

10. CULTURAL HERITAGE

10.1 Introduction

This **Section** presents the cultural heritage impact assessment (CHIA) associated with the construction of the proposed Project. In accordance with Clause 3.4.10 of the Study Brief No. ESB-326/2019, a Marine Archaeological Investigation (MAI) including impact assessment was undertaken by the qualified marine archaeologist (Dr. William Jeffery) and the findings of the MAI are presented herein.

10.2 Legislative Requirements and Evaluation Criteria

The following legislations/standards/guidelines/requirements are applicable to the assessment of archaeological and historic resources in Hong Kong.

- Environmental Impact Assessment Ordinance (Cap. 499) and the associated *Technical Memorandum on the EIA Process (EIAO-TM)*;
- Antiquities and Monuments Ordinance (Cap. 53) (AM Ordinance);
- Hong Kong Planning Standards and Guidelines; and
- Requirements for Marine Archaeological Investigation (MAI) (Appendix I of the EIA Study Brief).

10.2.1 Environmental Impact Assessment Ordinance (Cap 499)

Annex 10 of the *EIAO-TM* outlines the criteria for assessment of impact on sites of cultural heritage. The general presumption is in favour of the protection and conservation of all sites of cultural heritage. In addition, adverse impacts on sites of cultural heritage shall be kept to the absolute minimum.

Annex 19 of the *EIAO-TM* outlines the approaches required in investigating and assessing the impacts on sites of cultural heritage. There is no quantitative standard in deciding the relative importance of these sites, but in general, sites of unique archaeological, historical or architectural value will be considered as highly significant. Preservation in totality is preferred. If, due to site constraints and other factors, only preservation in part is possible, this must be fully justified with alternative proposals or layout designs, which confirm the impracticability of total preservation.

10.2.2 Antiquities and Monuments Ordinance (Cap 53)

The Antiquities and Monuments Ordinance (Cap. 53) (AM Ordinance) provides statutory protection against the threat of development on Declared Monuments to enable their preservation for posterity. The AM Ordinance also establishes the statutory procedures to be followed in making such a declaration.

Any person who discovers an antiquity, or supposed antiquity, is required to report the discovery to the Antiquities Authority.

10.2.3 Hong Kong Planning Standards and Guidelines (HKPSG)

The Chapter 10, Conservation, of the HKPSG provides general guidelines and measures for the conservation of historical buildings, sites of archaeological interest and other antiquities.

10.2.4 Requirements for Marine Archaeological Investigation (MAI)

Requirements for MAI provided in *Appendix I* of the Study Brief details the standard practice, procedures and methodology which must be undertaken in determining marine archaeological baseline and potential, presence of archaeological artefacts, evaluating the potential impact and establishing suitable mitigation measures.

10.3 Assessment Methodology

10.3.1 Introduction

The CHIA follows the criteria and guidelines in *Annexes 10 and 19* of the *EIAO-TM*. It also follows the Requirements for MAI as stated in Appendix I of the EIA Study Brief. It should be noted that the Project is marine-based and thus potential impacts on built heritage and terrestrial archaeological resources are not anticipated. Findings of the MAI of this Project are presented in the following sections.

10.3.2 Assessment Area

As the construction works of the proposed Mirs Bay Fish Culture Zone (FCZ), would mainly be the assembly and anchorage of fish rafts / cages that will be carried out by the fish farmers who obtain marine fish culture licences in this new FCZ which is limited to marine area, no built heritage impact assessment and terrestrial archaeological impact assessment will be conducted for the Cultural Heritage Impact Assessment (CHIA). Therefore, the CHIA will only cover the Marine Archaeological Investigation (MAI).

The Assessment Area for the MAI include area to be affected by the marine works associated with the anchoring system of fish rafts/cages as shown in the Project site location in **Figure 10.1**.

10.3.3 Baseline Review

A baseline review was conducted to collate existing information to identify the archaeological potential and their likely character, extent, quality and value. The baseline review will focus on known sources including:

- a) Civil Engineering and Development Department, Geotechnical Engineering Office – The Department holds extensive seabed survey data collected from previous geological research;
- b) Marine Department, Hydrographic Office – the Department holds a substantial archive of hydrographic data and charts;
- c) The Royal Naval Hydrographic Department in the UK – the Department maintains an archive of all survey data collected by naval hydrographers;
- d) Relevant Government departments such as Antiquities and Monuments Office, Environmental Protection Department etc. to obtain information on dredging history on the Project site locations; and
- e) Internet and libraries sources of relevant studies.

The findings will provide historical records and more detailed geological analysis of submarine features which may have been subsequently masked by more recent sediment deposits and accumulated debris.

10.3.4 Marine Geophysical Survey

A marine geophysical survey of the proposed Mirs Bay FCZ was conducted and deployed high resolution boomer, side scan sonar, an echo sounder and high resolution multi beam sonar. The data received from the survey were analysed in detail to provide:

- Exact definition of the areas of greatest archaeological potential;
- Assessment of the depth and nature of the seabed sediments to define which areas consist of suitable material to bury and preserve archaeological material;
- Detailed examination of survey records to map anomalies in and on the seabed which may be archaeological material; and

