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Project Profile

South East Asia – Japan 2 Cable System – Hong Kong Segment (SJC2-HK) – Chung Hom Kok

Prepared for China Mobile International Limited
19 December 2019

SMEC INTERNAL REF. 7076596 D01

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1 BASIC INFORMATION

1.1 Project Title

1.1.1 The title of the Project is "South East Asia – Japan 2 Cable System – Hong Kong Segment (SJC2-HK) – Chung Hom Kok".

1.2 Purpose and Nature of the Project

1.2.1 The South-East Asia Japan Cable System (SJC) is a submarine telecommunications cable connecting Japan, China, Hong Kong, the Philippines, Brunei, Thailand, Singapore and Indonesia, which was completed in 2013. Construction of the second South East Asia – Japan Cable System (SJC2) is now proposed and this Project comprises the Hong Kong Segment of SJC2. The indicative alignment of the whole SJC2 cable is shown in **Figure 1.1**.

1.2.2 The SJC2-HK Cable will provide Hong Kong with faster and more diverse international telecommunications services and will help to meet the growing demand for greater bandwidth. Installation is scheduled to be completed in 2020 and the system planned to be in service by end of 2020.

1.2.3 Buried below the seabed, the SJC2-HK Cable enters the eastern waters of Hong Kong, follows the established "east-west cable corridor (south)" and lands at an existing Beach Manhole (BMH) at Sha Shek Tan Beach (SST Beach) on the Chung Hom Kok (CHK) peninsula, which is at the south side of Hong Kong Island. This is the same landing location of the existing SJC Cable and other cables, including City-to-City Cable System ("C2C") and the East Asia Crossing + C2C cable system ("EAC-C2C").

1.2.4 CHK is an important telecommunications and media hub in Hong Kong. There are currently two teleport substations, GB21 Cable Station Chung Hom Kok Teleport Substation and Smartone Station Chung Hom Kok Teleport Substation, located at CHK. It is anticipated that this area will be further developed to cater for more telecommunication infrastructure in the future.

1.2.5 An assessment of the potential environmental impacts associated with the Project has been provided in this Project Profile. The methods of construction and installation of the SJC2-HK Cable is virtually identical to other telecommunication cable systems that have been installed at CHK and in other parts of Hong Kong.

1.3 Name of Project Proponent

China Mobile International Limited
Level 30, Tower 1, Kowloon Commerce Centre,
51 Kwai Cheong Road, Kwai Chung
Hong Kong

1.4 Location and Scale of Project

Location of Project

1.4.1 The Project comprises of the installation and operation of a high capacity network cable system between the eastern boundary of Hong Kong Waters and the cable landing point at CHK.

1.4.2 The alignment of SJC2-HK Cable between the eastern boundary of Hong Kong and CHK is shown in **Figure 1.2** and **Figure 1.3**. The cable installation process is tentatively scheduled to start from the landing point at SST to the eastern boundary of Hong Kong waters. From the BMH at STT Beach, the cable travels to the south leaving Stanley Bay and then turns southeast, it follows the established "east-west cable corridor (south)" to the south of Sung Kong island and Po Toi island, from which further travels to the east exiting the eastern boundary of Hong Kong waters.

1.4.3 The landing point at SST Beach is zoned as "Coastal Protection Area (CPA)" in the approved Stanley Outline Zoning Plan (OZP) No. S/H19/12. The surrounding areas are zoned as Other Specified Uses (OU) annotated "Composite Signals Organization Station Complex", Green Belt (GB) and Open Space (O). According to Schedule 1 of EIAO, "bathing beach" means any bathing beach which is specified in the *Fourth Schedule to the Public Health and Municipal Services (Cap. 132)*. Under Cap. 132, the landing site – SST Beach is not a bathing beach.

1.4.4 As observed during site visit conducted on 15 June 2018, there is no supporting facilities for bathing nor changing room / toilets available at the SST Beach. Also, there is no public nor private access road leading to the SST Beach. The landing site is only accessible through a semi-paved, uneven, and bluff footpath from Chung Hom Kok Road or from the sea (shown in **Figure 1.6**). There are some small boats stored at the SST Beach based on observation on site and no evidence showing the STT Beach will be used for bathing. Thus, the SST Beach is not considered as Water Sensitive Receiver (WSR).

Scale of Project

1.4.5 As shown in **Figure 1.2** and **Figure 1.3**, within Hong Kong waters the length of the SJC2-HK Cable will be about 37.9km. The cable itself is 47 millimetres in diameter. In addition, there will be a 200m long, 38mm diameter electrical earthing cable, from the sea-bed offshore to SST Beach.

1.4.6 From the shore-end section at the landing point to the eastern boundary of HK waters, the cable will be generally buried below the seabed (marine mud) by an "Injector Burial Tool" or "Sledge Tool" operated from a cable-laying vessel. The cable burial tool uses localised high-pressure water jets directly around the cable to fluidise a narrow trench in the seabed to the desired depth into which the cable is simultaneously laid and buried. The maximum width of the seabed fluidised by the burial tool is 0.5m and the cable is buried to a target depth of 5m. After the cable is laid, the trench will naturally re-fill in a short space of time and the seabed will return to its original profile. Where a cable-laying vessel cannot be used, e.g. due to insufficient water depth, or for maintenance works including repair works (see **Section 1.6**), divers with hand-held jetting tools and/or remotely operated vehicles (ROVs) with injector tool will be used.

1.4.7 The intended burial depth for the cable within Hong Kong waters will be 5m below seabed, except when crossing over existing cables, when the depth will be reduced, or when crossing the Hong Kong Electric (HKE) Gas Pipeline, in which case the cable will be laid by either ROVs with injector tool or divers at a depth possible/agreed with the facility owner and additional cable protection will be used to minimise the chance of future damage by vessel anchors and dropped objects.

1.4.8 For the land cable installation, only shallow trench excavation from the landing point at SST Beach to the existing BMH, exposing the below-ground BMH entry duct, cable laying and back filling works will be required at the shore to enable the cable to enter the existing BMH and to install the earthing system. On the land-side of the BMH, the cable will be fed into one of the nine existing conduits that run up the hillside and connect the BMH to the cable stations on the headland above. Equipment, including small tracked excavator, small winch, portable power generator, etc. will be used for land cable installation. Small items will be carried by hand along the existing footpath. Equipment that cannot be carried by hand, e.g. small tracked excavator, will be brought in by sea via boat. Therefore, no new access road will be required to deliver the equipment to the works area. The proposed cable installation for each cable section of SJC2-HK Cable is shown in **Figure 1.3**.

1.5 Cable Route Selection Process

Landing Site Selection

1.5.1 When identifying the most suitable landing site for the SJC2 Cable, a number of factors were taken into consideration. These included commercial and technical factors, such as the availability of existing BMH and conduits connecting to the nearest available Cable Landing Station (CLS) to keep land works minimal, and also physical and environmental factors.

1.5.2 CHK is one of the key cable landing locations in Hong Kong and there are four existing cables (SJC, C2C and two EAC-C2C cables) as well as a planned cable (the HKA cable) landing at SST Beach. At about 400m southwest of the SST Beach, also within CHK, there is an alternative landing site where two New T&T domestic cables land. However, this landing site is considered less suitable as it will result in additional submarine crossings of the SJC2-HK Cable over existing cables, and there is no suitable infrastructure available to the SJC2-HK Cable, such as BMH and conduits to the CLS. Construction of a new BMH and associated conduits would therefore be required, which would cause additional terrestrial environmental impacts. The proposed and alternative landing points, as well as the existing and planned cables, are shown in **Figure 1.4**.

1.5.3 The proposed landing site at SST Beach already has suitable BMH and conduits that can be used by the SJC2-HK Cable and so will have less environmental impact than the alternative landing site 400m to the southwest.

1.5.4 To summarize, the SST Beach at CHK is selected as the preferred landing site based on the following considerations:

- Available existing BMH.
- Available existing CLS.
- Available existing conduits connecting the BMH and CLS. New construction of the BMH and associated facilities could be avoided and only minor land works are required that potential terrestrial impact will be minimized.
- The SST Beach landing point has been previously used as landing site of several existing cables and the SJC2-HK Cable will follow similar landing route to minimize disturbance to the terrestrial environment.

Cable Route Planning Considerations

1.5.5 There are several sensitive receivers in the vicinity of the SJC2-HK Cable alignment, shown in **Figure 1.5**, that have helped to define the route alignment and cable-laying process. The cable route selection has considered seabed characteristics; physical constraints; planning issues; and environmentally sensitive receivers:

Seabed Characteristics

- **Marine Sediments.** Cables need to be installed within soft marine sediment of a sufficient depth above bedrock to provide protection to the cable and to achieve a burial depth of 5m. The cable should avoid rocky outcrops on the seabed as cable installation over an outcrop will require the cable to be surface laid, increasing the risk of cable damage due to vessel anchors and fishing activities. The geophysical survey indicated that the seabed of the proposed cable alignment will primarily be composed of fine sediment, predominantly clay or silt.

Physical Constraints

- **Seawater Intake.** The closest seawater intake is the Ocean Park seawater intake at Wong Chuk Hang, however, it is far away from the proposed landing site and proposed cable alignment, with a distance of over 3km, and so will not be affected.

- **Other Telecommunication Cables.** To ensure that laying the SJC2-HK Cable does not compromise the integrity of existing cables, the cable route should maximise the separation between existing cables and minimise the number of cable crossings as far as practicable. However, the SJC2-HK Cable will inevitably need to cross other existing cables – a minimum number of twelve crossings in Hong Kong waters has been identified. At each of these crossings, the SJC2-HK Cable will be buried to 3m below seabed instead of 5m below, approx. 2m above existing cables (laid at 5m below seabed), subject to the as-built depth of the existing cables.
- **HKE Gas Pipeline**. The SJC2-HK Cable will also need to cross the HKE Gas Pipeline and will be laid by either the burial tool or divers at a depth agreed with the facility owner, over the top of the Gas Pipeline.

Planning Issues

- **Marine Traffic.** The Traffic Separation Schemes (TSSs) for major marine vessel fairways and their vicinity have to be avoided as far as possible in order to minimise marine impacts in term of marine safety and marine feasibility as well as maximise the safety of the SJC2-HK cable laying operations. The SJC2-HK Cable route is selected not to cross the East Lamma Channel Traffic Separation Scheme (ELCTSS) and the cable will be laid outside the eastern edges of the ELCTSS. Such routing will minimise the disturbance to marine traffic within the East Lamma Channel and its vicinity. The original alignment crossing the ELCTSS and the current cable alignment travelling outside the ELCTSS are shown in **Figure 1.5**.
- **Marine Sand Borrow Area.** The marine seabed area to the west of the Po Toi and Beaufort islands is gazetted for sand dredging and sediment disposal. As a result, the seabed in this area has variable topography and, based on the marine survey, the preferred route avoids unsuitable areas of seabed such as this.
- **Other Projects.** The following projects are planned for the area:
  - Hong Kong-Americas (HKA) Submarine Cable Network – also landing at CHK
  - Hong Kong Offshore Wind Farm in Southeastern Waters

  In order to avoid interface and cumulative impacts with other projects, installation program of SJC2-HK Cable has considered the prevention of overlapping with the construction works of other projects. The appointed Liaison Officer will be responsible for liaising with the Project Proponents of other projects that may interface with the proposed SJC2-HK Cable so as to avoid any concurrent works.

Environmentally Sensitive Receivers

- **Environmentally Sensitive Areas.** The selected route should avoid sensitive areas, such as gazetted bathing beaches, marine parks, areas of known coastal ecology, Coral Communities of High Ecological Value, Fish Culture Zones (FCZs), Marine Reserve and Sites of Special Scientific Interest (SSSIs), etc. and maintain a suitable distance from these receivers/areas. The cable will unavoidably land in the area zoned as Coastal Protection Area (CPA), which stretches along the length of the coastline of CHK and the CHK headland is also surrounded by CPA. However, the cable burial works at the landing site will be of small scale and very short period in order to avoid any adverse impacts at the landing site within the CPA. The proposed landing site has been used as the landing points of other similar cables which also landed through the CPA. The selected route should also maintain a distance of over 500m from Water Sensitive Receivers (WSRs) except for the Fish Spawning Grounds through which the cable must be laid. The selected alignment has achieved a greater distance separation from WSRs compared to the originally proposed alignment; from 490m to 580m for St. Stephen's bathing beach; and from 700m to 1,320m for coral communities near Po Toi Island. The original alignment and the current cable alignment travelling outside the ELCTSS are shown in **Figure 1.5**. The selected alignment has already taken into consideration alternative options to maximise the distance between the cable and nearby sensitive receivers in order to minimise potential environmental impacts to these sensitive receivers.

Marine Archaeological Resources

- **Known Marine Archaeological Resources.** Avoid impact and minimize disturbance to any known marine archaeological resources.

1.5.6 Overall, the selected cable alignment of the SJC2-HK Cable has taken into account the above engineering, planning, environmental, operational considerations, as well as the existing cables, to avoid crossing the ELCTSS, Area Gazetted for Sand Dredging and Sediment Disposal, rocky outcrops, to maintain suitable distance from Environmentally Sensitive Receivers such as Coral Communities of High Ecological Value, FCZs, Marine Reserve and SSSIs, etc. also to minimize the number of crossings with existing/planned cables and the HKE Gas Pipeline. Thus, the selected cable alignment of SJC2-HK follows a narrow corridor in order to either avoid or reduce these constraints and impacts at sensitive receivers as far as practicable.

1.6 Project Details

1.6.1 The Project will be constructed in the following stages as discussed in below. **Table 1.1** summarises the cable installation for each cable section:

- Land Cable Installation at SST Beach in CHK
- Shore-end Cable installation
- Offshore Cable installation with protection over cable/pipeline crossing points

1.6.2 The cable installation process is tentatively scheduled to start from the landing point at SST to the eastern boundary of Hong Kong waters. The installation works will in general start with land cable installation and some works activities may be carried out concurrently. There are no activities after installation of the cable unless the cable becomes damaged, in which case emergency cable repair works will be required.

Table 1.1: Summary of Cable Installation Sections

	LAND CABLE INSTALLATION	SHORE-END CABLE INSTALLTION	OFF-SHORE CABLE INSTALLATION
Cable Section	From BMH to Landing Point	From landing point to 140m off-shore	From 140m off-shore to boundary of HKSAR
Approx. Length of Cable	65m	140m	37.6km
Target burial depth	2m	Max. 1 to 2m	5m
Tools that will be used for installation	• Small tracked excavators • Small winch or hand pulling for the cable to pass via the duct into the BMH	• Divers with less powerful, hand held tools using water jetting / air lifting techniques	• An “Injector Burial Tool” or “Sledge Tool” using water jetting techniques towed behind a cable-laying vessel

Land Cable Installation

1.6.3 The SST Beach landing point with the existing BMH and the land-side cable conduit are shown on **Figure 1.6** and **Figure 1.7**. All of this infrastructure is already in place and no new construction is required for the SJC2-HK Cable, other than shallow excavation works to enable the cable to enter the BMH and installing the electrical earthing cable.

1.6.4 In general, small tracked excavators will be used for the excavation and then small winch or hand pulling will be employed for laying the cable and earthing cable to pass via the duct into the BMH. Once the cables have been laid, the trench will be back filled with the original materials and reinstated to the original condition. Thereafter, the cable will be pulled through the land-side conduit up to the cable station on the headland by another winch at the cable station.

Shore-end Cable Installation

1.6.5 In the immediate vicinity of the shoreline at SST Beach the seabed is rocky and there are several other cables entering the BMH, so care will be taken when installing the SJC2-HK Cable. Because of this, shore-end installation in marine mud/sand (up to around 140m from the landing point, i.e. the low water mark at SST) will be performed by divers using jetting techniques to form a narrow trench in the seabed, approx. 0.5m wide and to a depth appropriate to the site conditions on a "best endeavour" basis. Thereafter, cable protection, such as Articulated Pipe (AP) shown in **Figure 1.8**, will be installed by divers as needed. The diameter of the cable with AP ranges from 74mm to 130mm. After the cable is laid, the trench will naturally re-fill in a short space of time and the seabed will return to its original profile.

Offshore Cable Installation

1.6.6 The offshore works will include route clearance, cable burial using a cable-laying vessel and cable burial tool, and shallow-burial at cable crossings and provision of cable protection.

