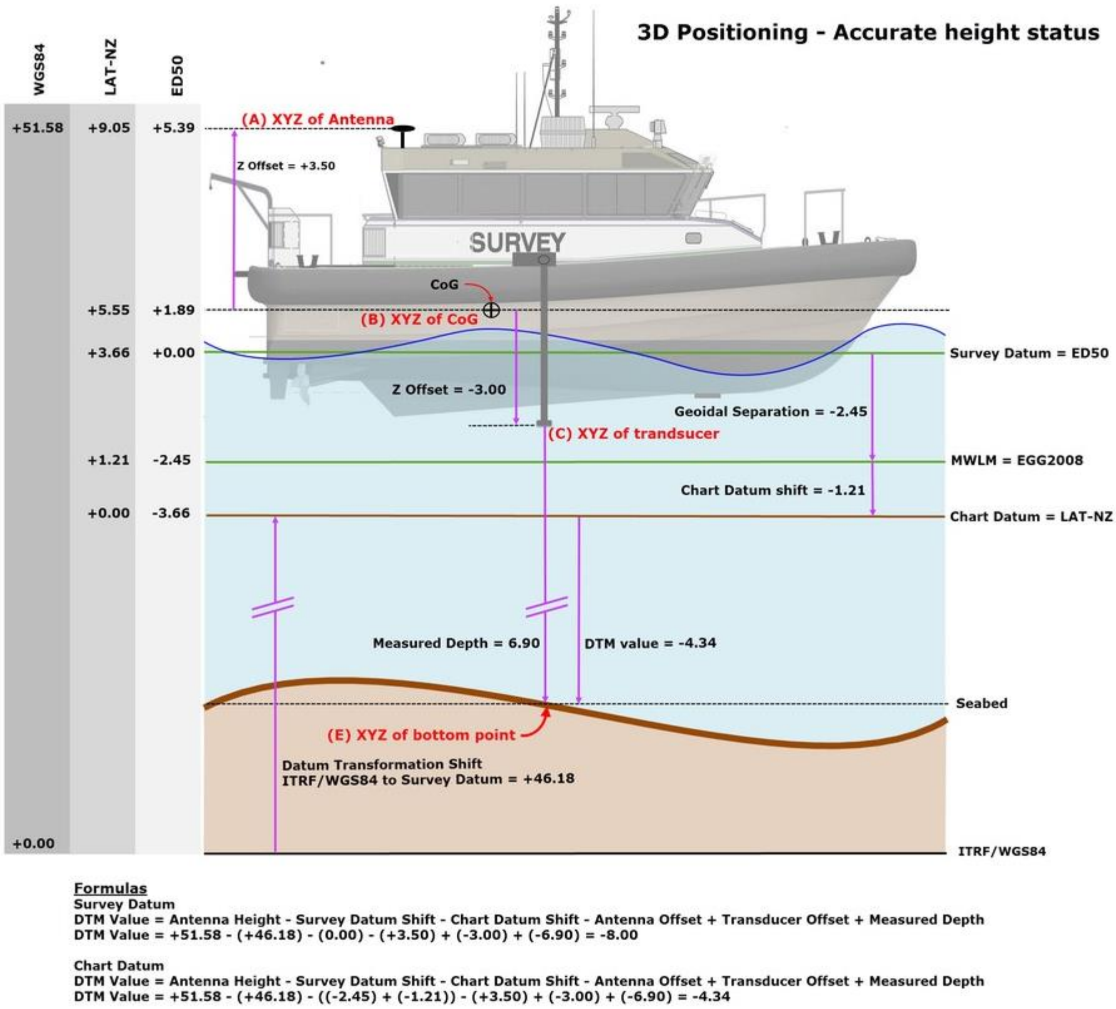


Figure 1-4: Qinsy method for accurate height calculation.

The separation between the WGS84 ellipsoid (GRS80) and the vertical datum is a model called Bathyelli v2. This comprises a set of surfaces, each of which defines the separation of one vertical datum from the WGS84 ellipsoid. If corrections drop out, they can be applied during post processing.

2. GEOPHYSICAL DATASET

2.1. QA/QC CHECK

The processed values obtained from the onboard processing team during the survey are checked before the ALARP certificate phase. This quality control check of the input data validates the quality of the processing method. Here is the QA/QC for the measurements made:

- QC0: Check of the geophysical value
- QC1: Check of the sensor position
- QC2: Check of the altitude of sensor and dynamic coverage
- QC3: Check of the noise
- QC4: Check of the speed and sampling frequency

2.2. SIT SURVEY

The calibration test (SIT) was carried out using ferrous surrogates, weighing 10 kg, 25 kg and 50 kg, in order to be consistent with historical data (Ref 01), considering the lowest magnetic signal to detect (LMB/LMA bomb) and the largest ammunition size. This test makes it possible to estimate the precision of the survey positioning, the amplitude of the signal to be sought and the detectability distance.

After mapping an area to make sure it was clear of potential targets, the surrogates were immerged. Several altitudes were utilised to undertake the calibration test above the surrogate: 3 m, 5 m, and 6 m (Figure 2-1). Each of the three surrogates were detectable at all altitudes (Ref 05); however, the amplitude of the signal at the 6 m altitude for the 10kg weight was found to be only 0.8 nT/m, well under the used cut-off of 2 nT/m.

From these SIT data, it was possible to estimate:

- The positional uncertainty of the survey at 2.5 m average (Table 3, 4 and 5)
- A detection range of 6 m for a ferrous mass greater than 25 kg
- A detection range of 4 m for a ferrous mass of about 10 kg, which could correspond to LMB/LMA munitions

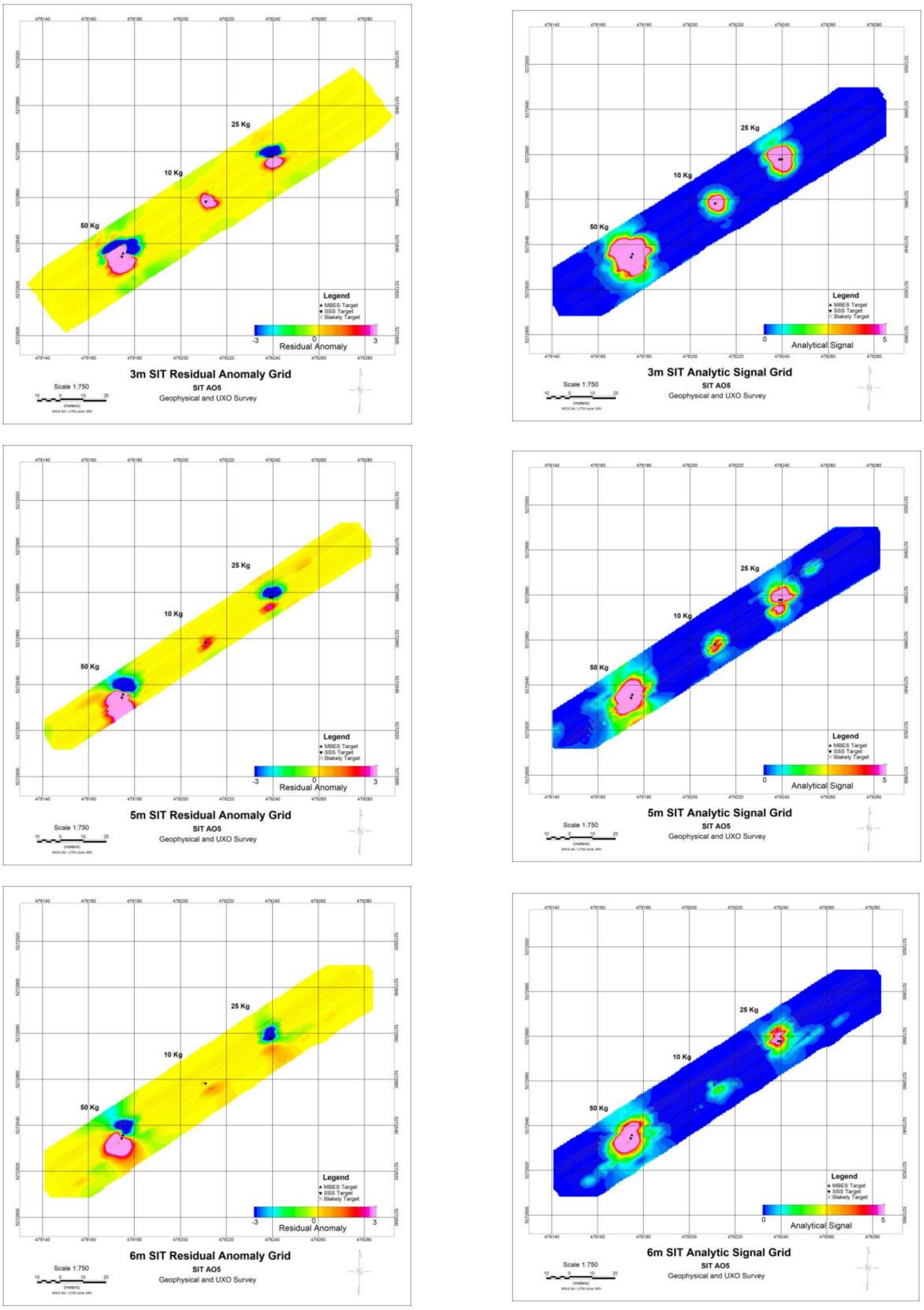


Figure 2-1: Result from the SIT, Residual field, and Analytic signal at 3m and 6 m altitude.

Table 3: Position verification of 10 Kg item.

	Source	Easting (m)	Northing (m)	Δ Easting (m)	Δ Northing (m)	Total Deviation (m)
10 Kg Surrogate Item	SSS position	479210.87	5272858.14	N/A	N/A	N/A
	Blakely test @ 3m	479211.5	5272859.0	0.63	0.87	1.08m
	Blakely test @ 5.0m	479212.50	5272857.50	1.64	0.64	1.72
	Blakely test @ 6.0m	479213.00	5272856.00	2.13	2.14	3.01

Table 4: Position verification of 25 Kg item.

	Source	Easting (m)	Northing (m)	Δ Easting (m)	Δ Northing (m)	Total Deviation (m)
25 Kg Surrogate Item	SSS position	479239.83	5272877.72	N/A	N/A	N/A
	Blakely test @ 3.0m	479239.5	5272879.00	-0.33	1.28	1.32
	Blakely test @ 5.0m	479239.00	5272880.00	0.81	2.27	2.41
	Blakely test @ 6.0m	479238.00	5272878.50	1.83	0.76	1.99

Table 5: Position verification of 72 Kg item.

	Source	Easting (m)	Northing (m)	Δ Easting (m)	Δ Northing (m)	Total Deviation (m)
50 Kg Surrogate Item	SSS position	479174.40	5272834.28	N/A	N/A	N/A
	Blakely test @ 3.0m	479174.00	5272835.00	0.40	0.26	0.47
	Blakely test @ 5.0m	479174.50	5515635.50	0.1	0.72	0.81
	Blakely test @ 6.0m	479173.00	5272832.50	1.40	1.78	2.24

3. DATA ACQUISITION

3.1. SURVEY ACQUISITION SCHEME

To ensure full coverage of the UXO boxes within the study area of the AO5 offshore windfarm area, data acquisition during the survey was carried out as follows:

Table 6: UXO data acquisition scheme information

Methodology	Survey lines	Range
Multibeam echosounder system (MBES)	6 m	75 m
Side Scan Sonar (SSS)		100 m
Gradiometer (MAG)		8 m

The following figure shows the basic data acquisition scheme for the UXO phase.

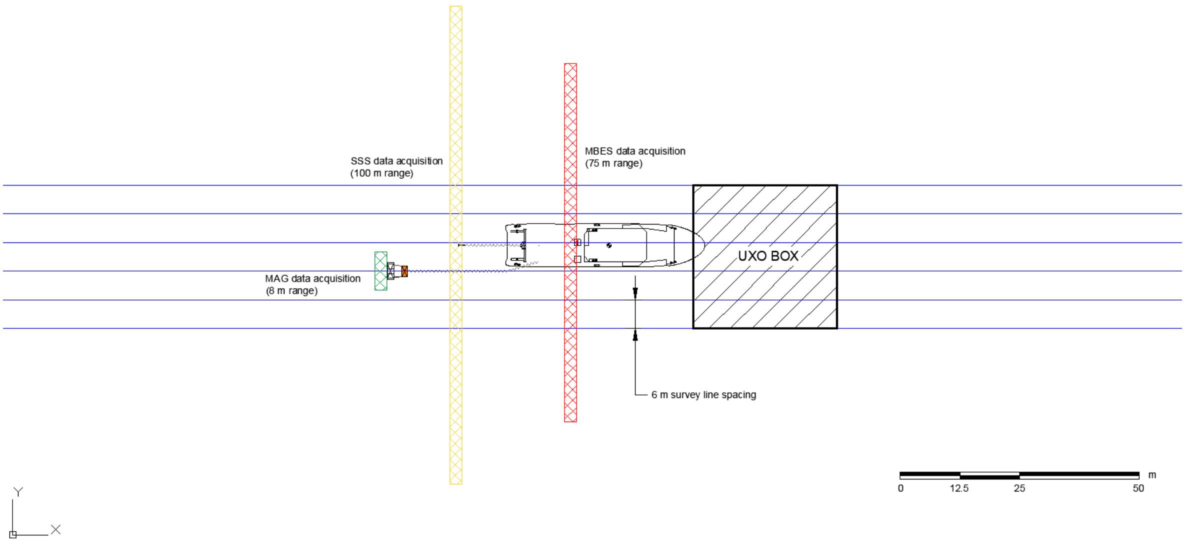


Figure 3-1: UXO data acquisition scheme.

3.2. MULTIBEAM ECHOSOUNDER

The objective of this phase of data acquisition is the detection of possible MBES targets lying on the seabed. Due to the coverage requirements of gradiometer data acquisition, this required total coverage of the seabed within each of the UXO boxes, and hence a survey line spacing of 6 metres was utilised.

During data acquisition, the vessel's master must follow previously programmed routes along the project lines, shown on the computer screen (Helmsmann indicator). If the actual course deviates from the programmed route by more than a specified amount, or when there is a problem with a peripheral, such as a loss of GPS corrections, the vessel master is warned by the use of visual and audible alarms.

While the master follows the navigation lines, the acquisition module of the hydrography program captures all of the position data sent by the GPS, the raw values of the movement reference unit (Hydrins III) and the heading of the equipment; to correct the location of the soundings sent by the multibeam echosounder. This correction is made for each transmission pulse in real-time.

Parallel to data entry, data acquired by the equipment and peripherals are synchronized. This process is carried out by Qinsy, and is complemented by the input of the time and the pulse per second (PPS) provided by the MRU, so that all data is time synchronised.

The guidelines followed by Tecnoambiente during the surveying for MBES data acquisition are:

- IT-CM-36 SVP Deployment Recovery, Rev1.0
- IT-CM-01. Guidelines for Hydrography Project management, 5
- IT-CM-04. Bathymetric survey, 1
- IT-CM-14 Survey Basics Guidance, 1
- IT-CM-15 Online Surveying procedure, 3

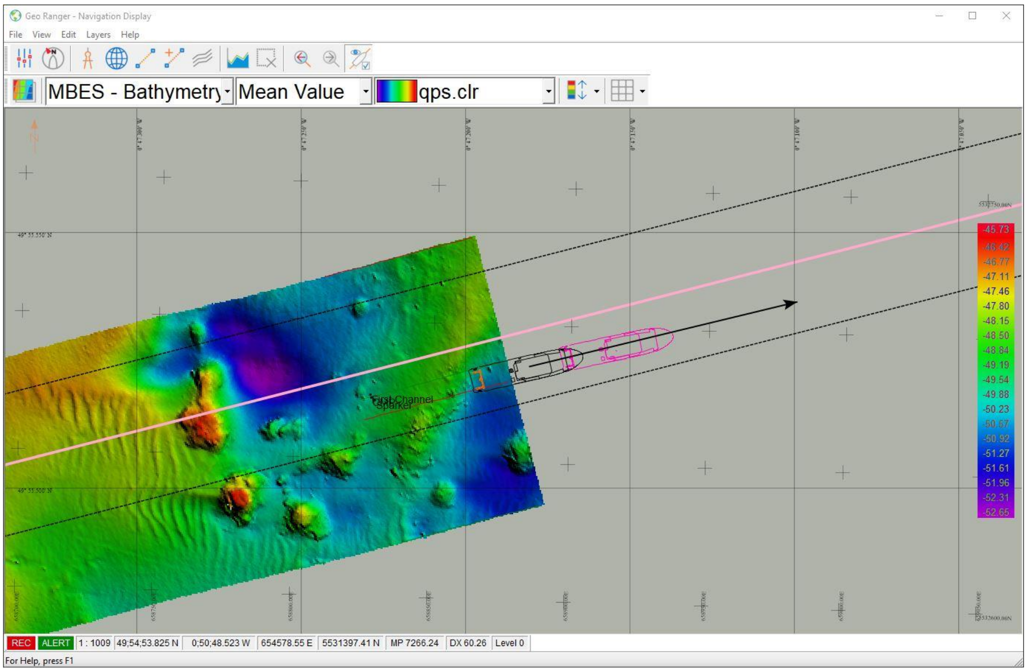


Figure 3-2: MBES bathymetry data acquisition with the Qinsy software.

During data acquisition, limits were applied to reduce soundings noise. These limits in the recording correspond to static gates of the equipment software that reduce the acquired registers noise, in accordance with statistical calculations of vertical uncertainty.

During the processing phase of acquired data, the lines on the screen are processed, in order to manually correct any noise that appears in the records. Noise is produced by multiple factors such as, multipath in position, air bubbles, cetaceans, motor interference from the vessel, etc., in the digital register of soundings. To make certain of the complete removal of any noise in the soundings, spike filters and spline filters were applied.

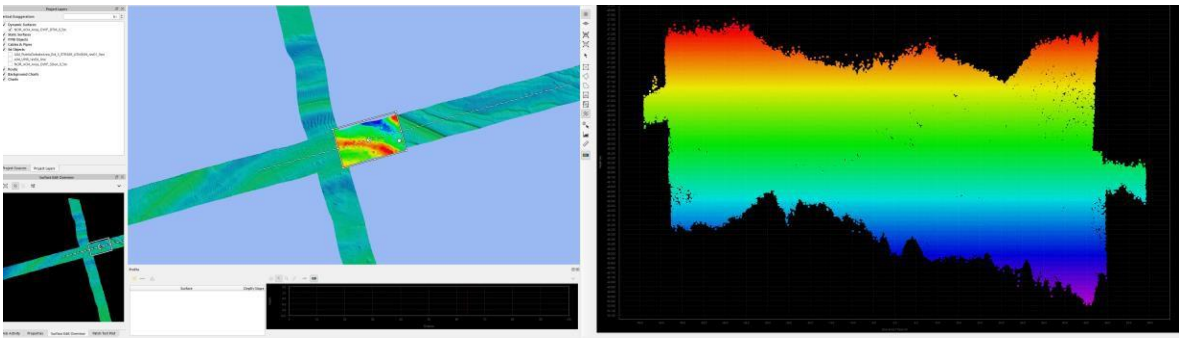


Figure 3-3: Processing screen of MBES bathymetry data with the Qimera software.

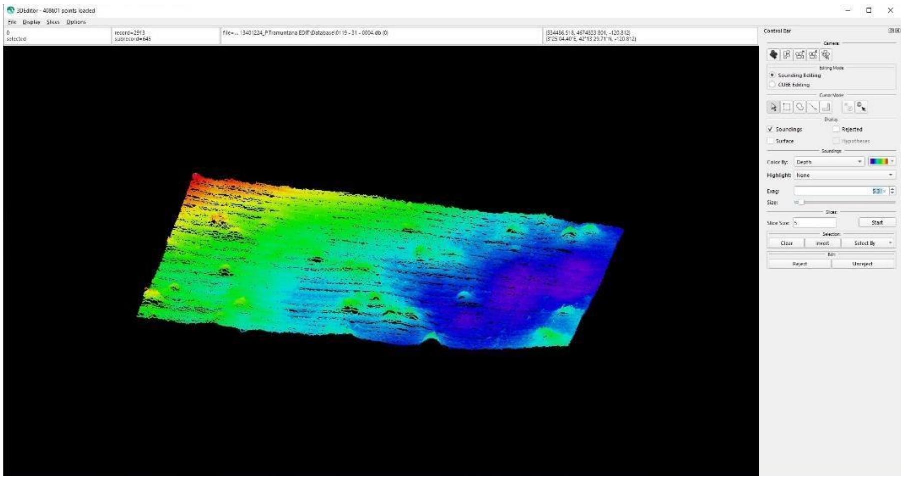


Figure 3-4: 3D image of the MBES bathymetry processing.

Once any possible existing errors in the records were deleted, a digital model of the terrain with 0.25 x 0.25 m grid size was produced, with a minimum cell size to obtain the maximum resolution of the seabed.

Digital terrain models (DTM) are created in Qimera. Once done, the DTM's are exported as 32bits RGB Geotiff, for each of the UXO boxes.

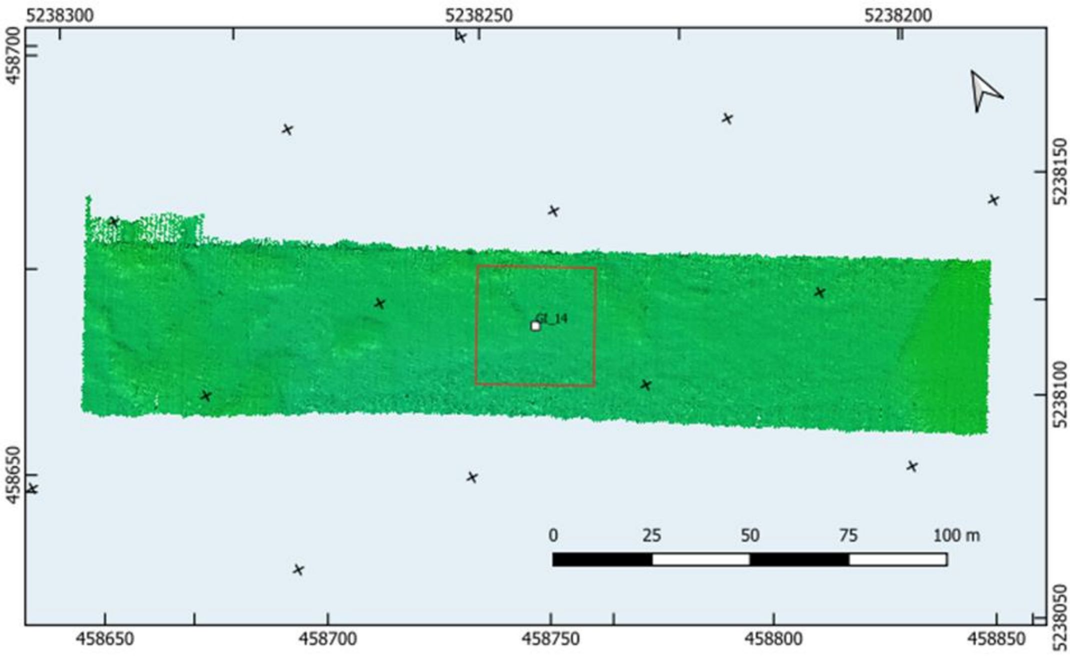


Figure 3-5: Example of the maps of the bathymetric chart produced for BRE_AO5 GI 14.

3.3. SIDE SCAN SONAR – UXO SURVEY

The objective of this phase of data acquisition is the detection of possible sonar targets lying on the seabed. Due to the coverage requirements of gradiometer data acquisition, this required total coverage of the seabed within each of the UXO boxes, and hence a survey line spacing of 6 metres was utilised.

A side scan sonar system comprises a processing unit connected through a cable to a wet unit that transmits and receives acoustic energy. Side scan sonar can determine seabed morphology and configuration by means of acoustic signals. It can also determine its composition, identifying different seabed strata as hard (rocky or consolidated), soft or sedimentary, as well as identifying areas of seagrass.

Side scan sonar systems can work in different frequency ranges: systems working in high frequencies, (between 500 kHz and 900kHz) offer higher resolution but lower ranges, with systems working in low frequencies (100 kHz), offer lower resolution but higher ranges. For this survey, a frequency of 900KHz was utilised. The reflection of the signal coming from the seabed is detected by the same transducers, amplified and transmitted to the control unit, and recorded and displayed on the computer screen, providing an acoustic map. With this data, it is possible to identify different seabed morphologies, together with the visualization of any seabed objects.

When the vessel is underway, the winch operator can start deploying cable until the fish gets to the desired working depth of about 6 m above the seabed.

The guidelines followed by Tecnoambiente during the surveying for SSS data acquisition are:

- IT-CM-01. SBL-SSS,1
- IT-CM-21. SSS Launch and Recovery, 0
- IT-CM-13. Geophysical Data Acquisition. General Procedure, 2
- IT-CM-14. Survey Basics Guidance, 0
- IT-CM-15. Online Surveying procedure, 3

- IT-CM-18. USBL Pole Deployment, 1

Once the SSS data were acquired and then exported into JSF format, the files are imported into the SonarWiz 7 software. Channels 3 and 4 were used for recording the high frequency data.

After data importation into the SonarWiz 7 software, an initial navigation correction was made for each imported file, applying smoothing filters to avoid errors in the heading of the tow fish. The track position was smoothed using a mean value of 300 pings.

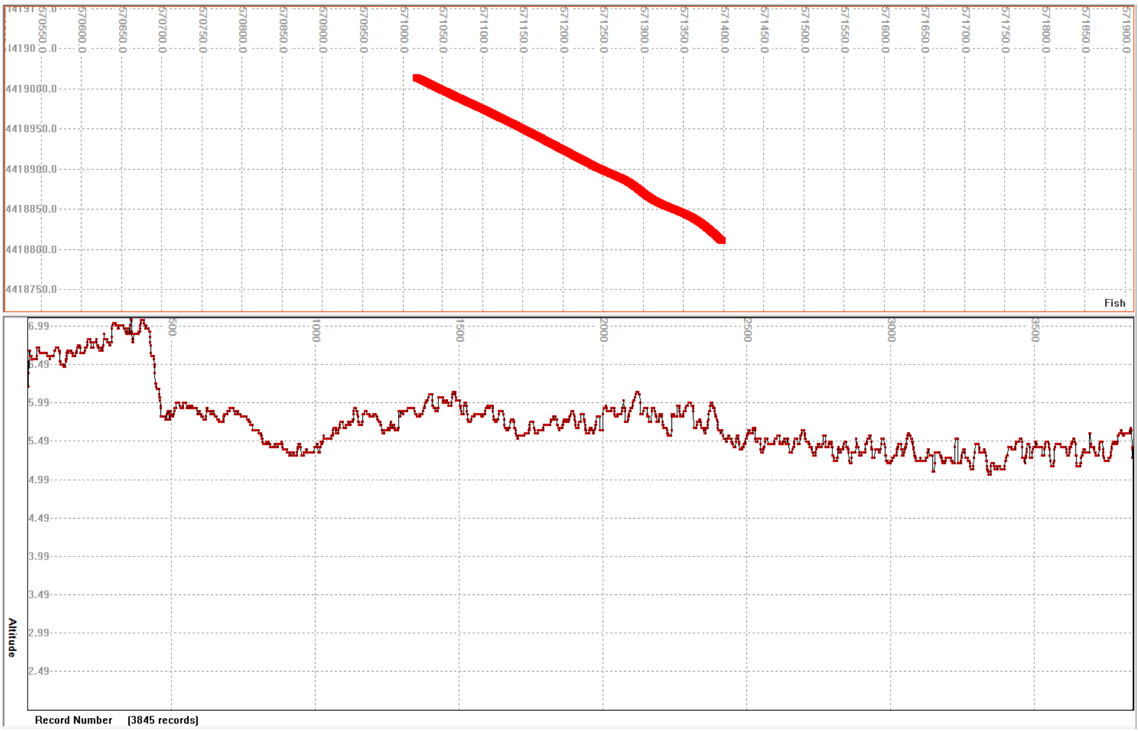


Figure 3-6: Navigation editor in SonarWiz 7.