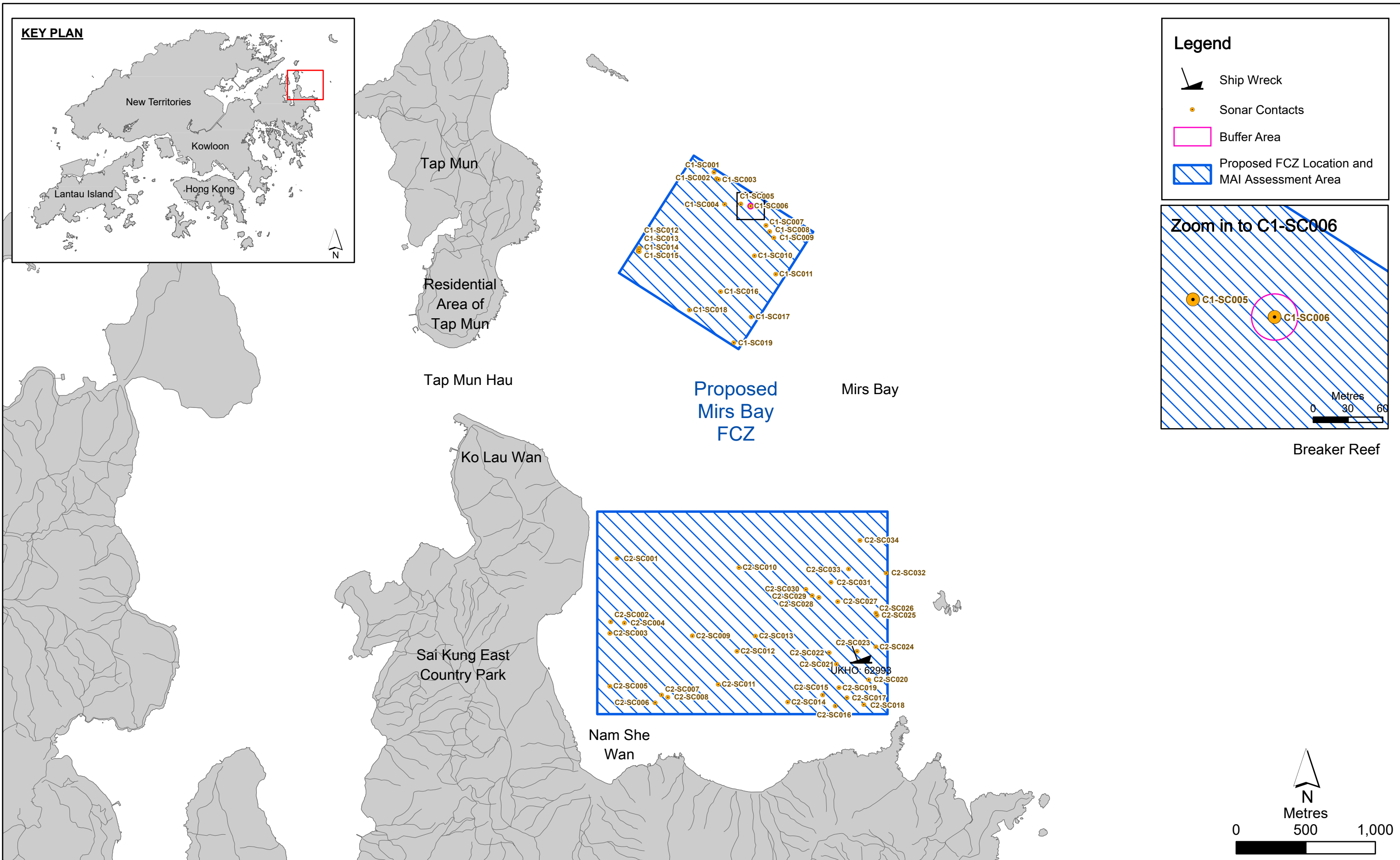


Figure 10.1

Locations of Sonar Contacts at the Proposed FCZ at Mirs Bay

- Detailed examination of the multi beam sonar data to assess the archaeological potential of the sonar contact.

10.3.5 Establishing Marine Archaeological Potential

The data examined during baseline review and marine geophysical survey data review were analysed to provide an indication of the likely character and extent of archaeological resources within the assessment area. The results are presented in below sections.

10.3.6 Further Archaeological Actions (Provisional)

Subject to the result from the archaeological potential establishment, accepted marine archaeological practice will be recommended to acquire more detailed data on areas with archaeological potential and may potentially impacted by the Project site at Mirs Bay. These may include further detailed marine geophysical survey at potential area, Remote Operated Vehicle, Visual Diver Survey or Watching Brief. If it is considered necessary, the detailed plan and scope will be agreed with AFCD, EPD and Antiquities and Monuments Office (AMO).

10.3.7 Impact Assessment and Recommendations

Based on the findings and analysis of the baseline conditions and result of the evaluation of the marine archaeological potential, an impact assessment was conducted to evaluate the potential marine impacts of the Project on marine archaeological resources / sites, and recommend necessary marine archaeological actions or mitigation measures.

10.4 Marine Archaeological Review

10.4.1 Baseline Review

10.4.1.1 Review of Historical Documents

The Assessment Area covers two separate areas: Site C1 and Site C2. Site C1 is located at the waters to the east of Tap Mun (1 km long and 1 km wide; equivalent to 105 hectares in size) while Site C2 is located at the waters to the east of Kau Lau Wan (2 km long and 1.5 km wide; equivalent to 305 hectares in size) (see **Figure 10.1**). It was refined to avoid the channel between Tap Mun and Kau Lau Wan, minimising potential impacts to marine traffic. The Project site at Mirs Bay is approximately 410 hectares in size, it is not located within and in the vicinity of historical or existing infrastructure facilities.

The closest Site of Archaeological Interest (SAI) (Hoi Ha SAI) is located 5 km at the west of the Assessment Area, where prehistoric pottery sherds, stone implements and ceramic sherds of Tang, Ming and Qing periods were found. Moreover, lime kilns of Tang period and stone-built track road which its historical dating was to be ascertained, (AMO, 2012) had also been found (B.A.V.Peacock & T.J.P.Nixon, 1986).

According to a tablet in the Tin Hau Temple on Tap Mun, Tap Mun was registered under the administration of the Dongguan County, as part of Mirs Bay, before 1573. By the late 17th century, Tanka fishermen began to use the anchorage and started fishery around the nearby waters (Faure, Luk, Ng, 1986).

Besides, Hakka started moving into southern China after the Mongol invasions of the Song dynasty. Although they were often associated with stonemasonry, farming and building rather than seafaring and maritime trade, they also engaged in fishing and made their principal routes to market for their products by sea, due to the very basic and steep unpaved paths that connected Hakka villages until late in the 20th century (ARUP, 2020).

Sea bandits and pirates were a periodic scourge especially in the years 1790-1810 when large piratical fleets caused havoc in the Pearl River Delta. Coastal dwellers themselves were not above resorting to piracy or receiving stolen goods. The region was also notorious for its inter lineage and inter village wars, sometimes conducted along ethnic lines. In the late 19th century the coastal regions of the new territories had long acquired a reputation for unruliness (ARUP, 2020).

The maritime history of the coastal Hakka villages of the New Territories is not widely explored but it is evident that fishing and maritime transport plus maritime deities like Tin Hau (Matsui) were an essential part of the culture and economy of village life and formed the links with neighbouring villages and the wider economy and official administration centered around Shenzhen (ARUP, 2020).

10.4.1.2 Geological Conditions

The solid geology of the Assessment Area consists of Hang Hau Formation with shallow marine sediments comprising beach sand, intertidal (mud and sand) and estuarine deposits (mud, clayey silt and sand). Onshore geology in the vicinity of Mirs Bay belongs to Long Harbour Formation comprising coarse ash crystal tuff with distinctive pink alkali feldspar crystals (EGS, 2021).

10.4.1.3 Review of Charts

A review of admiralty charts covering the Assessment Area did not identify any sites of potential marine archaeological interest. Chart number 2593 "Hong Kong to Mirs Bay" from the United States Hydrographic Office was compiled from British surveys until 1906, and no sites / shipwrecks were found to be in the Assessment Area.

10.4.1.4 United Kingdom Hydrographic Office 'Wreck' Files

The United Kingdom Hydrographic Office (UKHO) in Taunton maintains a database of known shipwrecks / undefined sites in the HKSAR. This is the same data held by the Hong Kong Marine Department, Hydrographic Office. The review showed that one wreck was found to be within the MAI Assessment Area (See **Appendix 10A**). The wreck number 62993 is located at the southeast corner of Assessment Area Site C2 with water depth of 16m and regarded as an "obstruction".

10.4.1.5 Summary of Marine Archaeological Potential

Based on the historical review, the human activities have occurred since Neolithic period around the area as prehistoric pottery sherds were found on Hoi Ha SAI. The Track Road also demonstrates connection of Hoi Ha with neighbouring villages in the past. Evidence shows that fishing and maritime transport associated with the old villages has been the major maritime activities at the adjacent area. One shipwrecks of marine archaeological potential identified from the Charts and the Wreck Databases, the waters of the Assessment Area may have marine archaeological potential.

10.4.2 Marine Geophysical Survey Result

A marine geophysical survey as part of the site investigations of the Project was conducted on 1st, 2nd, 4th, 5th and 20th March 2021 to study the seabed features and to locate anomalous features in the surveyed area. The survey covered the areas to be affected by marine works associated with the anchoring system of fish rafts. The survey findings were processed by the geophysicists and reviewed by the qualified marine archaeologist, Dr William Jeffery, and cultural heritage specialist, Ms Peggy Wong. **Figure 10.1** shows the marine geophysical survey coverage. The survey track plots are shown in **Appendix 10B**. Details of survey types with objectives and survey spacing are shown in **Table 10.1** and the equipment list is shown in **Table 10.2**.