Route Clearance

1.6.7 Prior to cable installation by barge, a Route Clearance Operation (RC) and Pre-lay Grapnel Run (PLGR) will be conducted, in which a grapnel is dragged along the seafloor to remove large objects from the cable path. Typical grapnels anchors used are shown in **Figure 1.9**. Such processes are intended to remove out-of-service cables and any debris or obstacles that may pose threat to the cable laying process. Any old cables or debris recovered will be retained on board the RC and PLGR vessel(s) and shall properly be disposed of to an approved dumping ground ashore.

1.6.8 Whenever other seabed debris is encountered this shall, as far as practicable and reasonable, be cleared to ensure that a safe corridor exists for the cable laying. In all circumstances, no towed equipment (e.g. grapnels) shall be used within 50m of any pipeline or in-use submarine cable system identified by the Tone/Magnet Detector survey (shown in **Figure 1.8**). Recovery/re-launch of towed equipment 50m before/after any crossing point is the industry standard practice and so will be followed.

Burial Using a Cable-laying vessel and Cable Burial Tool

1.6.9 The cable from about 140m away from the landing point to the eastern boundary of Hong Kong will be buried using jetting techniques to a depth of 5m by an "Injector Burial Tool" or "Sledge Tool" towed behind a cable-laying vessel. These burial tools are shown in **Figure 1.9**.

1.6.10 On board the cable-laying vessel, the cable will be fed into the burial tool, which will lay the cable into the seabed at the target depth. The target burial depth within Hong Kong waters is approximately 5m below the seabed, except when crossing obstructions and in transient zones, such as between launch positions of burial tool, the end of Articulated Pipes (APs), and reaching the target burial depth on an incline.

1.6.11 The cable burial tool uses localised high-pressure jets directly around the cable to fluidise a narrow trench in the seabed to the desired depth into which the cable is simultaneously laid and buried. The maximum width of the seabed fluidised by the burial tool is 0.5m and the disturbed area of the seabed will be limited to this width.

1.6.12 A dive team on the cable-laying vessel will be on standby during cable laying to ensure proper functioning and positioning of the burial tool. The cable-laying vessel towing the burial tool will travel at a maximum speed of 1km per hour during the cable laying process along the cable alignment.

1.6.13 The seabed where the cable will be laid has been used over the years for fishing, material extraction, public utilities and for the laying of other cables. The seabed in the vicinity of the cable alignment has been significantly disturbed and based on geophysical survey data, the seabed along the cable alignment shows scattered trawl scars and numerous dumped materials.

Shallow Burial at Crossings and Provision of Cable Protection

1.6.14 Where the SJC2-HK Cable needs to cross existing cables or pipelines, the burial tool will be re-adjusted about 50m from the crossing location to a depth sufficient to allow a cushion of seabed material to remain above the cable or pipeline to be crossed. Additional protection for the cable will be provided by "Uraduct" (shown in **Figure 1.8**), if needed. Crossings will be agreed with other cable owners in advance of installation. Once the cable has been crossed, the burial tool will be re-adjusted to achieve the target burial depth.

1.6.15 When crossing the HKE Gas Pipeline, which is buried around 3m below the seabed, a shallower burial depth is required. At around 100m from the Pipeline, shallower burial of the cable will be carried out by divers at a depth possible/agreed with the facility owner (over the top of the Pipeline), as shown in **Figure 1.8**. Since a cable laid with shallow burial may be susceptible to anchor damage, additional cable protection by "Uraduct" will be needed for this 200m section. "Uraduct" comes in various sizes, but for a 47mm diameter cable, the diameter of the cable with the "Uraduct" protection would be approximately of 115mm.

Post-lay Inspection and Burial

1.6.16 There will be some locations where the injector burial tool cannot be used, e.g. where there are existing cables or pipelines to be crossed. At these locations, the cable is not buried but rests temporarily on the seabed. Thereafter, post-lay inspection and post-lay burial will be carried out by means of water jetting using a ROV. The water jetting power of ROV is of either same or less than the injector burial tool/sledge tool used during cable installation. Thus, the seabed can be expected to naturally reinstate to before-work level and conditions shortly after completion of the post lay inspection and burial works, similar to that of the cable installation.

Emergency Cable Repair Works

1.6.17 If a cable installed under the seabed is damaged by anchors or dropped objects, cable repair works will be needed. These works comprise route clearance prior to repair, exposing the damaged cable section, reconnecting the damaged cable, and reburial of the repaired section.

1.6.18 To determine the fault location, inspection of cable will be carried out using ROV or divers and if the cable is buried, tracking equipment will be used. After identifying the fault area, ROV, grapnels or divers cut the cable. The buried cable will be uncovered by divers using hand-jetting and ROV using jetting technique. Without jetting, the grapnels will penetrate the seabed to pick up the cable. The cable ends then will be recovered to the vessel using diver, ROV or gripper grapnels. While one cable end is repaired on the vessel, the other cable end will be attached to a rope that is lowered to seabed and this rope will be attached to a buoy to mark its location.

1.6.19 Damaged cable section will be cut out. First one end will be spliced to the spare repair cable section and electrical and optical testing conducted to ensure the integrity of the splice and cables. Then the second cable end will be picked up and spliced back to the repair cable section. Upon completion, the cable integrity will be confirmed through end-to-end electrical and optical testing.

1.6.20 When repair and connection are completed, the repaired cable will be lowered onto the seabed back to the original alignment. Cable protections such as articulated pipe for shore-end installation, Uraduct for crossings or other measures would be applied to the cable before replacement. A diver or ROV will then inspect the repair area to identify the two ends of the unburied cable.

1.6.21 If burial is considered necessary, diver, ROV or burial tool will be used to bury the repaired cable to the target depth. If only shallow burial or surface laid is allowed, cable protection such as articulated piping, Uraduct or other measures will be implemented. Final inspection and burial will be carried out by diver or ROV before the completion of repair works.

1.6.22 Exposing the damaged cable section, picking up and reconnecting the damaged cable is anticipated to have limited disturbance to the seabed. Cable repairs will be carried out by either the burial tool or divers using jetting tools and ROV that is of either same or less powerful than those used during cable installation. Thus, the seabed can be expected to naturally reinstate to before-work level and conditions shortly after completion of the repair works, similar to that of the cable installation.

1.7 Designated Projects to be Covered by the Project Profile

1.7.1 The shore-end cable laying works at SST Beach are within 500m of a Coastal Protection Area (CPA). The Project is therefore classified as Designated Project (DP) under the Environmental Impact Assessment Ordinance (EIAO) as specified below, and the DP element is shown in **Figure 1.10**:

- **Schedule 2, Part I, Item C.12.** This refers to a dredging operation which (a) is less than 500m from the nearest boundary of an existing or planned (vii) coastal protection area.

1.7.2 As a DP, the SJC2-HK Cable requires an EP prior to commencement of cable installation works. This Project Profile has been prepared to support an application for permission to apply directly for the EP under Section 5(1)(b) and Section 5(11) of the EIAO.

1.8 Name and Telephone Number of Contact Person

1.8.1 The contact for the Project Proponent is:

Mr Anthony WONG
Manager – Transmission Engineering
China Mobile International Limited
Email anthonywong@cmi.chinamobile.com
Telephone +852 3975 6790

1.8.2 SMEC Asia Limited (SMEC) has been appointed to prepare this Project Profile. All queries can be addressed to SMEC at:

Ms Cindy CHUNG
Senior Environmental Consultant
SMEC Asia Limited
Email cindy.chung@smec.com
Telephone +852 3995 8100

Figure 1.1: Alignment of SJC2 Cable

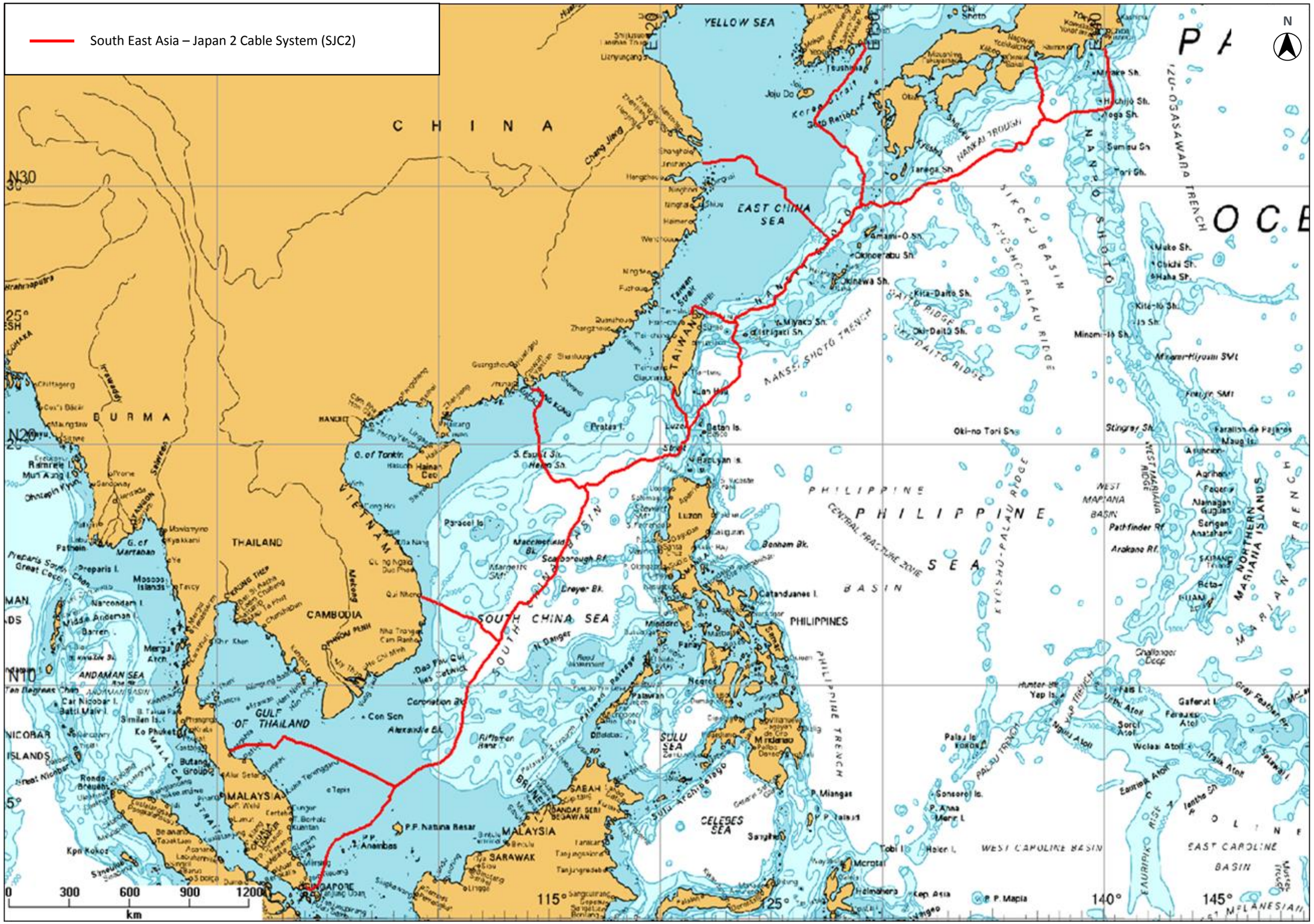


Figure 1.2: Alignment of SJC2-HK Cable

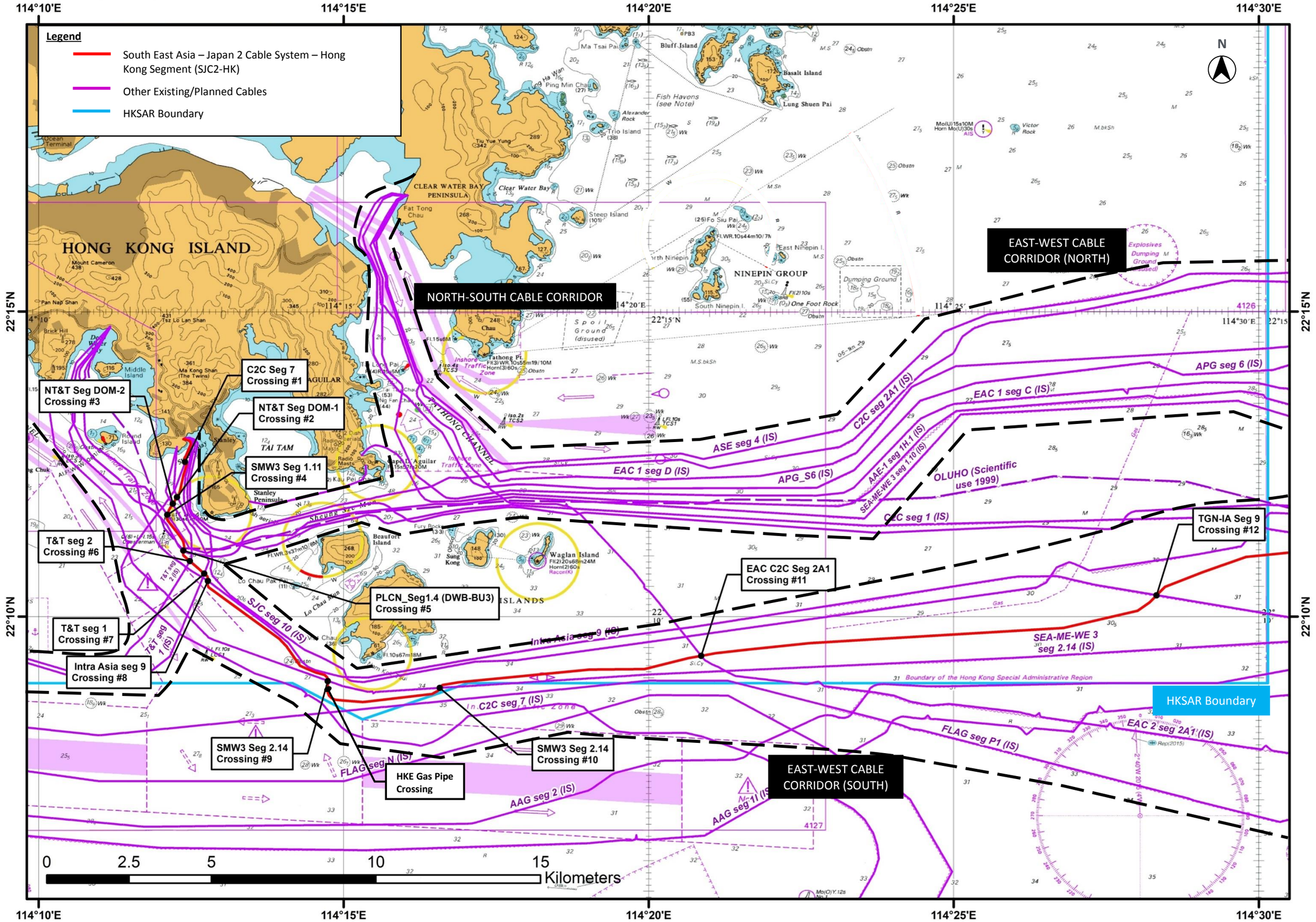


Figure 1.3: Proposed SJC2-HK Cable Alignment with Coordinates of Control Points

Land Cable Installation – from BMH to Landing Point
(approx. length of cable: 65m)

Tools/Methods for cable installation:

- Small tracked excavators
- Small winch or hand pulling for the cable to pass via the duct into the BMH

Shore-end Cable Installation – from Landing Point to about 140m Offshore
(approx. length of cable: 140m)

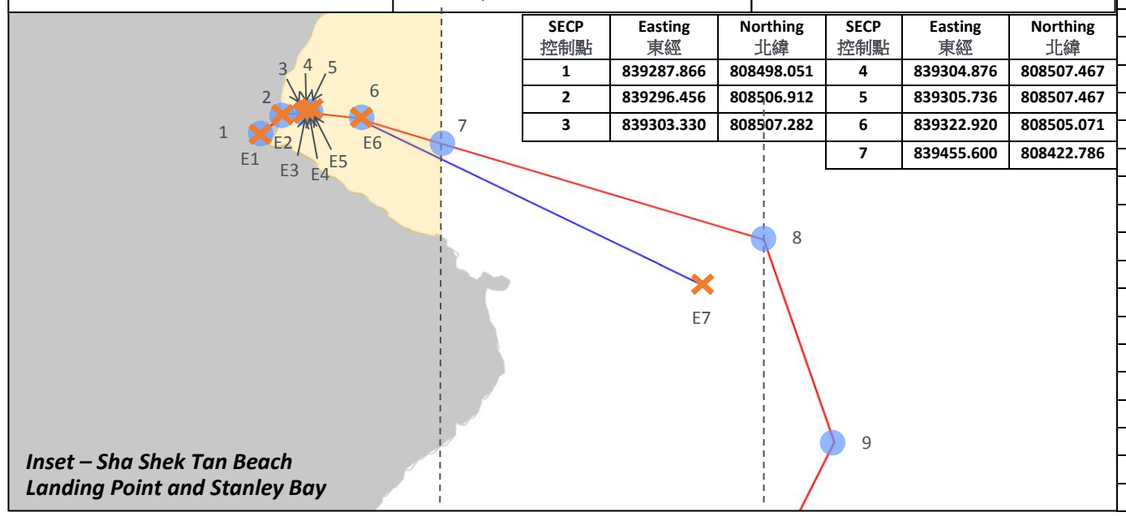
Tools/Methods for cable installation:

- Divers with less powerful, hand held tools using water jetting techniques

Offshore Cable Installation – from about 140m Offshore to HKSAR Boundary
(approx. length of cable: 37.6km)

Tools/Methods for cable installation:

- An "Injector Burial Tool" or "Sledge Tool" towed behind a cable-laying vessel



SECP 控制點	Easting 東經	Northing 北緯	SECP 控制點	Easting 東經	Northing 北緯
1	839287.866	808498.051	4	839304.876	808507.467
2	839296.456	808506.912	5	839305.736	808507.467
3	839303.330	808507.282	6	839322.920	808505.071
			7	839455.600	808422.786

WLCP 控制點	Easting 東經	Northing 北緯	WLCP 控制點	Easting 東經	Northing 北緯	WLCP 控制點	Easting 東經	Northing 北緯	WLCP 控制點	Easting 東經	Northing 北緯
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2	839296.456	808506.912	27	838935.939	806442.226	52	840835.780	803367.984	77	846503.351	800929.933
3	839303.330	808507.282	28	838886.284	806358.614	53	842010.534	802448.921	78	846519.311	800974.790
4	839304.876	808507.467	29	838841.967	806210.409	54	842036.503	802419.033	79	846530.294	801005.248
5	839305.736	808507.467	30	838827.710	806162.976	55	842209.691	802220.702	80	846601.432	801065.091
6	839322.920	808505.071	31	838825.308	806134.554	56	842220.528	802203.912	81	847050.958	801148.074
7	839340.965	808498.062	32	838827.376	806102.996	57	842475.286	801811.648	82	850736.826	801534.364
8	839476.216	808446.229	33	838834.599	806071.992	58	842583.832	801644.670	83	851731.373	801544.357
9	839502.700	808348.420	34	838848.698	806040.804	59	842785.532	801549.154	84	852289.935	801550.086
10	839363.920	807994.045	35	839149.203	805628.930	60	843035.551	801438.712	85	853535.811	801887.853
11	839331.452	807939.964	36	839264.565	805450.672	61	843274.553	801365.734	86	853885.758	801954.498
12	839320.288	807905.450	37	839288.466	805398.448	62	843342.148	801300.247	87	854292.593	802032.104
13	839318.407	807857.096	38	839304.118	805339.762	63	843362.284	801253.749	88	855166.651	802139.438
14	839326.491	807823.324	39	839314.449	805245.826	64	843362.634	801240.276	89	856931.939	802341.541
15	839340.929	807807.824	40	839306.036	805196.548	65	843361.973	801179.742	90	859261.810	802493.355
16	839374.104	807772.212	41	839292.815	805128.629	66	843362.720	801050.555	91	864090.563	802809.582
17	839385.452	807741.762	42	839286.290	805095.593	67	843360.886	800923.581	92	866180.299	803336.467
18	839384.937	807738.256	43	839279.593	805061.633	68	843360.575	800851.789	93	866523.257	803596.244
19	839379.274	807697.837	44	839292.499	804983.385	69	843397.931	800745.318	94	866711.946	803802.022
20	839293.920	807406.223	45	839476.276	804810.863	70	843460.718	800673.740	95	866950.374	804061.974
21	839176.306	806832.234	46	839882.009	804430.584	71	843558.400	800617.496	96	868000.788	804501.838
22	839115.828	806740.314	47	839965.737	804351.983	72	843801.176	800593.066	97	868534.086	804705.388
23	839079.575	806684.572	48	839990.162	804279.459	73	844342.091	800547.196	98	868696.391	804767.366
24	839068.407	806666.484	49	839985.366	804210.619	74	844413.094	800556.092	99	869226.923	804970.011
25	839008.273	806564.414	50	839977.315	804093.610	75	846302.971	800795.078	100	869843.671	805038.317

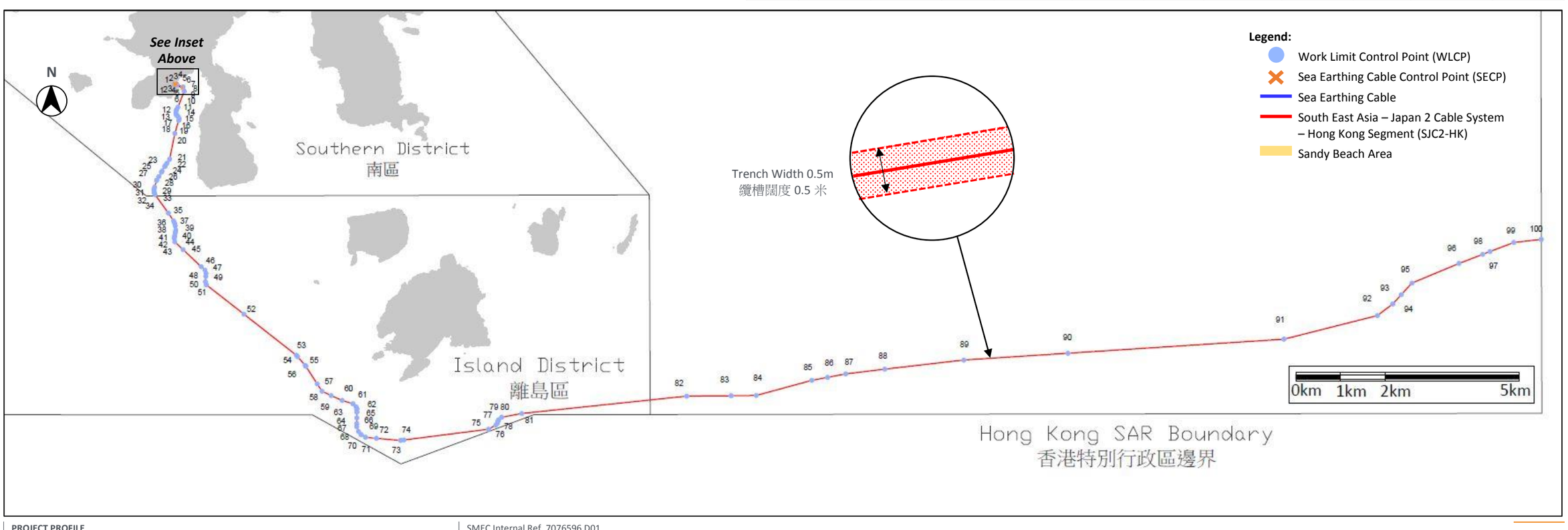


Figure 1.4: Proposed Cable System Landing at Sha Shek Tan Beach, Chung Hom Kok

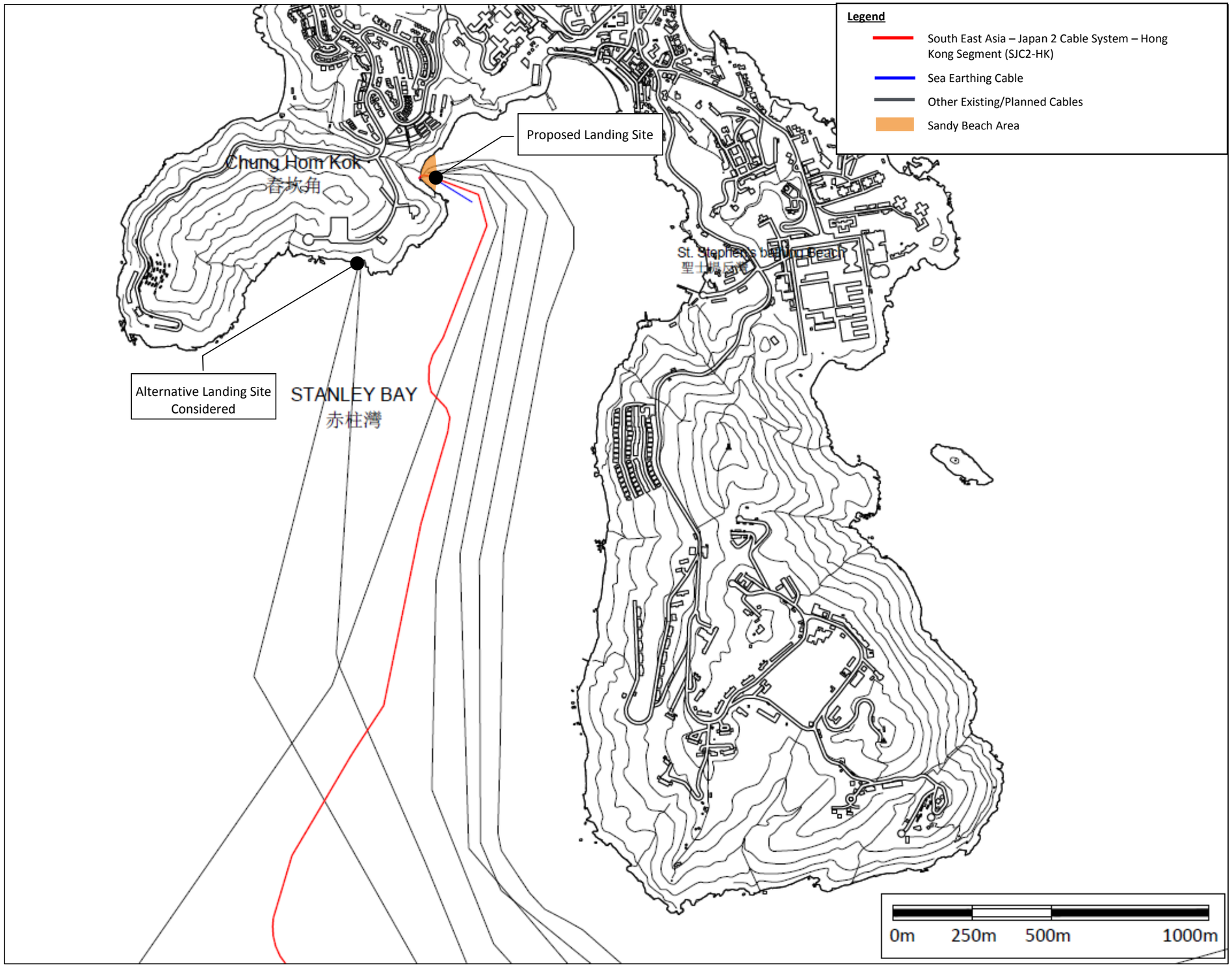


Figure 1.5: Environmental Elements in the Vicinity of the Original and Current Alignments of SJC2-HK

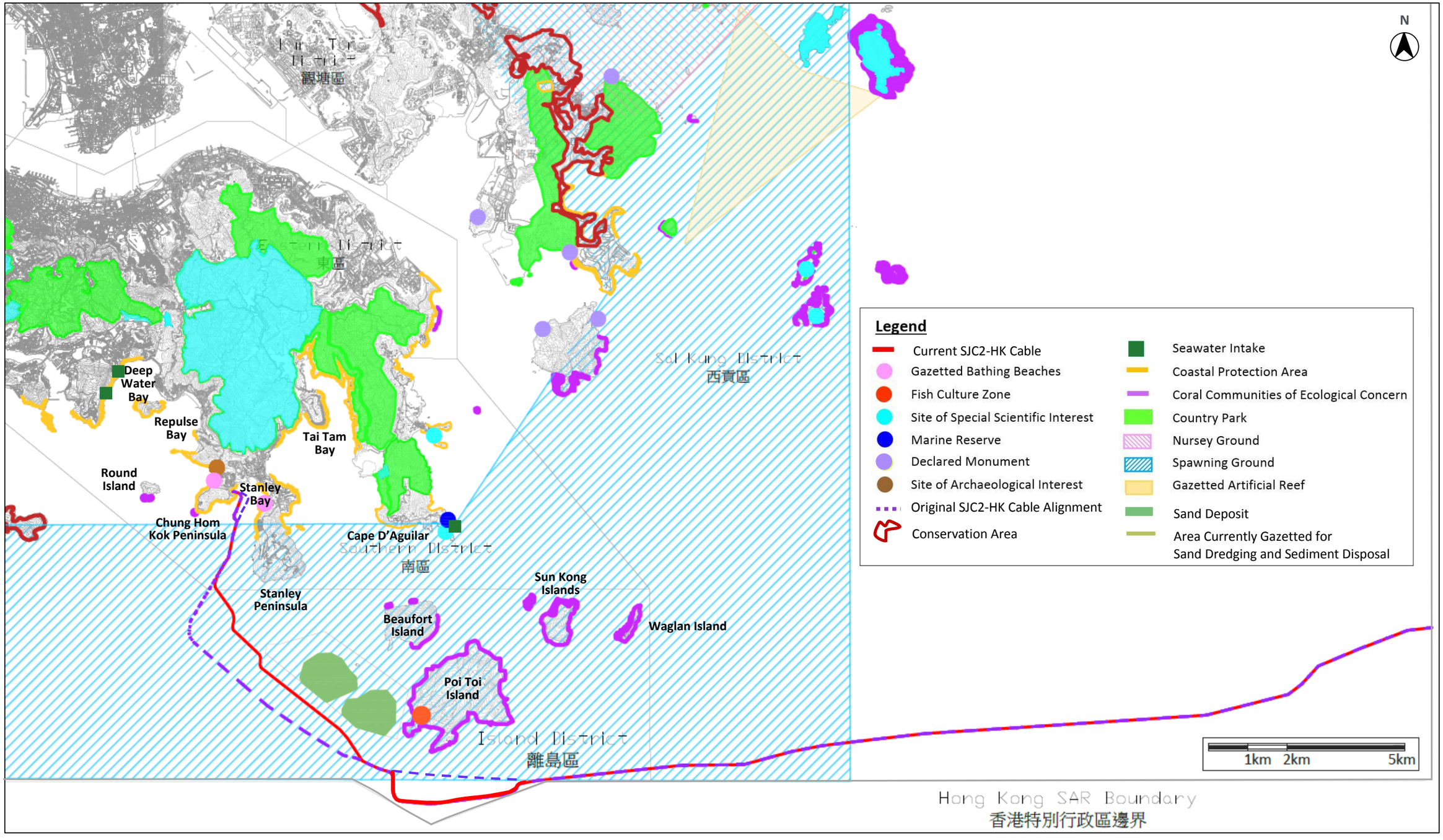


Figure 1.6: SST Beach Landing Area

SST Beach Landing Area

Access Path to SST Beach Landing Area

Figure 1.7: Existing BMH and Land-side Conduits at SST Beach Landing Area

Beach Manholes at SST Beach

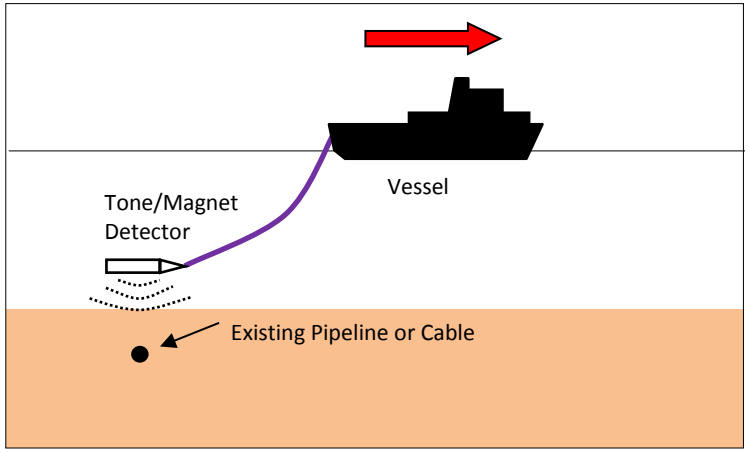
Land-side Conduits Connecting BMH to Cable Stations

Legend:

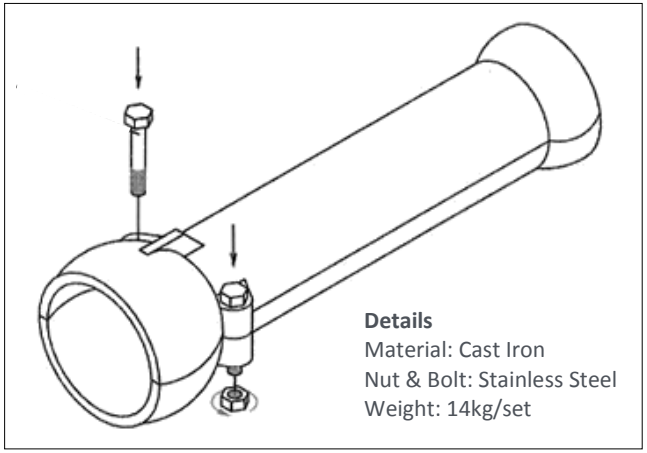
Indicative SJC2-HK Cable Alignment

Figure 1.8: Possible Cable Protection Measures at Crossing Locations

Detection of Existing Cables or Pipeline

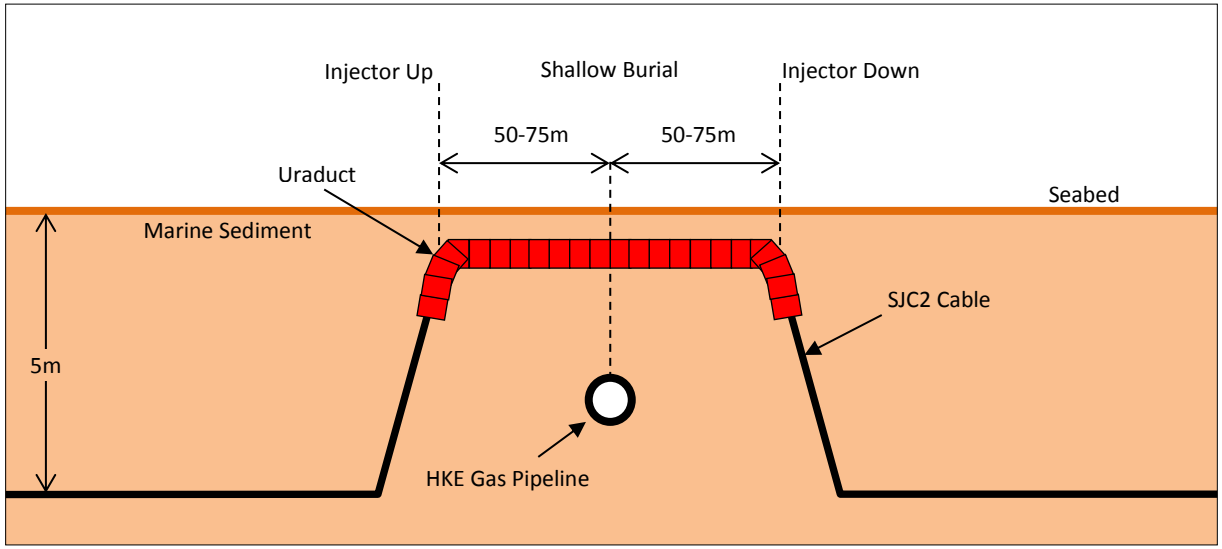


Articulated Pipe (Typical Specifications)



Diver Installation of Articulated Pipe

Typical Crossing Method for Hong Kong Electric Gas Pipeline



Uraduct

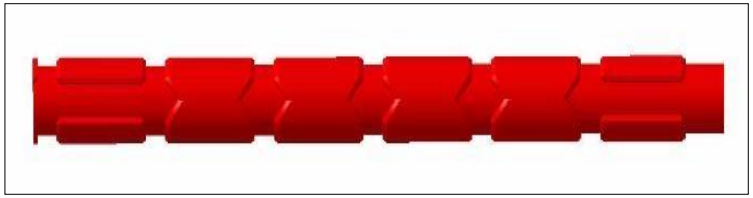
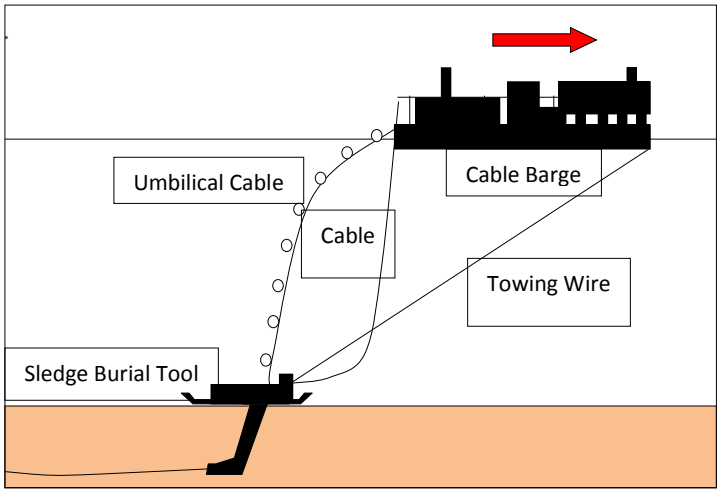
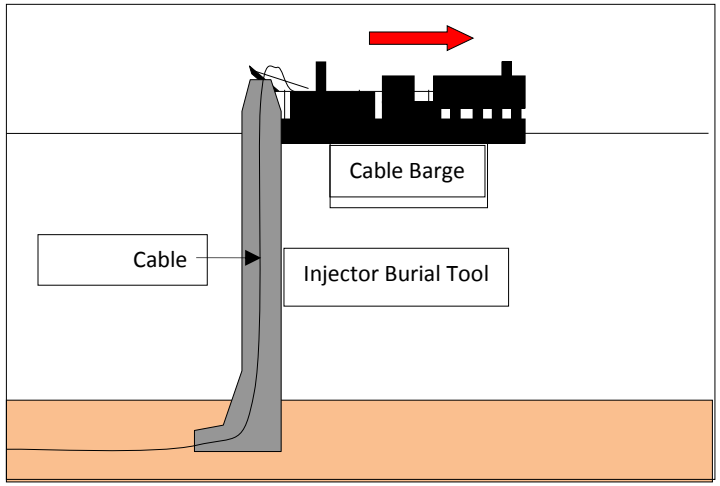


Figure 1.9: Examples of Cable-laying Vessels and Cable Burial Tools

Simultaneous Cable Laying and Burial Operation (Sledge Tool)



Simultaneous Cable Laying and Burial Operation (Injector Tool)



Typical Injector Tool

Typical Small Tracked Excavators

Typical Sledge Tool

Typical ROV

Typical Cable Installation Barge

Typical Grapnel Anchors

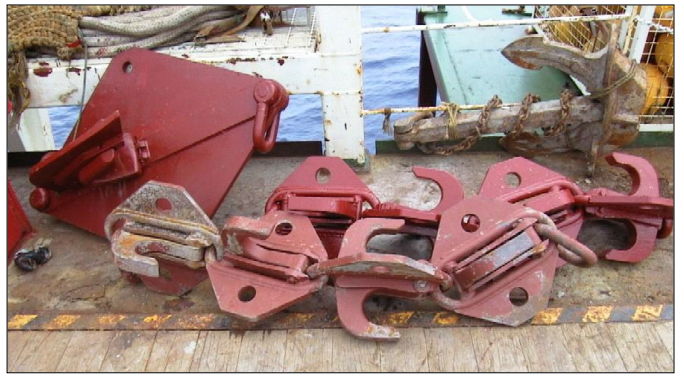
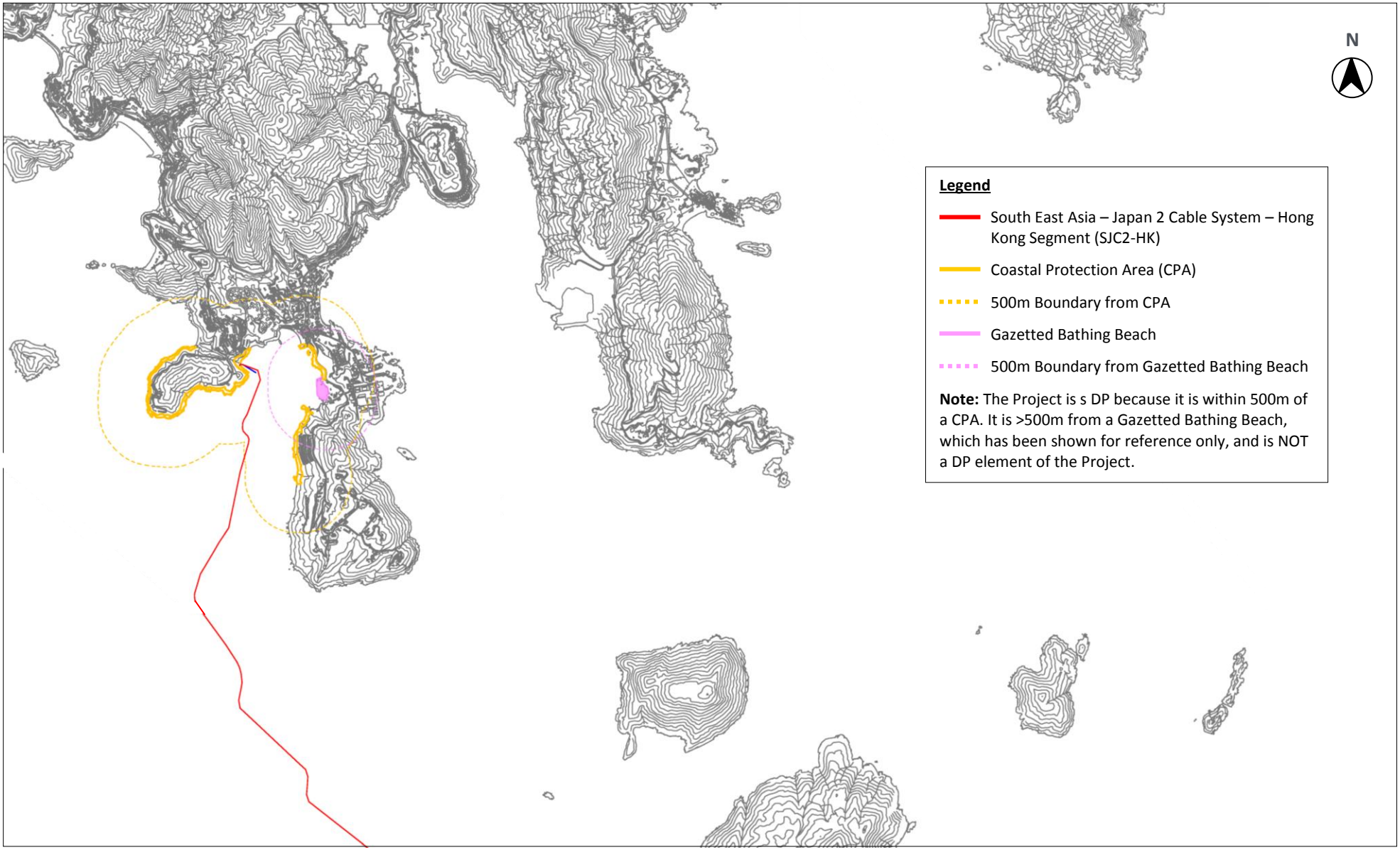


Figure 1.10: Designated Project Element of SJC2-HK Cable – Within 500m of CPA



2 OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1 Project Planning and Implementation

2.1.1 The Project is to be led, planned and managed by the Project Proponent, China Mobile International Limited (CMI). To assist in project planning and implementation, CMI has engaged:

- Consultants to:
  - Obtain gazettal under the Seabed and Foreshore (Reclamation) Ordinance (FSRO) and liaise with Lands Department (LandsD) and District Councils (DCs)
  - Address marine traffic issues and liaise with Marine Department
- Contractors to:
  - Carry out the cable laying works

2.2 Project Programme

2.2.1 The SJC2-HK Cable is provisionally scheduled to be landed and installed in the second quarter (April to June) of 2020, subject to receiving the necessary permits/approvals. The expected installation schedule within Hong Kong is shown in **Table 2.1** below and some works activities may be carried out concurrently that the overall marine cable installation shall be up to 150 working days:

Table 2.1: Tentative Installation Schedule

CABLE INSTALLATION	TENTATIVE TIME REQUIRED
Preparation for Cable Laying & Burial • Route Clearance and/or Pre-lay Grapnel Run	Up to 45 working days
Land Based Installation • Land works between the BMH and landing point	Up to 4 working days
Marine Cable Laying and Burial • Shore-end installation (between landing point to about 140m seaward) • Remaining offshore installation to eastern boundary of Hong Kong waters • Post-lay Works, if necessary	 Up to 10-14 working days Up to 60 working days Up to 45 working days

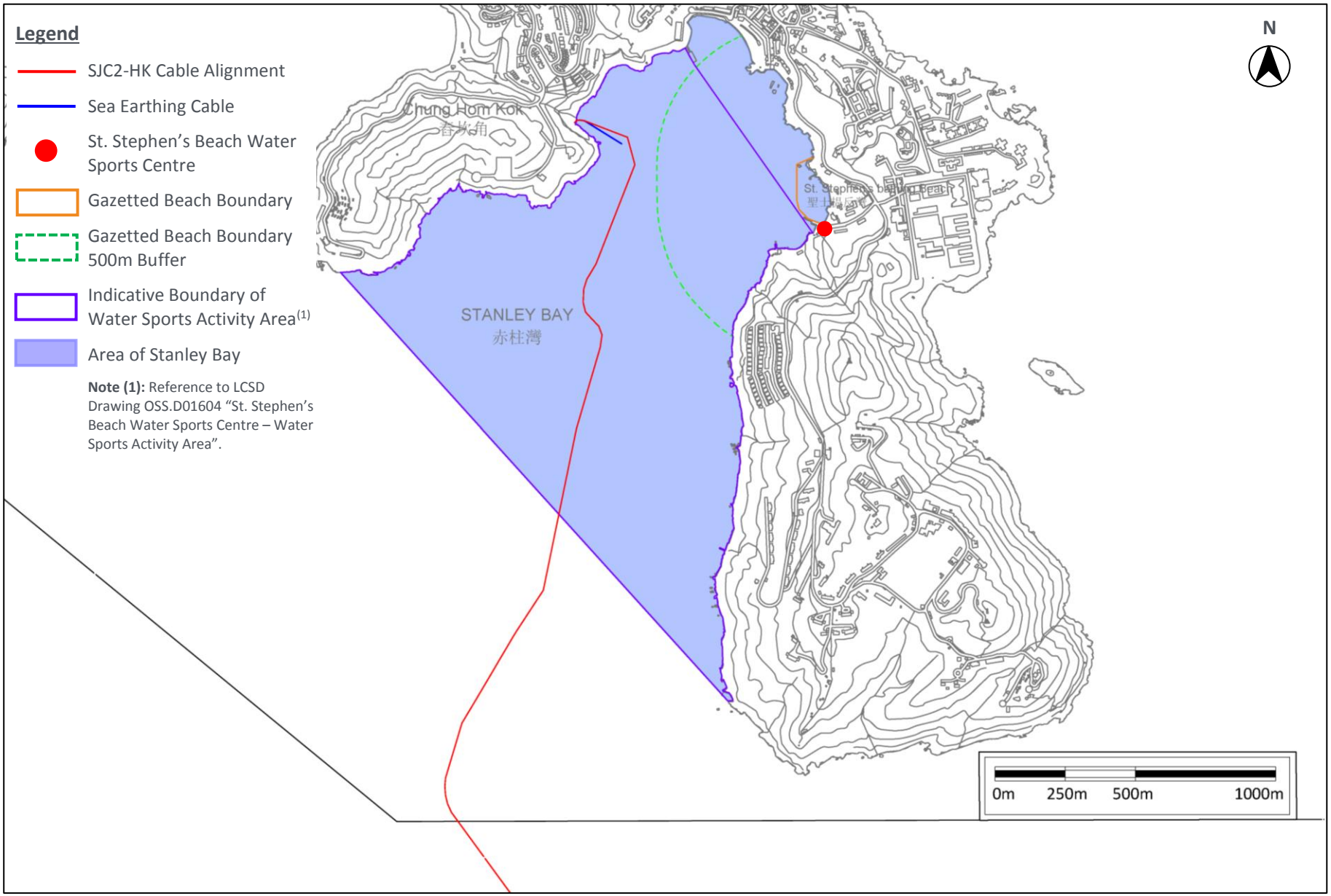
2.2.2 The cable alignment passes through Stanley Bay, which is used for water sports activities, as shown on **Figure 2.1**. The peak season for water sports activities is from mid-July to end-August and all days of Dragon Boat racing during the Tuen Ng Festival in June. To minimise potential nuisance to users of Stanley Bay (e.g. bathers at St. Stephen's Beach, participants of Dragon Boat races, etc.), including the St. Stephen's Beach Water Sports Centre (SSBWSC), marine works within Stanley Bay will be avoided throughout the period from 1 June to 31 August inclusive – see ***paragraph 3.3.5*** for further details.