After the aforementioned corrections were implemented, the water column for each file was eliminated, by applying the bottom-tracking acquired during the survey, as shown in Figure 3-7. If bottom-tracking of the tow fish failed during the survey, it was done automatically by applying filters or by drawing the seabed manually during post-processing. This enables slant range corrections for the digital data to be as accurate as possible.

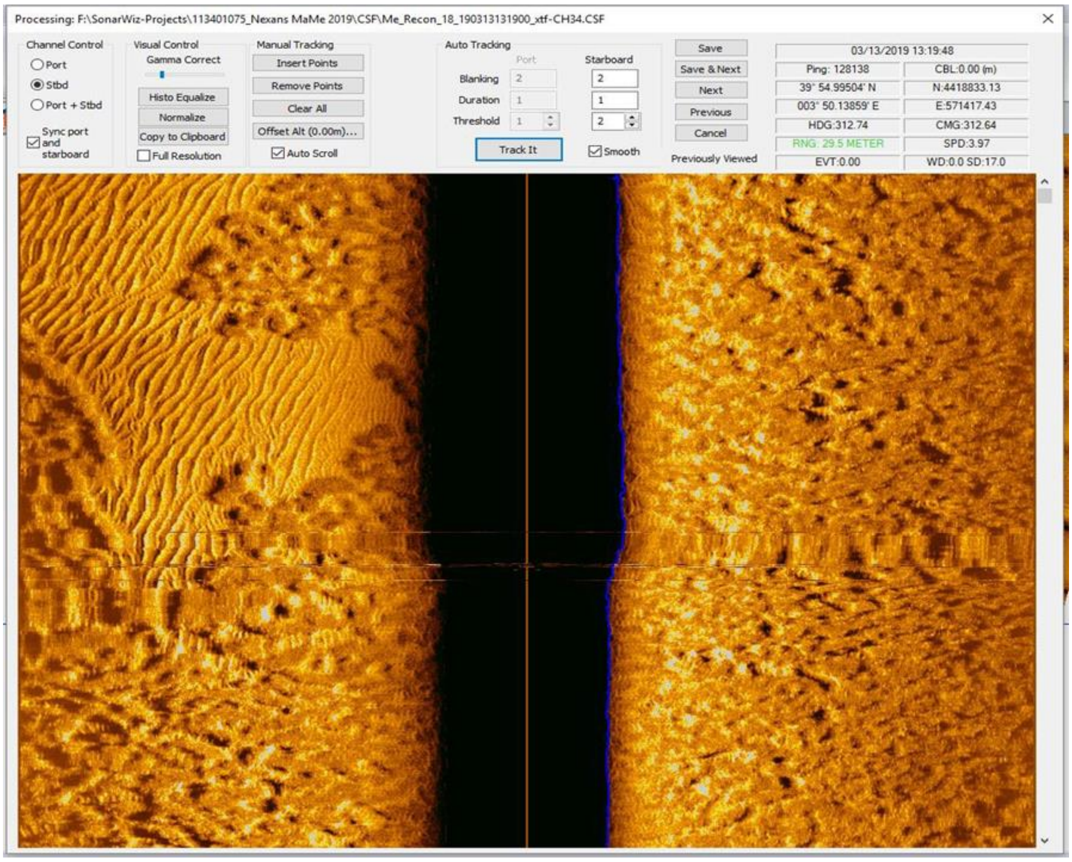


Figure 3-7: Bottom tracking processing drawn in blue in the SonarWiz 7 software

The following steps during SSS processing in the SonarWiz 7 software are the application and enabling of the EGN filter, and the enabling of the de-stripe filter.

At this point during data processing, a processed MBES geotiff is imported into the project. Using the MBES information, rotations to the SSS file are applied, in order to match feature orientations seen in the MBES data. Where necessary, a move offset can be applied to the SSS file, in order to match features within the MBES data.

Any observable contact within the area of interest is picked and its dimensions are measured.

The final processing step is the export of the sonar files into a GIS software package, where all of the information is integrated and a sonar mosaic is generated. This is carried out by converting the JSF files into 32bits RGB Geotiff images, to obtain georeferenced images of the processed data, with a resolution of 0.1 m.

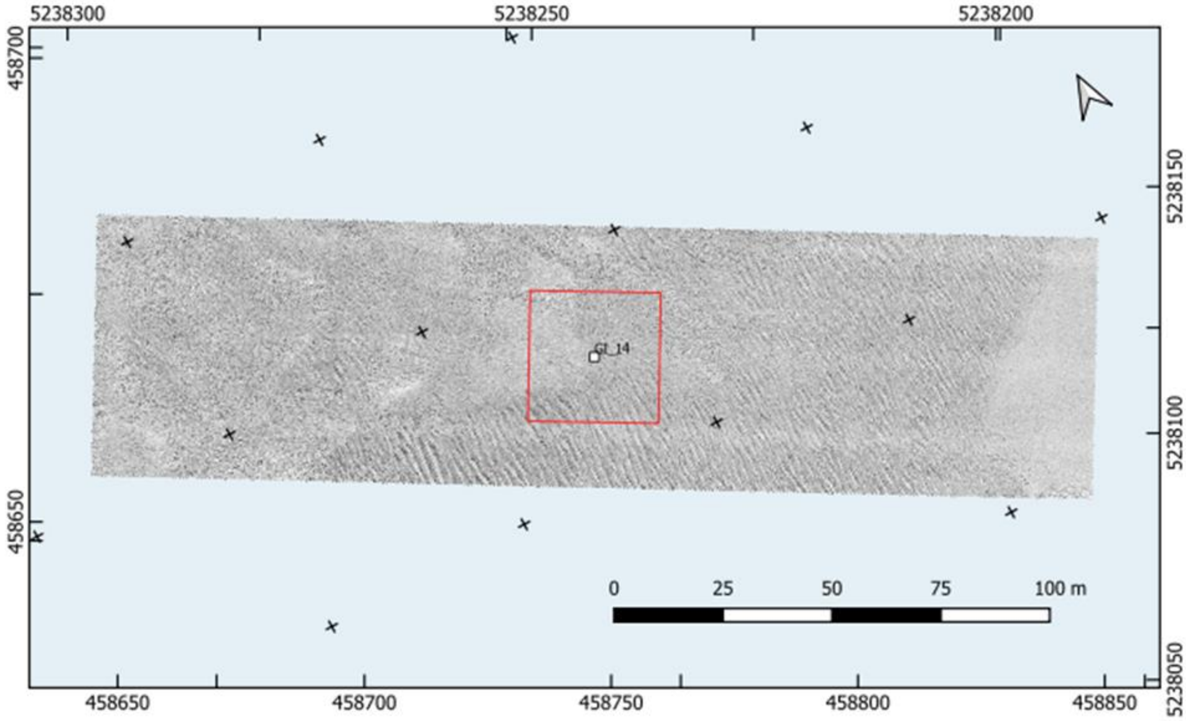


Figure 3-8: Example of side scan sonar chart, produced for BRE_AO5 GI 14.

The guidelines followed by Tecnoambiente during the surveying for SSS data processing are:

- IT-CM-01. SBL-SSS,1
- IT-CM-27. SSS Processing procedure, 0

3.4. GRADIOMETER – UXO SURVEY

Magnetometer data were recorded using four Geometrics G-882 magnetometers fitted in a custom frame and spaced 1.1 metres apart, horizontally. Survey line spacing was set at 6 metres. The frame has an automated bottom tracking function, allowing it to keep a fixed height above the seabed. After merging in Qinsy, all raw data were timestamped and output as .txt files were recorded for each magnetometer (Mag 1, Mag 2, Mag 3, and Mag 4).

Figure 3-9: ROTV with the fixed frame system for MAG acquisition.

The guidelines followed by Tecnoambiente during the surveying for MAG-UXO data acquisition are:

- IT-CM-25. UXO Mooring Procedures,0
- IT-CM-18. USBL Pole Deployment, 1
- IT-CM-26. UXO Scanfish Launch and Recovery, 0

Data was processed, using the UXO Marine Mag module from OASIS software.

Positioning and altitude data were corrected to eliminate outliers (despiked), then filtered, and smoothed. Incorrect positions were removed and the positions were filtered using a non-linear filter. All altitudes greater than 4 m were removed from the database.

The magnetometer data were corrected to eliminate aberrant values (“despiking”). They were also interpolated, but were also slightly smoothed, so as not to lose the weaker components of the signal.

The magnetometer values were then processed, in order to compensate for variations in the altitude of the fish (increase in the signal when the magnetometer approaches the seabed). The magnetometer values were recalculated at a constant virtual altitude of 3 m above the seabed. The altitudes were smoothed, using a B-Spline filter. Processed positions and altitudes were then exported, to calculate dynamic coverage.

Finally, the long-wavelength component of the Earth's magnetic field was calculated using several successive non-linear filters. This long wavelength component includes diurnal variations, geological variations, and noise, as well as the International Geomagnetic Reference Field (IGRF). This was then eliminated from the data set, resulting in a residual component, comprising primarily anthropogenic magnetic anomalies.

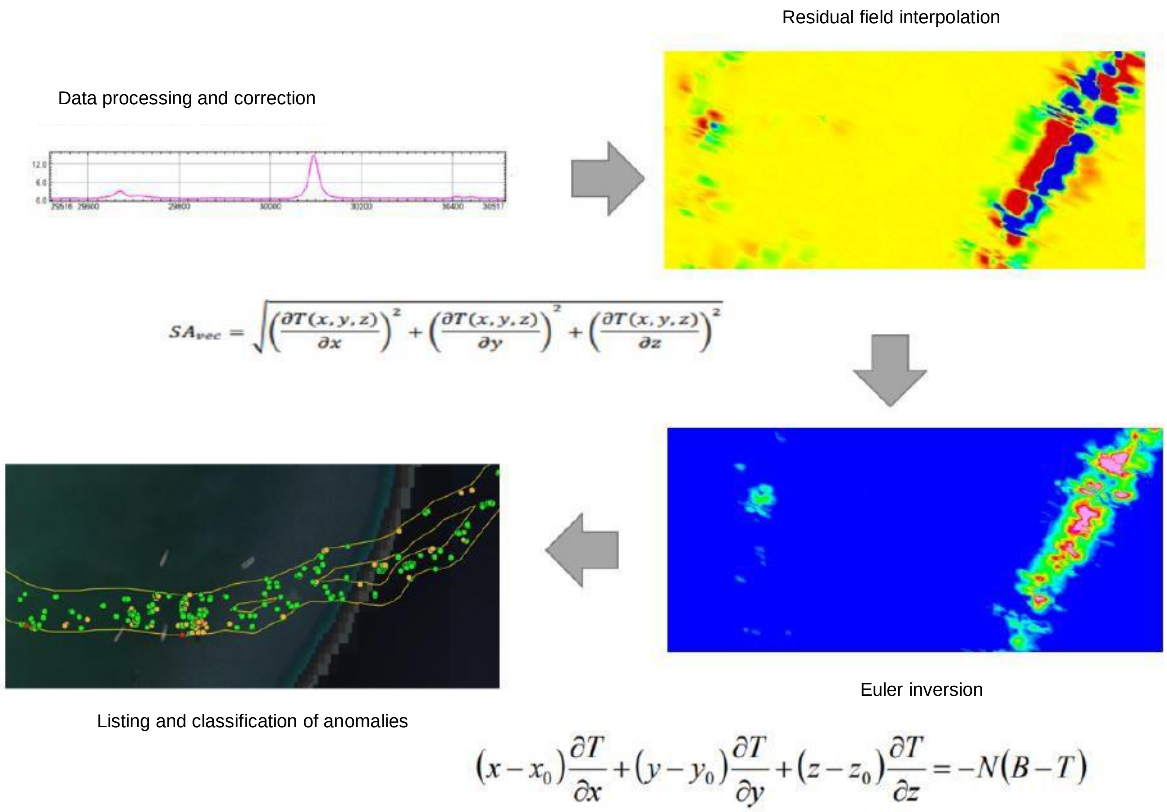


Figure 3-10: Processing workflow of magnetometer data.

A 2D map of the magnetic anomalies within the survey area was produced by interpolating these data, using a 0.25 m grid and 5 m blanking distance. The amplitude of the analytic signal was calculated using a 3D grid. The analytic signal is utilized for the mapping of structures and for the more precise positioning of any targets.

The results of the magnetometer measurements are included as two maps:

- A map of the residual magnetic field (in nT)
- A map of the analytical signal (in nT/m)

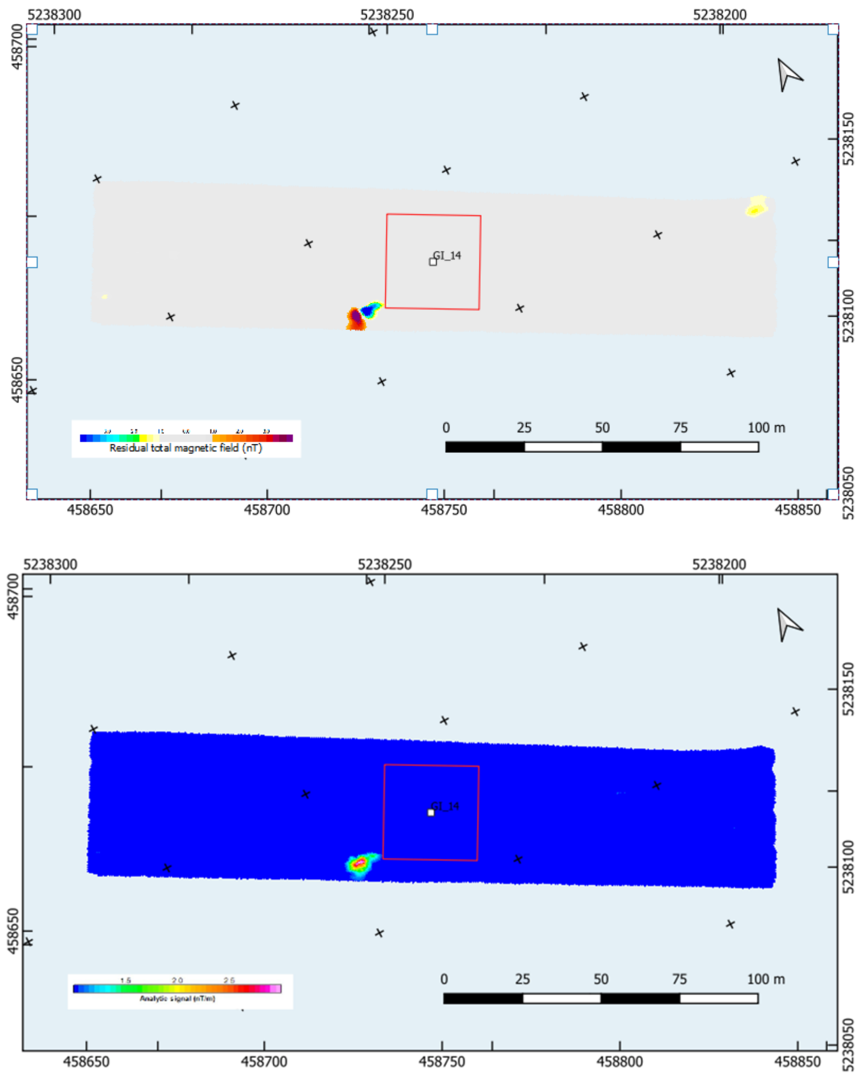


Figure 3-11: Residual field and analytic signal chart examples for BRE_AO5 GI 14.

The magnetometer coverage depended on the spacing width of the surveyed lines and the height above seabed of the measuring device, making it possible to ensure the detection of an object at any point, by knowing the distance between the measuring sensor and the object. The requirements of the Scope of Work were met throughout the surveyed areas, i.e. detection of a 25 kg ferrous mass at a depth of 2 m and a maximum detection distance of 6 m (*Penella 1982*).

The dynamic coverage was calculated for a detection range (Δ) determined by the mass of the smallest object we were looking for and the depth below seabed of the soil intrusive activity.

The detection radius (d) under sensor was then calculated for each point with the formula:

$$d = \sqrt{\Delta^2 - (alt + DBSF)^2}$$

Where:

Δ = Detection range
DBSF= Depth below seafloor
alt= Altitude of sensor

For the detection range of 6 m and depth of 2 m defined for this survey, the formula is defined as follows:

$$d = \sqrt{6^2 - (alt + 2)^2}$$

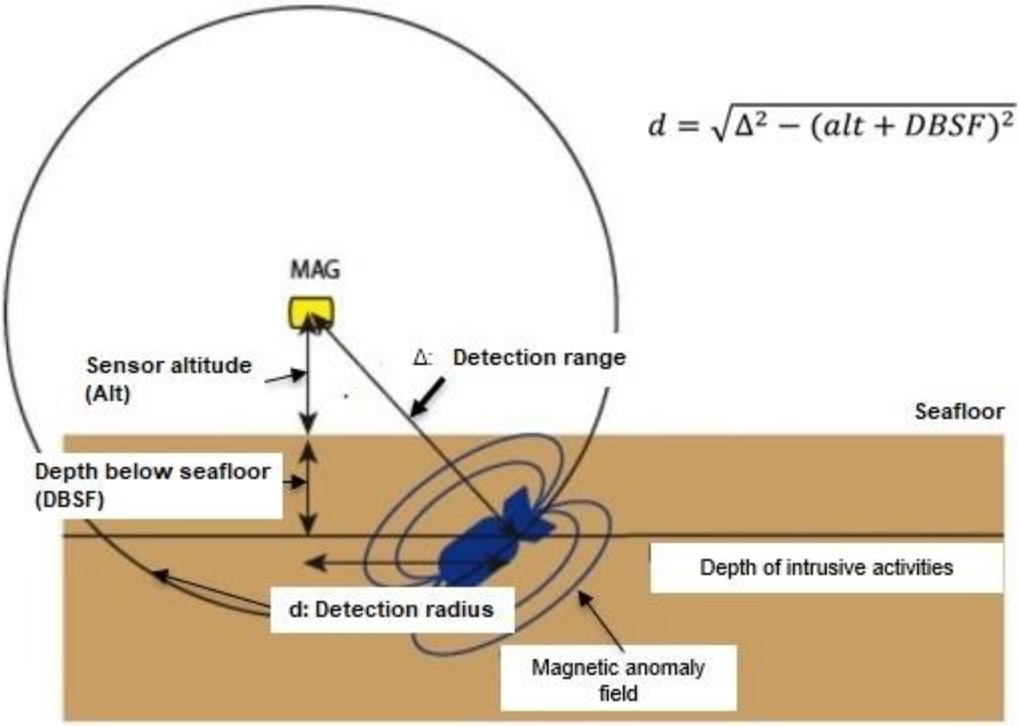


Figure 3-12:.Dynamic coverage calculations.

This means that for each point of data, a circle of detection with radius d is drawn around this point. The data were opened within a GIS software package (QGIS). Drawing these circles in the GIS software, using a buffer of detection ranges, enables us to map the detection coverage and identify any data gaps.

4. RESULTS

4.1. COVERAGE AREA

The survey took place over the OWF GI boxes for a magnetometer coverage of 11221 m^2.

Table 7: Magnetometer coverage area (centroid of the GI box).

BOX	MAGNETOMETER SURVEY AREA WITH 100% DYNAMIC COVERAGE (m^2)
GI_01_A	501
GI_02	501
GI_03_A	419
GI_04_D	243
GI_05_A	554
GI_06	514
GI_07	484
GI_08	434
GI_09	639
GI_10	535
GI_11	380
GI_12	507
GI_13	464
GI_14_A	496
GI_15_A	468
GI_16_A	279
GI_17	500
GI_18	500
GI_19	513
GI_20	539
GI_21_A	503
GI_22	503
GI_23_A	354
GI_24_A	391

BOX	MAGNETOMETER SURVEY AREA WITH 100% DYNAMIC COVERAGE (m^2)
TOTAL	11221

4.2. ANOMALY PICKING

4.2.1. Magnetic anomalies

Visualization of the residual field map (in nT) makes it possible to locate any dipole anomalies present. The map analysis threshold (sensitivity of the display via the adjustment of the colour scale) is very important to validate the interpretation. By gradually decreasing the analysis threshold, it is possible to image anomalies of lower intensity. After analysis of the data, anomalies were manually picked, using the colour scale presented in Figure 4-1.

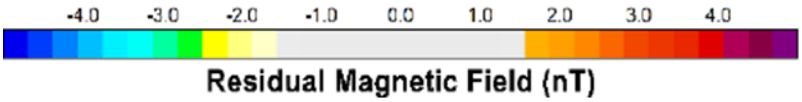


Figure 4-1: Colour scale and threshold used for analysis of magnetic anomalies.

Anomalies were also detected automatically from the analytical signal grid, with a 1.0 nT/m threshold (grid value cut-off of 1nT/m).

Magnetic anomalies were detected in the whole dataset. In particular, seventy (70) magnetic anomalies were detected within the OWF survey area (listed in Appendix I).

4.2.2. MBES and Side Scan Sonar Contacts

MBES and side scan sonar contacts were picked only in the 15 m vicinity of the original GI boxes location or the alternative GI Boxes location. A total of thirty (30) side scan sonar contacts and six (6) MBES contacts were detected within the dataset for the OWF survey area (Listed in Appendices II and III).

4.3. DISCRIMINATION OF pUXO TARGETS

Magnetic anomalies indicate the presence of ferrous elements at or below the seabed. This is true for most types of unexploded ordnance (UXO).

Any magnetic anomaly can therefore correspond to potential UXO

Therefore:

- Any side scan sonar or MBES contact with a magnetic signature is considered as pUXO.
- The shapes and lengths of side scan sonar and MBES contacts were analysed carefully for discrimination as non-UXO.
- Side scan sonar and MBES contacts without magnetic signatures and without any corresponding shape and length criteria are considered as non-UXO. But as these contacts correspond to potential obstructions on the seabed, they were mapped without any avoidance area indicated on the ALARP certificate maps.

5. AVOIDANCE DISTANCES

Following the analysis, we are looking for as low as reasonably practicable (ALARP), areas that can be considered clear of any pUXO. The avoidance criteria have been defined following the UXO threat and risk assessment with geotechnical investigation risk mitigation strategy recognised and the desktop studies (**Ref. 01**):

Thus, the avoidance distance can be calculated as follows (Figure 5-1):

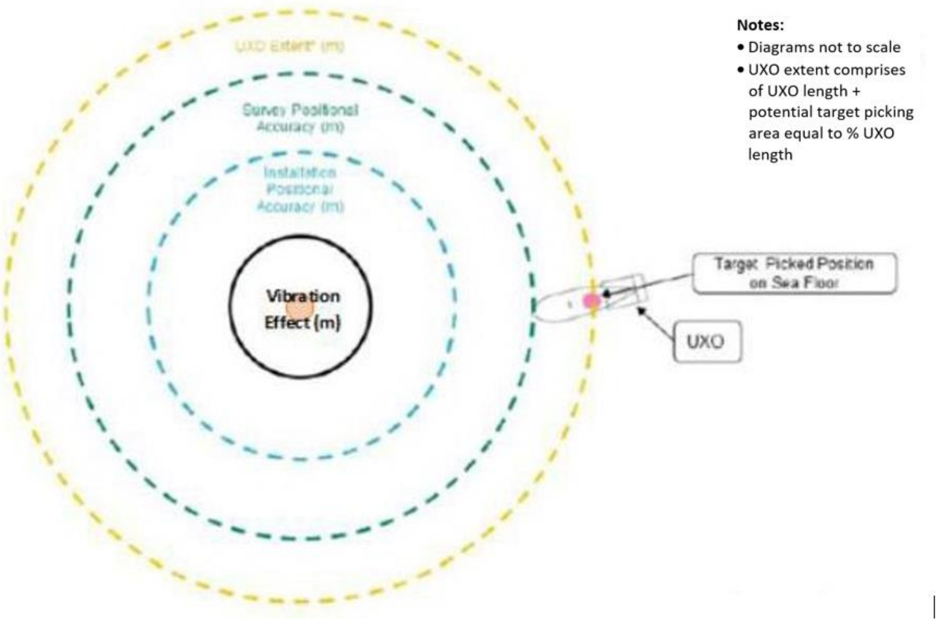


Figure 5-1: Avoidance distances.

Avoidance distance = Geotechnical tool width + Vibration effect distance + Geotechnical tool positioning accuracy + UXO survey accuracy + Ammunition length

The effect of the generation of seismic waves during vibro-driving or pile driving has to be taken into account in the case of geotechnical drilling or pile driving. These machines generate a wide variety of seismic waves (pressure, Rayleigh, shear) (Study report DRS17-164706-11171B, INERIS) that can trigger UXO detonation. This effect need not be considered for other geotechnical work, such as jack up or anchor installation.

For the OWF area, the 15 m buffer was applied as an avoidance distance, in accordance with the document delivered by 6 Alpha Associates Limited (Ref. 01).

A safety buffer of 15 m is to be employed from any isolated magnetic anomaly.

This was achieved through geospatial processing by QGIS software.

Firstly, the areas that could not be considered as clear of any pUXO are mapped, grouping the pUXO targets (magnetic anomalies and/or sonar and MBES contacts) and potential saturated areas. Afterwards, the "avoidance areas" were mapped with an avoidance zone of 15 metres (a 15 m safety buffer around the anomaly) away from all the potential UXO (pUXO) anomalies, or any saturated or excluded areas. This avoidance area was also applied from the edge of the dataset inwards, towards the centre of the survey area.

The free space between these avoidance areas and the detection surface and the survey limits was then mapped, and a workable area was obtained. This defined the outline of the ALARP certificate (Figure 5-2). When no ALARP zone was identified (Figure 5-3), an alternative location for the GI box was proposed.

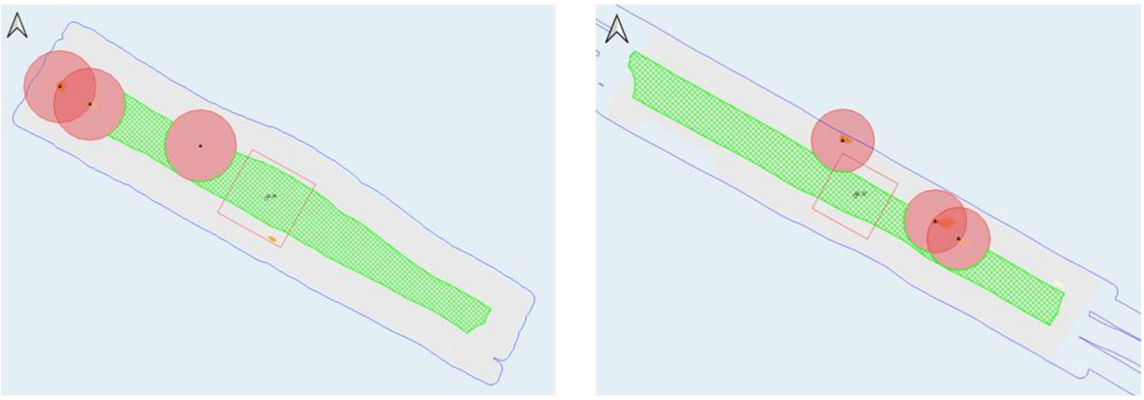


Figure 5-2: Case where the GI boxes location are not impacted or little impacted by avoidance areas: an ALARP zone is defined (in green).