For Assessment Area Site C1, the seabed is primarily covered with fine sediment mainly consist of silty mud and rocks with hard coral and gorgonian. Scattered seabed scars (mostly trawling scars) were observed mainly on the western portion of the survey site, and isolated pockmarks are also observed on the seafloor. Major area of rock outcrop is located from the northern tip to near middle of

the survey site, while an area with possible coarse sediments with megaripples is located in the northwest corner of the survey site near the rock outcrop (see **Figure 10.2**).

Review of the survey findings in Site C1 identified 19 sonar contacts (C1-SC001 to C1-SC019). They are located at a range of water depth from 19.6 m to 20.6 m and their dimensions are shown in **Table 10.3**. With the exception of C1-SC004 which is possibly a tire and of no marine archaeological interest, the majority of the sonar contacts are interpreted to be debris. Except sonar contact C1-SC006, due to their random placement, the diminished intensity of the sonar contacts, small in size, irregular shape, and lack of a shadow to indicate they have some elevation, the remaining sonar contacts have been interpreted as natural material and of no marine archaeological potential. C1-SC006, while possibly also debris of no archaeological interest but has a distinctive and interesting 3D signature (see **Figure 10.3**) to reflect it may be possible of marine archaeological interest. Their locations are shown in **Figure 10.1** and the sonar contact images are illustrated in **Appendix 10C**. No sub-bottom anomalies of marine archaeology potential were observed.

For Assessment Area Site C2, the seabed is primarily covered with fine sediment mainly consist of silty mud and a mixture of sand and rocks with hard corals. Numerous seabed scars (mostly trawling scars) were observed from the west to the middle of the survey site and isolated pockmarks are also observed on the seafloor. Areas of rock outcrop are mainly located in the northwest corner, southeast corner and southern boundary of the survey site while an area with coarse sediments with numerous megaripples is located in the east of the survey. Elongated areas with possible dumped materials or boulders were found on the eastern portion of the survey site, with a NW-SE orientation (see **Figures 10.4-10.6**).

Review of the survey findings in Assessment Area Site C2 identified 34 sonar contacts (C2-SC001 to C2-SC034). They are located at a range of water depth from 8.8 m to 19.6 m and their dimensions are shown in **Table 10.4**.

C2-SC023 is an unknown artificial object with a rectangular shape of 12.1 x 6.5 x 3 m (see **Figure 10.7**). Its location corresponds to the wreck number 62993 of the UKHO record. The UKHO record identified it as an “obstruction. C2-SC023 is some type of dumped or lost modern material, made of steel, and possibly, from the dimensions, two modern shipping containers sitting side by side, and of no marine archaeological potential.

Six of the sonar contacts (C2-SC001, C2-SC015 to C2-SC018 and C2-SC029) are linear in shape. Five of sonar contacts (C2-SC003, C2-SC009, C2-SC011, C2-SC021 and C2-SC027) are tires or possible tires. The remaining sonar contacts are interpreted as debris. Due to their random placement, the diminished intensity of the sonar contacts, small in size, irregular shape, and lack of a shadow to indicate they have some elevation, they have been interpreted a natural material. None of these sonar contacts are of marine archaeological potential. Their locations are shown in **Figure 10.1** and the sonar contact images are illustrated in **Appendix 10C**.

No sub-bottom anomalies of marine archaeology potential were observed.

Table 10.1 Survey Types with Objectives and Survey Spacing

Survey Type	Objective	Survey Spacing
Multi-beam echo sounding (MBES)	To provide detailed seabed level variations	50m, infill lines in shallow areas
Single beam echo sounding (SBES)	For cross check of MBES data	50m, infill lines in shallow areas
Side scan sonar (SSS)	To locate anomalous features and map sediment types on the seabed	50m, infill lines along the coast
Seismic sub-bottom profiling (SBP)	To identify sub-bottom features and stratigraphy	50m x 200m grid

Table 10.2 Equipment List

Type	Equipment
Survey Vessel	Class II licenced survey vessel <i>Wing Hung 2</i>
Horizontal positioning	C-Nav Globally Corrected Global Positioning System (GcGPS) Model 3050M
Single beam echo sounding	Knudsen 320M dual frequency Single-beam Echo Sounder TSS 320B Motion Sensor
Multi-beam echo sounding	R2Sonic SONIC2024 Multi-beam Echo Sounder
Side scan sonar	EdgeTech 4200 (100kHz & 400kHz)
Seismic sub-bottom profile	C-Boom Low Voltage high-resolution Boomer system C-Phone hydrophone system
Software	C-Nav computerized navigation suite C-View digital recording and processing system 3-D seismic interpretation environment
Others	A/C generators, computers and bar check equipment

Table 10.3 Sonar Contacts Summary Table for Site C1

Contact number	Latitude Longitude	Easting Northing	Water depth (m)	Dimensions (m)	Description
C1-SC001	22° 28.591' N 114° 22.736' E	857063.5E 837456.9N	20.2	3.4x<0.5x<0.5	Linear debris
C1-SC002	22° 28.566' N 114° 22.747' E	857082.0E 837410.3N	20.2	1.2x0.7x<0.5	Debris
C1-SC003	22° 28.563' N 114° 22.756' E	857096.4E 837404.2N	20.3	1.6x1.2x<0.5	Debris
C1-SC004	22° 28.466' N 114° 22.781' E	857139.9E 837226.5N	20.3	0.8x0.8x<0.5	Tire
C1-SC005	22° 28.468' N 114° 22.848' E	857255.7E 837228.9N	20.4	1.9x0.7x<0.5	Debris
C1-SC006	22° 28.459' N 114° 22.889' E	857326.1E 837213.6N	20.4	1.4x1.2x0.5	Debris
C1-SC007	22° 28.383' N 114° 22.954' E	857436.7E 837073.4N	20.5	1.7x0.9x<0.5	Debris
C1-SC008	22° 28.360' N 114° 22.969' E	857463.4E 837030.1N	20.6	2.7x1.6x<0.5	Debris
C1-SC009	22° 28.335' N 114° 22.987' E	857493.6E 836985.3N	20.6	1.3x0.8x<0.5	Debris
C1-SC010	22° 28.266' N 114° 22.905' E	857354.1E 836857.3N	20.5	1.4x0.6xnmh	Debris
C1-SC011	22° 28.194' N 114° 22.994' E	857506.9E 836724.3N	20.6	1.1x0.6x<0.5	Debris
C1-SC012	22° 28.297' N 114° 22.423' E	856526.9E 836913.2N	19.6	1.2x0.5x<0.5	Debris
C1-SC013	22° 28.292' N 114° 22.420' E	856521.7E 836903.9N	19.6	1.4x0.5x<0.5	Debris
C1-SC014	22° 28.285' N 114° 22.419' E	856518.8E 836890.6N	19.6	0.8x<0.5x<0.5	Debris
C1-SC015	22° 28.282' N 114° 22.422' E	856525.6E 836886.1N	19.6	1.2x<0.5x<0.5	Debris
C1-SC016	22° 28.127' N 114° 22.763' E	857110.5E 836599.7N	20.4	0.9x0.7x<0.5	Debris
C1-SC017	22° 28.028' N	857330.8E	20.5	1.4x0.5x<0.5	Debris