2.3 Interactions with Other Projects

2.3.1 The following projects are planned in the vicinity of the SJC2-HK Cable:

- **Hong Kong-Americas (HKA) Submarine Cable Network – CHK.** The HKA Cable is a submarine telecommunication cable system linking Hong Kong and the United States that was announced in January 2018. A Project Profile was prepared for application under S5(11) of the EIAO and the EP was issued in February 2019. According to that Project Profile, the programme for installation of HKA Cable is the first quarter of 2020. The SJC2-HK Cable is scheduled to be installed in the second quarter of 2020. The installation of HKA Cable will therefore be completed BEFORE the installation of SJC2-HK Cable and so there will be no overlap of construction works for these two cables. To ensure this is the case, the Project Proponent of SJC2-HK Cable will appoint a Liaison Officer who will be responsible for liaising with the Project Proponent of HKA Cable to avoid the two cables being installed at the same time. As the installation works of the two cables will therefore not be concurrent, cumulative environmental impact is not anticipated.
- **Hong Kong Offshore Wind Farm in Southeastern Waters.** CLP has extended the feasibility study stage of the project by a few years and postponed the construction stage. Since further economic viability and technical design studies are needed, there is still no firm date for the commencement of the project. The construction works for the cable section of this project are therefore are not likely to begin until AFTER the SJC2-HK Cable has been installed.

Figure 2.1: Stanley Bay Area and Indicative Boundary of Water Sports Activity Area



3 MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

3.1 Marine Fairways and Traffic Separation Scheme

3.1.1 The SJC2-HK Cable avoids all principal fairways and TSSs in Hong Kong waters, including the ELCTSS (the cable will be laid outside the eastern edges of the ELCTSS). Such routing will minimise the disturbance to marine traffic within the East Lamma Channel and its vicinity.

3.2 Cable, Pipelines, Outfalls and Seawater Intakes

3.2.1 There are several utilities located in the vicinity of the SJC2-HK Cable and these include communications cables and pipelines:

Communication Cables

3.2.2 SST Beach is a prime location for landing of submarine cables and four cables (all still in service) have previously landed at the BMH at SST Beach:

- EAC-C2C Cable – two in-service cables
- C2C Cable – one in-service cable
- SJC Cable – one in-service cable

Electrical Cables

3.2.3 There are no existing electrical cables located in the vicinity of the SJC2-HK cable alignment.

Pipelines and Outfalls

3.2.4 There is one pipeline, the HKE Gas Pipeline, that must be crossed by the SJC2-HK Cable (and is already crossed by most other cables).

Seawater Intakes

3.2.5 The closest seawater intake is the Ocean Park seawater intake at Wong Chuk Hang, however, it is more than 3km away from the proposed cable alignment at the closest point. Due to this distance, the intake will not be affected by the Project.

3.3 Designated Areas

3.3.1 There are a number of areas with special planning designation in the vicinity of the SJC2-HK Cable alignment. These include Coastal Protection Areas (CPAs); Gazetted Bathing Beaches; Marine Reserve; Sites of Special Scientific Interest (SSSIs); coral communities; Fish Culture Zones (FCZs); and cultural heritage sites:

Coastal Protection Area (CPA)

3.3.2 The BMH and shore beach section of the cable route are within land zoned as CPA, which stretches along the length of the coastline of CHK. Considering the small scale and very short period of cable burial works to be carried out at the landing site, the impacts arising from the works at the landing site, which is within the CPA, will be insignificant. Only a small amount of existing concrete and soft sand will be removed and reinstated while flora and fauna will not be affected. Terrestrial ecological impact is not anticipated and the works area of existing concrete and soft sand will be reinstated once the land based works are completed. Therefore, the CPA will not be permanently affected by this Project.

3.3.3 However, for reference, there are CPAs near both north and south of the St Stephen's Beach, which is at the southeast of landing site. These CPAs are located at Wong Ma Kok and Tong Yan Pai. The SJC2-HK Cable will be about 460m from these CPAs at the closest point. Offshore cable installation will only be carried out at the area near the seabed and these CPAs are located on land and so will not be affected by this Project.

Gazetted Bathing Beaches

3.3.4 The closest Gazetted Bathing Beaches to the cable alignment are St Stephen's Beach and Chung Hom Kok Beach, which are about 580m and 2,300m (distance measured along marine environment instead of terrestrial environment, the shortest distance sediment could travel through the sea between the cable alignment and the beach). Given the beaches are over 500m from the cable alignment, these beaches will not be affected by this Project and mitigation for these beaches is not required.

3.3.5 The cable alignment passes through Stanley Bay, which is used for water sports activities. The peak season for water sports activities is from mid-July to end-August and all days of Dragon Boat racing during the Tuen Ng Festival in June. To minimise potential nuisance to users of Stanley Bay (e.g. bathers at St. Stephen's Beach, participants of Dragon Boat races, etc.), including the St. Stephen's Beach Water Sports Centre (SSBWSC), marine works within Stanley Bay will be avoided throughout the period from 1 June to 31 August inclusive.

Marine Reserve

3.3.6 The Marine Reserve closest to the cable alignment is Cape D'Aguilar Marine Reserve, which occupies about 20ha of sea area around Cape D'Aguilar. The Marine Reserve is located over 5km to the north of the cable alignment and the cable does not enter the Marine Reserve at any point. As such, the Marine Reserve will not be affected by this Project.

Site of Special Scientific Interest (SSSI)

3.3.7 The closest SSSI, Tai Tam Reservoir SSSI, is a terrestrial site about 980m from the closest alignment of the cable while the Cape D'Aguilar SSSI is located over 5km to the north of the cable alignment. Since these SSSIs are located far from the cable alignment, they will not be affected by this Project.

Coral Communities

3.3.8 Several coral communities of ecological significance have been identified near the cable alignment, including those along the coastline of Round Island, CHK, Beaufort Island, Po Toi, Sung Kong and Waglan Island.

3.3.9 The closest coral community is along the coast of southwest of CHK with the distance of about 920m from the cable alignment, while the remaining coral communities are more than 1,000m from the cable alignment. Given these distances, the coral communities of ecological significance will not be affected by this Project.

Fish Culture Zone (FCZ)

3.3.10 The nearest FCZ is the Po Toi FCZ located 1,420m from the cable alignment. Given this distance, the FCZ will not be affected by this Project.

Cultural Heritage Sites

3.3.11 According to the *List of Sites of Archaeological Interest in Hong Kong*, maintained by the Antiquities and Monuments Office (AMO), the Chung Hom Wan Site of Archaeological Interest is located approx. 470m west of the landing site at SST Beach. No declared monuments, proposed monuments, graded historic sites/buildings, or government historic sites identified by AMO are found within 500m of the cable landing site.

3.3.12 As the Chung Hom Wan Site of Archaeological Interest is on land, and there are no major land-based construction works associated with the Project, no terrestrial cultural heritage sites will be affected by this Project.

3.3.13 To assess any impact to marine archaeological resources from the proposed SJC2-HK Cable, reference has been made to the SJC in 2011, which follows a similar alignment to that proposed for the SJC2-HK Cable. The Project Profile for SJC concluded that there are no features of archaeological value identified in the vicinity of the cable alignment. This is also supported by the findings of the marine geophysical survey that was completed for the SJC2-HK cable in 2018.

3.4 Cumulative Impacts From Other Projects

3.4.1 **Section 2.3** identified potential interactions between the installation of the SJC2-HK Cable and construction of other projects in the vicinity. The installation of the SJC2-HK Cable will not coincide with other projects, and so cumulative impacts will not be an issue.

4 POSSIBLE IMPACTS ON THE ENVIRONMENT

4.1 Summary of Potential Environmental Impacts

4.1.1 The potential environmental impacts associated with the Project are summarised in **Table 4.1** and likely impacts are assessed in the following sub-sections.

Table 4.1: Potential Sources of Environmental Impacts

POTENTIAL IMPACTS		CONSTRUCTION	OPERATION		REMARKS
			NORMAL	CABLE REPAIR	
Gaseous Emissions		×	×	×	No significant emissions
Dust		×	×	×	No significant emissions
Odour		×	×	×	Not anticipated
Noisy Operations		✓	×	✓	Limited Powered Mechanical Equipment will be used.
Night-time Operations		×	×	×	Not required
Traffic Generation		✓	×	✓	Limited marine traffic movement is expected
Liquid Effluents, Discharges, or Contaminated Runoff		×	×	×	Not anticipated
Generation of Waste or By-products		×	×	×	Not anticipated
Manufacturing, Storage, Use, Handling, Transport, or Disposal of Dangerous Goods, Hazardous Materials or Wastes		×	×	×	Not anticipated
Risk of Accidents Which Result in Pollution or Hazard		×	×	×	Not anticipated
Disposal of Spoil Material, Including Potentially Contaminated Materials		×	×	×	No contaminated mud and no disposal of spoil anticipated
Disruption of Water Movement or Bottom Sediment		✓	×	✓	Cable laying will disturb the bottom sediment, however, the potential impact will be temporary
Unsightly Visual Appearance		×	×	×	Works are mainly under water
Ecological Impacts	Terrestrial	×	×	×	Minor excavation work and no new construction on land that flora and fauna will not be affected
	Inter-tidal	✓	×	✓	Habitat at SST Beach may be affected by the cable as it approaches the landing site
	Marine	✓	×	✓	Corals and marine mammals in vicinity of the cable alignment may be affected
Fisheries		✓	×	✓	Potential impacts along the cable alignment
Cultural Heritage	Terrestrial	×	×	×	No impact on terrestrial sites
	Marine	×	×	×	No marine archaeological resources identified

Key: ✓ = Potential to result in adverse impacts.

× = Not expected to result in adverse impacts.

4.1.2 No environmental impacts are expected to occur during normal operation of the cable, however, there may be a future requirement for maintenance work (i.e. cable repair at particularly fault location due to unexpected damage) to be carried out. Cable repair will be carried out by either the burial tool or divers using jetting tools that is of either same or less powerful than those used during cable installation. The same techniques and either same or less powerful tools used for cable installation will be adopted for laying of the re-paired cable. Thus, the seabed can be expected to naturally reinstate to before-work level and conditions shortly after completion of the repair works, similar to that of the cable installation. The impacts from any future cable repair work are expected to be smaller than for the cable installation.

4.1.3 The future cable repair works will be conducted along the same proposed alignment and it is expected that the repair works will be carried out within a much short period than the main cable installation as it shall be at a particular fault location only. Since the impacts are anticipated to be smaller during cable maintenance and repair works than those for cable installation during construction, the following assessments therefore relate only to the installation of the cable and any potential repair works that may be needed in the future during the operation stage are expected to cause less impact.

4.2 Water Quality Assessment

4.2.1 A water quality assessment is provided in **Appendix A**. A summary is provided below.

4.2.2 There will be limited use of machinery for the shore-end cable installation, oil spillage from machinery could be a potential source of water quality impact. However, oil spillage could be prevented with the implementation of precautionary measures and good site practice.

4.2.3 There is potential for small scale and localised water quality impacts to occur from cable installation works. The calculation of sediment transport from the cable laying works indicates that sediments disturbed during use of the cable burial tool will settle back to the seabed within a maximum of 180m of the cable alignment within about 3.5 minutes.

4.2.4 A total of 16 no. Water Sensitive Receivers (WSRs) have been identified near the cable alignment, including seawater intakes, gazetted bathing beaches, a FCZ, Fish Spawning Grounds, SSSIs, a Marine Reserve, and coral communities of ecological concern. The nearest of these to the cable alignment is St Stephen's Beach, a gazetted bathing beach, which is 580m from the cable alignment.

4.2.5 The cable (and the majority of other existing cables) passes through Fish Spawning Grounds and so there may be short-term impacts during installation. None of the other WSRs are located within the 180m maximum sediment settlement distance from the cable trench, which means none will be directly affected by the Project. Also, none of the other WSRs are located within 500m of the cable trench (the distance normally adopted as the study area for water quality impacts), which means that none will be indirectly affected by the Project.

4.2.6 Overall, with the recommended mitigation measures in place, no adverse water quality impacts are anticipated from the cable installation works.

4.3 Marine Ecology Assessment

4.3.1 A marine ecological assessment is provided in **Appendix B**. A summary is provided below.

4.3.2 The review of the existing information on the marine ecological resources in the vicinity of the cable landing point at SST Beach in CHK and the cable alignment in Hong Kong waters has revealed that the area where the cable is to be laid is of generally low ecological value.

4.3.3 Although soft bottom assemblages will be disturbed during cable laying, the habitat will be reinstated by similar communities within a short period of time and thus the impacts are not regarded as significant.

4.3.4 The landing point is composed of natural soft sandy beaches and previous ecological surveys found no rare species of conservation interest. As such, the landing point is considered to be of low ecological value and thus any impacts are not regarded as significant.

4.3.5 The closest coral community of ecological concern is along the coast of southwest of CHK, which is more than 900m from the cable alignment. It is unlikely to be affected by the cable installation as it located a significant distance beyond the 180m maximum sediment dispersion distance. Due to the small scale of the works, the short duration of impacts and the limited dispersion of sediment plume, potential impacts are considered to be unlikely at coral communities locating along coast of southwest of CHK (920m), coast of Po Toi (1,030m) and other coral communities that are more than 1,500m from the cable alignment.

4.3.6 The closest SSSI is the Tai Tam Reservoir SSSI, a terrestrial site about 980m from the closest alignment of the cable while the Cape D'Aguilar SSSI and Marine Reserve is located over 5km to the north of the cable alignment. Since these SSSIs and the Marine Park are located a significant distance from the cable alignment, they will not be affected by this Project.

4.3.7 Considering that the maximum speed of the cable-laying vessel will be just 1km/h, the risk of vessel collisions with cetaceans will be very small. Thus, direct impact to marine mammals caused by vessel collision is not anticipated. Studies of the Finless Porpoise suggest that it produces sonar clicks at a peak frequency of 142kHz. With regard to the potential construction phase impacts, marine jetting works and large marine vessels typically emit sound in the range of 0.02 to 1 kHz, which is generally below the hearing range of Finless Porpoises. Construction noise levels are also generally below the 8 to 90 kHz hearing range of Chinese White Dolphins[Ref.#11], although this species is uncommon outside its preferred estuarine habitat in the western waters of Hong Kong. Considering that the marine jetting works and large marine vessels typically emit sound which is of much lower frequency than the sonar clicks produced by Finless Porpoises, the works will not affect marine mammals. Thus, it is anticipated the operation of the jetting works and vessels will not cause indirect impact to the Finless Porpoise.

4.3.8 The Chinese White Dolphin is not recorded as being present in the south-eastern waters where the SJC2-HK Cable will be laid and so will not be affected. Part of the cable, i.e. from the CHK landing point to south of the CHK landing point will cover the areas where the Finless Porpoise has been observed in the dry season, from December to May. The rest of the cable, i.e. southern to south-eastern waters, will be located in an area that where Finless Porpoise has been observed during wet season, from June to November. The anticipated timing for landing and installation of cable is during the second quarter (April to June) of 2020. Although the anticipated construction programme implies that landing and installation of cable will straddles across the dry and wet seasons, marine mammals are highly mobile and can swim into open waters to avoid short term and localized seabed disturbance. Also, marine mammals are air breathing so that sediment plume will have no effect on their respiratory surfaces. Given the temporal and spatial distribution of Chinese White Dolphins and Finless Porpoises, it is not anticipated there would be any adverse impact on marine mammals caused by the cable installation works.

4.3.9 The cable laying and electrical earthing system will be installed by diver(s) in a shallow area near the proposed landing point to avoid direct impacts on the hard bottom habitats and minimise the impacts on coral colonies. Sparse hard coral colonies of locally common, widely-distributed species were found in the vicinity of the landing site by a recent survey. Therefore, installation by diver(s) using less powerful hand held jetting tools and by selecting a route in soft bottom habitat with low coral coverage and ecological value will avoid direct impacts on the hard bottom habitats and coral colonies near the landing site. As a result, no direct impact to the coral colonies of the sparse hard coral colonies in the vicinity of the proposed cable alignment near SST Beach is anticipated. However, as a precautionary measure, coral monitoring through pre-installation survey and post-project survey will be carried out in the vicinity of the landing area to confirm no adverse impacts to corals, as well as a marine mammal exclusion zone within a radius of 250m from the cable installation barge will be set up to mitigate potential indirect

impacts on Finless Porpoise during the cable laying works. Full details of the EM&A requirements are given in **Appendix F**.