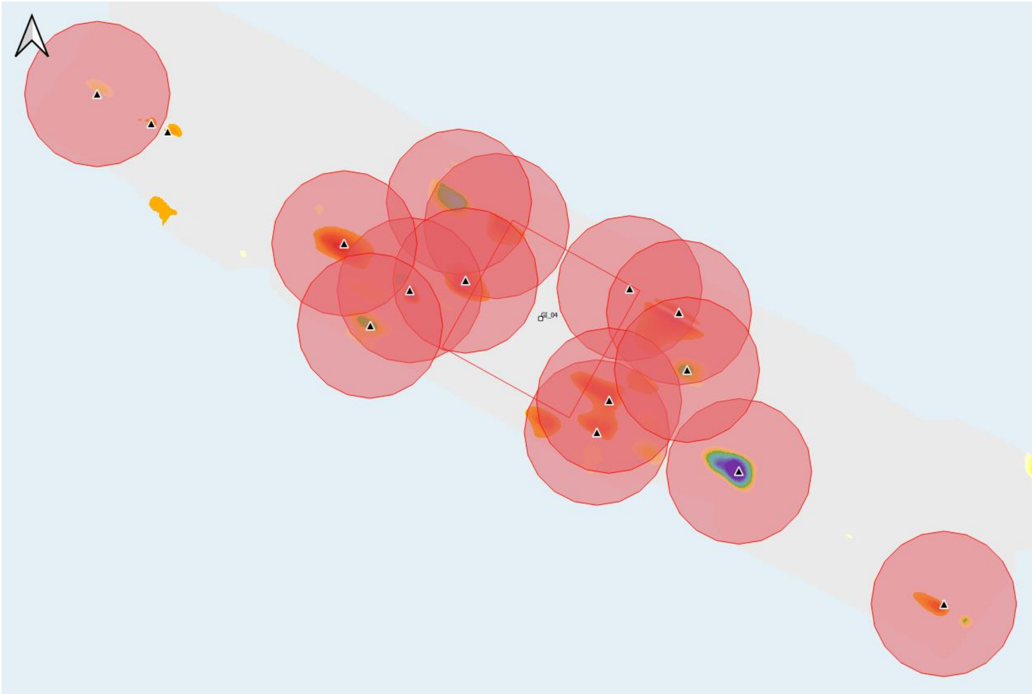


Figure 5-3: Case where the GI boxes location are largely or completely impacted by avoidance areas and no ALARP zone can be defined

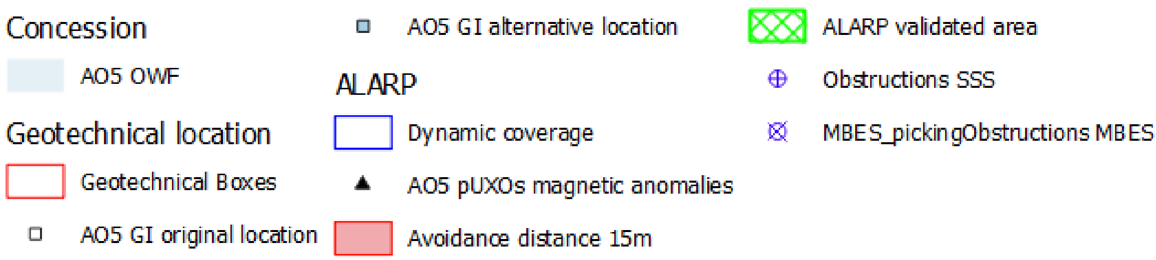


Figure 5-4: Legend of the ALARP maps.

6. CONCLUSION

ALARP areas totalling 11221 m^2 were identified for the 24 GI locations. Ten proposed GI positions required alternative locations. These alternative locations are indicated in grey in Table 8.

Table 8: Final ALARP workable areas and GI box location.

ID	Name GI	Easting UTM30N	Northing UTM30N	Workable area (m^2)
z	GI_01_A	446709,75	5247255,75	501
2	GI_02	449403,64	5248035,93	501
3	GI_03_A	448820,97	5244919,97	419
4	GI_04_D	451036,71	5244827,14	243
5	GI_05_A	449582,88	5242197,95	554
6	GI_06	451804,50	5242096,75	514
7	GI_07	454254,78	5246457,78	484
8	GI_08	454537,71	5242876,42	434
9	GI_09	456871,44	5244987,59	639
10	GI_10	453931,13	5239754,29	535
11	GI_11	455783,49	5241008,70	380
12	GI_12	456763,61	5242753,17	507
13	GI_13	458026,62	5240916,14	464
14	GI_14_A	458792,33	5238170,57	496
15	GI_15_A	459796,22	5239922,05	468
16	GI_16_A	444081,96	5248751,87	279
17	GI_17	443464,34	5245635,16	500
18	GI_18	444718,71	5243782,78	500
19	GI_19	446355,23	5240568,06	513
20	GI_20	448481,87	5238225,58	539
21	GI_21_A	451931,83	5236287,75	503

ID	Name GI	Easting UTM30N	Northing UTM30N	Workable area (m^2)
22	GI_22	454695,47	5237029,66	503
23	GI_23_A	456417,63	5236064,76	354
24	GI_24_A	456335,88	5233812,61	391

Total	11221

REFERENCES

In accordance with:

- Letter the "*Inspection des poudres et explosifs*" of the French Ministry of Defence and the *"Direction générale du Travail*" of the French Ministry of Labour of September 18th, 2013, relating to pyrotechnic clearance carried out on civil land.
- Decree No. 2014-381 of March 28, 2014, regulatory part Art. R.733-1 to 16 and legislative part Art. L. 733-1 to 3.

In reference to:

- Decree No. 2005-1325 of October 26, 2005, amended from the Ministry of Defence relating to the safety rules applicable during work in the context of a pyrotechnic clearance site and the two implementing decrees.

Ref.01. Unexploded Ordnance Threat and Risk Assessment with Risk Mitigation Strategy: *8811_UXOTARA_with_RMS_A05 Brittany_DNVGL_Client Draft_V1.0*

Ref.02. Project AO5 De-risk Surveys Scope Of Work: *SOS-01 - Scope Of Service AO5*

Ref.03. Employer's Requirements Marine Operations: *SVY-ERS-03 – Survey Specification*

Ref.04. Specification for UXO Survey Verification Test RTE Export Cables: *ERS-03-A – SVT Specification*

Ref.05. UXO Surrogate Items report: *SIT report – AO4 and A05 geophysical and UXO survey*

Ref.06. BRE_AO5 Area - Geophysical and UXO survey - Mobilization Report: *BRE_TEC_21_Mob report - AO5 survey 2022_1.2*

Pennella 1982 Magnetometer techniques in the detection of projectiles Final Report, TR239, Naval explosive ordnance technology center

Rapport d'étude DRS 17-164706-11171-B, Impact des vibrations sur la stabilité des carrières souterraines, INERIS, 2017.

APPENDIX I – LIST OF THE MAGNETIC ANOMALIES DETECTED

Nb	Target ID	X (m)	Y (m)	SA (nT/m)	Box	Status
1	AO5-OWF_MAG-01	446585,45	5247311,78	2,34	GI_01_A	
2	AO5-OWF_MAG-02	446599,00	5247316,28	1,50	GI_01_A	
3	AO5-OWF_MAG-03	446737,52	5247240,73	1,97	GI_01_A	
4	AO5-OWF_MAG-04	446755,11	5247228,00	0,98	GI_01_A	
5	AO5-OWF_MAG-05	446768,68	5247222,53	3,67	GI_01_A	
6	AO5-OWF_MAG-06	446769,85	5247210,91	9,75	GI_01_A	
7	AO5-OWF_MAG-07	446763,26	5247209,18	1,81	GI_01_A	
8	AO5-OWF_MAG-08	451124,75	5244879,99	14,57	GI_04_D	
9	AO5-OWF_MAG-09	450992,61	5244775,01	1,48	GI_04_D	
10	AO5-OWF_MAG-10	450918,74	5244756,02	13,43	GI_04_D	
11	AO5-OWF_MAG-11	449488,49	5242228,58	1,75	GI_05_A	
12	AO5-OWF_MAG-12	449491,82	5242225,24	1,91	GI_05_A	
13	AO5-OWF_MAG-13	449537,97	5242217,54	1,42	GI_05_A	
14	AO5-OWF_MAG-14	449549,76	5242218,03	1,24	GI_05_A	
15	AO5-OWF_MAG-15	449551,74	5242216,75	1,26	GI_05_A	
16	AO5-OWF_MAG-16	449540,87	5242197,85	3,16	GI_05_A	
17	AO5-OWF_MAG-17	451881,73	5242051,78	3,45	GI_06	
18	AO5-OWF_MAG-18	454296,86	5246439,42	1,73	GI_07	
19	AO5-OWF_MAG-19	454305,09	5246422,19	2,06	GI_07	
20	AO5-OWF_MAG-20	456785,44	5245034,07	1,08	GI_09	
21	AO5-OWF_MAG-21	456797,86	5245026,78	1,25	GI_09	
22	AO5-OWF_MAG-22	456843,92	5245009,48	1,93	GI_09	
23	AO5-OWF_MAG-23	453873,80	5239780,77	0,76	GI_10	
24	AO5-OWF_MAG-24	453885,05	5239773,92	0,85	GI_10	
25	AO5-OWF_MAG-25	453940,02	5239726,33	0,54	GI_10	
26	AO5-OWF_MAG-26	454027,13	5239701,30	0,69	GI_10	
27	AO5-OWF_MAG-27	455753,73	5241012,08	1,98	GI_11	
28	AO5-OWF_MAG-28	458879,92	5238142,07	1,00	GI_14_A	
29	AO5-OWF_MAG-29	458753,99	5238172,76	9,89	GI_14_A	
30	AO5-OWF_MAG-30	458759,50	5238172,76	3,57	GI_14_A	
31	AO5-OWF_MAG-31	459718,16	5239951,89	2,06	GI_15_A	
32	AO5-OWF_MAG-32	459734,81	5239936,70	0,78	GI_15_A	
33	AO5-OWF_MAG-33	459761,88	5239931,40	2,79	GI_15_A	
34	AO5-OWF_MAG-34	459851,52	5239884,06	1,11	GI_15_A	
35	AO5-OWF_MAG-35	443985,92	5248790,76	1,64	GI_16_A	
36	AO5-OWF_MAG-36	443985,48	5248796,75	4,54	GI_16_A	
37	AO5-OWF_MAG-37	443994,28	5248808,89	1,64	GI_16_A	
38	AO5-OWF_MAG-38	443993,27	5248796,53	6,32	GI_16_A	

Nb	Target ID	X (m)	Y (m)	SA (nT/m)	Box	Status
39	AO5-OWF_MAG-39	443993,75	5248792,48	7,95	GI_16_A	
40	AO5-OWF_MAG-40	444104,33	5248725,60	1,82	GI_16_A	
41	AO5-OWF_MAG-41	444131,77	5248740,25	4,62	GI_16_A	
42	AO5-OWF_MAG-42	444157,48	5248726,00	3,37	GI_16_A	
43	AO5-OWF_MAG-43	443380,65	5245678,61	7,10	GI_17	
44	AO5-OWF_MAG-44	443388,99	5245686,02	1,10	GI_17	
45	AO5-OWF_MAG-45	443397,48	5245674,56	2,05	GI_17	
46	AO5-OWF_MAG-46	443402,34	5245668,29	3,24	GI_17	
47	AO5-OWF_MAG-47	443411,20	5245665,24	3,80	GI_17	
48	AO5-OWF_MAG-48	443417,98	5245662,53	2,90	GI_17	
49	AO5-OWF_MAG-49	443425,45	5245666,52	6,71	GI_17	
50	AO5-OWF_MAG-50	444779,46	5243763,08	3,76	GI_18	
51	AO5-OWF_MAG-51	444780,74	5243766,25	4,31	GI_18	
52	AO5-OWF_MAG-52	444783,51	5243764,47	5,10	GI_18	
53	AO5-OWF_MAG-53	444789,25	5243763,76	4,97	GI_18	
54	AO5-OWF_MAG-54	444792,93	5243759,63	3,57	GI_18	
55	AO5-OWF_MAG-55	451962,04	5236288,51	2,38	GI_21_A	
56	AO5-OWF_MAG-56	451981,51	5236278,07	1,09	GI_21_A	
57	AO5-OWF_MAG-57	451901,59	5236296,68	1,03	GI_21_A	
58	AO5-OWF_MAG-58	452031,81	5236243,51	0,99	GI_21_A	
59	AO5-OWF_MAG-59	454689,65	5237055,97	1,23	GI_22	
60	AO5-OWF_MAG-60	454733,48	5237017,68	1,97	GI_22	
61	AO5-OWF_MAG-61	454744,57	5237009,36	0,95	GI_22	
62	AO5-OWF_MAG-62	456369,30	5236112,65	0,66	GI_23_A	
63	AO5-OWF_MAG-63	456370,03	5236073,10	1,37	GI_23_A	
64	AO5-OWF_MAG-64	456447,47	5236050,24	2,24	GI_23_A	
65	AO5-OWF_MAG-65	456453,48	5236053,99	1,37	GI_23_A	
66	AO5-OWF_MAG-66	456453,42	5236026,45	2,07	GI_23_A	
67	AO5-OWF_MAG-67	456456,33	5236016,62	0,53	GI_23_A	
68	AO5-OWF_MAG-68	456260,92	5233831,80	0,77	GI_24_A	
69	AO5-OWF_MAG-69	456314,34	5233841,25	2,47	GI_24_A	
70	AO5-OWF_MAG-70	456315,72	5233837,25	1,26	GI_24_A	

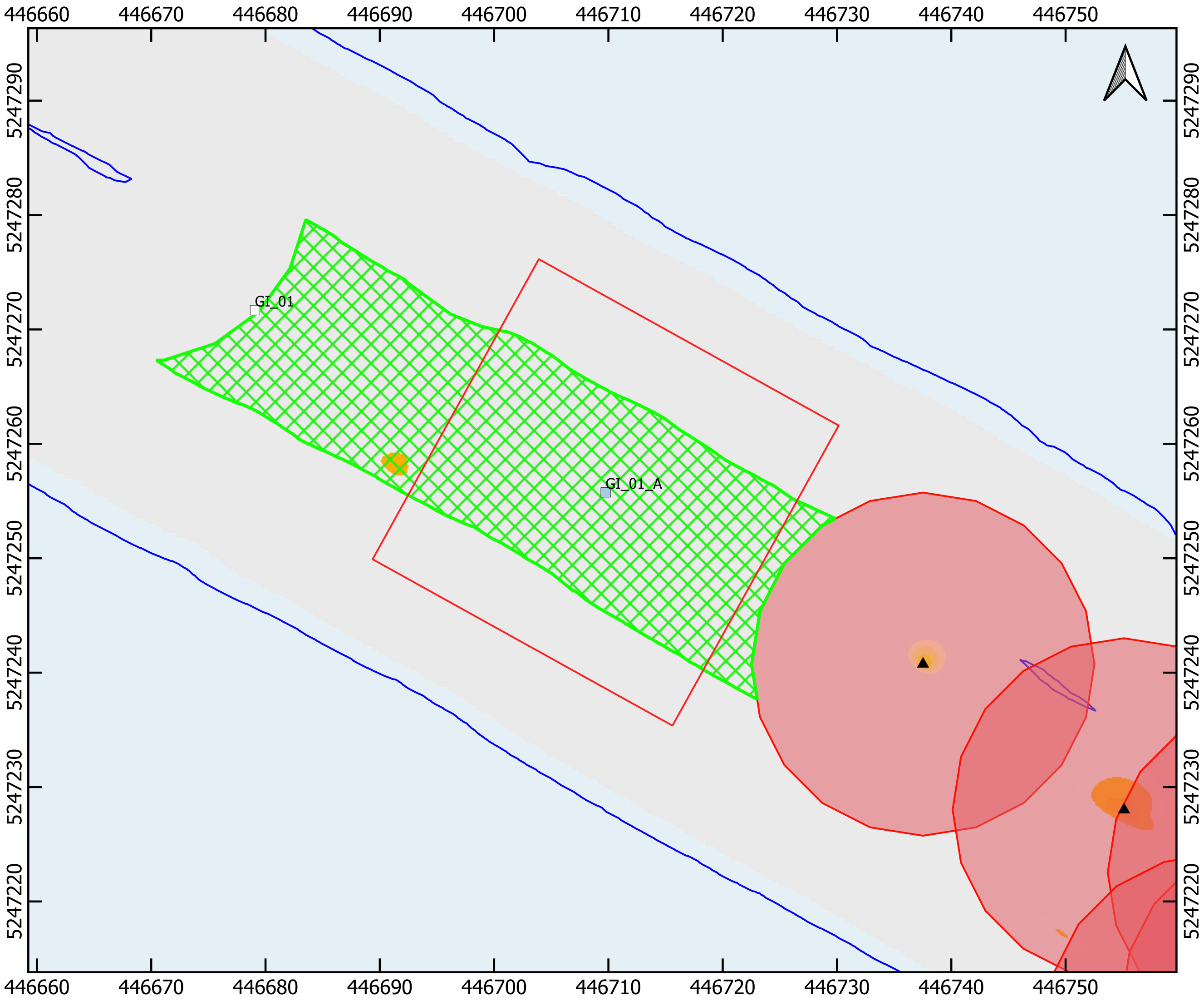
APPENDIX II – LIST OF THE SIDE SCAN SONAR CONTACTS DETECTED

Nb	Target ID	X (m)	Y (m)	Status
1	AO5-OWF_SSS-01	451052,64	5244806,05	
2	AO5-OWF_SSS-02	449570,17	5242206,76	
3	AO5-OWF_SSS-03	454277,67	5246433,95	
4	AO5-OWF_SSS-04	454226,39	5246481,78	
5	AO5-OWF_SSS-05	454214,01	5246484,51	
6	AO5-OWF_SSS-06	454188,61	5246499,66	
7	AO5-OWF_SSS-07	454192,24	5246502,39	
8	AO5-OWF_SSS-08	454197,29	5246503,81	
9	AO5-OWF_SSS-09	454198,76	5246503,39	
10	AO5-OWF_SSS-10	455720,28	5241064,62	
11	AO5-OWF_SSS-11	456721,32	5242754,39	
12	AO5-OWF_SSS-12	456840,19	5242732,58	
13	AO5-OWF_SSS-13	459730,60	5239952,69	
14	AO5-OWF_SSS-14	459739,32	5239951,16	
15	AO5-OWF_SSS-15	459737,99	5239951,77	
16	AO5-OWF_SSS-16	459697,85	5239961,03	
17	AO5-OWF_SSS-17	449427,67	5248036,77	
18	AO5-OWF_SSS-18	456823,21	5245013,41	
19	AO5-OWF_SSS-19	456833,43	5245007,48	
20	AO5-OWF_SSS-20	456914,39	5244980,29	
21	AO5-OWF_SSS-21	456927,06	5244953,10	
22	AO5-OWF_SSS-22	459749,28	5239971,57	
23	AO5-OWF_SSS-23	459749,48	5239965,90	
24	AO5-OWF_SSS-24	456402,44	5233796,55	
25	AO5-OWF_SSS-25	456407,21	5233792,81	
26	AO5-OWF_SSS-26	456419,14	5233761,19	
27	AO5-OWF_SSS-27	456421,80	5233760,37	
28	AO5-OWF_SSS-28	456362,16	5233818,86	
29	AO5-OWF_SSS-29	444644,34	5243817,74	
30	AO5-OWF_SSS-30	451040,84	5244812,07	

APPENDIX III – LIST OF THE MBES CONTACTS DETECTED

Nb	Target ID	X (m)	Y (m)	Status
1	AO5-OWF_MBES-01	459749,78	5239965,69	
2	AO5-OWF_MBES-02	459726,89	5239951,94	
3	AO5-OWF_MBES-03	459739,13	5239951,45	
4	AO5-OWF_MBES-04	459702,55	5239995,93	
5	AO5-OWF_MBES-05	459825,08	5239913,76	
6	AO5-OWF_MBES-06	451965,58	5236279,50	

APPENDIX IV – ALARP CERTIFICATE MAPS

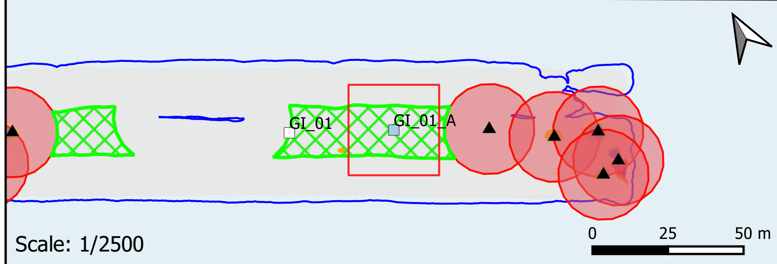


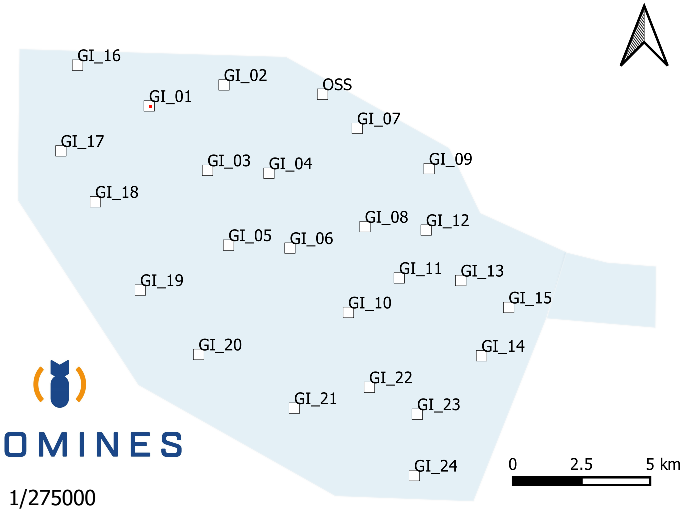
ANNEXE A: AO5 - GI_01_A
ALARP CERTIFICATE GIS

Scale: 1/600 Date: 2022-05-24

Geodesy : WGS 84 - UTM 30N Version: V1

0 5 10 15 20 m





Scale: 1/275000

Concession

AO5 OWF

Geotechnical location

AO5 GI Original location

AO5 GI Alternative Location

Geotechnical Boxes

ALARP

Dynamic coverage

AO5 pUXO magnetic anomalies

AO5 avoidance distance

ALARP validated area

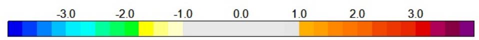
Obstructions

Obstructions SSS

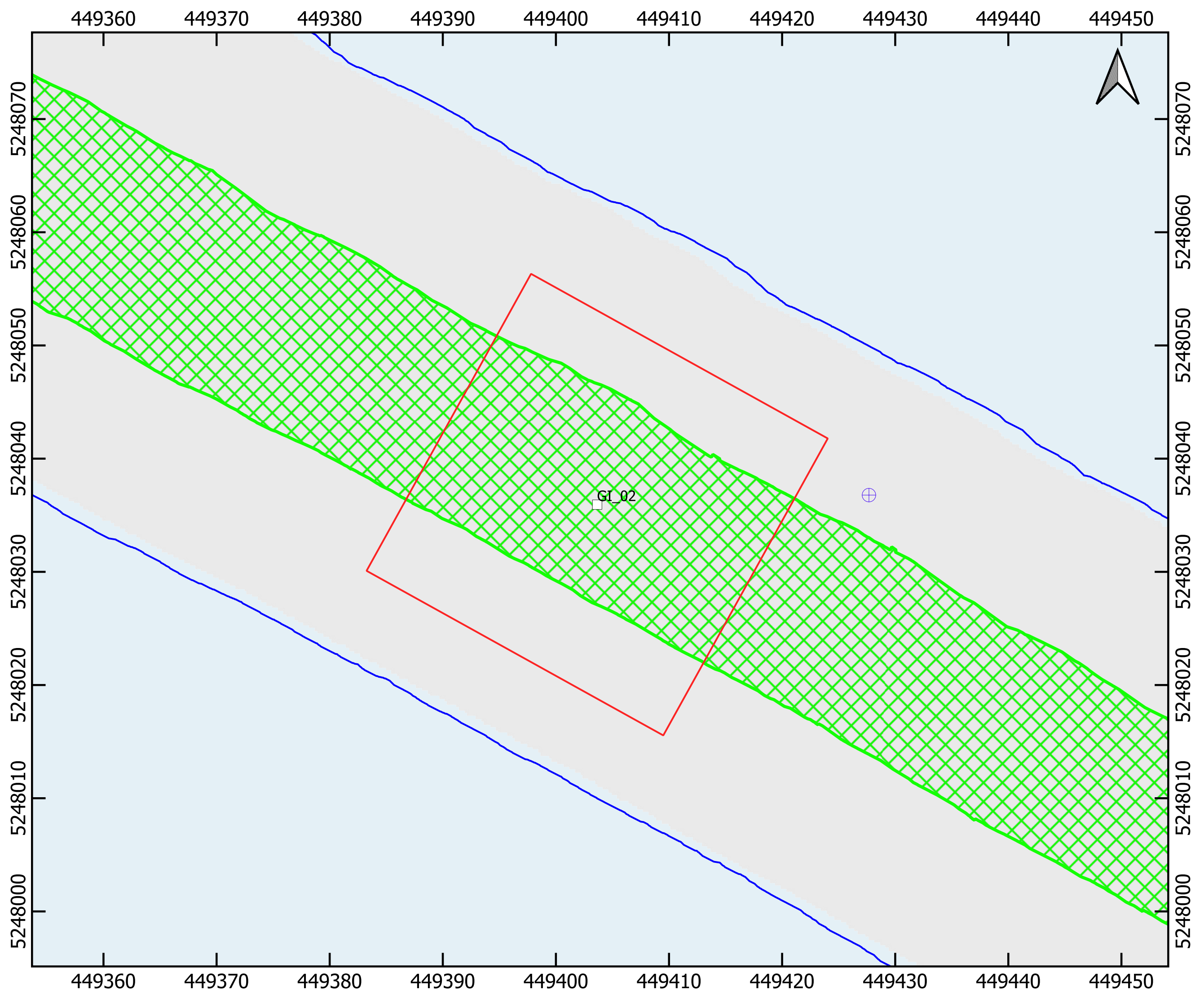
Obstructions MBES

ALARP area: 501 square meter

Easting:446709.75, Northing: 5247255.75



Residual total magnetic field
(nT)