Contact number	Latitude Longitude	Easting Northing	Water depth (m)	Dimensions (m)	Description
	114° 22.892' E	836418.1N			
C1-SC018	22° 28.055' N 114° 22.633' E	856886.6E 836467.0N	20.2	2x1xnmh	Debris
C1-SC019	22° 27.927' N 114° 22.818' E	857205.6E 836230.4N	20.4	1.1x0.5x<0.5	Debris

Table 10.4 Sonar Contacts Summary Table for Site C2

Contact number	Latitude Longitude	Easting Northing	Water depth (m)	Dimensions (m)	Description
C2-SC001	22° 27.087' N 114° 22.328' E	856366.9E 834679.7N	15.9	1.7x<0.5x<0.5	Linear object
C2-SC002	22° 26.841' N 114° 22.302' E	856321.8E 834225.6N	16.1	2.4x0.8x<0.5	Debris
C2-SC003	22° 26.796' N 114° 22.297' E	856314.3E 834142.7N	15.7	1.2x1.1x<0.5	Tire
C2-SC004	22° 26.836' N 114° 22.358' E	856419.3E 834216.5N	16.3	0.9x0.6xnmh	Debris
C2-SC005	22° 26.589' N 114° 22.297' E	856314.1E 833761.1N	14.3	2.2x1.2x<0.5	Debris
C2-SC006	22° 26.525' N 114° 22.487' E	856640.4E 833643.5N	14.8	3.9x0.5x<0.5	Linear debris
C2-SC007	22° 26.555' N 114° 22.514' E	856686.2E 833698.4N	15.3	2.0x0.5x<0.5	Debris
C2-SC008	22° 26.546' N 114° 22.540' E	856731.3E 833681.6N	15.3	2.2x1.0x<0.5	Debris
C2-SC009	22° 26.786' N 114° 22.643' E	856908.3E 834124.0N	16.7	3.8x3.8x0.5	Tire
C2-SC010	22° 27.051' N 114° 22.839' E	857243.2E 834613.8N	18.6	1.4x0.9xnmh	Debris
C2-SC011	22° 26.596' N 114° 22.751' E	857093.7E 833775.2N	16.3	2.2x2.0x<0.5	Tire
C2-SC012	22° 26.725' N 114° 22.830' E	857228.6E 834012.7N	16.9	3.4x1.9x<0.5	Debris
C2-SC013	22° 26.785' N 114° 22.907' E	857360.9E 834123.6N	17.6	2.6x2.6x<0.5	Debris
C2-SC014	22° 26.527' N 114° 23.042' E	857593.6E 833647.7N	8.8	3.1x1.6x0.5	Debris
C2-SC015	22° 26.555' N 114° 23.189' E	857844.7E 833699.6N	14	90x<0.5xnmh	Possible linear contact
C2-SC016	22° 26.512' N 114° 23.241' E	857934.9E 833620.2N	14.4	46x<0.5xnmh	Possible linear contact
C2-SC017	22° 26.544' N 114° 23.290' E	858018.7E 833679.4N	15.3	69x<0.5xnmh	Possible linear contact
C2-SC018	22° 26.516' N 114° 23.361' E	858140.7E 833629.1N	13.1	77x<0.5xnmh	Possible linear contact
C2-SC019	22° 26.582' N 114° 23.257' E	857961.5E 833750.6N	15.6	3.0x1.3x<0.5	Debris
C2-SC020	22° 26.614' N 114° 23.382' E	858175.7E 833808.7N	17	2.2x1.2x<0.5	Debris

Contact number	Latitude Longitude	Easting Northing	Water depth (m)	Dimensions (m)	Description
C2-SC021	22° 26.675' N 114° 23.247' E	857944.3E 833920.8N	16	2.4x2.2x<0.5	Possible Tire
C2-SC022	22° 26.720' N 114° 23.216' E	857891.2E 834004.0N	16	1.5x0.8x<0.5	Debris
C2-SC023	22° 26.725' N 114° 23.333' E	858092.1E 834013.5N	15.6	12.1x6.5x3.0	Unknown object
C2-SC024	22° 26.741' N 114° 23.412' E	858227.7E 834044.5N	16.5	1.7x1.3x<0.5	Debris
C2-SC025	22° 26.864' N 114° 23.417' E	858235.0E 834271.4N	16.1	1.2x0.5x<0.5	Debris
C2-SC026	22° 26.874' N 114° 23.413' E	858228.1E 834288.6N	16	1.2x1.0x0.5	Debris
C2-SC027	22° 26.918' N 114° 23.253' E	857953.1E 834369.6N	15.1	2.4x2.3x0.5	Possible tire
C2-SC028	22° 26.934' N 114° 23.174' E	857818.0E 834399.5N	15.5	1.3x1.3x<0.5	Debris
C2-SC029	22° 26.941' N 114° 23.145' E	857769.1E 834411.9N	16.1	10.0x<0.5x<0.5	Linear object
C2-SC030	22° 26.966' N 114° 23.119' E	857723.6E 834457.7N	17.4	1.2x1.1x0.6	Debris
C2-SC031	22° 26.994' N 114° 23.224' E	857903.8E 834509.6N	15.8	2.9x2.2x<0.5	Debris
C2-SC032	22° 27.029' N 114° 23.456' E	858301.7E 834574.9N	16.6	1.3x0.8x<0.5	Debris
C2-SC033	22° 27.045' N 114° 23.298' E	858031.5E 834604.5N	17	0.5x0.5x<0.5	Debris
C2-SC034	22° 27.156' N 114° 23.346' E	858112.5E 834809.6N	19.6	2.4x1.3x<nmh	Debris

Figure 10.2 Example of Side Scan Sonar (SSS) Mosaic of Site C1 Showing Areas with Rock Outcrop