4.3.10 Impacts to marine ecological resources have largely been avoided during cable laying through the selection of a landing site, careful consideration for cable alignment, and use of cable laying techniques that result in little disturbance to the marine environment. Due to the small scale of the works, the short duration of impacts and the limited dispersion of sediment plumes, adverse impacts to marine ecology are not expected to be significant and will be minimised during the cable installation and any subsequent cable repair works.

4.3.11 Precautionary measures/good site practices recommended to minimise impacts to water quality will also minimise impacts to marine ecological resources. Water quality monitoring will be carried out during marine works to demonstrate that no adverse impact has occurred.

4.4 Fisheries Assessment

4.4.1 A fisheries assessment is provided in **Appendix C**. A summary is provided below.

4.4.2 A review of existing information on the fisheries resources and fishing operations along the alignment of the SJC2-HK Cable has found the majority of the area supports fisheries resources with low to moderate fisheries production.

4.4.3 There is a recognized Spawning Grounds of commercial fisheries resources at south-eastern waters through which the SJC2-HK Cable passes, which might be directly affected. Fisheries production in this area ranges from 0 kg/ha to >300 to 400kg/ha in terms of catch weight of fish, in which the majority of the grids show less than 300kg/ha. Fisheries production with Sampan was highest (>50 to 100 kg/ha) in the cable section west of Beaufort Island and the value decreases (0 to 50 kg/ha) in the cable section from west to east of Po Toi. Fisheries production with other types of fishing vessels was highest (>300 to 400 kg/ha) in the cable section south of Po Toi and the value decreases (0 to 200 kg/ha) in the cable section east of Po Toi.

4.4.4 The south-eastern and eastern waters through which the cable will be laid have been recognised as spawning grounds for high value commercial species. After the cable burial tool has buried the cable, the seabed will be reinstated naturally by resettlement of disturbed sediments, following which there will be immediate recolonization by benthic fauna that provide food for fish. In terms of indirect impacts, the maximum predicted extent of suspended solids is expected to be 180m from the cable trench and would settle back onto the seabed within 3.5 minutes, based on worst case scenario. Given the above, there is only short-term and a minor disturbance to the seabed within the Spawning Grounds. Due to the small area occupied by the cable-laying vessel and short duration required for the cable installation in any one location, potential impacts on fishing vessel transit, fishing activities and Spawning Grounds along the cable alignment will not be significant.

4.4.5 In terms of indirect impact, based on worst case scenario the maximum predicted extent of any sediment plume arising from the cable laying works is 180m from the cable trench, and will settle back onto the seabed within 3.5 minutes. Thus, the seabed will be reinstated naturally by resettlement of disturbed sediments, following which there will be immediate recolonization by benthic fauna that provide food for fish.

4.4.6 The greater the distance from the cable trench, the less likely there is to be any indirect impact on sensitive receivers. Nursery Grounds and Artificial Reefs are >13km from the cable alignment and the nearest FCZ is >1.4km away. At these distances, the Nursery Grounds, Artificial Reefs and FCZ are unlikely to be affected by the Project.

4.4.7 Given the above, unacceptable adverse impacts are not expected to arise from the cable laying works. No environmental impacts are expected to occur during normal operation of the cable, however, there may be a future requirement for maintenance work (i.e. cable repair at particularly fault location due to unexpected damage) to be carried out. The cable repairs will be

carried out by divers using less powerful, hand-held jetting tools and ROV, the seabed can be expected to naturally reinstate to before-work level and conditions shortly after completion of the repair works. Overall, no unacceptable impacts are predicted to occur to fisheries resources or fishing operations as a result of this Project.

4.5 Cultural Heritage Assessment

4.5.1 A cultural heritage assessment is provided in **Appendix D**, which includes a MAI conducted by a qualified marine archaeologist. A summary is provided below.

4.5.2 There will be no threat to terrestrial cultural heritage from marine works. At the SST Beach landing point, the only works will be shallow excavation to enable the cable to enter the existing BMH – no new construction is required. As such, there is also no threat to the nearest Site of Archaeological Interest. Hence no mitigation measures need to be put in place.

4.5.3 The geophysical surveys of previous MAIs and the one carried out for the SJC2-HK Cable in 2018 reveal that seabed along the SJC2-HK Cable alignment has been heavily impacted from trawling and the dumping of materials and installation of the previous cables. It also found the nature of the sediments to be very soft to soft sandy gravelly clay. The previous seabed disturbance would have significantly reduced the archaeological potential of the seabed in the vicinity of the cable.

4.5.4 The geophysical survey of the SJC2-HK Cable alignment revealed that the seabed has numerous scars and debris/boulder along the alignment. It identified 19 no. sonar contacts within the 50m corridor, but with one exception, all of these are identified as debris/possible discarded man-made objects/boulders.

4.5.5 The exception is a “new” wreck (SC003) close to the landing site. The wreck appears to be that of a small sampan, located 2m from the SJC2-HK Cable alignment located close to the landing site. This wreck was also identified as SC002 on Figure E4-1 of the Project Profile for HKA Submarine Cable – Chung Hom Kok, November 2018. This wreck (SC003) was not identified in the geophysical survey for SJC Cable in 2011, nor was it identified in the Project Profiles for C2C Cable in 2000, both of which also landed at SST Beach. This is possibly because the sampan was sunk after 2011. Since the wreck (SC003) is recent, it is not considered to have any archaeological potential.

4.5.6 Sixteen magnetic contacts were identified within the 50m corridor but all of these are identified as unknown objects, most likely associated with existing cables and their installation. Other magnetic contacts and sub-bottom anomalies that were found during the geophysical surveys relate to other cables, the HKE Gas Pipeline, and dumped materials/debris.

4.5.7 A review of the UKHO wrecks database identified two wrecks in the vicinity of the cable alignment but the closest one is 270m away and outside the 50m cable alignment corridor.

4.5.8 The MAI established that there is no evidence for marine archaeological resources and hence no marine archaeological impacts are expected. No mitigation measures or further action will therefore be required.

4.6 Noise Assessment

4.6.1 A noise impact assessment is provided in **Appendix E**. A summary is provided below.

4.6.2 A noise assessment was undertaken to describe and evaluate the potential noise impacts arising from the land, inshore and remaining submarine works associated with cable installation and operation (including maintenance) at two residential Noise Sensitive Receivers on Cape Road.

4.6.3 No exceedance at representative NSRs is predicted to occur and so it can be concluded that there will be no unacceptable noise impact resulting from the Project.

4.7 Others

4.7.1 The following impacts are not anticipated from the installation of the cable and so have not been assessed in this Project Profile:

- **Gaseous Emissions.** Exhaust emissions from plant used for installation works will be insignificant due to the limited plant required and will not cause adverse impacts on air local quality. Any Non-Road Mobile Machinery (NRMMs) used will follow requirements of the *Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation* to minimise emissions.
- **Dust.** No new construction works required for the cable landing as existing infrastructure will be used. As such, dust generation will be negligible. Nevertheless, relevant control measures stipulated in the *Air Pollution Control (Construction Dust) Regulation* will be implemented to minimise dust emissions during installation.
- **Odour.** No odour impacts will arise from the Project. No marine sediments will be dredged or brought to the surface.
- **Night-time Operations.** There is no expectation that construction works associated with the onshore and offshore submarine cable installation will need to be carried out during Restricted Hours, however, should this be required, then a Construction Noise Permit will be applied for under the Noise Control Ordinance.
- **Traffic Generation.** Only minimal or short-term marine traffic movement related to the shore-end and offshore cable installation is expected, which will not generate significant gaseous emission.
- **Liquid Effluents, Discharges, or Contaminated Runoff.** There will be no effluents, discharge or contaminated run-off entering the marine environment.
- **Generation of Waste or By-products.** No waste materials are anticipated to be generated as a result of cable installation. Any old cables or debris recovered during the RC and PLGR will be retained on board the RC and PLGR vessel(s) for proper disposal ashore.
- **Manufacturing, Storage, Use, Handling, Transport or Disposal of Dangerous Goods, Hazardous Materials or Wastes.** No dangerous goods or hazardous materials will be used or generated by this Project. No waste will be generated by this Project other than the above.
- **Risk of Accidents Resulting in Pollution or Hazard.** Laying of submarine cables is an established process in Hong Kong and there is only a minimal risk of accident. Given that no dangerous goods or hazardous materials will be used or generated by this Project, the risk of any accident resulting in pollution or hazard is negligible.
- **Disposal of Spoil Material, Including Potentially Contaminated Materials.** No spoil or dredged material will be generated by the Project and so there is no need for disposal of such. There are no contaminated mud pits in the vicinity of the cable alignment and there is no reason to suspect any contaminated materials will be encountered.
- **Landscape and Visual.** Since the cable will be buried in the seabed, its installation will not cause any visual obstruction or inconvenience to the public. At the landing site, the installation will use existing BHM and conduits connecting to the CLS that no tree felling is anticipated. There will be some trenching between the landing point to the existing BMH to bury the cable and construct the duct, but the works area will be reinstated to its original state immediately afterward the burial work is completed and the proposed works are not anticipated to cause any long term adverse impact on existing landscape resources or character. Therefore adverse landscape, tree or visual impact is not anticipated during either construction or operation.
- **Ecological Impacts – Terrestrial.** No impacts to terrestrial ecology will arise from the installation of the cable below the seabed. The cable landing point above water at SST Beach comprises soft sand and existing concrete and does not provide valuable habitat.

5 ENVIRONMENTAL PROTECTION MEASURES TO BE INCORPORATED INTO THE DESIGN AND ANY FURTHER IMPLICATIONS

5.1 Measures to Minimise Environmental Impacts

Water Quality

5.1.1 This environmental assessment has identified that the Project may result in a localised temporary elevation of suspended solids at the seabed during cable installation. The increased suspended solids will be generally limited to within 180m of the cable trench and would settle within about 3.5 minutes after cable installation. Previous assessments and monitoring results from similar projects (listed in **Section 6**) have similar findings.

5.1.2 A total of 15 no. WSRs have been identified, comprising seawater intakes, gazetted bathing beaches, a FCZ, Fish Spawning Grounds, SSSIs, a Marine Reserve, and coral communities of ecological concern. For the Fish Spawning Grounds through which the cable (and the majority of other previous cables) passes, there may be short-term impact. None of the other WSRs are located within the 180m maximum sediment settlement distance from the cable trench, which means none will be directly affected by the Project. Also, none of the other WSRs are located within 500m of the cable trench (the distance normally adopted as the study area for water quality impacts), which means none will be indirectly affected by the Project. It is expected there will not be any unacceptable indirect impact on these WSRs caused by the Project.

5.1.3 The following mitigation measures for land cable installation works shall be implemented as far as possible:

- Stockpiles of materials will be covered with tarpaulin or similar fabric to minimise runoff during the rainy season.
- Care will be taken during land cable installation works to avoid any spillage of materials to the adjacent waters and to ensure that no spoil is discharged into adjacent waters.
- Machinery shall be checked before being in use at the work sites to ensure the land based area as well as water near the shore would not be polluted with oil/fuel spillage from the machinery. Maintenance and repair of machinery shall be carried out off-site to prevent chemical spillage during such servicing. In the event that such maintenance and repair are unavoidable on-site, measures such as drip trays shall be provided at any fuel connection point, e.g. between the delivery pipe and the fuel tank. Any spilled fuel shall be collected and taken off-site for proper treatment/disposal.
- All construction waste and drainage will be handled and disposed of in accordance with the *Waste Disposal Ordinance* and *Practice Note for Professional Persons, Construction Site Drainage (ProPECC PN1/94)*.
- Best Management Practices (BMPs) will be applied to avoid and minimise contaminated runoff from work sites, marine plant and vessels.

5.1.4 The following mitigation measures for marine cable installation works shall be implemented:

- Avoidance of marine works within Stanley Bay during peak water sport season as proposed precautionary measures
- The Project Proponent shall appoint a liaison officer for the Project so as to ensure effective communication during the marine works.
- The speed of the installation barge will be limited to a maximum of 1km per hour.
- Water quality monitoring will be carried out to verify the water quality impact on St. Stephen's Bay Beach, coral communities along the southwest coast of CHK and coast of Po

Toi, Po Toi FCZ and fish spawning grounds as precautionary measures. Due to the length of the cable in Hong Kong waters, the monitoring stations are divided into two zones to effectively and efficiently monitor the water quality. Monitoring shall be required in the relevant zone when cable laying works are being carried out in that zone. Further details of the EM&A requirements are given in **Appendix F**.

Coral Monitoring

5.1.5 Direct impact on coral communicates caused by cable laying works during construction and operation is not likely, as assessed in **Appendix B**. With reference to the survey of subtidal hard bottom assemblages carried out in 2018 for the HKA Cable, two common hard coral colonies were identified in the near shore area of SST. Given the proximity between the proposed cable alignment and coral colonies in the vicinity of the cable landing at SST, as a precautionary measure a Pre-installation Coral Survey and a Post-project Coral Survey are proposed.

Marine Mammals

5.1.6 The Chinese White Dolphin is not recorded as being present in the south-eastern waters where the SJC2-HK Cable will be laid and so will not be affected. Part of the cable, i.e. from the CHK landing point to south of the CHK landing point, would cover the areas where the Finless Porpoise was observed in dry season from December to May while the rest of the cable i.e. southern to south-eastern waters, will be located where Finless Porpoise rarely frequents the area during the dry season. The anticipated timing for landing and installation of cable is during the second quarter (April to June) of 2020. Although the anticipated construction programme implies that landing and installation of cable will straddles across the dry and wet seasons, marine mammals are highly mobile and can swim into open waters to avoid short term and localized seabed disturbance. Also, marine mammals are air breathing so that sediment plume will have no effect on their respiratory surfaces. Given the temporal and spatial distribution of Chinese White Dolphins and Finless Porpoises, it is not anticipated that there would be any significant adverse impact on marine mammals caused by the cable installation works.

5.1.7 However, as a precautionary measure, a marine mammal exclusion zone with a radius of 250m from the cable installation barge will be set up to mitigate potential indirect impacts on Finless Porpoise during cable laying works. Details of the EM&A requirements are given in **Appendix F**.

Other

5.1.8 Relevant standard mitigations set out in the Air Pollution Control (Construction Dust) Regulation will be implemented to minimise dust emissions, where applicable, during project construction phase. To ensure the emissions from NRMMs are minimized, requirements of the *Air Pollution Control (Non-road Mobile Machinery) Regulation* shall also be implemented.

5.1.9 Other than the above, this environmental assessment has not identified any other environmental impacts during the installation of the cable that require environmental protection measures to be incorporated into the design, or require mitigation measures.

5.1.10 There will be no environmental impacts from the normal operation of SJC2-HK Cable.

5.2 Possible Severity, Distribution and Duration of Environmental Effects

5.2.1 Potential environmental impacts have been assessed in this Project Profile. The duration of the installation of the cable will be approx. five months, including time required for preparation works and contingency. Minor water quality impacts have been identified, although these are minimal, temporary in nature, and localised. No residual environmental impacts are anticipated.

5.2.2 After installation of the cable, there will be no environmental impacts during normal operation. In the event that the cable becomes damaged, repair work at this particular fault location will be required. The cable repair works will be carried out by either the burial tool or divers using jetting tools that is of either same or less powerful than those used during cable installation, and so the

seabed can be expected to naturally reinstate to before-work level and conditions shortly after completion of the repair works, similar to that of the cable installation. The impacts from any future cable repair work are expected to be smaller than for the cable installation and so no adverse environmental impacts are anticipated from the operation of the Project (including any cable repair).

5.2.3 No secondary or induced effects have been identified. The installation of the SJC2-HK Cable will not coincide with other projects, and so cumulative impacts are not expected to be an issue.

5.2.4 In terms of benefits, SJC2-HK Cable will help meeting the growing demand for high speed internet access services and greatly increase bandwidth capacity within Hong Kong. The Project will provide telecommunication infrastructure to support industries (such as financial, trading, logistics, media, and other data intensive industries) that have a far-reaching effect on the economy of Hong Kong. Without this Project, these benefits may not be realized.