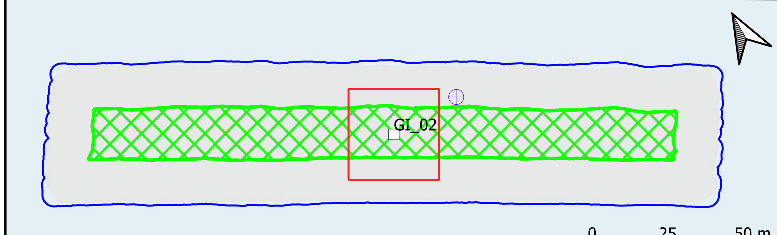


ANNEXE A: AO5 - GI_02
ALARP CERTIFICATE GIS

Scale: 1/600 Date: 2022-05-24

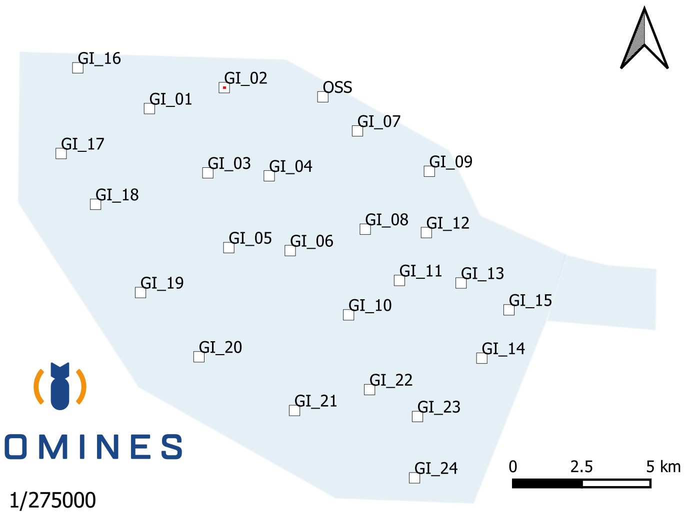
Geodesy : WGS 84 - UTM 30N Version: V1

0 5 10 15 20 m



Scale: 1/2500

0 25 50 m



GEOMINES

Scale: 1/275000

0 2.5 5 km

Concession

AO5 OWF

Geotechnical location

AO5 GI Original location

AO5 GI Alternative Location

Geotechnical Boxes

ALARP

Dynamic coverage

AO5 pUXO magnetic anomalies

AO5 avoidance distance

ALARP validated area

Obstructions

Obstructions SSS

Obstructions MBES

ALARP area: 501 square meter

Easting:449403.64, Northing: 5248035.93

-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

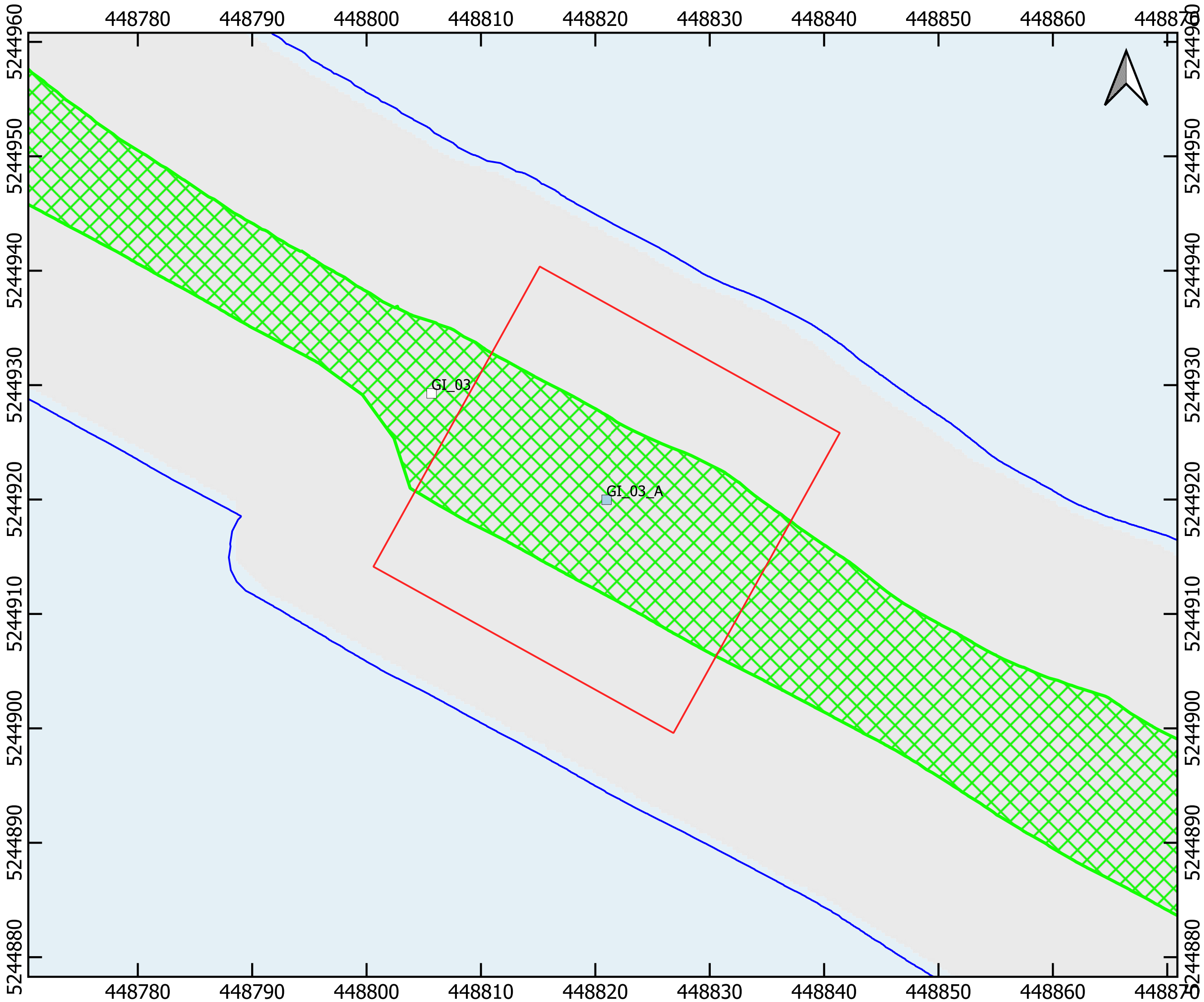
Residual total magnetic field (nT)

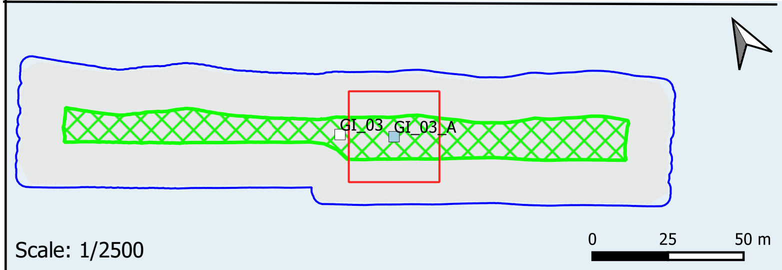
Rte
TECNOAMBIENTE
A TRADEBE COMPANY
MINISTÈRE DE LA TRANSITION ÉCOLOGIQUE
GEOQUIP MARINE

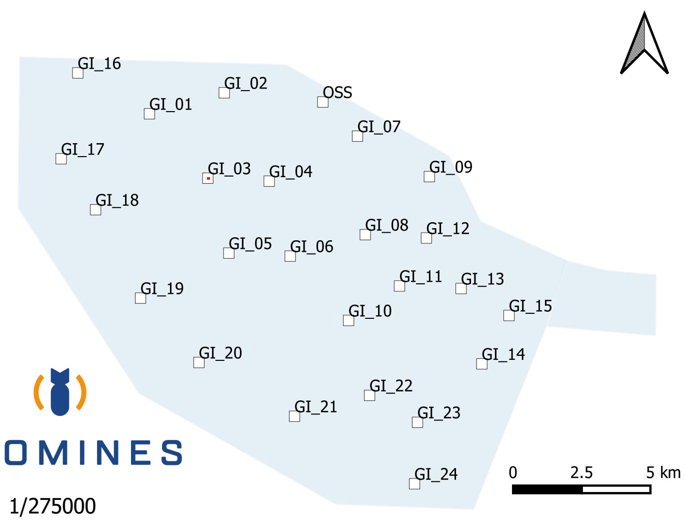
ANNEXE A: AO5 - GI_03_A
ALARP CERTIFICATE GIS

Scale: 1/600
Date: 2022-05-24
Geodesy : WGS 84 - UTM 30N
Version: V1

0 5 10 15 20 m







GEOMINES

Concession
- AO5 OWF

Geotechnical location
- AO5 GI Original location
- AO5 GI Alternative Location
- Geotechnical Boxes

ALARP
- Dynamic coverage

- AO5 pUXO magnetic anomalies
- AO5 avoidance distance
- ALARP validated area

Obstructions
- Obstructions SSS
- Obstructions MBES

ALARP area: 419 square meter

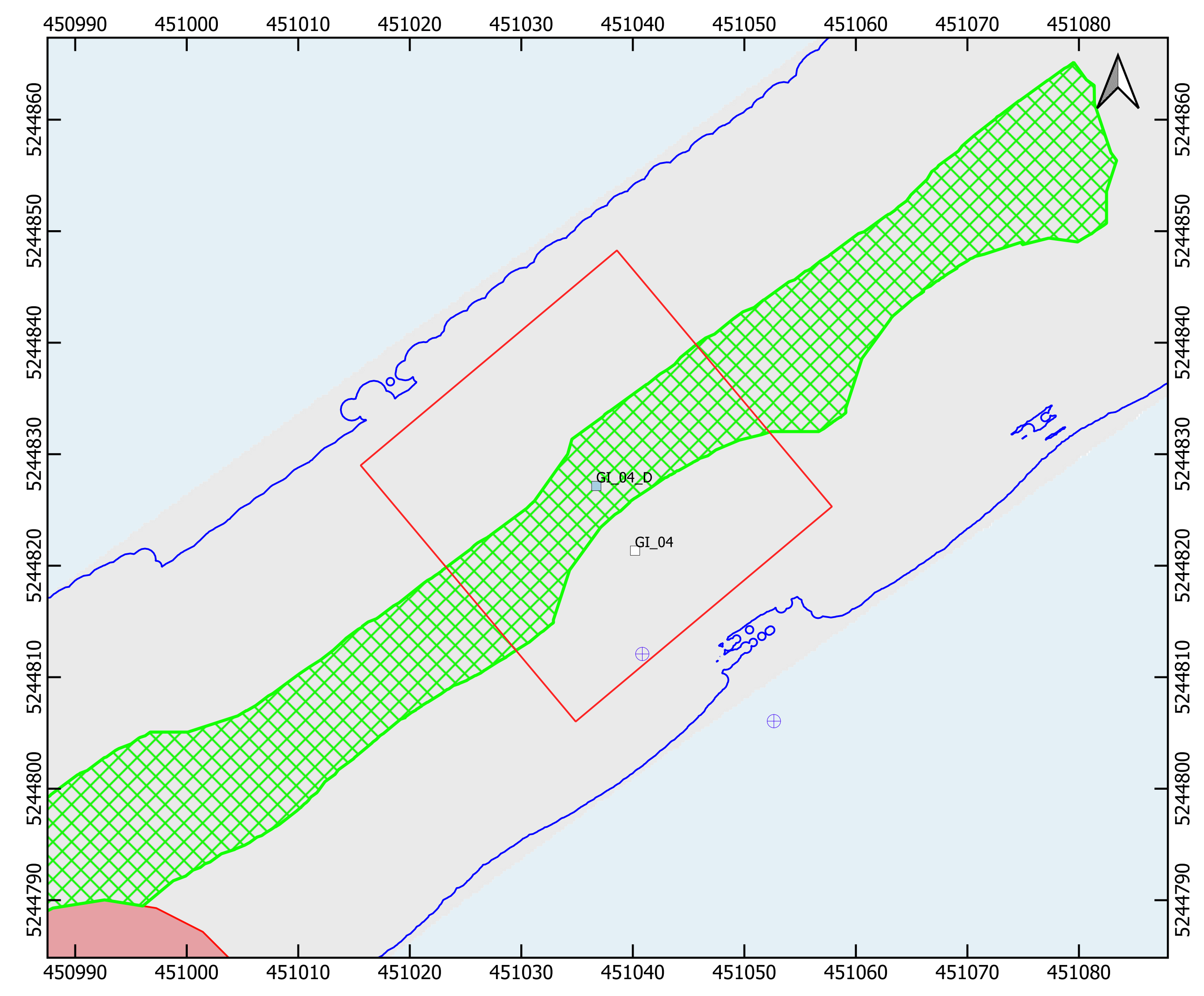
Easting:448820.97, Northing: 5244919.97

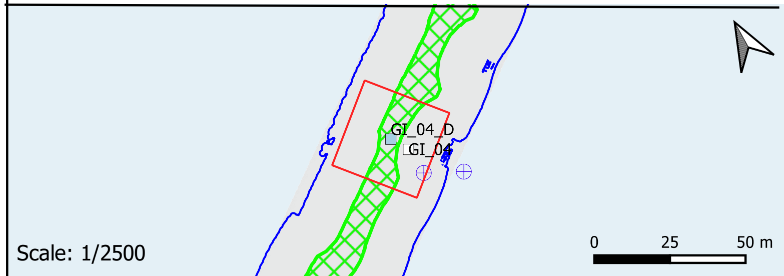
-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

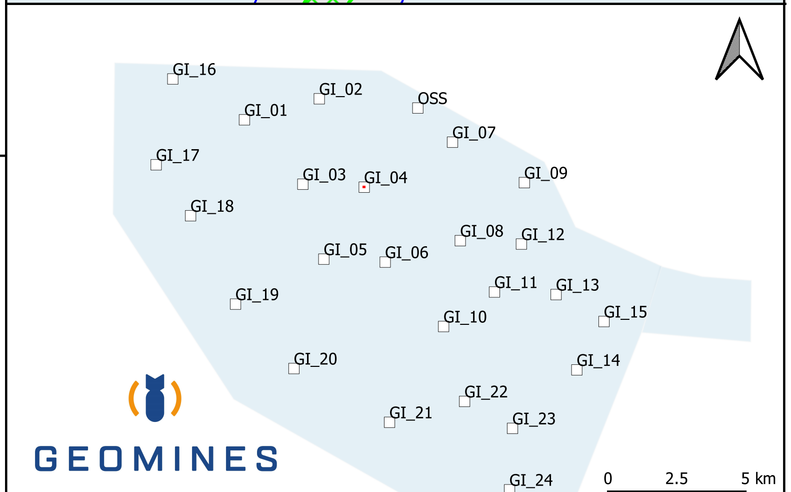
Residual total magnetic field (nT)

ANNEXE A: AO5 - GI_04_D
ALARP CERTIFICATE GIS

Scale: 1/600 Date: 2022-05-24
Geodesy : WGS 84 - UTM 30N Version: V1







Scale: 1/275000

Concession
- AO5 OWF

Geotechnical location
- AO5 GI Original location
- AO5 GI Alternative Location
- Geotechnical Boxes

ALARP
- Dynamic coverage

- AO5 pUXO magnetic anomalies
- AO5 avoidance distance
- ALARP validated area

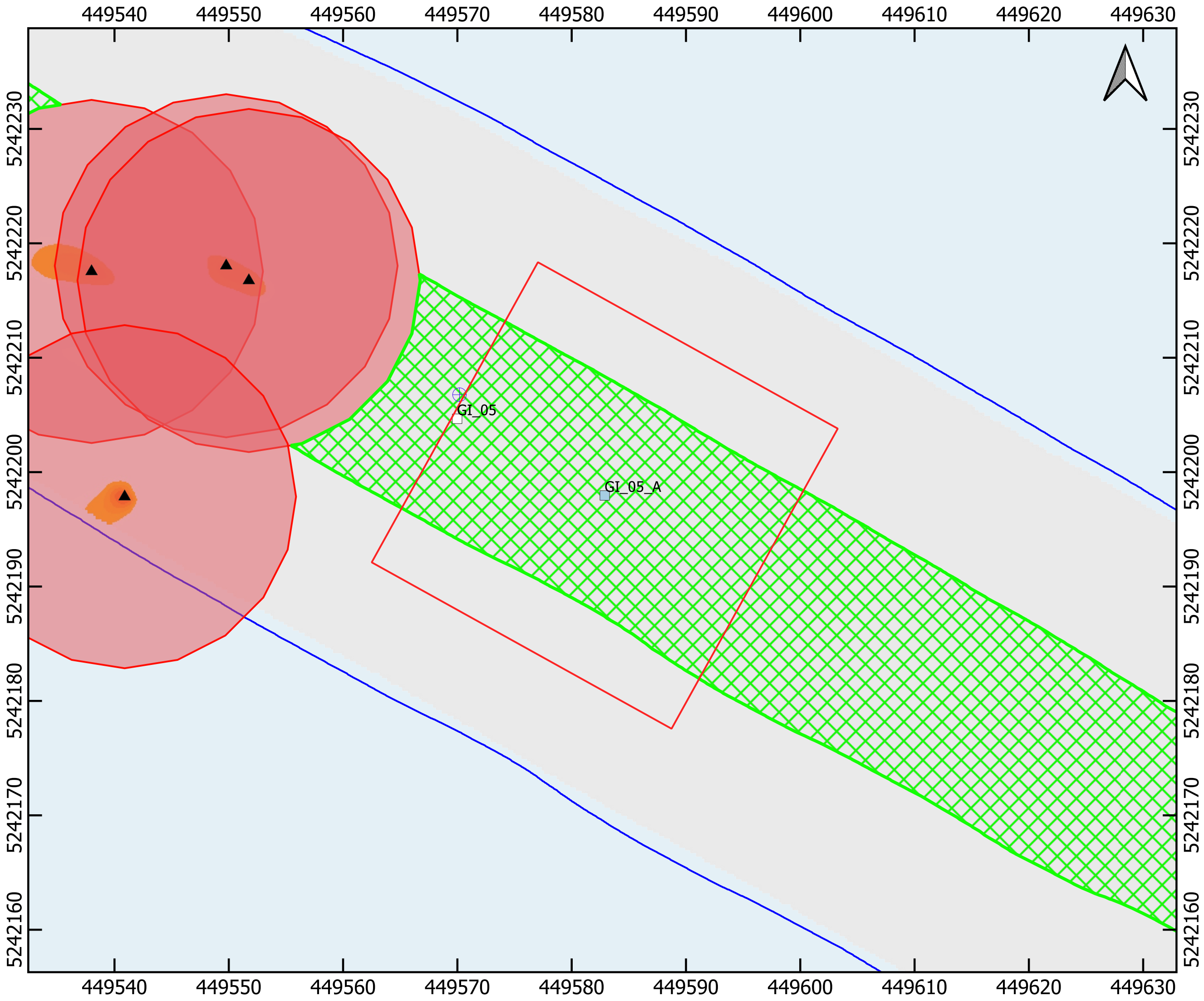
Obstructions
- Obstructions SSS
- Obstructions MBES

ALARP area: 243 square meter

Easting:451036.71, Northing: 5244827.14

-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

Residual total magnetic field
(nT)



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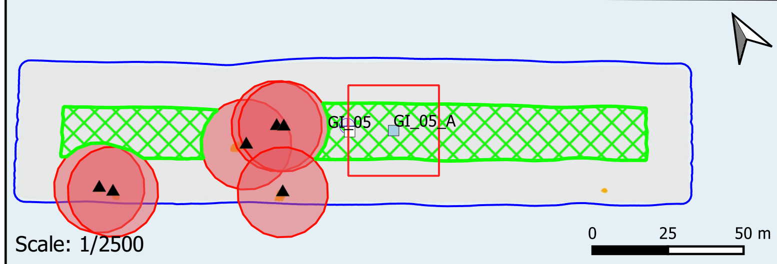
GEOQUIPMARINE

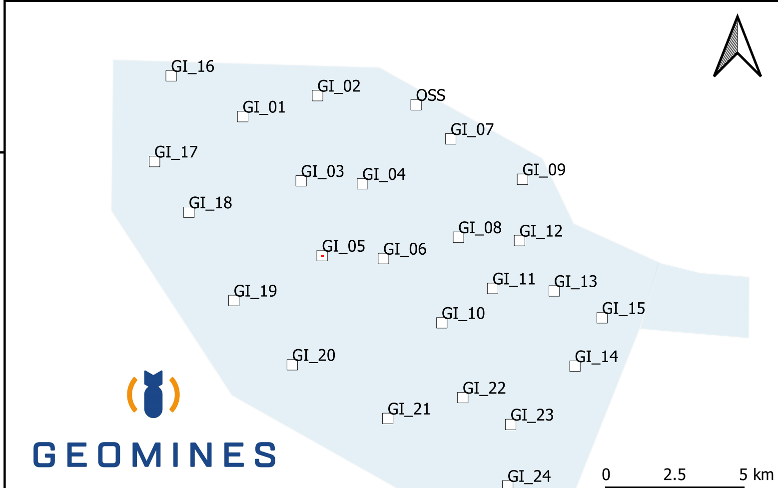
ANNEXE A: AO5 - GI_05_A
ALARP CERTIFICATE GIS

Scale: 1/600 Date: 2022-05-24

Geodesy : WGS 84 - UTM 30N Version: V1

0 5 10 15 20 m





GEOMINES

Scale: 1/275000

Concession

AO5 OWF

Geotechnical location

AO5 GI Original location

AO5 GI Alternative Location

Geotechnical Boxes

ALARP

Dynamic coverage

AO5 pUXO magnetic anomalies

AO5 avoidance distance

ALARP validated area

Obstructions

Obstructions SSS

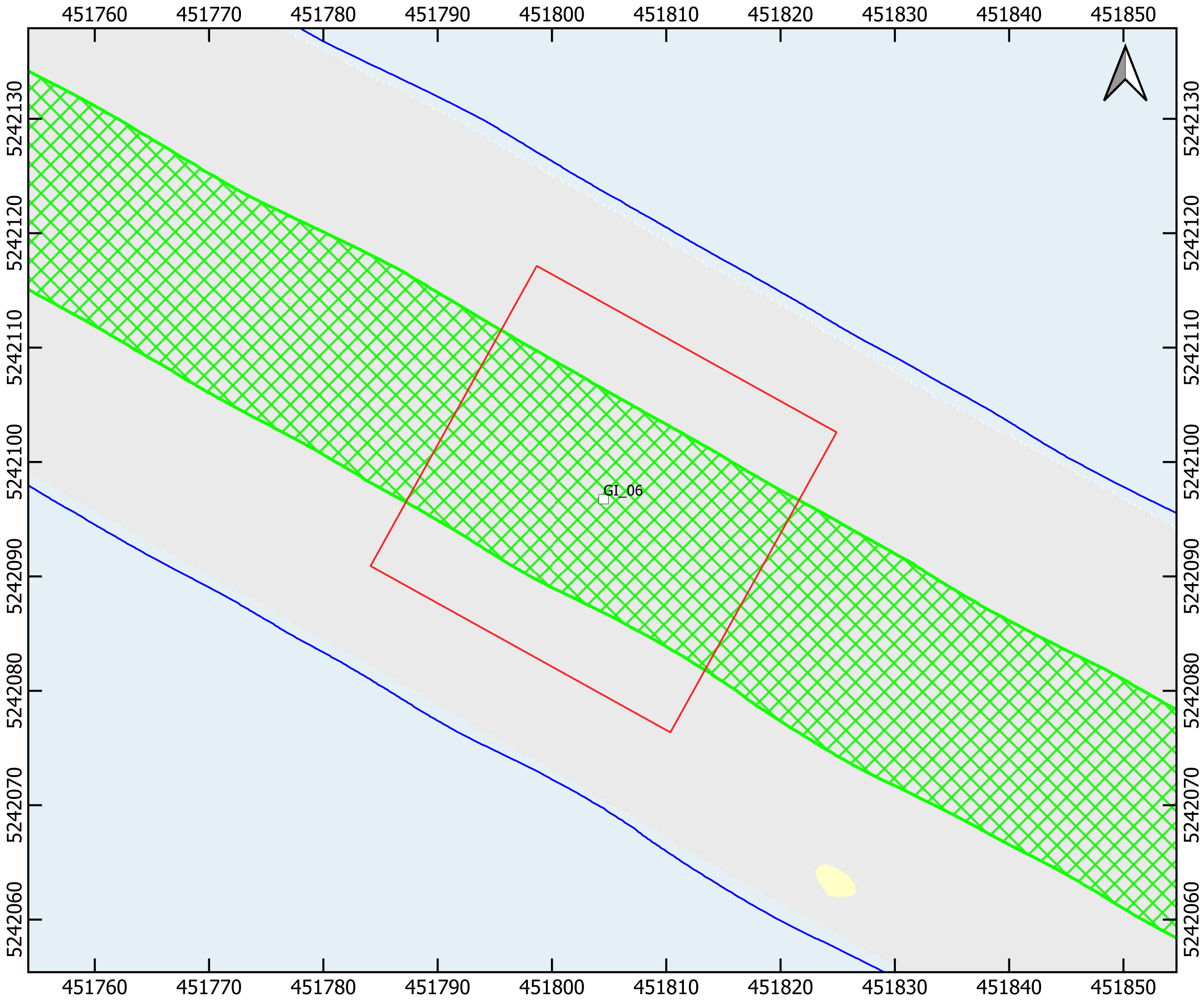
Obstructions MBES

ALARP area: 554 square meter

Easting:449582.88, Northing: 5242197.95

-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

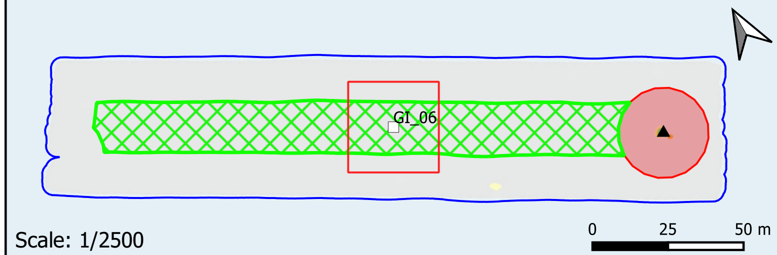
Residual total magnetic field (nT)



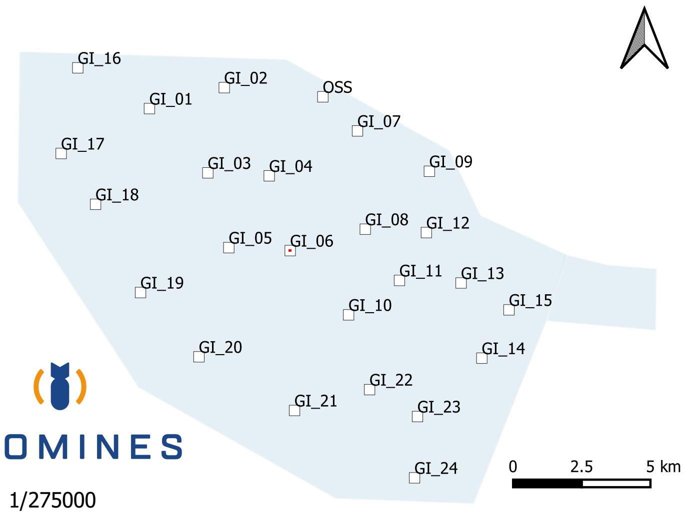
ANNEXE A: AO5 - GI_06
ALARP CERTIFICATE GIS

Scale: 1/600
Date: 2022-05-24
Geodesy : WGS 84 - UTM 30N
Version: V1

0 5 10 15 20 m



Scale: 1/2500



GEOMINES

Scale: 1/275000

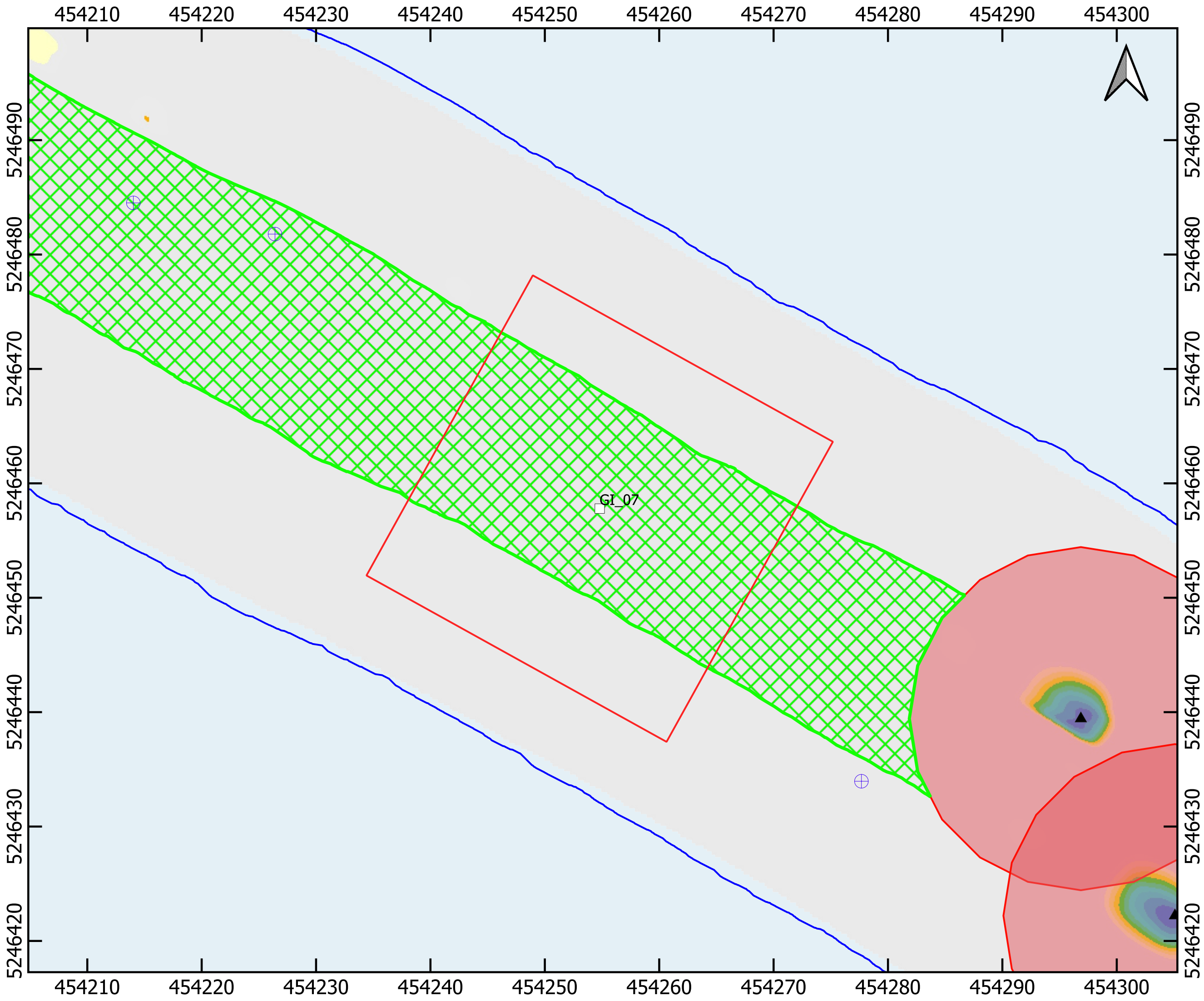
Concession
AO5 OWF
Geotechnical location
AO5 GI Original location
AO5 GI Alternative Location
Geotechnical Boxes
ALARP
Dynamic coverage
AO5 pUXO magnetic anomalies
AO5 avoidance distance
ALARP validated area
Obstructions
Obstructions SSS
Obstructions MBES