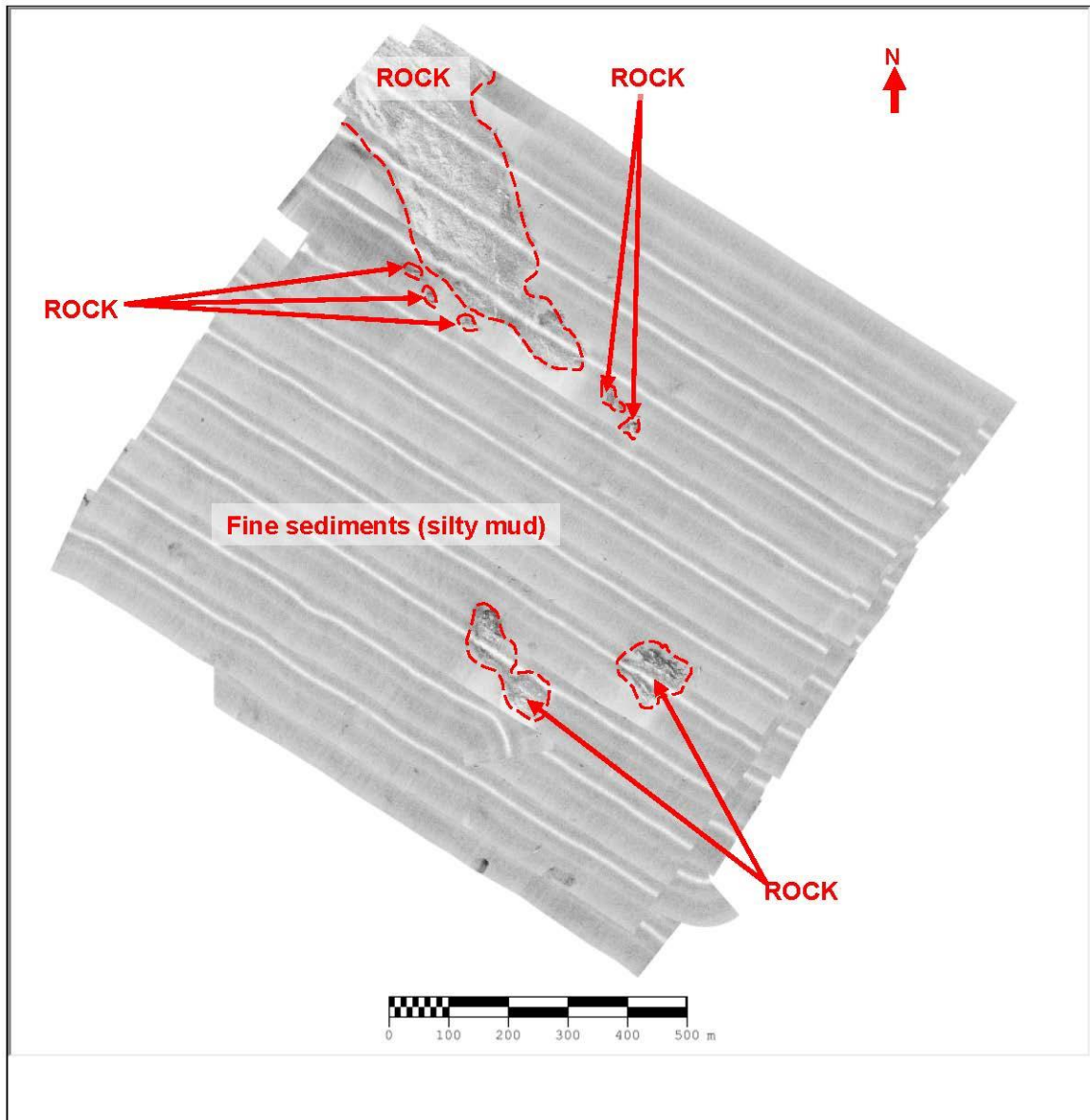


Figure 10.3 SSS Rectified Image Showing Sonar Contact C1-SC006

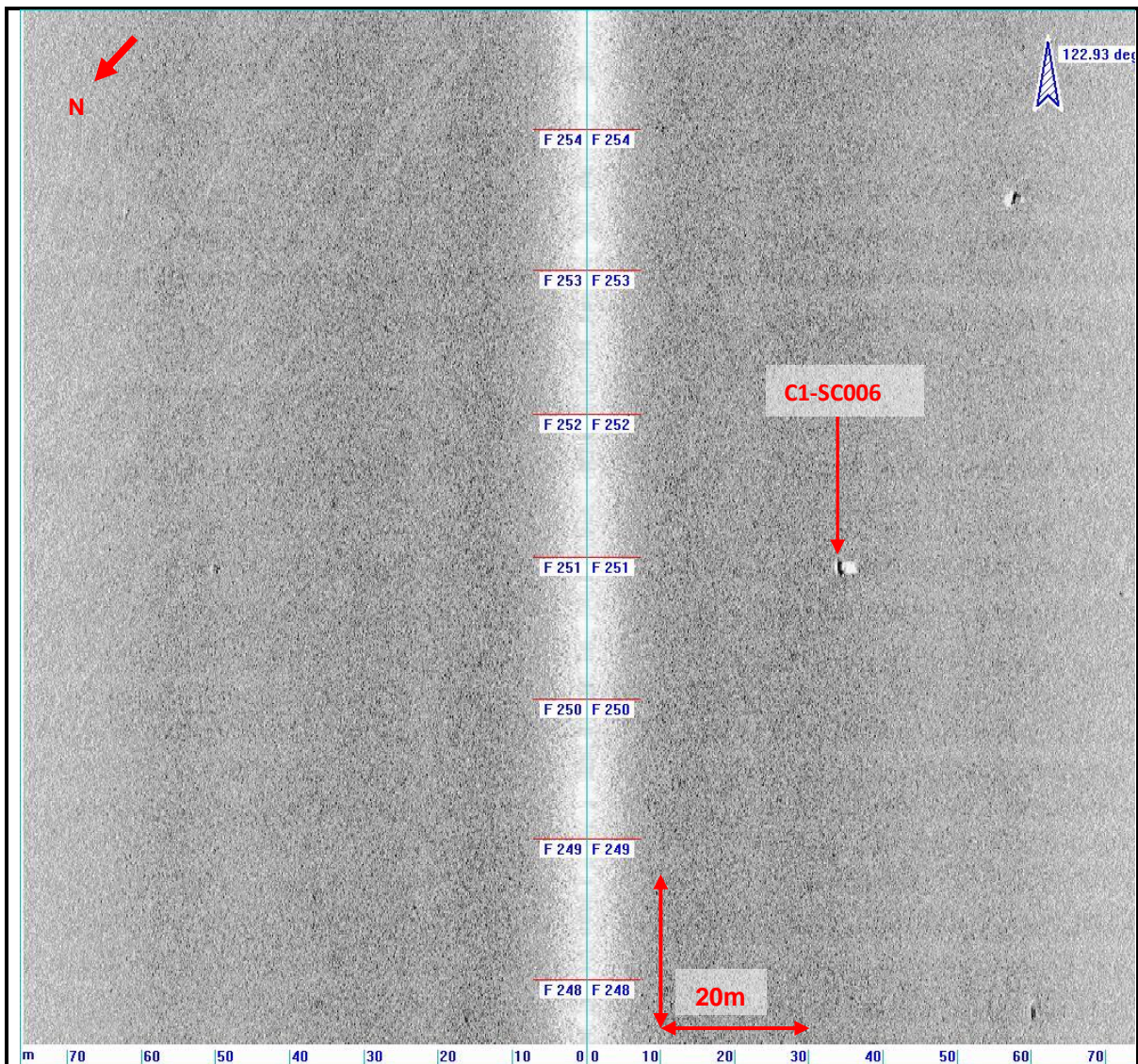


Figure 10.4 Example of Side Scan Sonar (SSS) Mosaic of Site C2 Showing Areas with Rock Outcrop