5.3 Further Implications

5.3.1 SST Beach in CHK has been used by several other cable systems and no records of adverse impacts to the environment have been identified from the installation or operations of these systems – see **Section 6** for details of other similar projects.

5.3.2 Obtaining the EP for SJC2-HK Cable is just one of the requirements progress the Project. Approvals under other relevant ordinances / regulations from other government departments, including Marine Department and Lands Department, must also be obtained – these departments will be contacted for required approvals in due course. No objection in principle for the Project has already been obtained from the Office of the Communications Authority (OFCA).

5.4 Environmental Monitoring and Auditing (EM&A)

5.4.1 With the exception of the Fish Spawning Grounds through which the cable (and the majority of other existing cables) passes, none of the other 14 no. WSRs are located within the 180m maximum sediment settlement distance from the cable trench, which means none will be directly affected by the Project. None of these 14 no. WSRs are located within 500m of the cable trench, which means none will be indirectly affected by the Project. Nonetheless, water quality monitoring is proposed to verify the predictions that the installation works will not result in unacceptable impacts on water quality.

5.4.2 As a precautionary measure for the Fish Spawning Grounds, to verify the accuracy of the predications of the fisheries impact assessment and to detect any unpredicted fisheries impacts at the nearest FCZ (Po Toi FCZ, 1.4 km from the cable trench), a number of water quality sampling stations have been proposed along the cable alignment within the Fish Spawning Grounds and at the closest point to the Po Toi FCZ.

5.4.3 A Pre-installation Coral Survey will be carried out to identify the locations of any corals in the near shore area of SST that are in proximity to the proposed cable alignment and to confirm that none will be directly impacted by cable installation works. A Post-project Coral Survey will be carried out to verify that the corals identified during the Pre-installation Coral Survey have not be directly impacted as a result of the cable installation.

5.4.4 A marine mammal exclusion zone within a radius of 250m from the cable installation barge will be set up during the cable laying works in day-time hours to mitigate potential indirect impacts on Finless Porpoise.

5.4.5 Full details of the EM&A requirements, including the recommended personnel, are given in **Appendix F**.

6 USE OF PREVIOUSLY APPROVED EIA REPORTS

6.1.1 Since enactment of the EIAO, cable laying projects that are DPs have all secured EPs via obtaining permission to apply directly for the EP ("Direct Application"). It is the intention of the Project Proponent to also secure an EP via Direct Application, under Section 5(1)(b) and Section 5(11) of the EIAO.

6.1.2 As all cable laying projects have secured EPs via Direct Application, no EIA Reports have been submitted for approval. The following (generally more recent) Project Profiles have been referenced in the preparation of this Project Profile:

- **Hong Kong-Americas Cable (HKA), Chung Hom Kok (China Telecom Global Ltd).** The Project Profile was submitted on 26 November 2018 (PP-573/2018). The length of cable in Hong Kong waters was around 34km. The study concluded that there would be no adverse long-term or cumulative effects/impacts to the environment. The EP was granted on 20 February 2019 (EP-567/2019).
- **Ultra Express Link (UEL), Tseung Kwan O/Chai Wan (Hong Kong Telecommunications (HKT) Ltd).** The Project Profile was submitted on 29 June 2017 (PP-553/2017). The length of cable in Hong Kong waters was around 2.7km. The study concluded that there would be no adverse long-term or cumulative effects/impacts to the environment. The EP was granted on 14 September 2017 (EP-543/2017).
- **Pacific Light Cable Network (PLCN), Deep Water Bay (PCCW Global (HK) Ltd).** The Project Profile was submitted on 27 April 2017 (PP-550/2017). The length of cable in Hong Kong waters was around 40km. The study concluded that there would be no adverse long-term or cumulative effects/impacts to the environment. The EP was granted on 10 July 2017 (EP-539/2017).
- **Asia-Africa-Europe-1 (AAE-1) Cable System, Cape D'Aguilar (PCCW Global (HK) Ltd).** The Project Profile was submitted on 1 February 2016 (PP-533/2016). The length of cable in Hong Kong waters was around 27.65km. The study concluded that there would be no adverse long-term or cumulative effects/impacts to the environment. The EP was granted on 20 Apr 2016 (EP-508/2016).
- **Tseung Kwan O Express – Cable System (TKO-E_, Tseung Kwan O/Chai Wan (Superloop (Hong Kong) Ltd).** The Project Profile was submitted on 16 December 2015 (PP-532/2015). The length of cable in Hong Kong waters was around 2.7km. The study concluded that there would be no adverse long-term or cumulative effects/impacts to the environment. The EP was granted on 15 January 2016 (EP-509/2016).
- **Asia Pacific Gateway (APG), Tseung Kwan O (China Mobile International Ltd).** The Project Profile was submitted on 9 October 2013 (PP-496/2013). The length of cable in Hong Kong waters was around 35km. The study concluded that there would be no adverse long-term or cumulative effects/impacts to the environment. The EP was granted on 18 February 2014 (EP-485/2014).
- **South-East Asia Japan Cable System (SJC) Hong Kong Segment, Chung Hom Kok (China Telecom (Hong Kong) International Limited).** The Project Profile was submitted on 22 June 2011 (PP-444/2011). The length of cable in Hong Kong waters was around 37 km. The study concluded that there would be no adverse long-term or cumulative effects/impacts to the environment. The EP was granted on 24 October 2011 (EP-433/2011).
- **C2C Cable Network – Hong Kong Section: Chung Hom Kok (GB 21 (Hong Kong) Limited).** The Project Profile was submitted on 5 December 2000 (PP-109/2000). The Project involves laying of three cables entering the southern and eastern waters from Hong Kong to a landing site at Sha Shek Tan beach. The total lenth of each cable within Hong Kong waters is around 30km. The study concluded that there would be no adverse long-term or cumulative effects/impacts to the environment. The EP was granted on 11 January 2001 (EP-087/2001).

Appendix A WATER QUALITY ASSESSMENT

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A WATER QUALITY ASSESSMENT

A.1 Introduction

A.1.1 This appendix provides an assessment of water quality impacts associated with installation of the SJC2-HK Cable and may be read in conjunction with the marine ecology assessment in **Appendix B**.

A.2 Relevant Legislation and Assessment Criteria

A.2.1 The following legislation and associated guidance or non-statuary guidelines are applicable to the evaluation of water quality impacts:

- Environmental Impact Assessment Ordinance (Cap. 499. S.16) and the Technical Memorandum on EIA Process (EIAO-TM), Annexes 6 and 14
- Water Pollution Control Ordinance (WPCO)
- Technical Memorandum for Effluents Discharge into Drainage and Sewerage Systems, Inland and Coastal Waters (TM-ICW)
- Professional Persons Environmental Consultative Committee Practice Notes, Construction Site Drainage (ProPECC PN1/94)

Water Pollution Control Ordinance (WPCO)

A.2.2 The WPCO is the primary legislation for the control of water pollution and water quality in Hong Kong. There are a total of ten Water Control Zones (WCZ) and four supplementary WCZs in Hong Kong. Each WCZ has its own set of Water Quality Objectives (WQOs).

A.2.3 The alignment of the SJC2-HK Cable passes through the Southern, Second Southern Supplementary and Mirs Bay WCZs, as shown on **Figure A.1**. A summary of the WQOs for the three WCZs are presented in **Table A.1**. These WQOs are applicable as evaluation criteria for assessing the compliance of any discharge during the installation of the submarine cable system.

Table A.1: Summary of Water Quality Objectives for Relevant WCZs

PARAMETER	SOUTHERN, SECOND SOUTHERN SUPPLEMENTARY AND MIRS BAY WCZ
Temperature	Change due to waste discharge not to exceed 2°C
Salinity	Change due to waste discharge not to exceed 10% of natural ambient level
pH	To be in the range 6.5 to 8.5, change due to waste discharge not to exceed 0.2
Suspended Solids (SS)	Waste discharge not to raise the natural ambient level by 30% nor cause the accumulation of suspended solids which may adversely affect aquatic communities
Dissolved Oxygen (DO)	Bottom: Not less than 2mg/L for 90% samples Depth-averaged: Not less than 4mg/L for 90% samples
Nutrients (measured as total inorganic nitrogen)	Southern WCZ: Not to exceed 0.1 mg/L (annual mean depth-averaged) Mirs Bay WCZ: Not to exceed 0.3 mg/L (annual mean depth-averaged)
Unionised Ammonia	Not to exceed 0.021mg/L (annual mean)
Chlorophyll-a	No criteria established for Southern, Second Southern Supplementary and Mirs Bay WCZs
Toxicants	Not to be present at levels producing significant toxic effect
E. coli	Annual geometric mean not to exceed 610cfu/100mL (secondary contact recreation subzones in Southern, Second Southern Supplementary and Mirs Bay WCZ and fish culture subzones in Junk Bay, Eastern Buffer, Southern and Mirs Bay WCZs)

EIAO-TM

A.2.4 Annexes 6 and 14 of the EIAO-TM provide general guidelines and criteria to be used in assessing water quality impacts. The EIAO-TM recognises that in the application of the above water quality criteria, it may not be possible to achieve all WQOs at the point of discharge as there are areas subjected to greater impacts (termed by the Environmental Protection Department (EPD) as "mixing zones") where the initial dilution of an input of pollutants takes place. The definition of this area is determined on a case-by-case basis. In general, the criteria for acceptance of the initial dilution area are that it must not impair the integrity of the water body as a whole and must not damage the ecosystem.

TM-ICW

A.2.5 Under Section 21 of WPCO, all discharges during the installation of the submarine cable are required to comply with the TM-ICW. Effluents discharged into the drainage and sewerage systems, inshore and coastal waters of the WCZs are subject to pollutant concentration standards for particular volumes of discharge. These are defined by EPD and specified in licence conditions for any new discharge within a WCZ.

Seawater Intakes

A.2.6 Quality of seawater at intake points should comply with relevant WQOs shown in **Table A.2**.

Table A.2: WQOs for Seawater for Flushing Supply at Intake Point

PARAMETER	TARGET
Colour (HU)	<20
Turbidity (NTU)	<10
Threshold Odour No. (TON)	<100
Ammoniacal Nitrogen (mg/L)	<1
Suspended Solids (mg/L)	<10

PARAMETER	TARGET
Dissolved Oxygen (mg/L)	>2
Biochemical Oxygen Demand (mg/L)	<10
Synthetic Detergents (mg/L)	<5
E.coli (cfu per 100mL)	<20,000

ProPECC PN 1/94

A.2.7 Apart from the above statutory requirements, the *Practice Notes for Professional Persons, Construction Site Drainage (ProPECC PN 1/94)*, issued by EPD in 1994, also provides useful guidelines on water pollution associated with construction activities.

A.3 Description of the Environment

Hydrodynamics

A.3.1 The shore-end part of the SJC2-HK Cable in Chung Hom Kok (CHK) lies within Southern WCZ. Further to the southeast, the cable passes the Second Southern Supplementary WCZ and continues along the edge of Southern WCZ. The remainder of the cable lies within the Mirs Bay WCZ as it heads toward the eastern boundary of Hong Kong. As the cable exits Hong Kong waters, the main influence will be the oceanic waters of the South China Sea.

Routine Water Quality Monitoring Results

A.3.2 There are three EPD routine water quality monitoring stations (SM19, MM8 and MM13) in the vicinity of the cable alignment, as shown on **Figure A.2**. Water quality data from these stations between 2012 and 2016 has been collected and is summarised in **Table A.3**, below.

Table A.3: Summary of EPD Routine Water Quality Monitoring Data between 2012 and 2016 (SM19, MM8 and MM13)

	HONG KONG ISLAND (SOUTH)			WAGLAN ISLAND			MIRS BAY (SOUTH)		
	SM19			MM8			MM13		
WATER QUALITY PARAMETER	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Temperature (°C)	23.06	22.9	23.2	22.7	22.4	23.0	22.9	22.3	23.4
Salinity	32.04	31.2	32.6	32.28	31.7	33.0	32.62	31.9	33.1
Dissolved Oxygen (mg/L)	6.66	6.4	7.1	6.38	6.2	6.8	6.52	6.2	6.8
Bottom	6.06	5.8	6.5	5.84	5.6	6.2	6.04	5.8	6.3
Dissolved Oxygen (% Saturation)	92.8	90	98	88.6	86	95	91.6	88	96
Bottom	83.6	80	90	80	76	85	83.2	80	86
pH	8.0	7.9	8.1	7.96	7.8	8.1	7.96	7.8	8.1
Suspended Solid (mg/L)	4.46	2.8	7.6	4.3	2.7	7.1	3.94	2.5	6.6
5-day Biochemical Oxygen Demand (mg/L)	0.56	0.4	0.8	0.46	0.3	0.6	0.46	0.3	0.6
Unionised Ammonia (mg/L)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Inorganic Nitrogen (mg/L)	0.124	0.1	0.14	0.114	0.08	0.14	0.092	0.07	0.12
Total Nitrogen (mg/L)	0.342	0.24	0.54	0.312	0.24	0.54	0.294	0.19	0.58
Chlorophyll-a (µg/L)	3.02	1.9	5.2	2.04	1.2	3.2	2.08	1.3	3.1
Escherichia coli (cfu/100mL)	1	1	1	1	1	1	1	1	1

Source: Compiled from *Appendix B of Marine Water Quality in Hong Kong in 2012 to 2016*, EPD.

Notes:

1. Data presented is the depth-averaged value averaged over 5 years, unless stated otherwise.
2. Total Inorganic Nitrogen and Unionised Ammonia is presented as the depth averaged annual mean over 5 years and the depth averaged annual range.
3. E.coli is presented as depth averaged annual geometric mean.

Table A.4: Summary of EPD Routine Sediment Quality Monitoring Data between 2012 and 2016 (MS8 and MS13)

SEDIMENT QUALITY PARAMETER	LCEL	UCEL	WAGLAN ISLAND			MIRS BAY (SOUTH)		
			MS8			MS13		
			Mean	Min	Mean	Mean	Mean	Max
Chemical Oxygen Demand (mg/kg)	-	-	10,140	8,600	12,000	8,260	6,400	10,000
Total Kjeldahl Nitrogen (mg/kg)	-	-	490	400	550	490	430	550
Arsenic (mg/kg)	12	42	7.4	6.6	8.7	7.7	6.3	8.7
Cadmium (mg/kg)	1.5	4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (mg/kg)	80	160	31	28	33	30	24	34
Copper (mg/kg)	65	110	14	10	18	12	10	17
Lead (mg/kg)	75	110	33	30	37	31	25	35
Mercury (mg/kg)	0.5	1	0.05	<0.05	0.06	0.05	<0.05	0.07
Nickel (mg/kg)	40	40	22	20	24	22	19	24
Silver (mg/kg)	1	2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Zinc (mg/kg)	200	270	79	72	89	77	62	86

Source: Compiled from *Appendix E of Marine Water Quality in Hong Kong in 2016*, EPD.

Notes:

1. Data presented are arithmetic mean (except if specified differently)
2. Data is based on Government laboratory analysis of bulk samples collected twice per year.
3. LCEL – Lower Chemical Exceedance Level, UCEL – Upper Chemical Exceedance Level.
4. If concentrations are below the limit of detection, results are taken as half of the reporting limit.

A.3.3 The data shows that the annual mean for both depth-averaged and bottom dissolved oxygen complied with the WQO during 2012 to 2016. Full compliance (100%) was achieved with the WQOs for total inorganic nitrogen and unionised ammonia at all stations except for total inorganic nitrogen at station SM19 in the Southern WCZ, the mean value of the total inorganic nitrogen is 0.124mg/L while the WQO for Southern WCZ is 0.1mg/L. The suspended solid concentrations were within a range from 2.5 to 7.6mg/L at all monitoring stations. *E.coli* levels also stayed in compliance with the WQOs at all stations between 2012 and 2016.

Routine Sediment Quality Monitoring Results

A.3.4 There are two EPD routine sediment quality monitoring stations (MS8 and MS13) in the vicinity of the cable alignment, as shown on Figure A-3. Sediment quality data from these stations between 2012 and 2016 has been collected and is summarised in Table A-4, below.

A.3.5 Sediment quality, management and classification specified under *Works Bureau Technical Circular (Works) No. 34/2002 Management of Dredged/Excavated Sediment* comprise two criteria for a broad range of Contaminants of Concern. The lower criterion is referred to as the Lower Chemical Exceedance Limit (LCEL) and the upper criterion is referred to as the Upper Chemical Exceedance Limit (UCEL). The sediment quality data (mean values) show that there were no exceedances of the LCEL and UCEL at all stations, from which can be concluded that the sediment in the vicinity of the cable alignment is not contaminated based on the existing sediment classification guidelines.