ALARP area: 514 square meter

Easting:451804.5, Northing: 5242096.75

-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

Residual total magnetic field (nT)



ANNEXE A: AO5 - GI_07
ALARP CERTIFICATE GIS

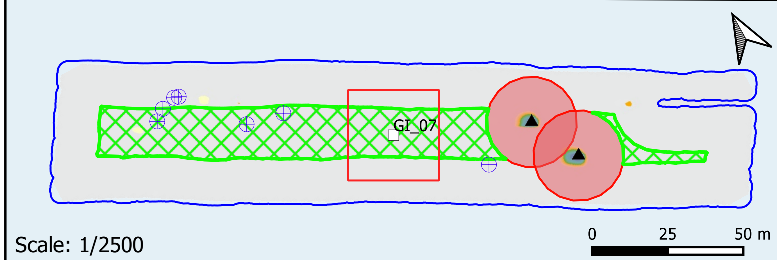
Scale: 1/600

Date: 2022-05-24

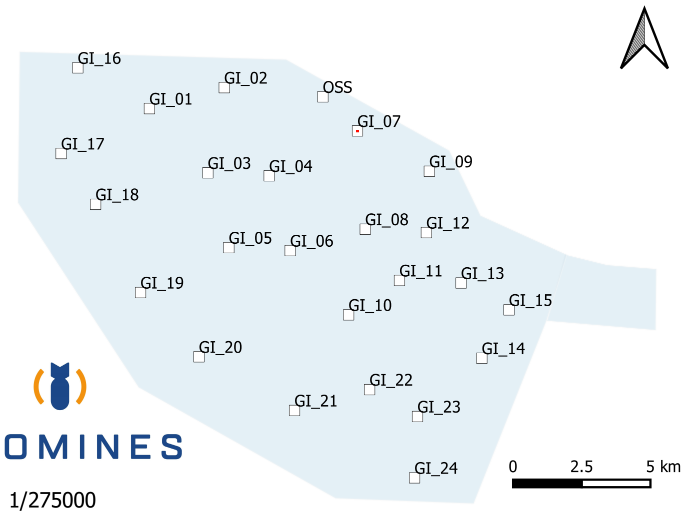
Geodesy : WGS 84 - UTM 30N

Version: V1

0 5 10 15 20 m



Scale: 1/2500



Scale: 1/275000

GEOMINES

Concession

AO5 OWF

Geotechnical location

AO5 GI Original location

AO5 GI Alternative Location

Geotechnical Boxes

ALARP

Dynamic coverage

AO5 pUXO magnetic anomalies

AO5 avoidance distance

ALARP validated area

Obstructions

Obstructions SSS

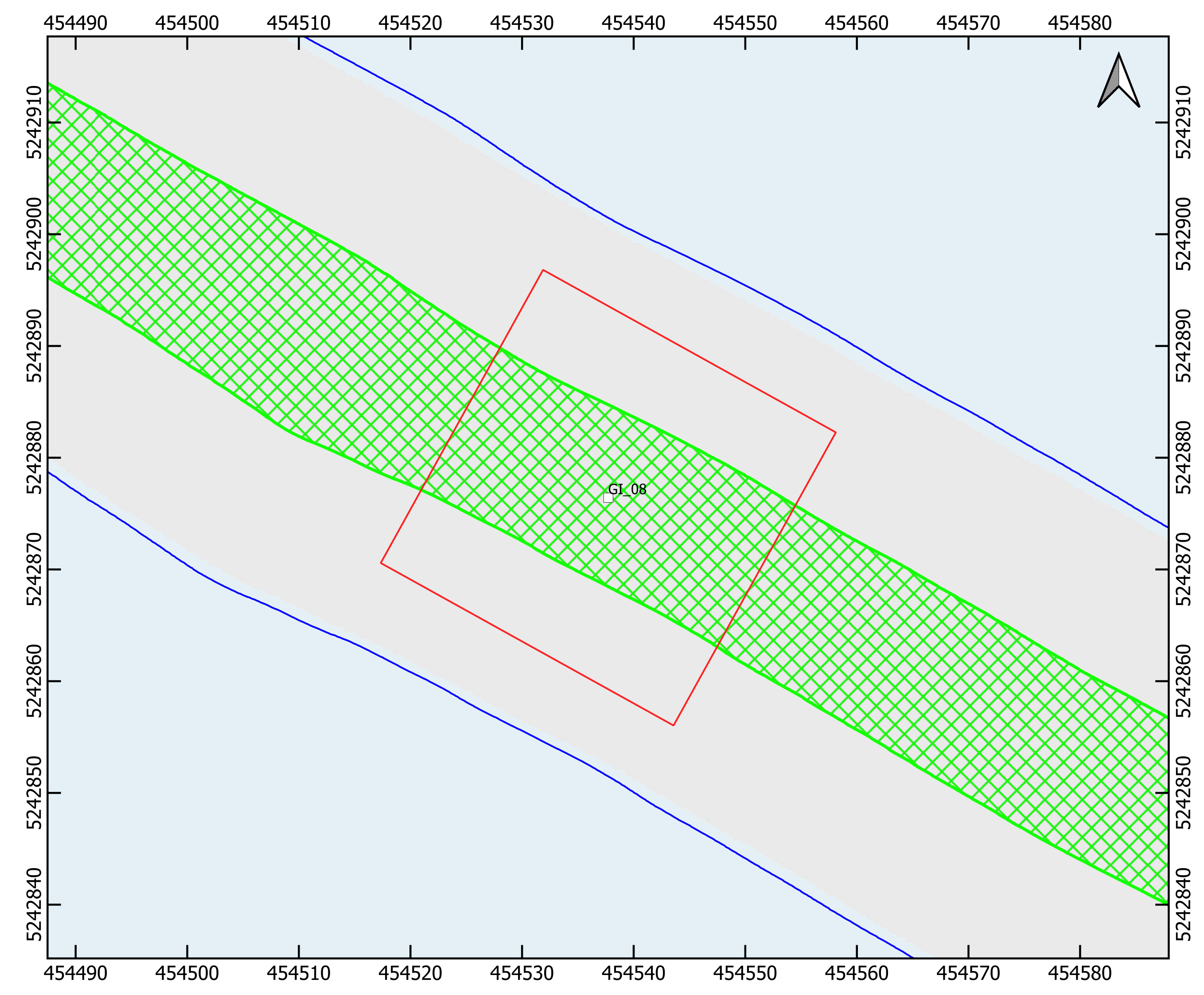
Obstructions MBES

ALARP area: 484 square meter

Easting:454254.78, Northing: 5246457.78

-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

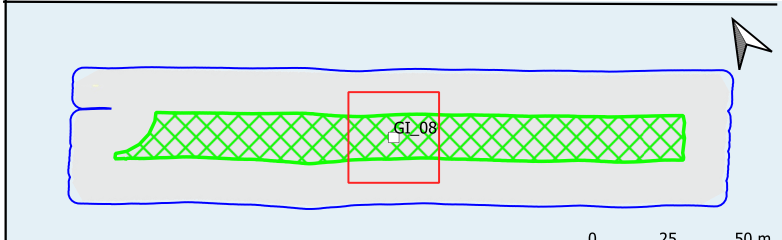
Residual total magnetic field (nT)



ANNEXE A: AO5 - GI_08
ALARP CERTIFICATE GIS

Scale: 1/600
Date: 2022-05-24
Geodesy : WGS 84 - UTM 30N
Version: V1

0 5 10 15 20 m



Concession

AO5 OWF

Geotechnical location

AO5 GI Original location

AO5 GI Alternative Location

Geotechnical Boxes

ALARP

Dynamic coverage

AO5 pUXO magnetic anomalies

AO5 avoidance distance

ALARP validated area

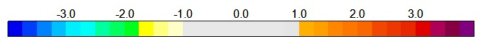
Obstructions

Obstructions SSS

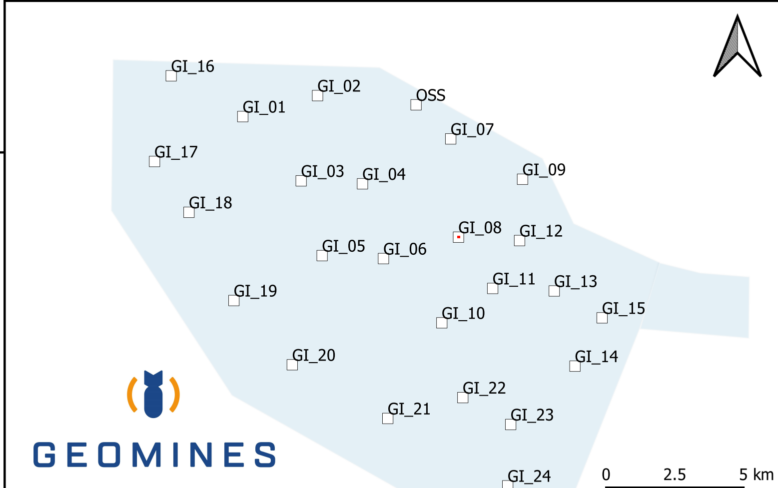
Obstructions MBES

ALARP area: 434 square meter

Easting:454537.71, Northing: 5242876.42

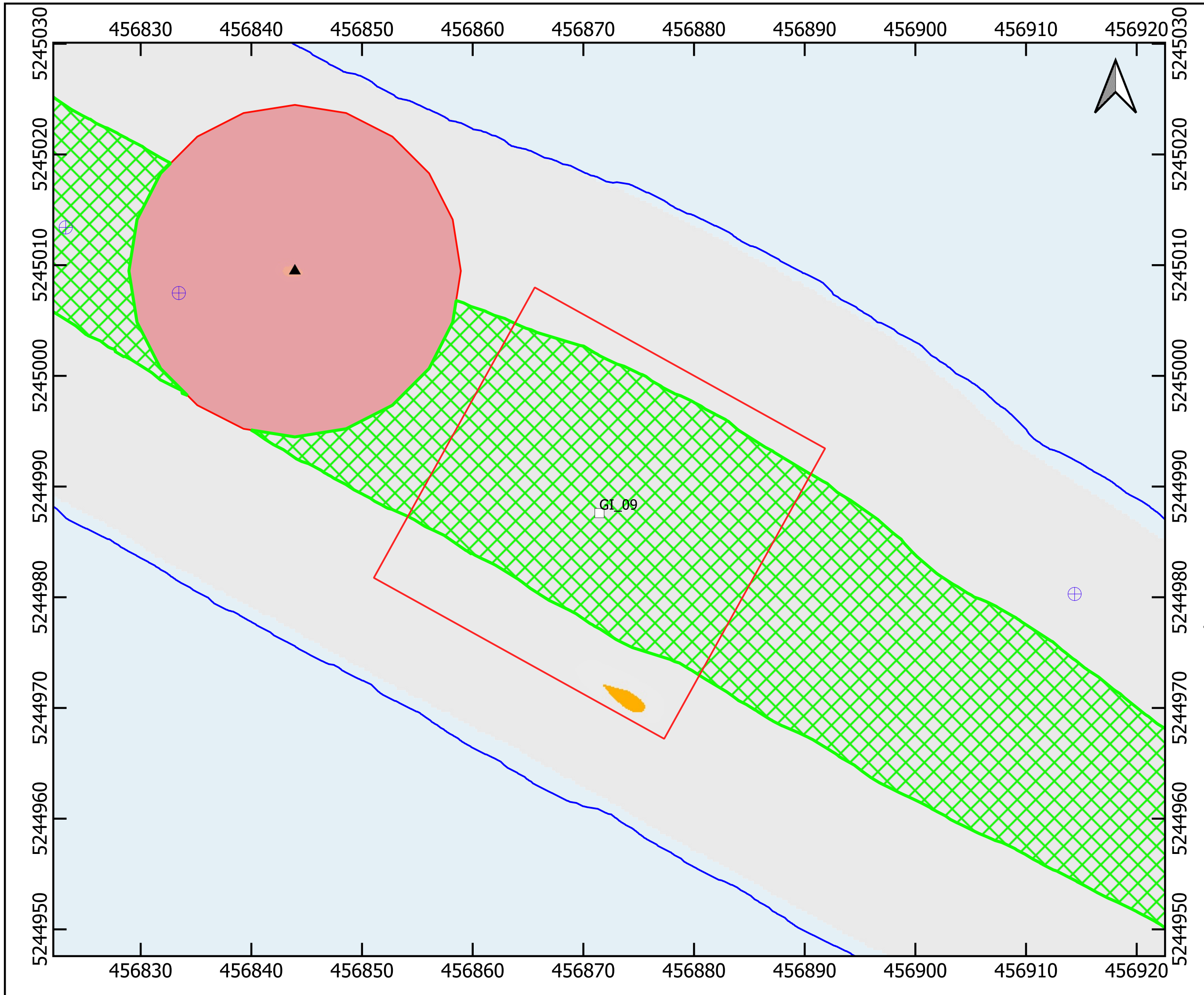


Residual total magnetic field
(nT)



GEOMINES

Scale: 1/275000



ANNEXE A: AO5 - GI_09
ALARP CERTIFICATE GIS

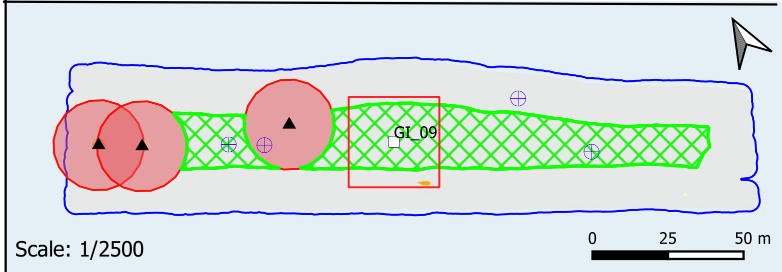
Scale: 1/600

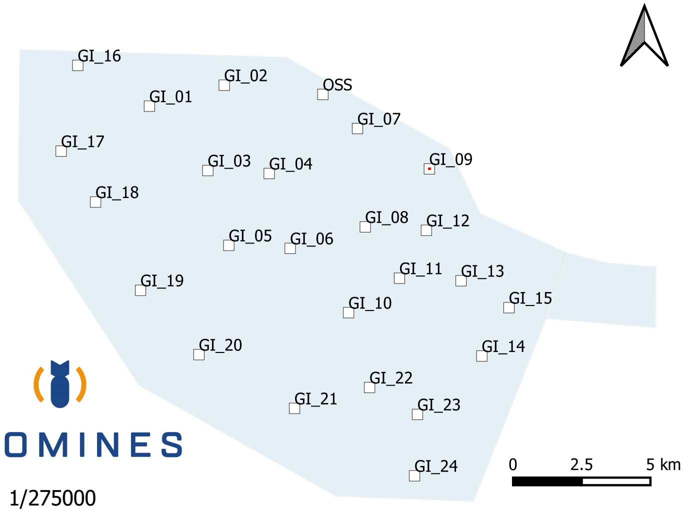
Date: 2022-05-24

Geodesy : WGS 84 - UTM 30N

Version: V1

0 5 10 15 20 m





GEOMINES

Scale: 1/275000

Concession

AO5 OWF

Geotechnical location

AO5 GI Original location

AO5 GI Alternative Location

Geotechnical Boxes

ALARP

Dynamic coverage

AO5 pUXO magnetic anomalies

AO5 avoidance distance

ALARP validated area

Obstructions

Obstructions SSS

Obstructions MBES

ALARP area: 639 square meter

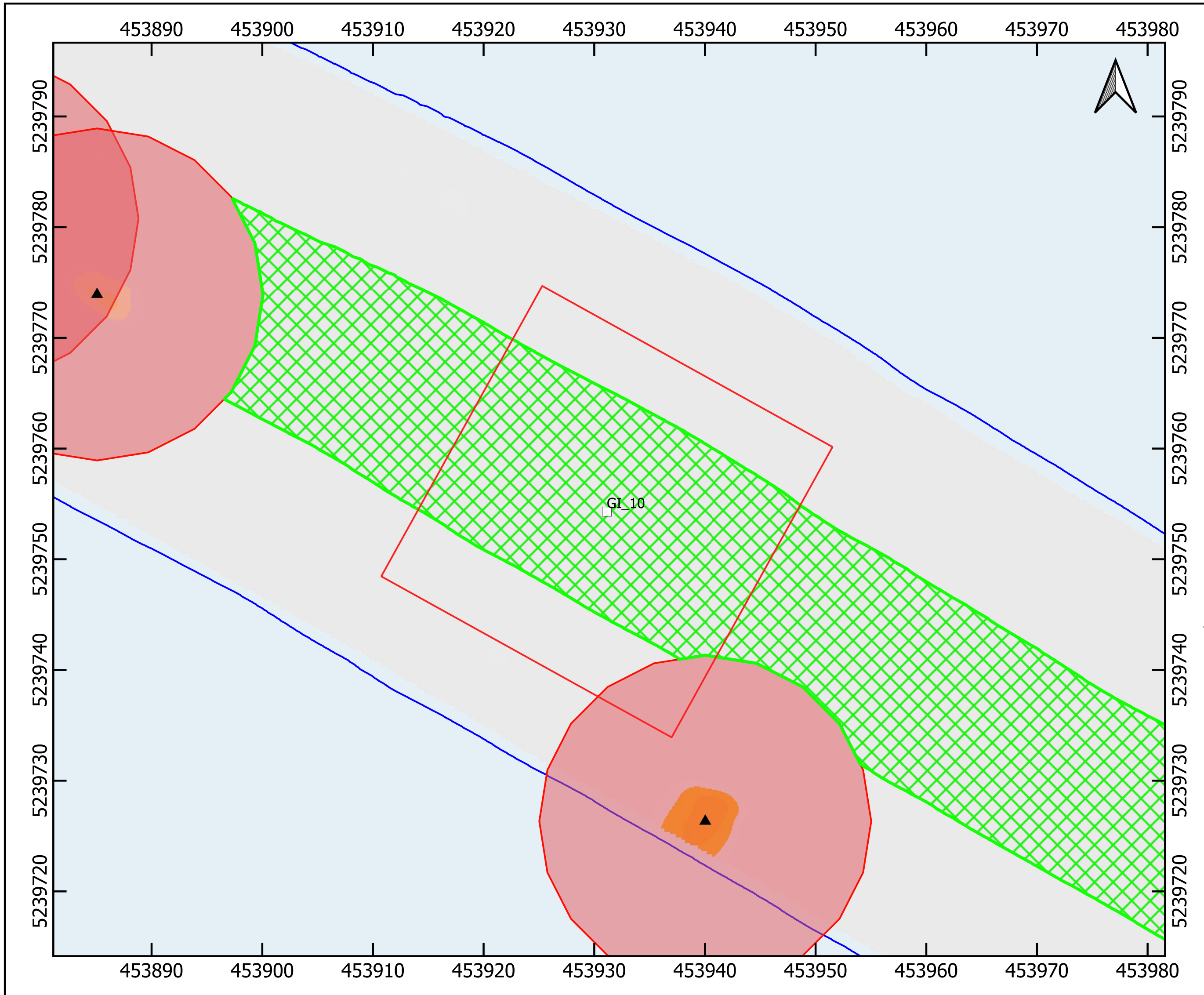
Easting:456871.44, Northing: 5244987.59

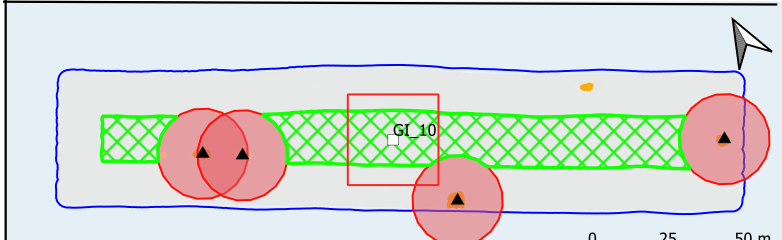
-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

Residual total magnetic field (nT)

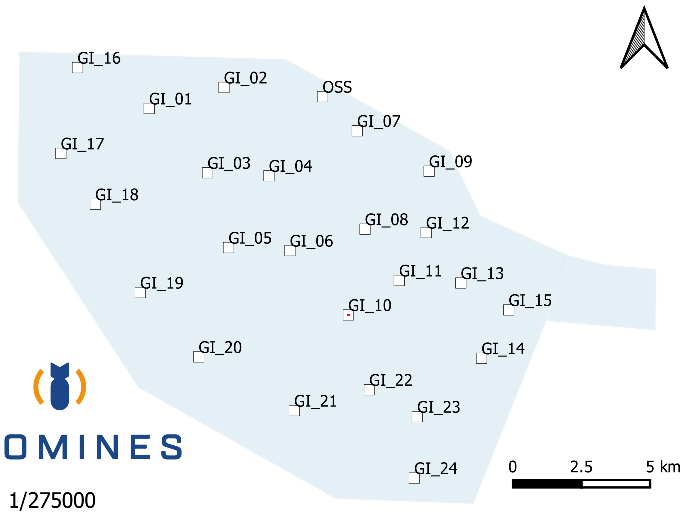
ANNEXE A: AO5 - GI_10
ALARP CERTIFICATE GIS

Scale: 1/600
Date: 2022-05-24
Geodesy : WGS 84 - UTM 30N
Version: V1





Scale: 1/2500



Scale: 1/275000

Concession
AO5 OWF

Geotechnical location
AO5 GI Original location
AO5 GI Alternative Location
Geotechnical Boxes

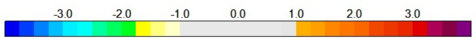
ALARP
Dynamic coverage

AO5 pUXO magnetic anomalies
AO5 avoidance distance
ALARP validated area

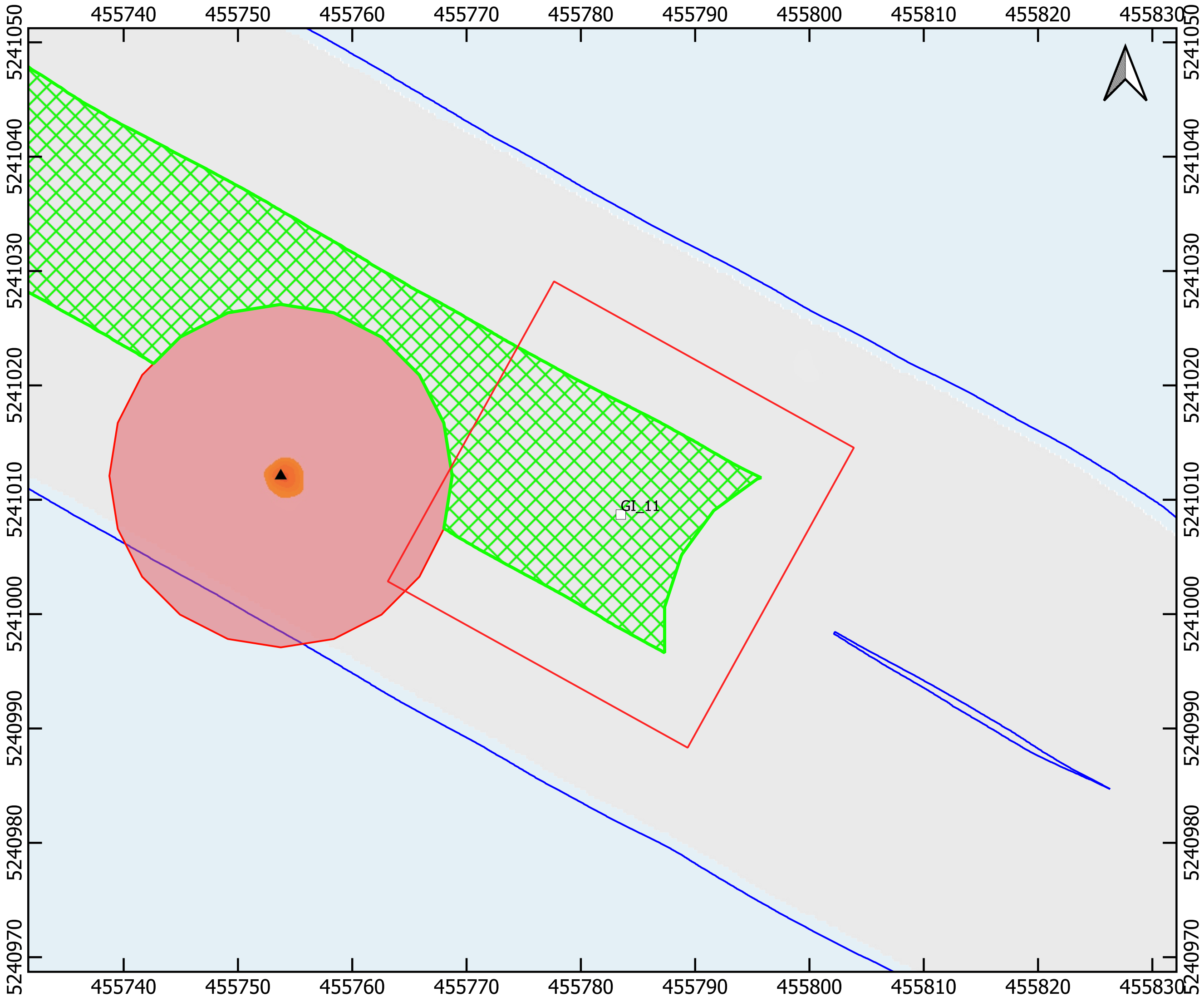
Obstructions
Obstructions SSS
Obstructions MBES

ALARP area: 535 square meter

Easting:453931.13, Northing: 5239754.3



Residual total magnetic field
(nT)