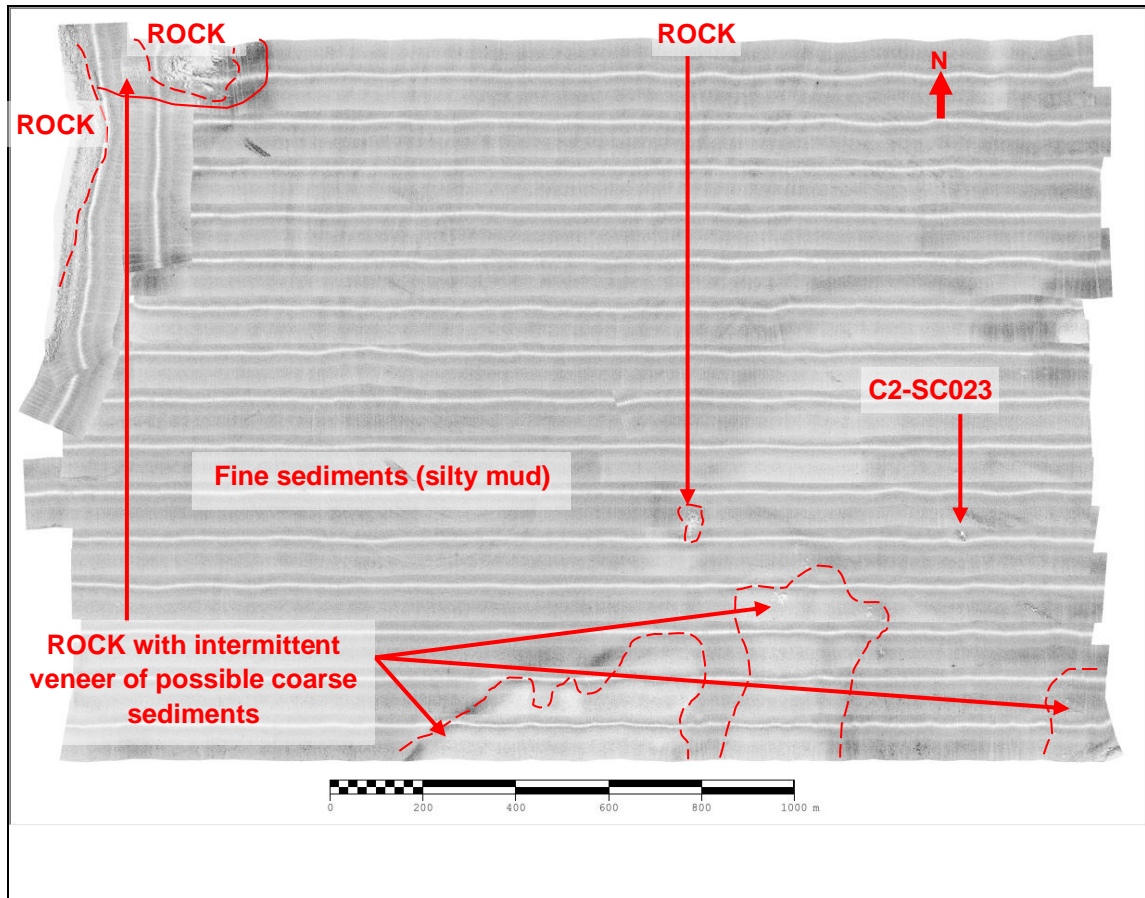


Figure 10.5 SSS Rectified Image Showing Numerous Trawl Scars in Site C2

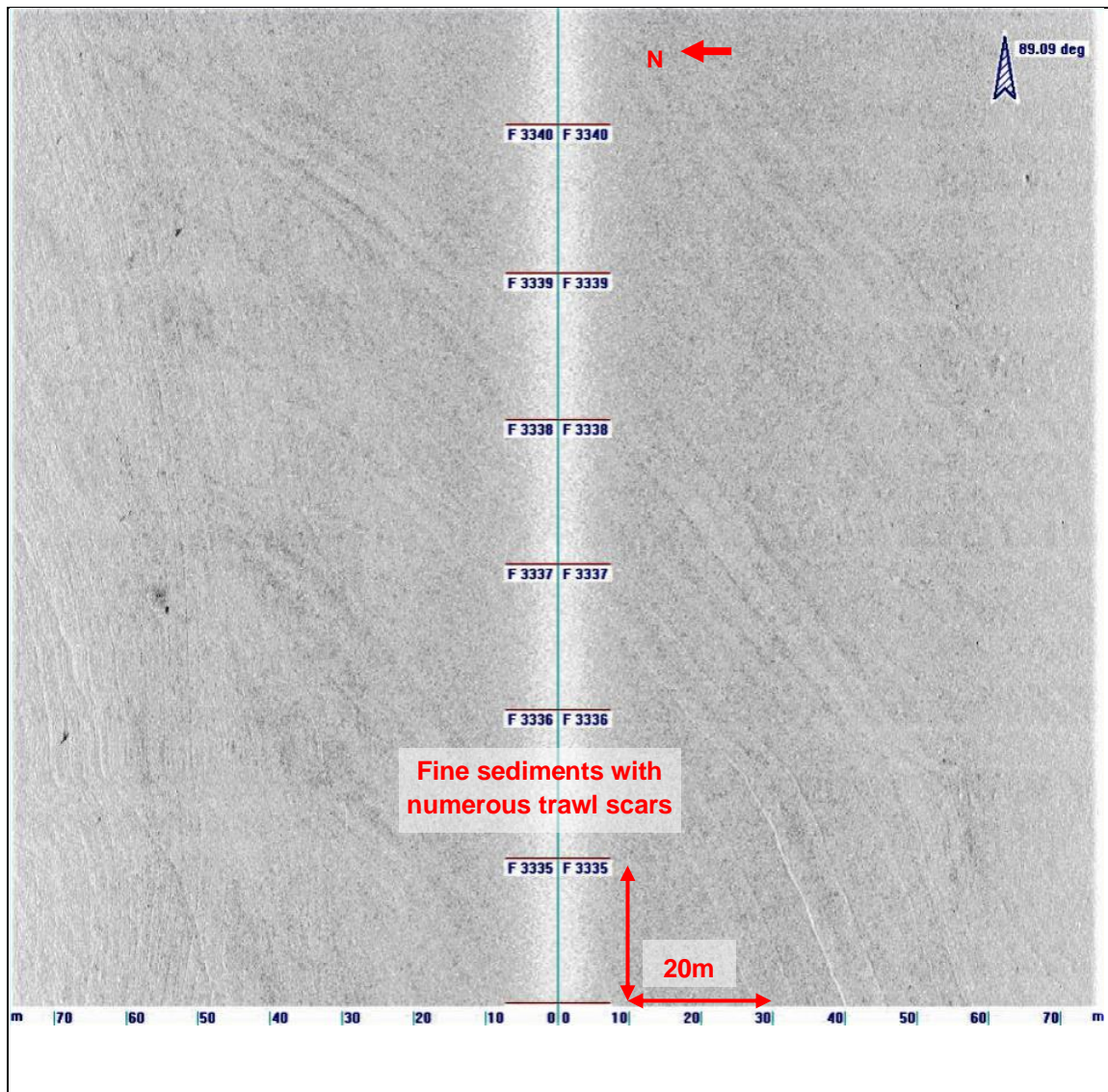


Figure 10.6 SSS Rectified Image Showing Possible Dumped Materials / Boulders (NW-SE Orientation) in Site C2