ANNEXE A: AO5 - GI_11
ALARP CERTIFICATE GIS

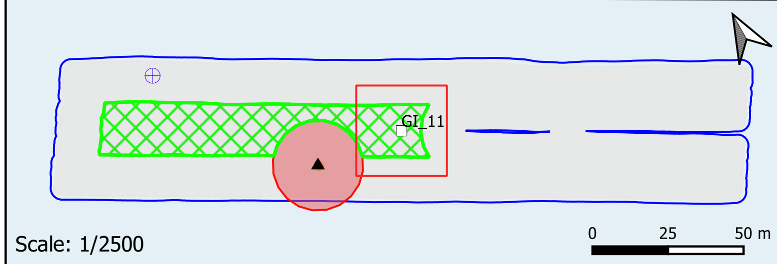
Scale: 1/600

Date: 2022-05-24

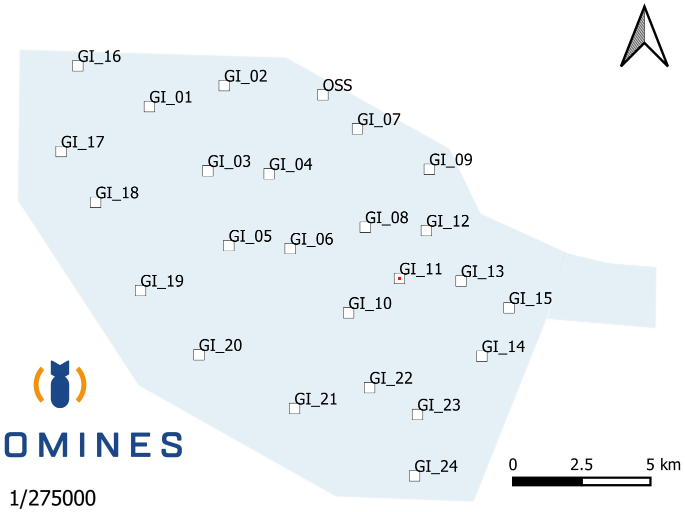
Geodesy : WGS 84 - UTM 30N

Version: V1

0 5 10 15 20 m



Scale: 1/2500



GEOMINES

Scale: 1/275000

Concession

AO5 OWF

Geotechnical location

AO5 GI Original location

AO5 GI Alternative Location

Geotechnical Boxes

ALARP

Dynamic coverage

AO5 pUXO magnetic anomalies

AO5 avoidance distance

ALARP validated area

Obstructions

Obstructions SSS

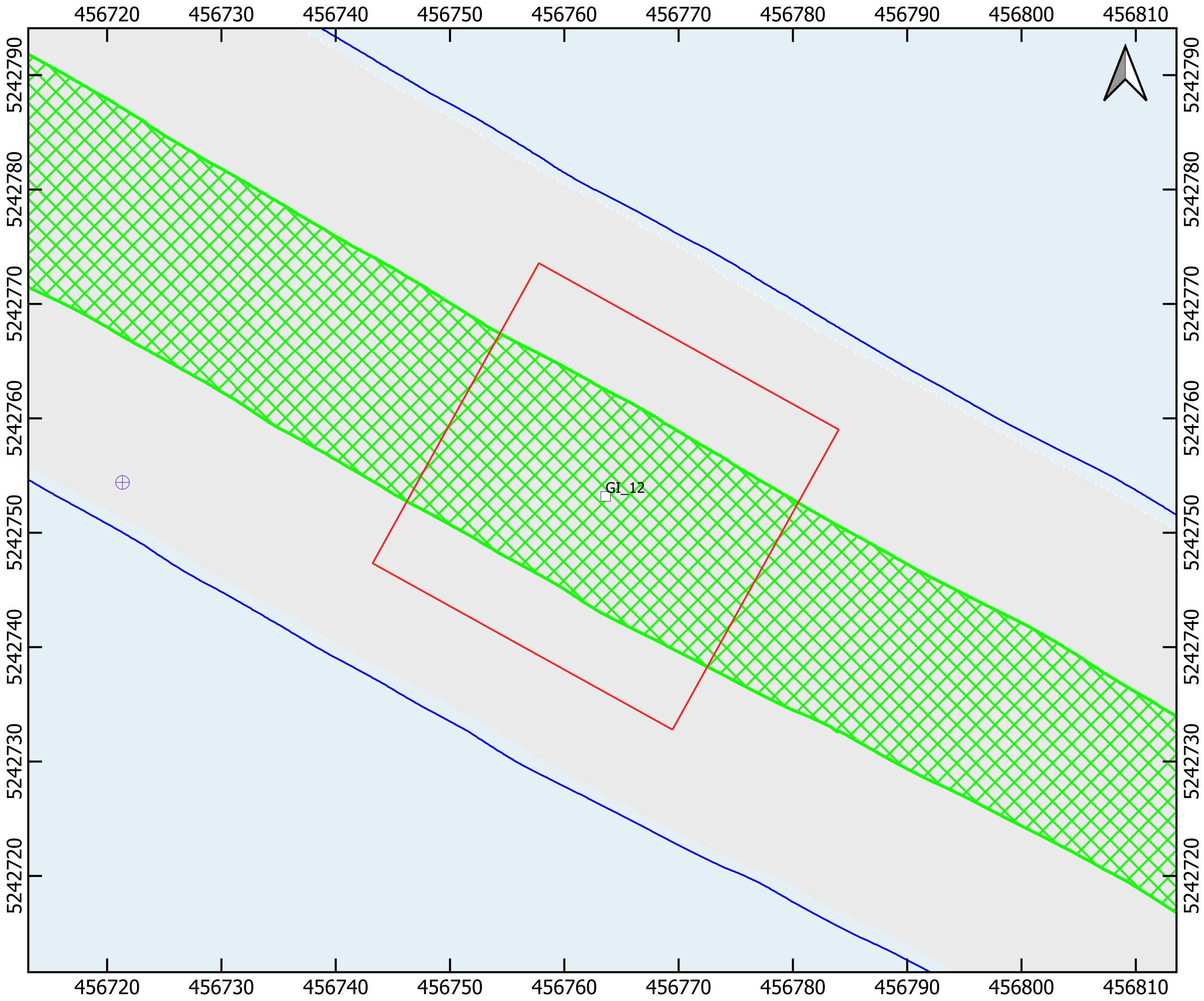
Obstructions MBES

ALARP area: 380 square meter

Easting:455783.49, Northing: 5241008.7

-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

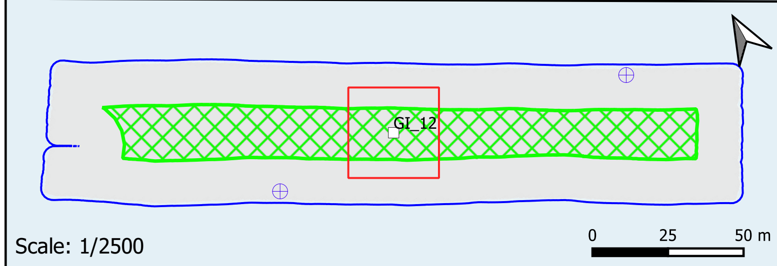
Residual total magnetic field (nT)

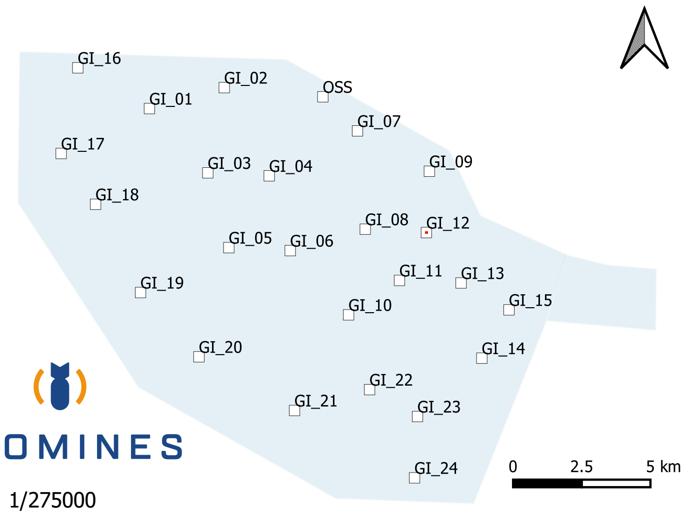


ANNEXE A: AO5 - GI_12
ALARP CERTIFICATE GIS

Scale: 1/600 Date: 2022-05-24
Geodesy : WGS 84 - UTM 30N Version: V1

0 5 10 15 20 m





GEOMINES

Scale: 1/275000

Concession
- AO5 OWF

Geotechnical location
- AO5 GI Original location
- AO5 GI Alternative Location
- Geotechnical Boxes

ALARP
- Dynamic coverage

- AO5 pUXO magnetic anomalies
- AO5 avoidance distance
- ALARP validated area

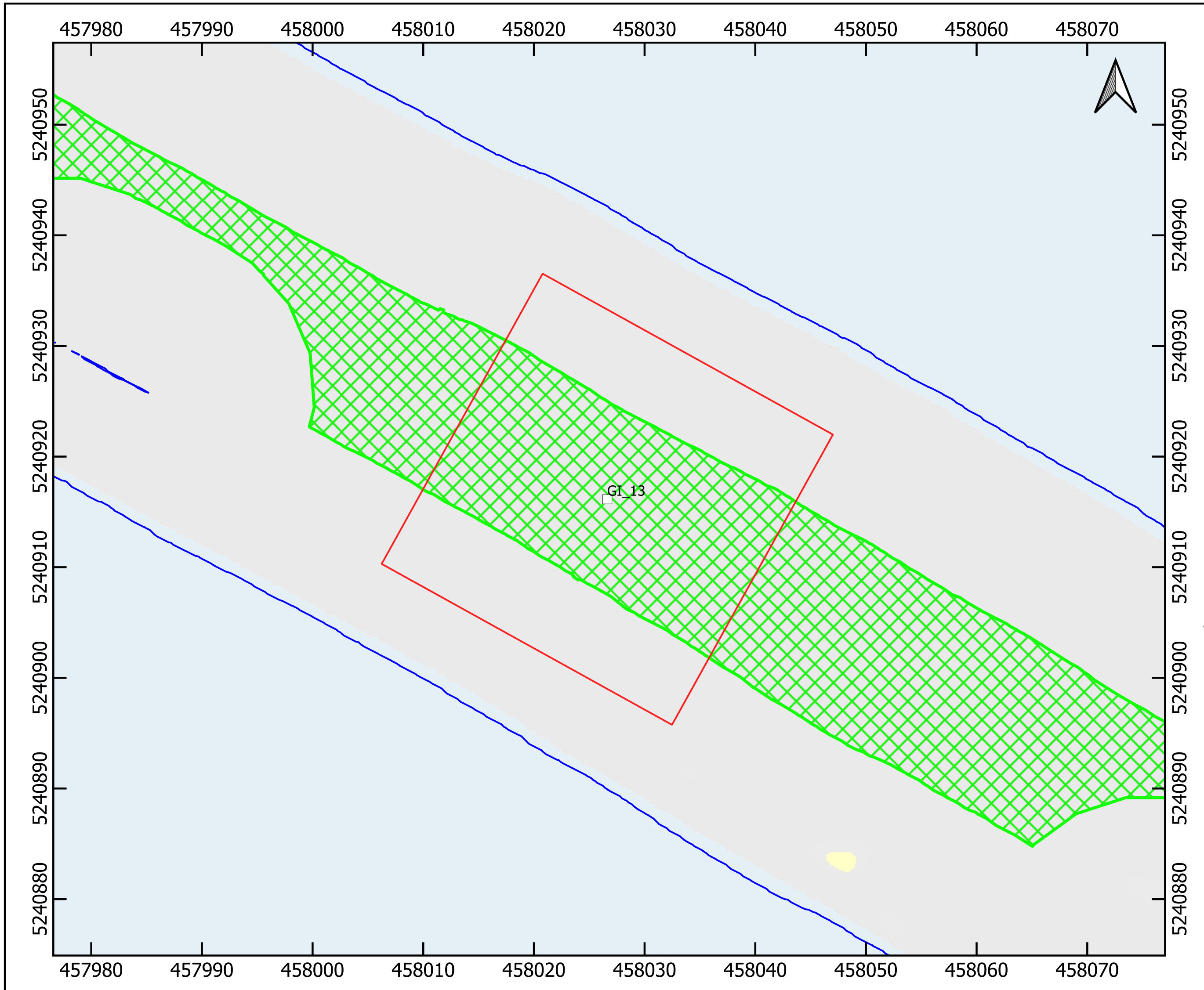
Obstructions
- Obstructions SSS
- Obstructions MBES

ALARP area: 507 square meter

Easting:456763.61, Northing: 5242753.17

-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

Residual total magnetic field
(nT)



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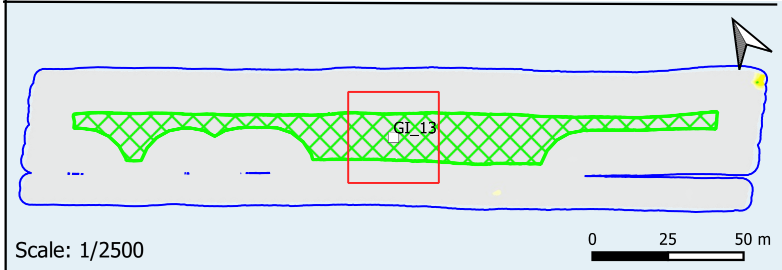
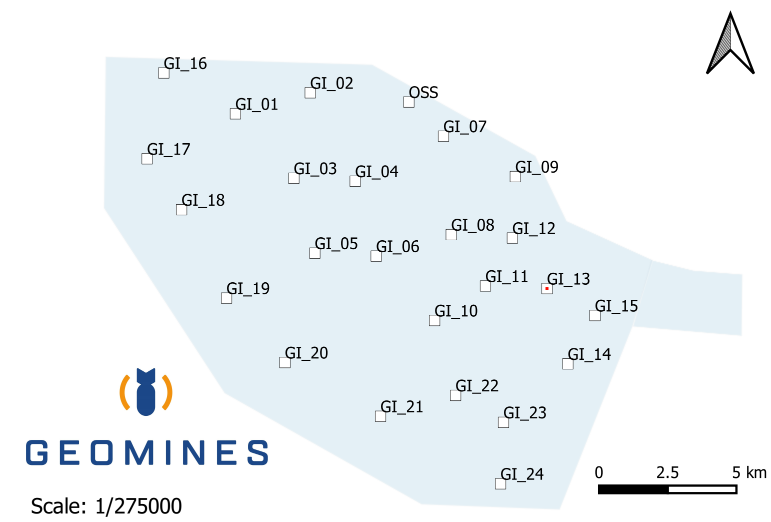
ANNEXE A: AO5 - GI_13
ALARP CERTIFICATE GIS

Scale: 1/600 | Date: 2022-05-24

Geodesy : WGS 84 - UTM 30N | Version: V1

0 5 10 15 20 m





Concession
- AO5 OWF

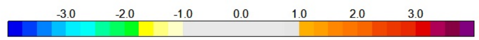
Geotechnical location
- AO5 GI Original location
- AO5 GI Alternative Location
- Geotechnical Boxes

ALARP
- Dynamic coverage
- AO5 pUXO magnetic anomalies
- AO5 avoidance distance
- ALARP validated area

Obstructions
- Obstructions SSS
- Obstructions MBES

ALARP area: 464 square meter

Easting:458026.62, Northing: 5240916.14

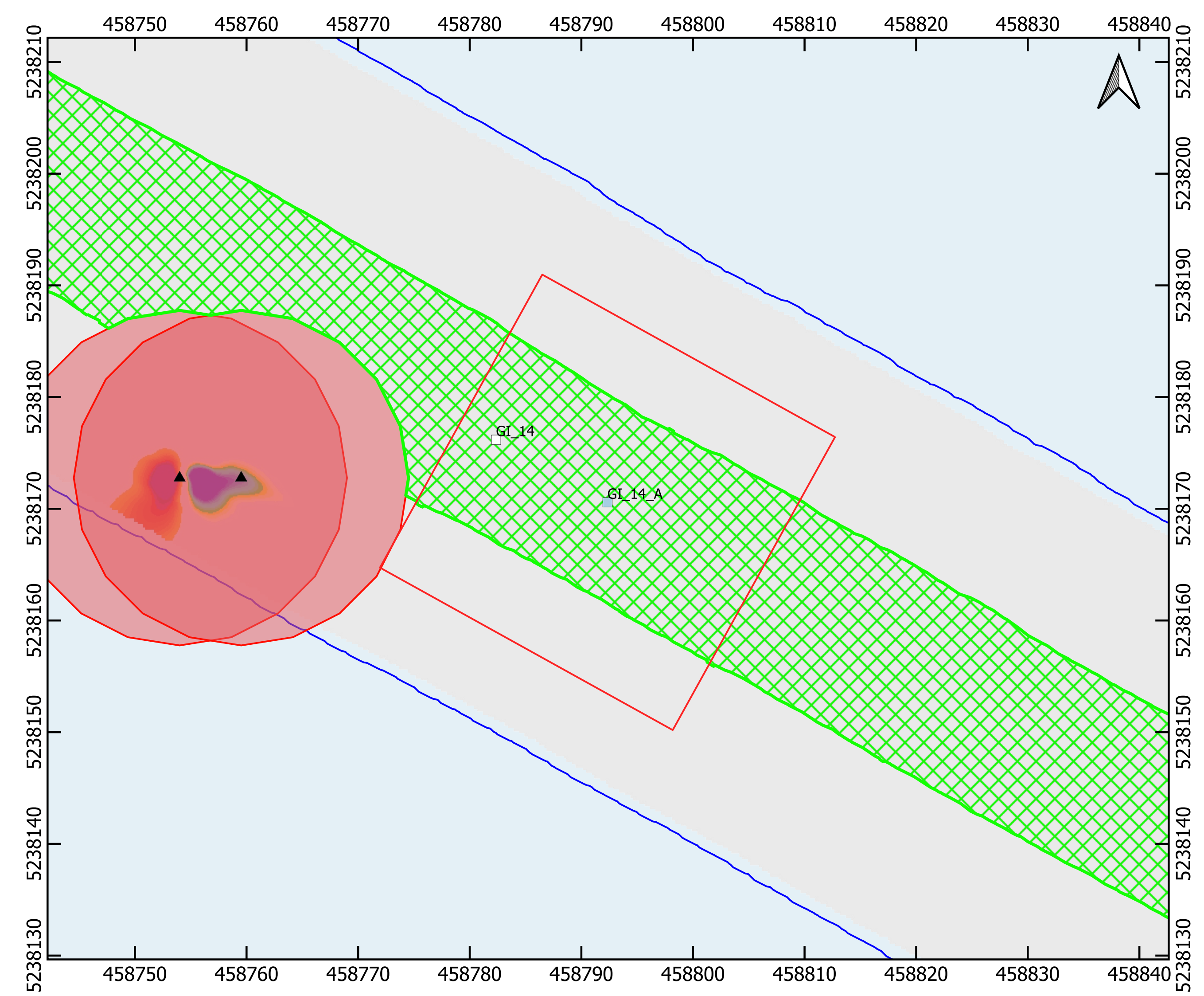


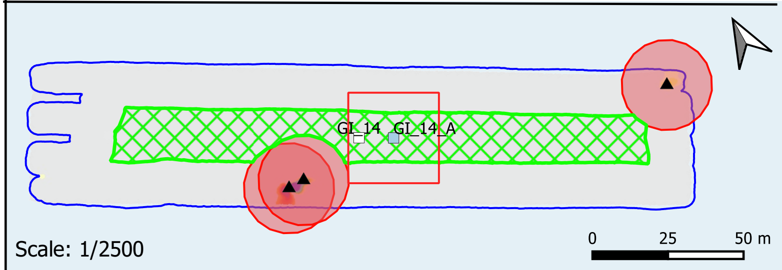
Residual total magnetic field (nT)

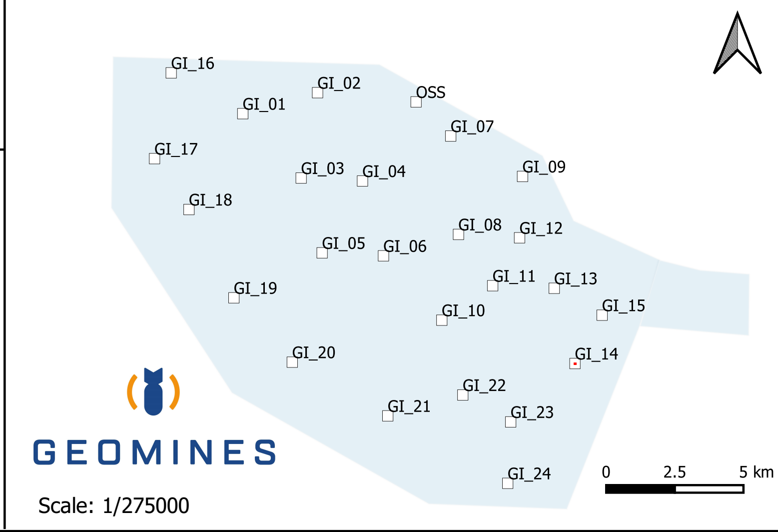
ANNEXE A: AO5 - GI_14_A
ALARP CERTIFICATE GIS

Scale: 1/600
Date: 2022-05-24
Geodesy : WGS 84 - UTM 30N
Version: V1

0 5 10 15 20 m







Concession
- AO5 OWF

Geotechnical location
- AO5 GI Original location
- AO5 GI Alternative Location
- Geotechnical Boxes

ALARP
- Dynamic coverage

- AO5 pUXO magnetic anomalies
- AO5 avoidance distance
- ALARP validated area

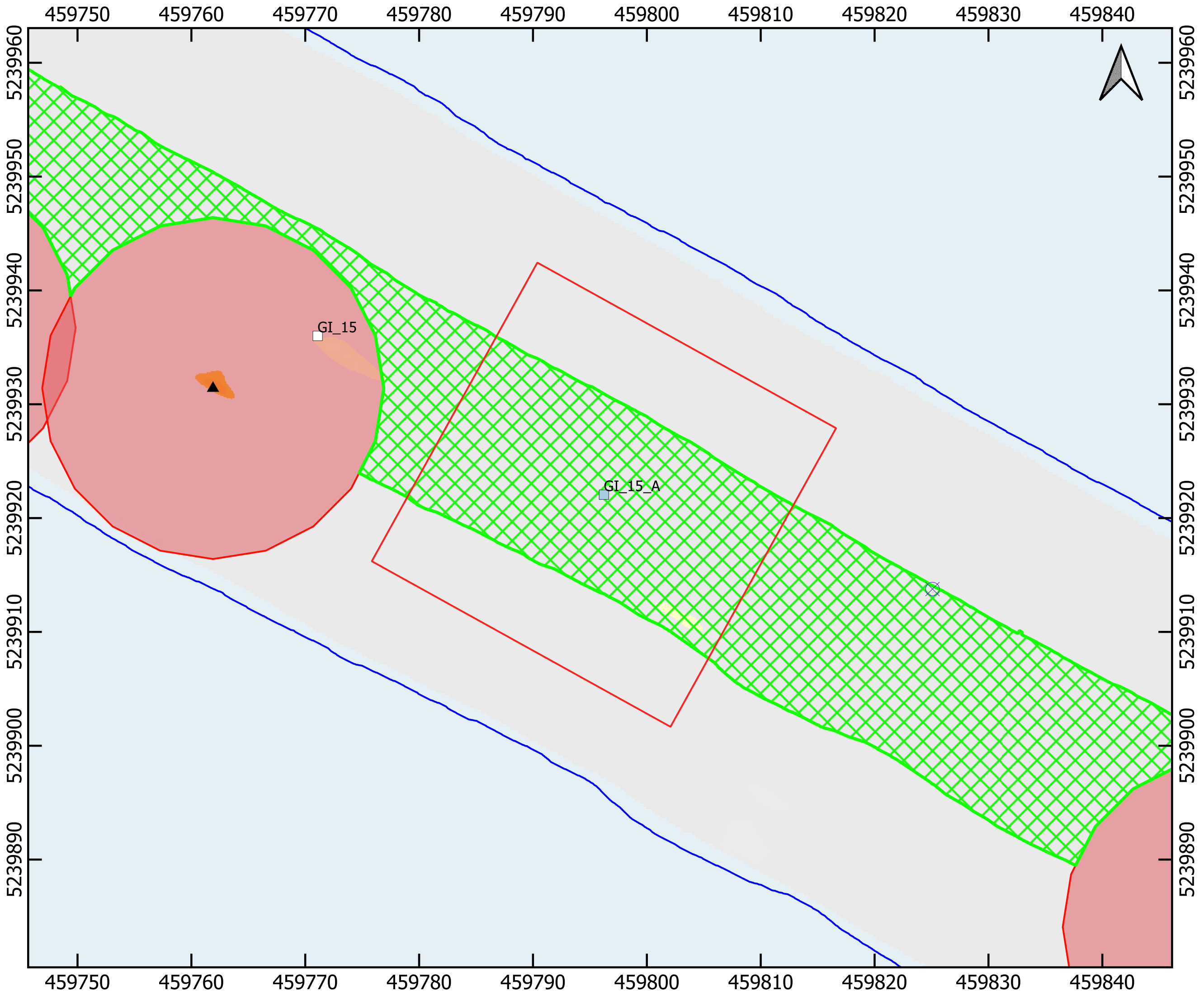
Obstructions
- Obstructions SSS
- Obstructions MBES

ALARP area: 496 square meter

Easting:458792.33, Northing: 5238170.57

-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

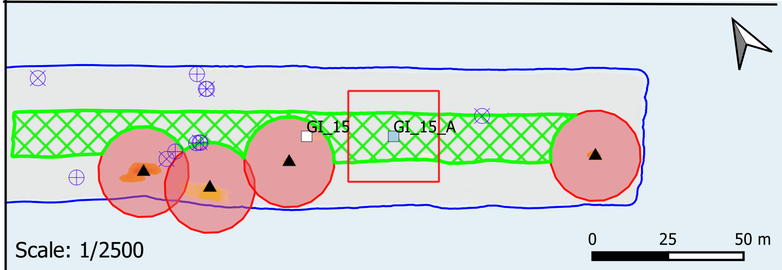
Residual total magnetic field
(nT)

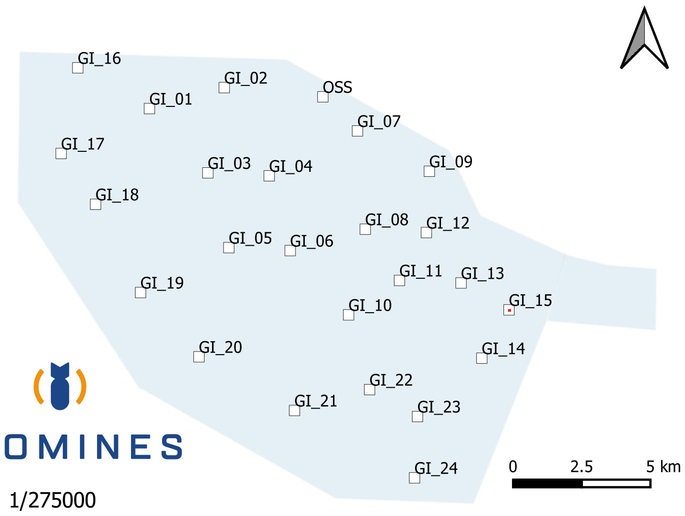


ANNEXE A: AO5 - GI_15_A
ALARP CERTIFICATE GIS

Scale: 1/600 Date: 2022-05-24
Geodesy : WGS 84 - UTM 30N Version: V1

0 5 10 15 20 m





GEOMINES

Scale: 1/275000

Concession

AO5 OWF

Geotechnical location

AO5 GI Original location

AO5 GI Alternative Location

Geotechnical Boxes

ALARP

Dynamic coverage

AO5 pUXO magnetic anomalies

AO5 avoidance distance

ALARP validated area

Obstructions

Obstructions SSS

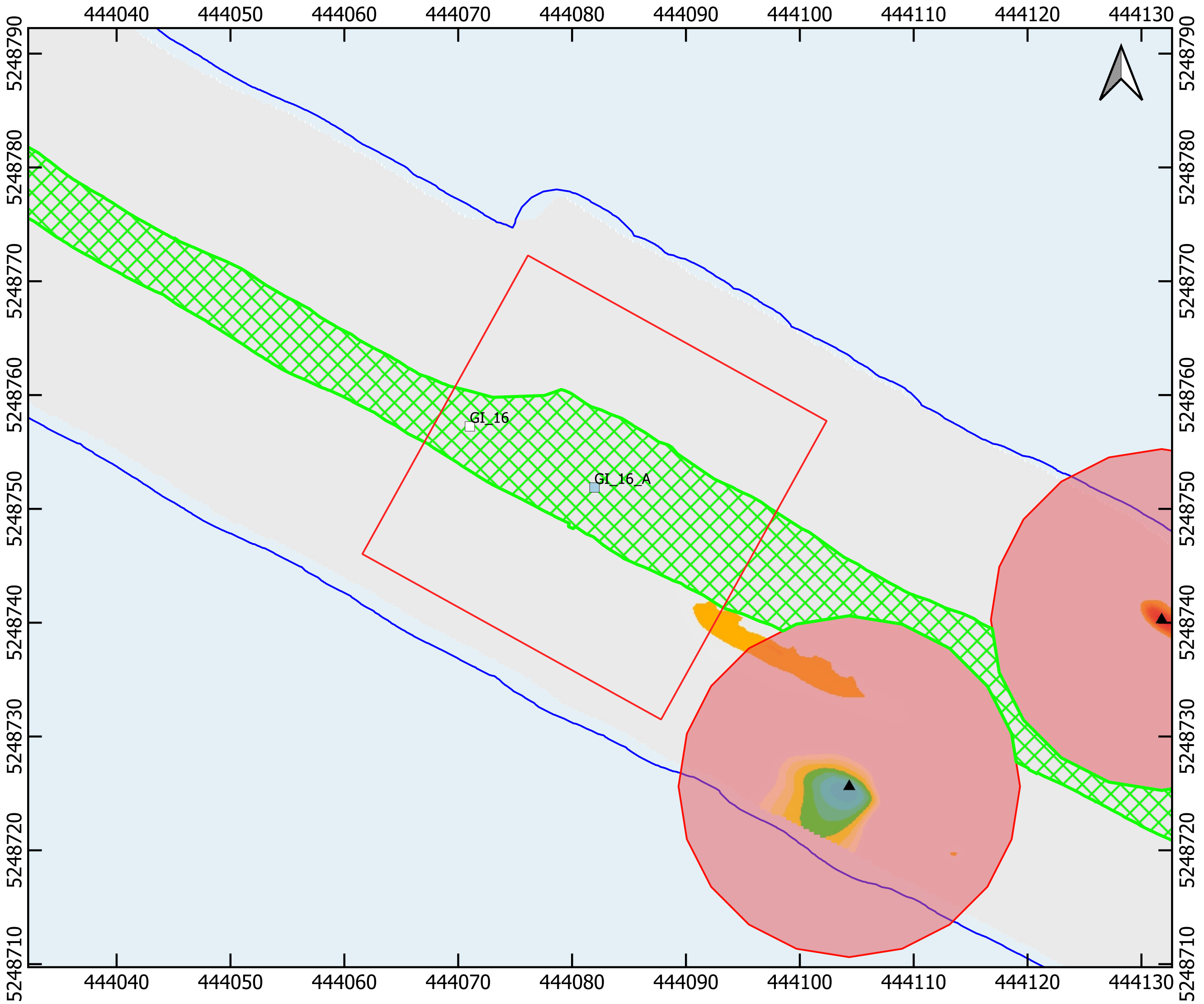
Obstructions MBES

ALARP area: 468 square meter

Easting:459796.22, Northing: 5239922.05

-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

Residual total magnetic field (nT)



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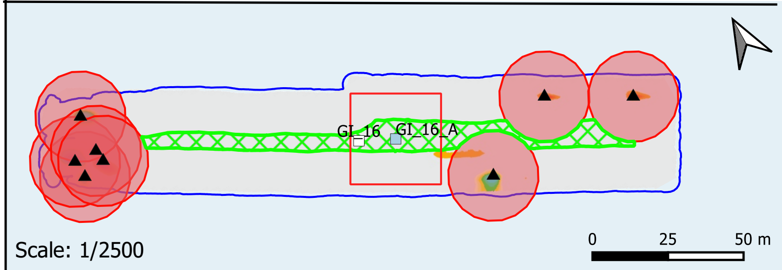
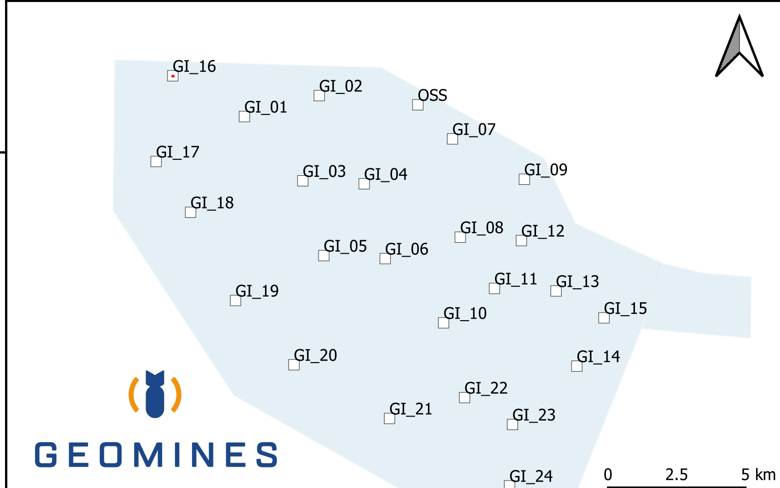
GEOQUIP MARINE

ANNEXE A: AO5 - GI_16_A
ALARP CERTIFICATE GIS

Scale: 1/600
Date: 2022-05-24
Geodesy : WGS 84 - UTM 30N
Version: V1

0 5 10 15 20 m





GEOMINES

Scale: 1/275000

Concession

AO5 OWF

Geotechnical location

AO5 GI Original location

AO5 GI Alternative Location

Geotechnical Boxes

ALARP

Dynamic coverage

AO5 pUXO magnetic anomalies

AO5 avoidance distance

ALARP validated area

Obstructions

Obstructions SSS

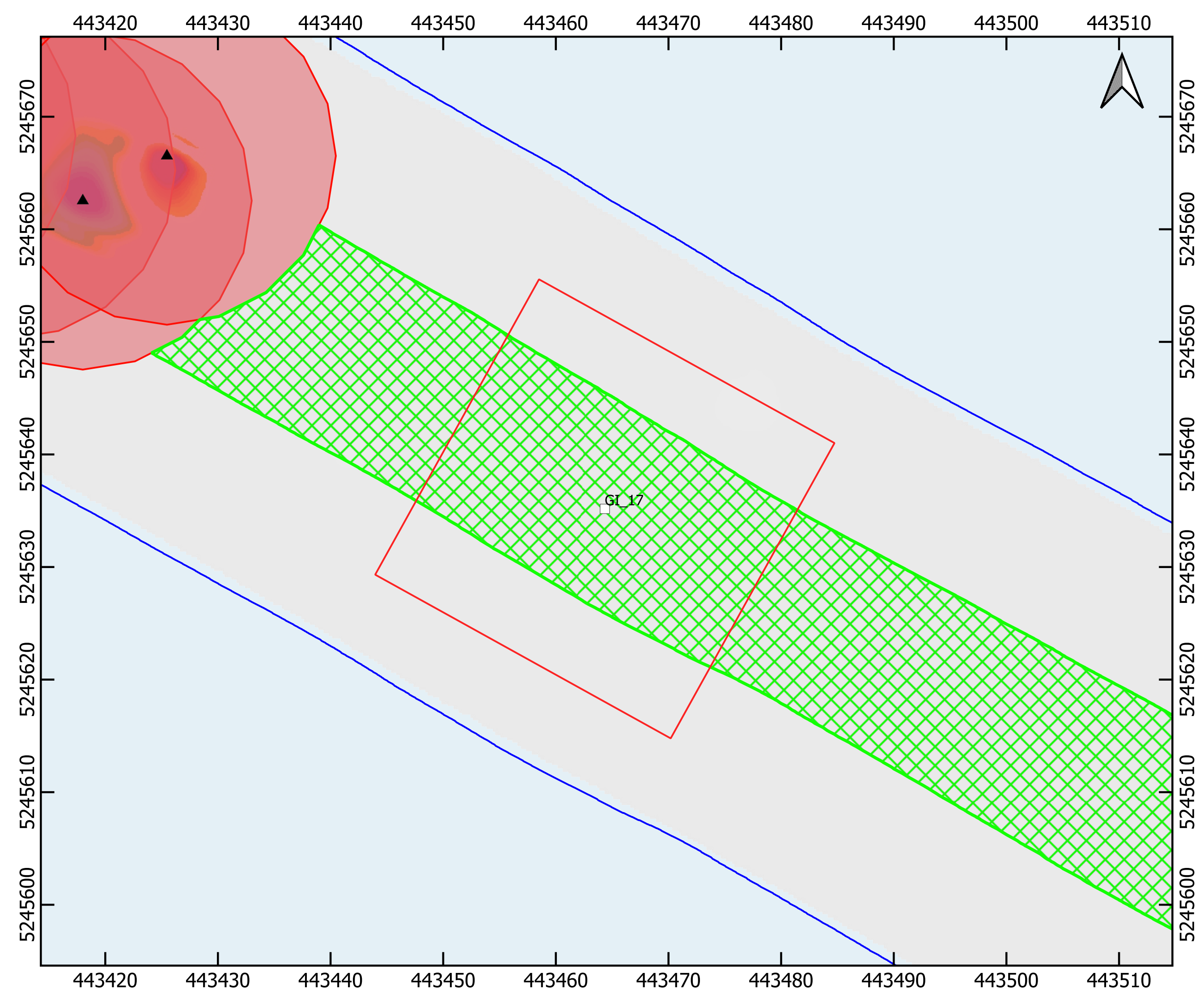
Obstructions MBES

ALARP area: 279 square meter

Easting:444081.96, Northing: 5248751.87

-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

Residual total magnetic field (nT)



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DE LA TRANSITION
ÉCOLOGIQUE

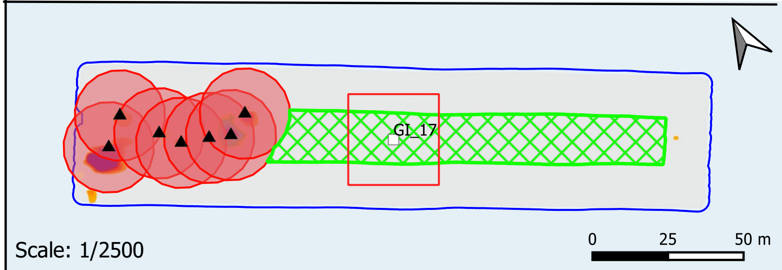
TECNOAMBIENTE
A TRADEBE COMPANY

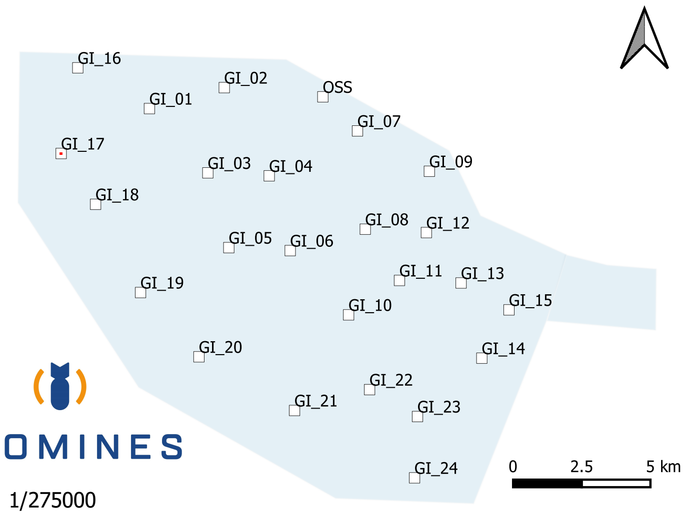
GEOQUIPMARINE

ANNEXE A: AO5 - GI_17
ALARP CERTIFICATE GIS

Scale: 1/600
Date: 2022-05-24
Geodesy : WGS 84 - UTM 30N
Version: V1

0 5 10 15 20 m





GEOMINES

Scale: 1/275000

Concession

AO5 OWF

Geotechnical location

AO5 GI Original location

AO5 GI Alternative Location

Geotechnical Boxes

ALARP

Dynamic coverage

AO5 pUXO magnetic anomalies

AO5 avoidance distance

ALARP validated area

Obstructions

Obstructions SSS

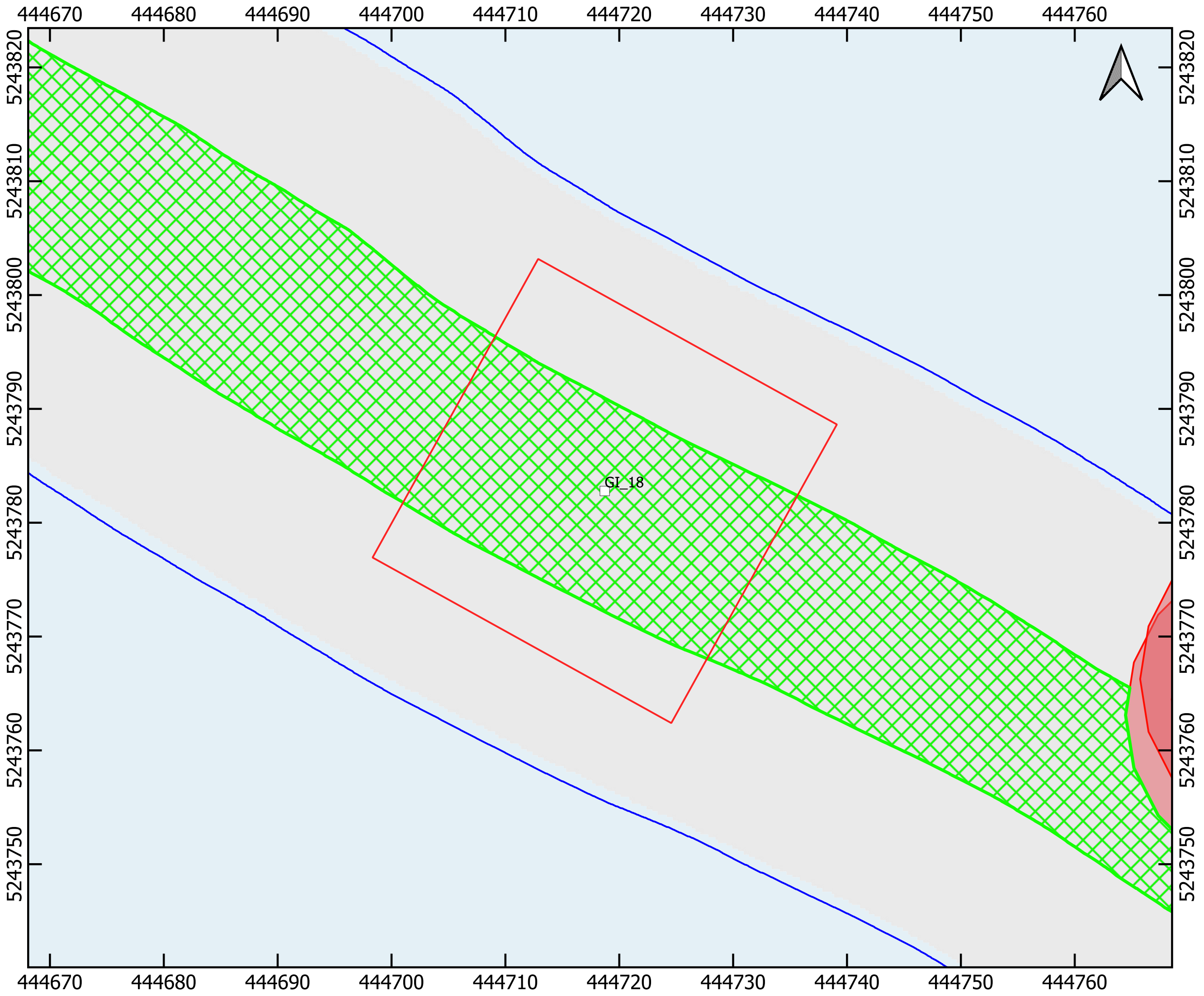
Obstructions MBES

ALARP area: 500 square meter

Easting:443464.34, Northing: 5245635.16

-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

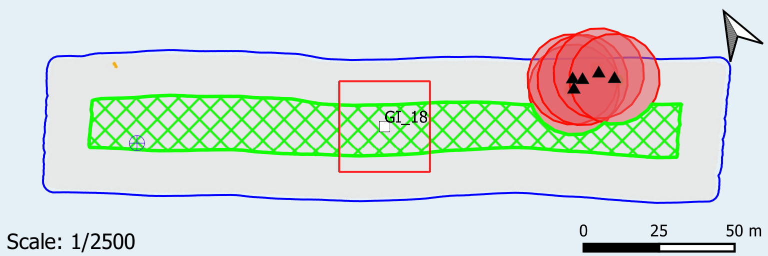
Residual total magnetic field
(nT)



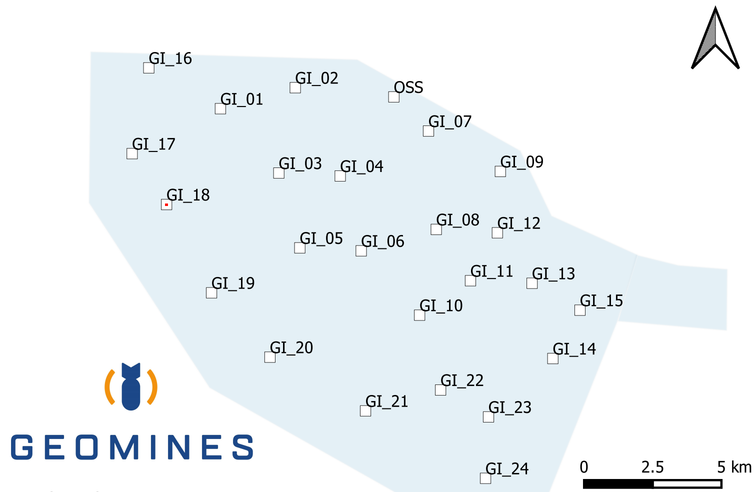
ANNEXE A: AO5 - GI_18
ALARP CERTIFICATE GIS

Scale: 1/600 Date: 2022-05-24
Geodesy : WGS 84 - UTM 30N Version: V1

0 5 10 15 20 m



Scale: 1/2500



GEOMINES

Scale: 1/275000

Concession

AO5 OWF

Geotechnical location

AO5 GI Original location

AO5 GI Alternative Location

Geotechnical Boxes

ALARP

Dynamic coverage

AO5 pUXO magnetic anomalies

AO5 avoidance distance

ALARP validated area

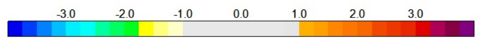
Obstructions

Obstructions SSS

Obstructions MBES

ALARP area: 500 square meter

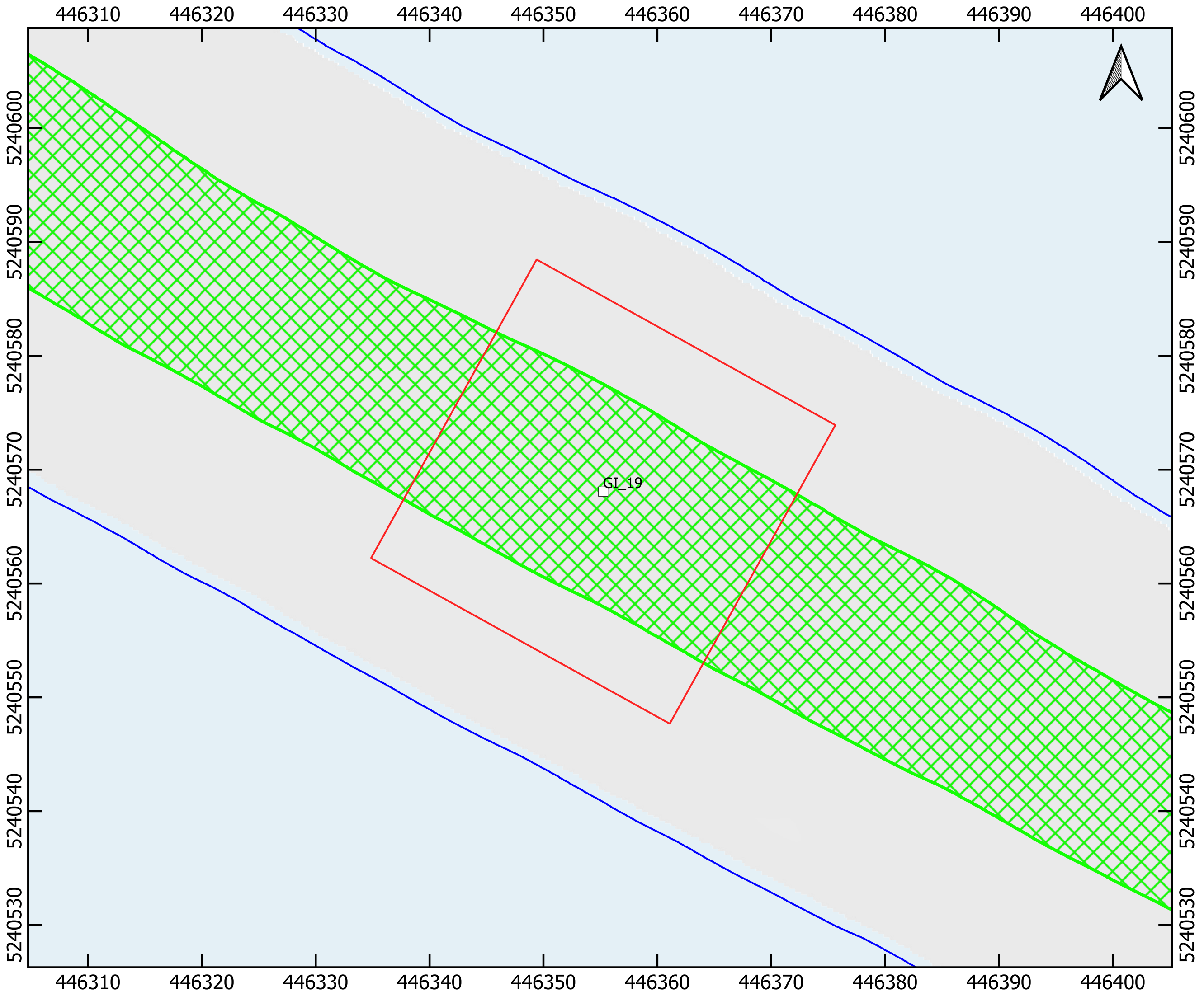
Easting:444718.71, Northing: 5243782.78

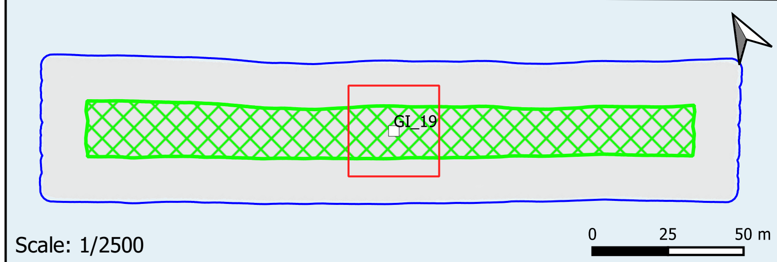


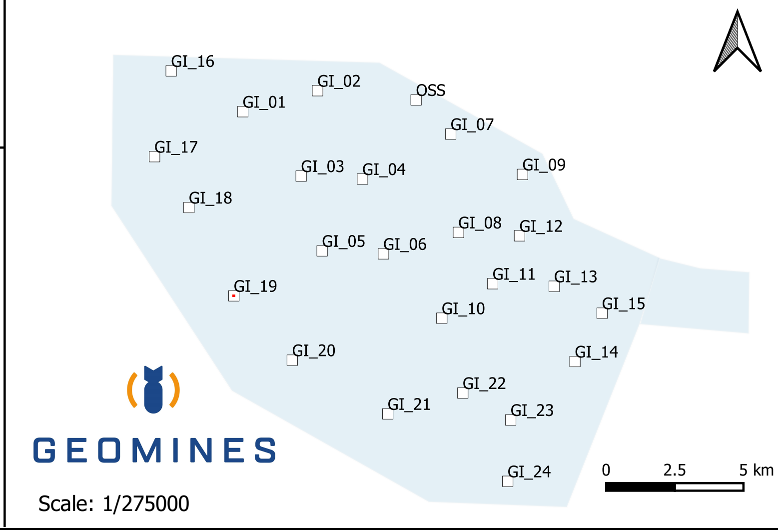
Residual total magnetic field
(nT)

ANNEXE A: AO5 - GI_19
ALARP CERTIFICATE GIS

Scale: 1/600 Date: 2022-05-24
Geodesy : WGS 84 - UTM 30N Version: V1







Concession

AO5 OWF

Geotechnical location

AO5 GI Original location

AO5 GI Alternative Location

Geotechnical Boxes

ALARP

Dynamic coverage

AO5 pUXO magnetic anomalies

AO5 avoidance distance

ALARP validated area

Obstructions

Obstructions SSS

Obstructions MBES

ALARP area: 513 square meter

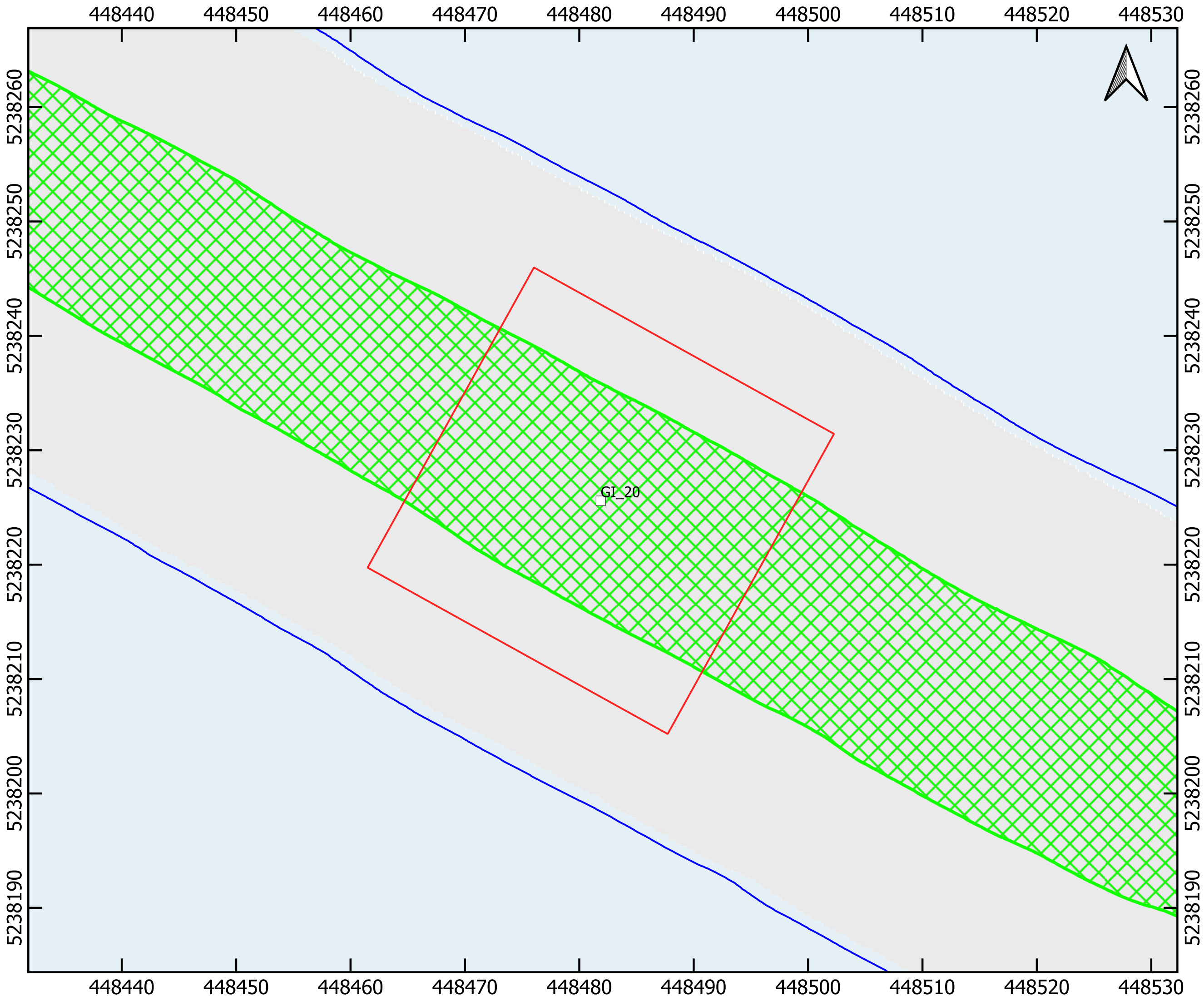
Easting:446355.23, Northing: 5240568.06

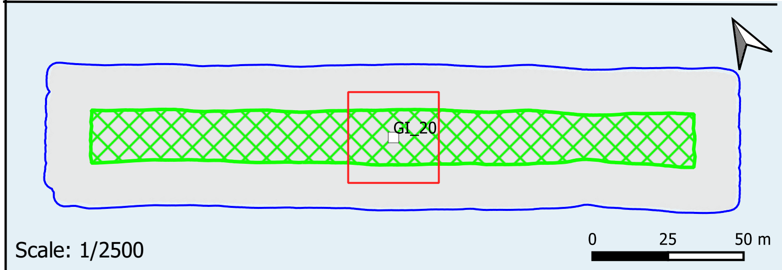
-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