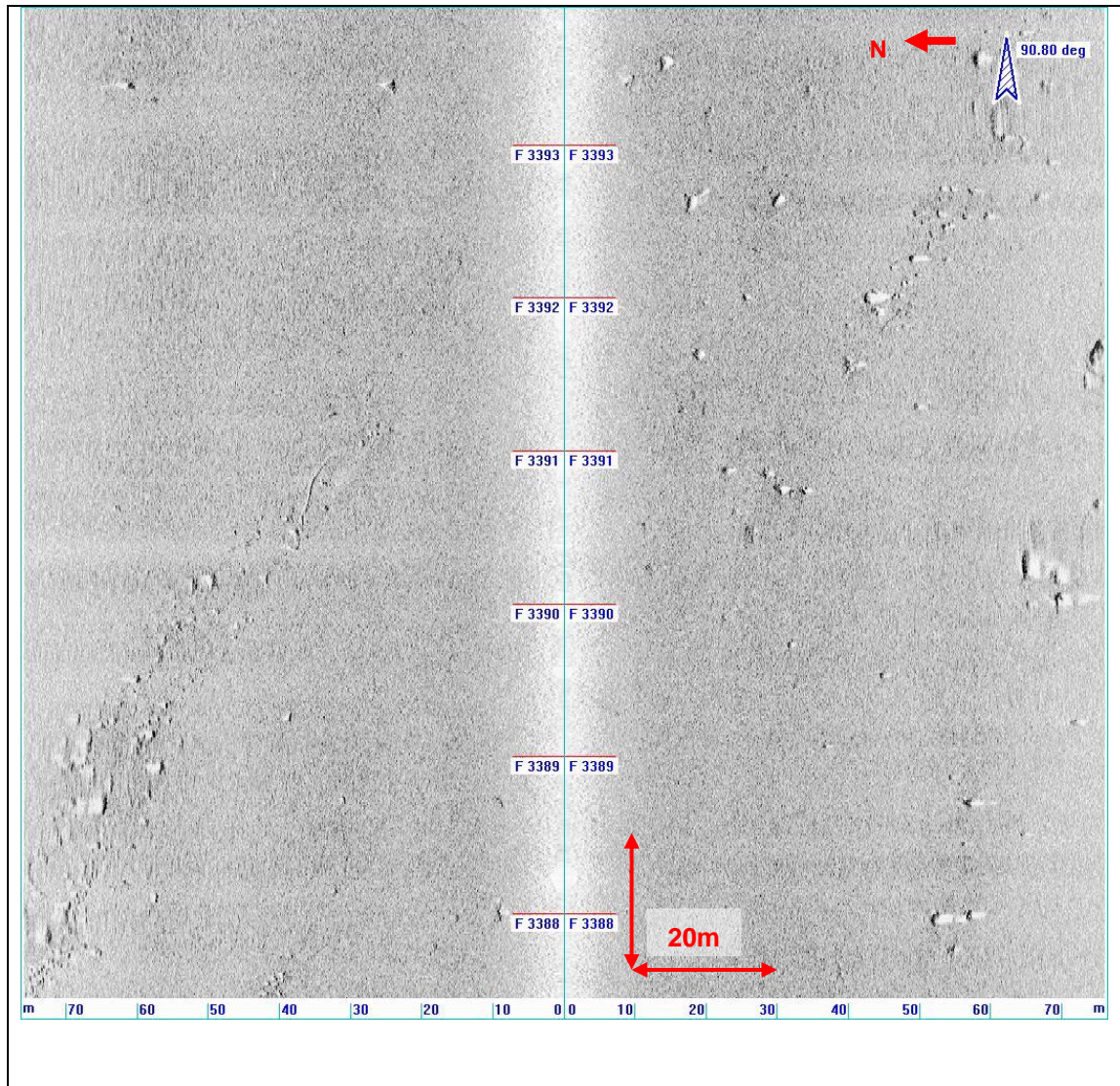
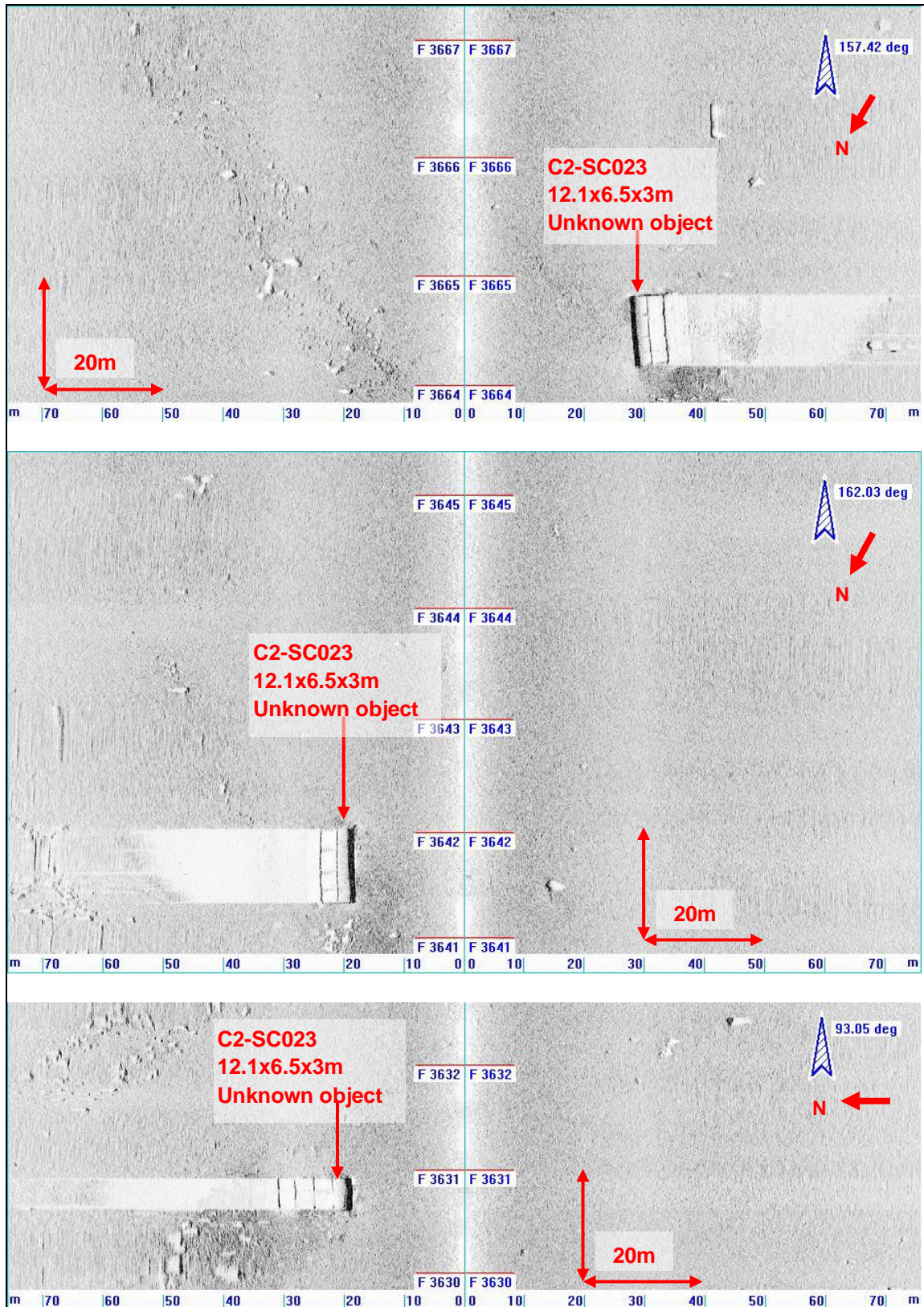


Figure 10.7 SSS Rectified Images Showing Sonar Contact C2-SC023 from Different Survey Lines in Site C2



10.4.3 Establishment of Marine Archaeological Potential

There are 19 sonar contacts (C1-SC001 to C1-SC019) in area C1 and 34 sonar contacts (C2-SC001 to C2-SC034) in area C2.

In area C1, C1-SC004 which is possibly a tire and of no marine archaeological interest; C1-SC002, C1-SC003, C1-SC005 to SC019 are interpreted to be debris. Except sonar contact C1-SC006, due to their random placement, the diminished intensity of the sonar contacts, small in size, irregular shape, and lack of a shadow to indicate they have some elevation, the remaining sonar contacts have been interpreted as natural material and of no marine archaeological potential.