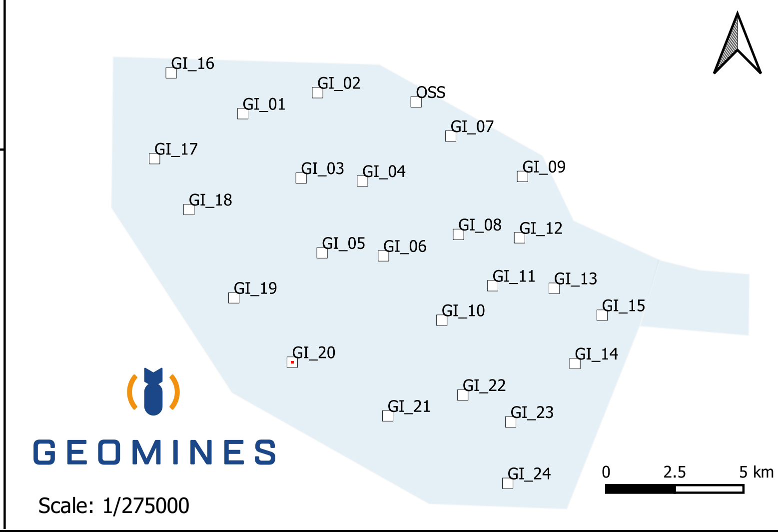
Residual total magnetic field (nT)

ANNEXE A: AO5 - GI_20
ALARP CERTIFICATE GIS

Scale: 1/600
Date: 2022-05-24
Geodesy : WGS 84 - UTM 30N
Version: V1







Concession
AO5 OWF

Geotechnical location
AO5 GI Original location
AO5 GI Alternative Location
Geotechnical Boxes

ALARP
Dynamic coverage

AO5 pUXO magnetic anomalies
AO5 avoidance distance
ALARP validated area

Obstructions
Obstructions SSS
Obstructions MBES

ALARP area: 539 square meter

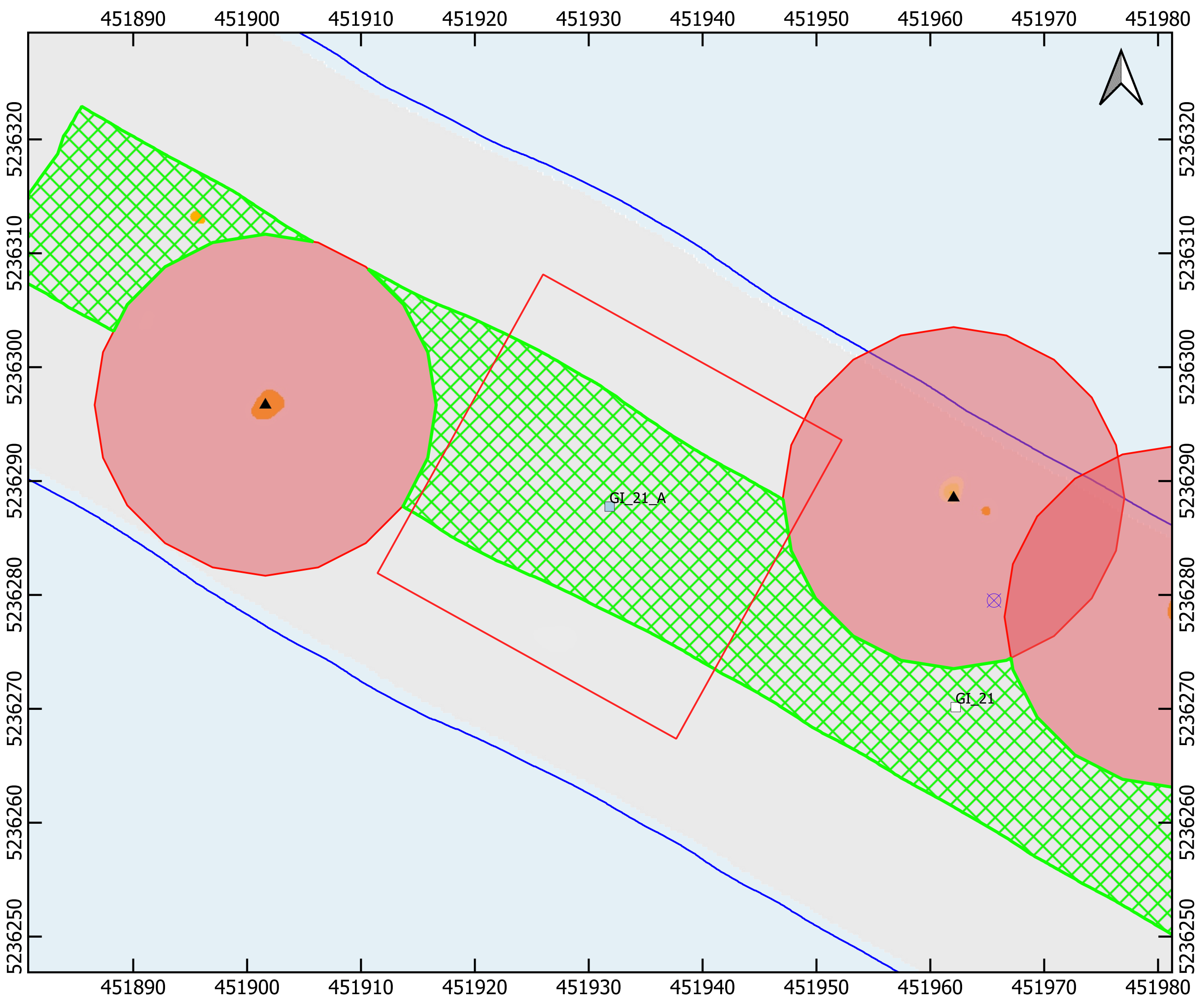
Easting:448481.87, Northing: 5238225.58

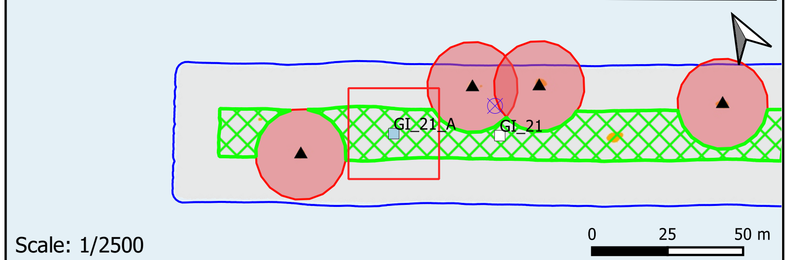
-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

Residual total magnetic field
(nT)

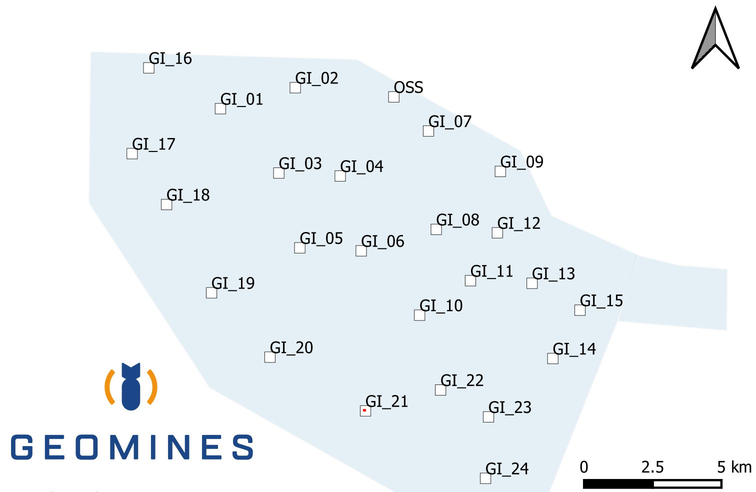
ANNEXE A: AO5 - GI_21_A
ALARP CERTIFICATE GIS

Scale: 1/600 Date: 2022-05-24
Geodesy : WGS 84 - UTM 30N Version: V1





Scale: 1/2500



Scale: 1/275000

Concession
- AO5 OWF

Geotechnical location
- AO5 GI Original location
- AO5 GI Alternative Location
- Geotechnical Boxes

ALARP
- Dynamic coverage

- AO5 pUXO magnetic anomalies
- AO5 avoidance distance
- ALARP validated area

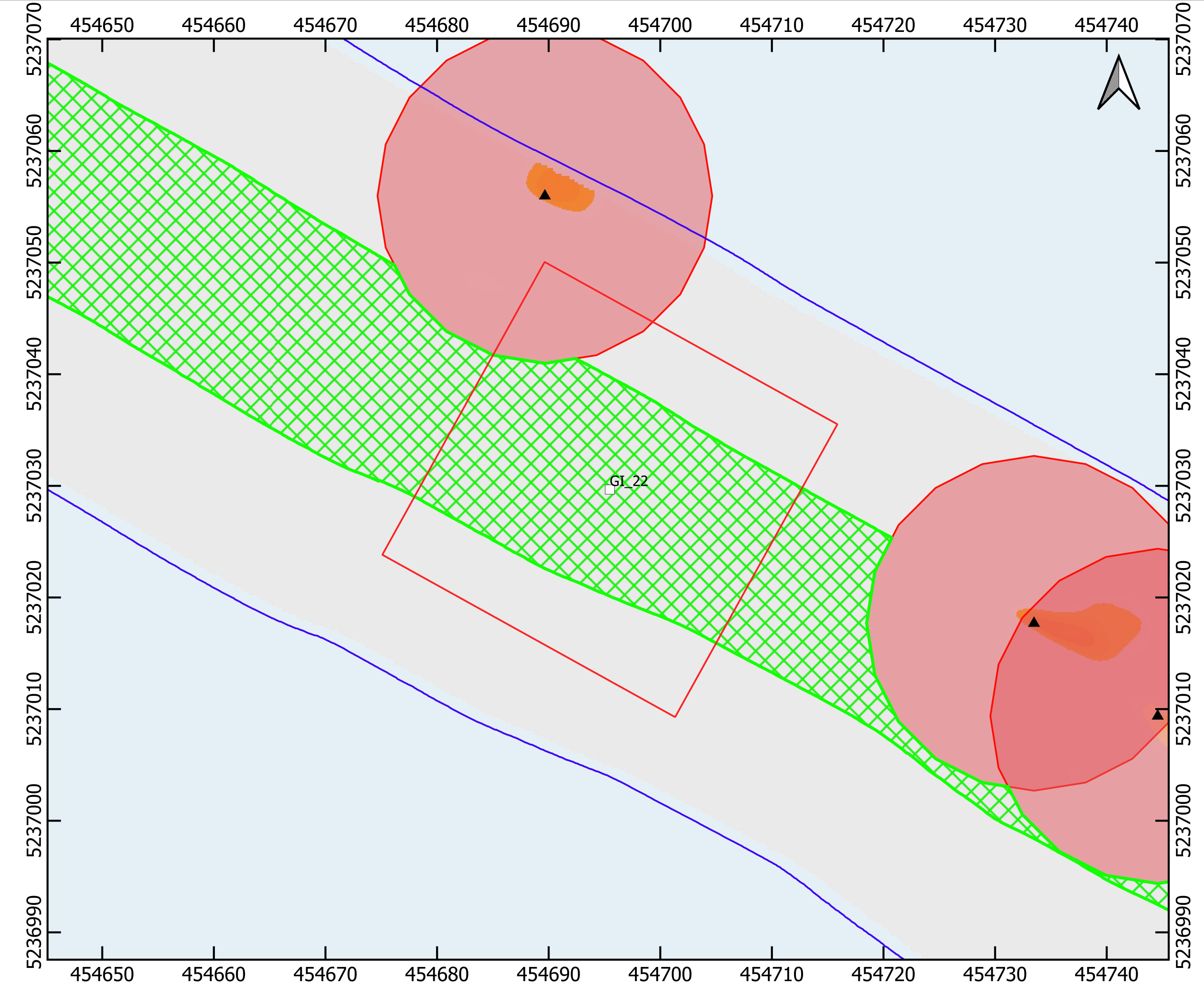
Obstructions
- Obstructions SSS
- Obstructions MBES

ALARP area: 503 square meter

Easting:451931.83, Northing: 5236287.75

-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

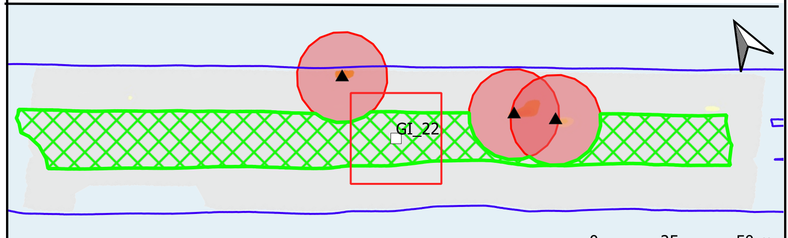
Residual total magnetic field (nT)



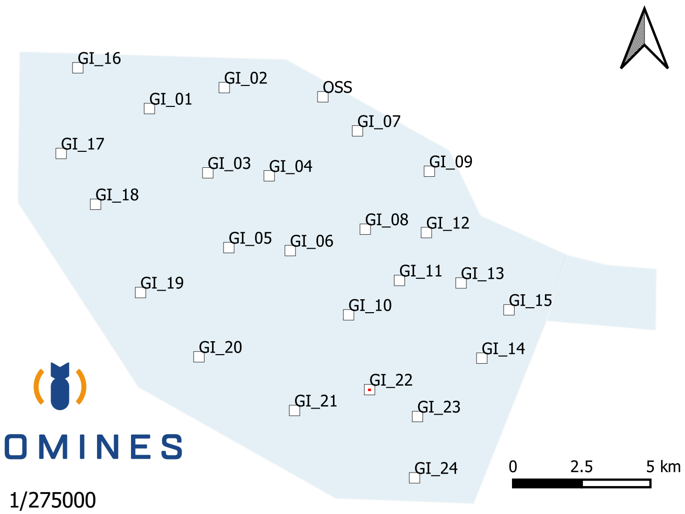
ANNEXE A: AO5 - GI_22
ALARP CERTIFICATE GIS

Scale: 1/600 Date: 2022-05-24
Geodesy : WGS 84 - UTM 30N Version: V1

0 5 10 15 20 m



Scale: 1/2500



GEOMINES

Scale: 1/275000

Concession
- AO5 OWF

Geotechnical location
- AO5 GI Original location
- AO5 GI Alternative Location
- Geotechnical Boxes

ALARP
- Dynamic coverage

- AO5 pUXO magnetic anomalies
- AO5 avoidance distance
- ALARP validated area

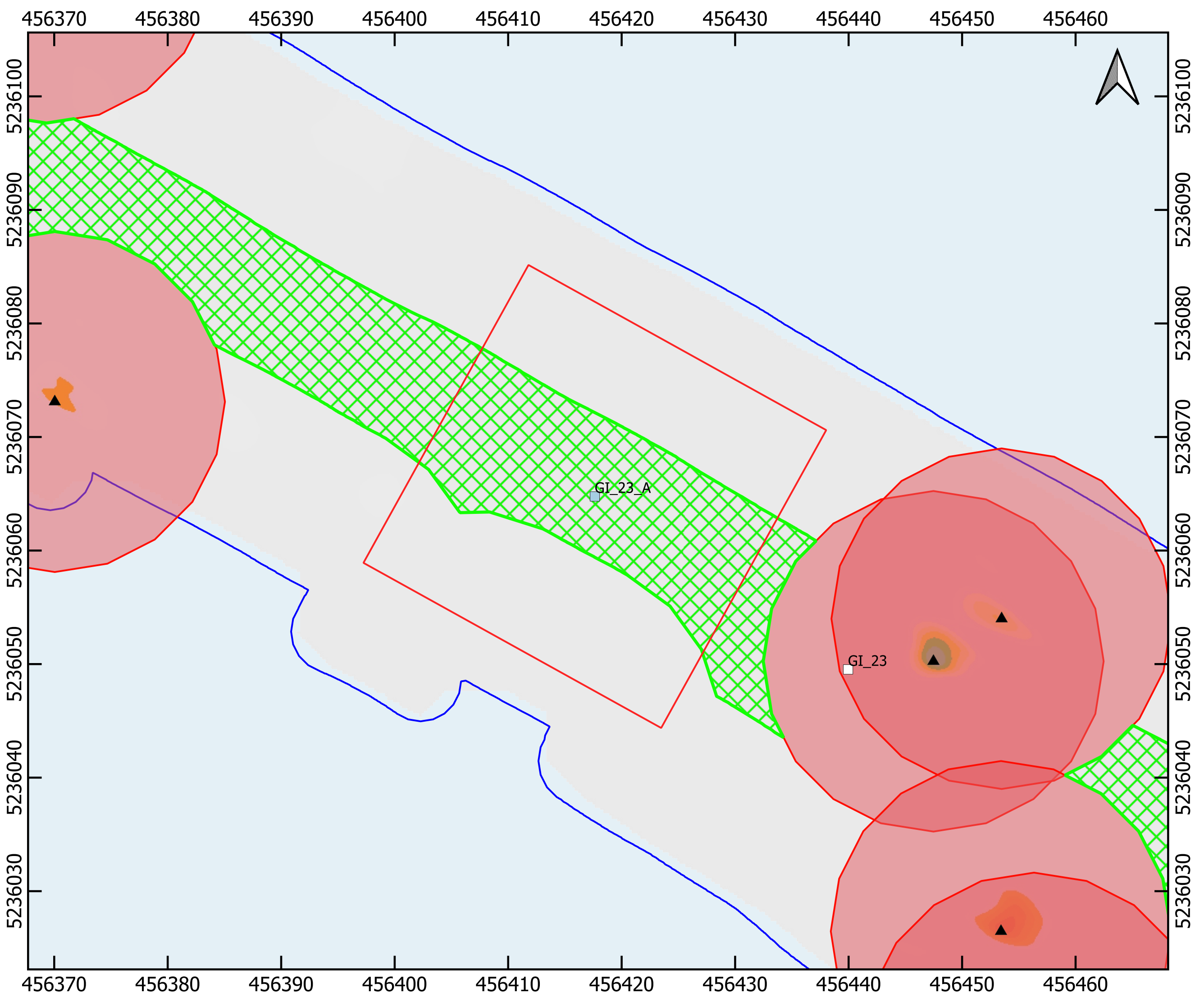
Obstructions
- Obstructions SSS
- Obstructions MBES

ALARP area: 503 square meter

Easting:454695.47, Northing: 5237029.66

-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

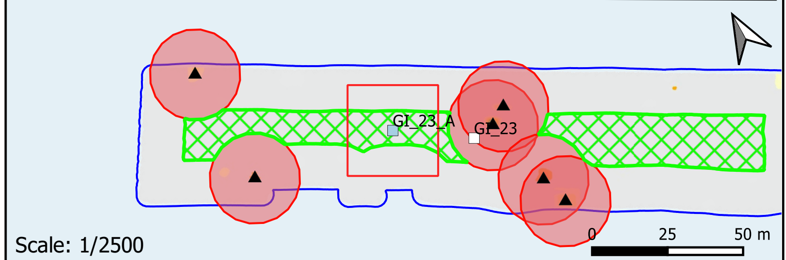
Residual total magnetic field
(nT)



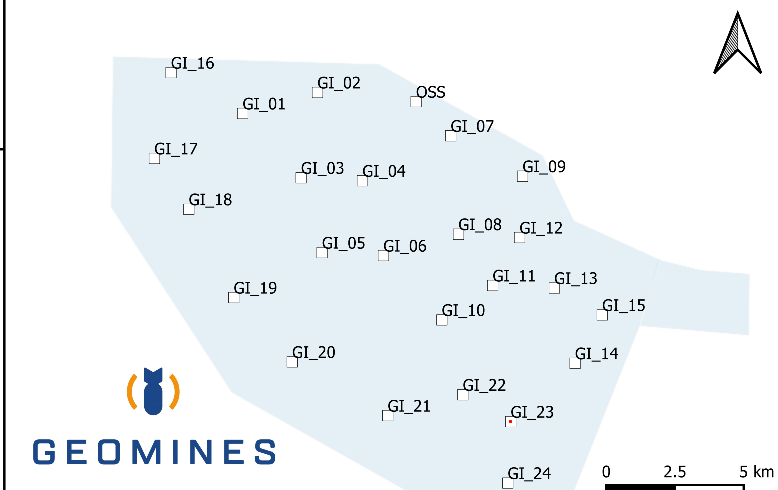
ANNEXE A: AO5 - GI_23_A
ALARP CERTIFICATE GIS

Scale: 1/600 Date: 2022-05-24
Geodesy : WGS 84 - UTM 30N Version: V1

0 5 10 15 20 m



Scale: 1/2500



GEOMINES

Scale: 1/275000

Concession
AO5 OWF

Geotechnical location
AO5 GI Original location
AO5 GI Alternative Location
Geotechnical Boxes

ALARP
Dynamic coverage

AO5 pUXO magnetic anomalies
AO5 avoidance distance
ALARP validated area

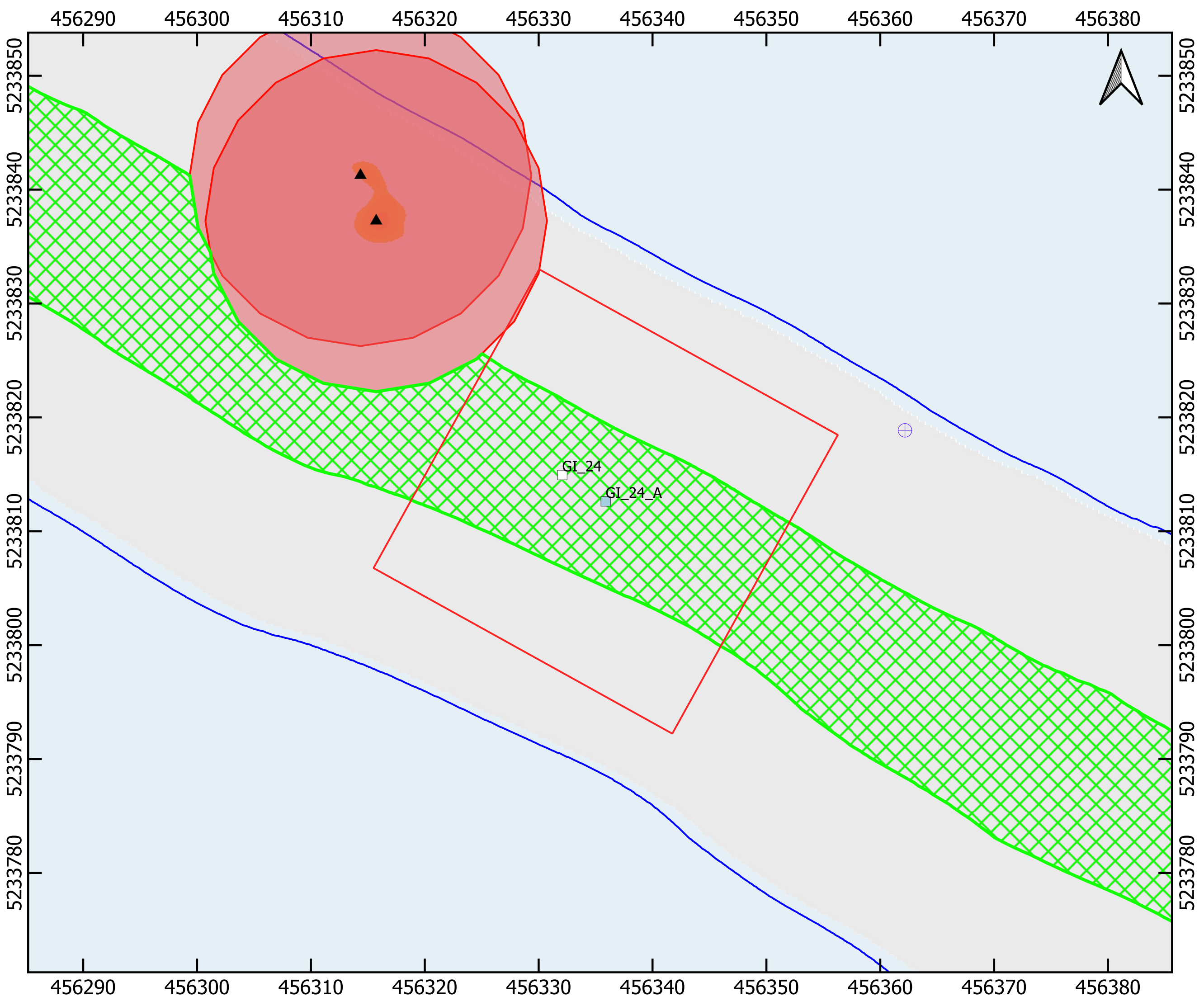
Obstructions
Obstructions SSS
Obstructions MBES

ALARP area: 354 square meter

Easting:456417.63, Northing: 5236064.76

-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

Residual total magnetic field
(nT)



ANNEXE A: AO5 - GI_24_A
ALARP CERTIFICATE GIS

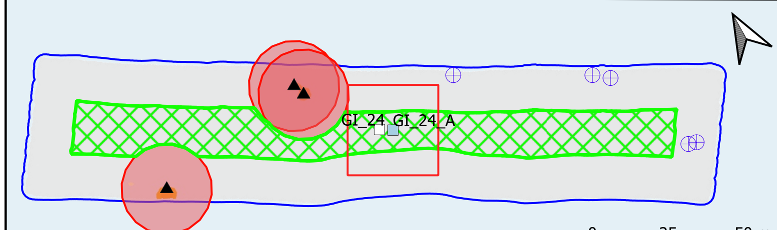
Scale: 1/600

Date: 2022-05-24

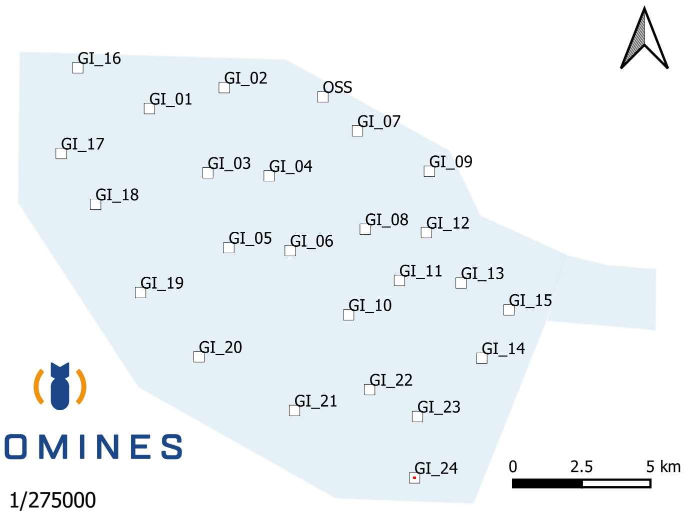
Geodesy : WGS 84 - UTM 30N

Version: V1

0 5 10 15 20 m



Scale: 1/2500



GEOMINES

Scale: 1/275000

Concession

AO5 OWF

Geotechnical location

AO5 GI Original location

AO5 GI Alternative Location

Geotechnical Boxes

ALARP

Dynamic coverage

AO5 pUXO magnetic anomalies

AO5 avoidance distance

ALARP validated area

Obstructions

Obstructions SSS

Obstructions MBES

ALARP area: 391 square meter

Easting:456335.88, Northing: 5233812.61

-3.0 -2.0 -1.0 0.0 1.0 2.0 3.0

Residual total magnetic field
(nT)