C1-SC006, while possibly also debris of no archaeological interest but has a distinctive and interesting 3D signature (see **Figure 10.3**) to reflect it may be possible of marine archaeological interest. Nevertheless, because of the muddy/silty seabed, objects such as cannon would sink into the seabed, the sonar contact is most likely to be modern, recently deposited debris that would not be of high archaeological potential.

In area C2, eight of the sonar contacts are linear in shape (C2-SC001, C2-SC006, C2-SC015 to C2-SC018 and C2-SC029), five of them are tires or possible tires (C2-SC003, C2-SC009, C2-SC011, C2-SC021 and C2-SC027). They are of no marine archaeological potential. The remaining sonar contacts except C2-SC023 are interpreted as debris. Due to their random placement, the diminished intensity of the sonar contacts, small in size, irregular shape, and lack of a shadow to indicate they have some elevation, the remaining sonar contacts have been interpreted as natural material and of no marine archaeological potential.

C2-SC023 and the wreck number 62993 of UKHO record is one and the same. C2-SC023 is some type of dumped or lost modern material, made of steel, and possibly, from the dimensions, two modern shipping containers sitting side by side, and of no marine archaeological potential.

No sub-bottom anomalies of marine archaeology potential were observed.

10.5 Potential Sources of Impact

The construction works of the proposed Mirs Bay FCZ, would mainly be on-site assembly and anchorage of fish rafts/cages that will be carried out by the fish farmers who obtain marine fish culture licences in this new FCZ. Maintenance dredging or removal of sediments is not anticipated during FCZ operation under the Project.

- Potential impacts arising from the these activities include:
- Direct loss of potential marine archaeological deposits due to seabed disturbance works during anchorage of the fish rafts/cages;
- Indirect impact on access for future archaeological surveys; and
- Permanent access disturbance to marine archaeological deposits if they are found to be within the Project Area.

10.6 Impact Assessment

The desktop review found no sites of archaeological interest, declared monuments, proposed monuments, graded historic sites/buildings/structures, and Government historic sites identified by the AMO fall within the Assessment Area. No construction phase and operation phase impact to these cultural heritage resources is anticipated. However, marine geophysical survey identified 19 sonar contacts in Site C1 and 34 sonar contacts in Site 2 of the Assessment Area. Their impact assessments are discussed below.

10.6.1 Construction Phase

The construction of fish rafts / cages will simply involve the use of tug boats to tow the main part of the fish rafts/cages to within the Project site, and to be assembled and anchored therein. No major marine construction works, such as dredging or works with significant seabed disturbance, is expected. The fish rafts / cages will generally be gravity cages and the four corners of each cage will be anchored using weights and ropes and it is expected that the seabed to be disturbed by anchoring will be confined to a thin vertical surface layer (<0.5 m), and < 2m horizontally.

Although potential impact to sonar contacts (C1-SC002 to C1-SC019) in Site C1 and 34 sonar contacts (C2-SC001 to C2-SC034) in Site C2 is possible, they are of no marine archaeological potential.

Although potential impact to sonar contact C2-SC023 is possible, C2-SC023 is an unknown artificial object with a rectangular shape and identical to the wreck number 62993 in UKHO record. C2-SC023 is some type of dumped or lost modern material, made of steel, and possibly, from the dimensions, two modern shipping containers sitting side by side, and of no marine archaeological potential.

Sonar contact C1-SC006 has a distinctive signature, and potentially of marine archaeological interest. Nevertheless, because of the muddy/silty seabed, objects such as cannon would sink into the seabed, the sonar contact is most likely to be modern, recently deposited debris that would not be of high archaeological potential. Potential direct impact on sonar contact C1-SC006 due to the construction work of fish rafts / cages is possible.

10.6.2 Operation Phase

Potential direct impact on sonar contact C1-SC006 that may be of marine archaeological potential during operation phase of the Project is possible. Although potential impact on other remaining sonar contacts in Site C1 and Site C2 is possible, they are of no archaeological potential.

10.7 Mitigation Measures

As no impacts to sites of archaeological interest, declared monuments, proposed monuments, graded historic sites/buildings/structures, and Government historic sites identified by AMO are expected, no construction phase and operation phase mitigation measure for terrestrial cultural heritage is required. However, mitigation measures for identified 19 sonar contacts in Site C1 and 34 sonar contacts in Site C2 of the Assessment Area are recommended below.

10.7.1 Construction Phase

Potential impact to Sonar contacts (C1-SC001 to C1-SC005, C1-SC007 to C1-SC019) in Site C1, and sonar contacts (C2-SC001 to C2-SC034) in Site C2 have been identified but they are of no marine archaeological potential. No mitigation measure is required.

According to *Annex 10 of EIAO-TM*, the general presumption is in favour of the protection and conservation of all sites of cultural heritage, the potential direct impact on sonar contact C1-SC006 will be avoided by isolating it with a 20 m radius buffer area from any tug boat anchoring and anchoring of the fish rafts/cages as shown in **Figure 10.1**. The locations and relocations of fish rafts/cages are regulated by the *Marine Fish Culture Ordinance (Cap. 353)*, and AFCD will ensure the locations of anchoring of vessels and fish rafts / cages will not be located within the buffer area. Site inspections on a regular basis by the Environmental Team are recommended to check if any seabed disturbance work is conducted in the buffer area.

10.7.2 Operation Phase

The buffer area as shown in **Figure 10.1** with 20 m radius from C1-SC006 should be implemented during operation phase of the Project. AFCD will maintain the record of the buffer area and the locations of the fish rafts / cages. The locations and relocations of fish rafts / cages are regulated by

the *Marine Fish Culture Ordinance (Cap. 353)*, and AFCD will ensure the locations of anchoring of vessels and fish rafts / cages will not be located within the buffer area. AFCD will conduct regular site inspections to check if any seabed disturbance work is conducted in the buffer area.

Although potential impact on other remaining sonar contacts in Site C1 and Site C2 is possible, they are of no archaeological potential. No mitigation measure is required.

10.8 Cumulative Impacts

At present, there are no planned projects within the Assessment Area that could have cumulative cultural heritage impacts with the proposed Project. No cumulative impact or adverse residual impacts on marine archaeological resources are expected.

10.9 Conclusion

The desktop review supplemented with the results of marine geophysical survey conducted for the Project identified one sonar contact (C1-SC006) is of potential marine archaeological interest. Nevertheless, because of the muddy / silty seabed, objects such as cannon would sink into the seabed, the sonar contact is most likely to be modern, recently deposited debris that would not be of high archaeological potential. A buffer area with 20 m radius from C1-SC006 is recommended to avoid any tug boat anchoring and anchoring of the fish rafts/cages in the area so as to avoid any impact to C1-SC006 during both the construction and operation phases of the Project. The locations and relocations of fish rafts / cages are regulated by the *Marine Fish Culture Ordinance (Cap. 353)*, and AFCD will ensure the locations of anchoring of vessels and fish rafts/cages will not be located within the buffer area. Site inspections on a regular basis by the Environmental Team are recommended to check if any seabed disturbance work is conducted in the buffer area during construction phase of the Project. AFCD will conduct regular inspections to check if any seabed disturbance work is conducted in the buffer area during operation phase of the Project.

10.10 Bibliography

10.10.1 English

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10.10.2 Charts

Chart number 2593 “Hong Kong to Mirs Bay” from the United States Hydrographic Office was compiled from British surveys until 1906.