Water Sensitive Receivers

A.3.6 There are 16 no. Water Sensitive Receivers (WSRs) in the vicinity of the cable alignment:

- Seawater Intakes: for Ocean Park at Deep Water Bay and The University of Hong Kong Swire Institute of Marine Science at Cape D'Aguilar
- Gazetted Bathing Beaches: St. Stephen's Beach and Chung Hom Kok Beach
- Fisheries: Po Toi Fish Culture Zone (FCZ) and Fish Spawning Grounds
- Sites of Special Scientific Interest (SSSI): Tai Tam Reservoir Catchment SSSI and Cape D'Aguilar SSSI
- Marine Reserve: Cape D'Aguilar Marine Reserve
- Coral Communities of Ecological Concern: Along coast of Round Island, southwest of Chung Hom Kok, Beaufort Island, Po Toi, Sung Kong and Waglan Island

A.3.7 WSRs are shown on **Figure A.4** and summarised in **Table A.5,** which also indicates the distance between the WSR and the closest alignment of the cable.

Table A.5: Closest Distances of WSRs to the Cable Alignment

CATEGORY	ID	SENSITIVE RECEIVERS	CLOSEST DISTANCE FROM CABLE ALIGNMENT (M)
Seawater Intake	I1	Ocean Park Training Yard Seawater Intake	>5km
	I2	Ocean Park Main Seawater Intake	>5km
	I3	The University of Hong Kong Swire Institute of Marine Science	>5km
Gazetted Bathing Beach	B1	Chung Hom Kok Beach (other side of peninsula)	2,300*
	B2	St. Stephen's Beach	580
FCZ	F1	Po Toi FCZ	1,420

CATEGORY	ID	SENSITIVE RECEIVERS	CLOSEST DISTANCE FROM CABLE ALIGNMENT (M)
Fish Spawning Grounds	F2	The southern and eastern waters through which the cable alignment passes	0
SSSI	S1	Tai Tam Reservoir Catchment SSSI	980
	S2	Cape D'Aguilar SSSI	>5km
Marine Reserve	M1	Cape D'Aguilar Marine Reserve	>5km
Coral Communities of Ecological Concern	C1	Coral communities along coast of Round Island	2,080
	C2	Coral communities along coast of southwest of Chung Hom Kok	920
	C3	Coral communities along coast of Beaufort Island	2,786
	C4	Coral communities along coast of Po Toi Island	1,020
	C5	Coral communities along coast of Sung Kong Islands	>3km
	C6	Coral communities along coast of Waglan Island	>3km

Note: * This is the shortest distance sediment could travel through the sea between the alignment and CHK Beach

A.4 Potential Sources of Impact

A.4.1 Cable installation will involve the following activities that have the potential to generate suspended solids:

- **Route Clearance.** Removal of obstacles along the cable route by grapnel.
- **Shore-end Cable Installation at Sha Shek Tan Beach (SST Beach) in CHK.** Pulling the cable and the electrical earthing cable through a duct on the beach and securing in the BMH.
- **Off-shore Cable Installation.** Cable burial by cable burial tool or shallow burial by divers at cable and pipeline crossings.
- **Emergency Cable Repair Works.** Bring a cable to the surface to effect repairs due to accidental damage, e.g. from anchors.

A.4.2 The potential for any adverse direct and indirect impacts to water quality from the installation of the cable are discussed below. There will be no adverse impacts to water quality from the operation of the cable and so these have not been assessed.

Route Clearance

A.4.3 For the majority of the alignment, the cable will be buried by an "Injector Burial Tool" or "Sledge Tool". Prior to this, a Route Clearance Operation (RC) and Pre-lay Grapnel Run (PLGR) will be conducted, in which a grapnel is dragged on the seafloor to remove large objects from the cable path. Such processes are intended to remove out of service cables and any debris or obstacles that may pose threat to cable laying. The depth of seabed that the grapnel is expected to penetrate during the route clearance will not be deeper than the target depth of the actual cable burial and grapnels would simply penetrate the seabed without jetting. Thus, the sediment release from the grapnel run is considered to be minimal and the volume of sediments that may arise is anticipated to be lower than that generated from cable laying works.

A.4.4 RC and PLGR are carried out for all cable laying projects and in none of the previous Project Profiles submitted for these projects has the RC and PLGR been predicted to cause unacceptable water quality impacts. As the same methods are to be used for this Project, the impacts arising from the RC and PLGR would be same as previous projects. Given the closest WSR is located far over 500m from the cable route, unacceptable water quality impacts are also not anticipated.

Shore-end Cable Installation at SST Beach in CHK

A.4.5 At the SST Beach landing point existing infrastructure is already in place, such as the BMH and the land-side cable conduit, and no new construction is required for the SJC2-HK Cable, other than shallow excavation works to enable the cable to enter the BMH.

A.4.6 In general, small tracked diggers will be used for the excavation and then small winch or hand pulling will be used to pull the cable into the BMH. Once the cable has been laid, the trench will be back filled with the original materials and reinstated to the original condition. Thereafter, the cable will be pulled through the land-side conduit up to the cable station on the headland by another winch at the cable station. Surface water runoff could potentially cause water quality impacts from land cable installation works. Also, there will be limited use of machinery for the land works, oil spillage from machinery could be a potential source of water quality impact. However, the surface water runoff and oil spillage could be prevented with the implementation of measures and good site practice discussed in **paragraph A.6.1**.

A.4.7 In the immediate vicinity of the shoreline at SST Beach the seabed is rocky and there are several other cables entering the BMH, so care will be taken when installing the SJC2-HK Cable. Because of this, shore-end installation in marine mud/sand (up to around 140m from the landing point) will be performed by divers using jetting techniques to form a narrow trench in the seabed, approx. 0.5m wide and to a depth appropriate to the site conditions on a “best endeavour” basis. Thereafter, cable protection, such as Articulated Pipe (AP), will be installed by divers as needed. After the cable is laid, the trench will naturally re-fill in a short space of time and the seabed will return to its original profile.

A.4.8 Considering that diver installation will be only for short sections of cable, will be carried out in a matter of hours, and will use less powerful jetting equipment, the sediment release is considered to be minimal. The seabed can therefore be expected to naturally reinstate to before-work levels and conditions shortly after completion of the works. As such, no significant water quality impact is anticipated for shore-end installation carried out by divers.

Off-shore Cable Installation

Burial Using a Cable-laying Vessel and Cable Burial Tool

A.4.9 The cable to the eastern boundary of Hong Kong waters (after the first 140m from the landing point) will be buried using jetting techniques to a depth of 5m by an “Injector Burial Tool” or “Sledge Tool” towed behind a cable-laying vessel.

A.4.10 On board the cable-laying vessel, the cable will be fed into the burial tool, which will lay the cable into the seabed at the target depth. The target burial depth within Hong Kong waters is approximately 5m below the seabed, except when crossing obstructions and in transient zones, i.e. the cable from the landing site will be buried by divers using jetting techniques to transition from the target burial depth of 2m below the beach to 5m below the seabed at a location near the coastline where the installation barge can be set up and deploy the 5m burial tool.

A.4.11 The cable burial tool uses localised high-pressure jets directly around the cable to fluidise a narrow trench in the seabed to the desired depth into which the cable is simultaneously laid and buried. The maximum width of the seabed fluidised by the burial tool is 0.5m and the disturbed area of the seabed will be limited to this width.

A.4.12 A dive team on the cable-laying vessel will be on standby during cable laying to ensure proper functioning and positioning of the burial tool. The cable-laying vessel towing the burial tool will travel at a maximum speed of 1km per hour or less along the cable alignment.

A.4.13 During the cable laying process, seabed sediments will be disturbed and a small percentage of sediment will be lost to suspension in the lower part of the water column in the immediate vicinity of the cable burial tool. The sediment along the trench area naturally slumps around the cable, burying it, and leaving a small line in the seabed, which is then infilled by natural sedimentation.

A.4.14 As the majority of the cable will be laid using an "Injector Burial Tool" or "Sledge Tool" the impacts from this have been assessed in **Section A.5** in a quantitative manner.

Shallow Burial at Crossings and Provision of Cable Protection

A.4.15 Where the SJC2-HK Cable needs to cross existing cables, the burial tool will be re-adjusted about 50m from the crossing location to a depth sufficient to allow a cushion of seabed material to remain above the cable or pipeline to be crossed. Additional protection for the cable will be provided by "Uraduct", if needed, and will be agreed with other cable owners in advance of installation. Once the cable has been crossed, the burial tool will be re-adjusted to achieve the target burial depth.

A.4.16 When crossing the HKE Gas Pipeline, which is buried around 3m below the seabed, a shallower burial depth is required. To avoid any interference with the HKE Gas Pipeline, at around 100m from the Pipeline the SJC2-HK Cable will be laid by divers at a depth possible/agreed with the Pipeline owner, over the top of the Pipeline. Since the cable is laid with shallow burial, it may be susceptible to anchor damage, additional cable protection by Uraduct will be needed for this 200m section.

A.4.17 Considering that diver installation will be only for short sections of cable, will be carried out in a matter of hours at each location, and will use less powerful jetting equipment, the sediment release is considered to be minimal. The seabed can therefore be expected to naturally reinstate to before-work levels and conditions shortly after completion of the works. As such, no significant water quality impact is anticipated for shallow burial at crossings carried out by divers.

Emergency Cable Repair Works

A.4.18 If a cable installed under the seabed is damaged by dropped objects or anchoring activities, cable repair works shall be required. These comprise route clearance prior to repair works; exposing the damaged cable section; reconnecting the damaged cable; and reburial of the repaired section that the laying of the repaired cable will follow the original cable alignment.

A.4.19 Considering that diver installation will be only for short sections of cable, will be carried out in a matter of hours, and will use less powerful jetting equipment, such as ROV, the sediment release is considered to be minimal. The seabed can therefore be expected to naturally reinstate to before-work levels and conditions shortly after completion of the works. As such, no significant water quality impact is anticipated for emergency cable repair works carried out by divers.

A.5 Impact Assessment

Calculations

A.5.1 In the following calculations, all of the values adopted for the SJC2-HK Cable lie within the range of values adopted in other recently approved Project Profiles for similar cable laying projects; all of the formulae that have been used for the SJC2-HK Cable are identical to those used in other recently approved Project Profiles for similar cable laying projects; and the approach for calculating settling velocity and settling time is the same as that used in other recently approved Project Profiles for similar cable laying projects, including UEL and PLCN. A list of values adopted in these calculations has been provided in an **Annex** to this Appendix, for reference.

Calculation of Sediment Release Rate

A.5.2 Calculation of sediment transport is based on the following approach with appropriate reference to EAC, ASE, APG, TKOE, UEL and PLCN. The upper limits for the parameters have been used in these studies for calculating the release rate, settling velocity and settling time and distance travelled for suspended sediments to account for a worst case scenario.

Release rate	= cross sectional area of disturbed sediment x speed of burial tool x sediment dry density x percentage loss
Depth of Disturbance	= 5m (burial depth of cable)
Width of Disturbance	= 0.5m (width of seabed disturbance as cable buried)
Max. Cross-sectional Area.	= 2.5m^2
Loss Rate	= 20% (majority of sediment not disturbed)
Speed of Burial Tool	= 0.278m s^{-1} (1km per hour)
In-situ Dry Sediment Density	= 600kg m^{-3} (typical of Hong Kong sediment)
Release Rate	**= 83.4kg s^{-1}**

A.5.3 The width of temporary disturbance during cable installation is approximately 0.25m from either side the centre line of the cable alignment, which is 0.5m in total. With reference to recently completed cable projects, the maximum speed of the cable-laying vessel (and therefore the burial tool) will be 1km per hour, as adopted above.

Initial Concentration of Suspended Sediments

A.5.4 During cable laying works, seabed sediment will be released at the bottom of the water column, which will result in high localised suspended sediment concentrations and high settling velocities. At high concentrations and within a localised area the suspended sediments will tend to form large aggregations of sediment particles (flocculation), which have a higher settling velocity than the individual particles.

A.5.5 It is expected that the suspended sediments will remain within 1m of the seabed, which is independent of the water depth. Current velocities at the seabed are lower than those near the water surface due to effects such as bottom friction. The current velocity has been chosen based on velocity values of cable projects with similar alignments to SJC2-HK.

A.5.6 For the purpose of the assessment, a current velocity of 0.9m s^{-1} has been applied, which is an upper bound estimate of bottom current velocities in the vicinity of the cable alignment and a conservative estimate. Based on recent data, this would be an absolute worst-case scenario.

A.5.7 It is expected that the sediment will initially spread to a maximum of 6m along the centre line of the trench, which represents the longitudinal dimension of the cable burial tool. Although the suspended solids are expected to form around the cable laying works, a conservative assumption has been used to allow for a cross-current to carry sediment towards the sensitive receivers.

A.5.8 Referring to the above, the worst case scenario is that the sediment initially mixes evenly over the lower 1m of the water column and over the initial length of spread of the sediment.

Initial concentration	= release rate ÷ (current speed x height of sediment x width of sediment)
Release Rate	= 83.4kg s^{-1}
Current Velocity	= 0.9 m s^{-1}
Height of Sediment	= 1m
Width of Sediment	= 6m
Initial Concentration	**= 15.44kg m^{-3}**

Settling Velocity and Settling Time

A.5.9 Typically, the settling velocity of suspended solids is determined by examining the relationship between the initial suspended solids concentrations and the cohesive nature of the sediment being disturbed. It is generally accepted that an increase in sediment concentrations also increases the settling velocity, a result of flocculation leading to gain in mass and therefore faster settlement. However, when initial concentrations exceed values such as 1kg m^{-3}

(*Hydraulics Research, Estuarine Muds Manual*, 1998), this is no longer true. As the initial concentrations for this Project are predicted to be greater than this value, a conservative settling velocity of 10mms^{-1} has been adopted.

A.5.10 As the sediment progressively settles onto the seabed, suspended sediment concentrations will gradually reduce. In order to account for the gradually reducing concentrations, the above settling velocity is halved, which gives a value of 5.0mm s^{-1}. This is the same approach as was adopted for the EAC, ASE, APG, TKOE, UEL and PLCN and others.

A.5.11 The time taken for the sediment to settle onto the seabed will thus be the maximum height of the sediment divided by the average settling velocity.

Settling Time = maximum height of sediment ÷ settling velocity
= 1m/0.005m s^{-1}
Settling Time = 200s (3.3 minutes)

Distance Travelled

A.5.12 Combining this settling time with the speed of the tidal currents allows an estimate of how far the sediment will spread during the cable laying process. In this case, a worst-case tidal current of 0.9 m s^{-1} has been assumed.

Distance Travelled = Settling Time x Speed of Tidal Current
= 200s x 0.9m s^{-1}
Distance Travelled = 180m

A.5.13 The above calculation indicates that the sediments disturbed during cable laying works will settle onto the seabed within approximately 180m of the trench and will settle within about 3.5 minutes.

Potential Impacts to WSRs

A.5.14 **Table A.6**, below, shows the 16 no. WSRs for the SJC2-HK Cable and examines the potential impacts based on distance from cable laying activities. Based on the sediment plume distance calculated above, WSRs located within the 180m maximum sediment settlement distance from the cable trench would likely be affected by the Project but WSRs located far beyond 180m would unlikely be affected (see **Figure A.4**).

A.5.15 The cable (and the majority of other existing cables) passes through Fish Spawning Grounds and so there may be short-term impacts during installation. None of the other WSRs are located within the 180m maximum sediment settlement distance from the cable trench, which means none will be directly affected by the Project. Also, other WSRs are located far beyond 180m of the cable trench, which means that they will unlikely be affected by the Project.

A.5.16 Considering the potential short-term impact to the Fish Spawning Grounds through which the cable (and the majority of other existing cables) passes and also to detect any unpredicted fisheries impact arising from the cable laying works on the nearest FCZ (although the nearest, Po Toi FCZ, is over 1.4 km from the cable trench and so adverse impact from the cable laying works is unlikely), it is recommend that water quality monitoring to be carried out along the cable project area which are near FCZ and spawning grounds of commercial fisheries resources as a precautionary measure.

Cumulative Impacts

A.5.17 While there are two projects planned in the vicinity of the SJC2-HK Cable, none of them will be constructed concurrently with the SJC2-HK Cable. As discussed in **Section 3.4**, given that the installation of the SJC2-HK Cable will not coincide with other projects, cumulative water quality impacts will not be an issue.

Table A.6: Water Quality Impact at WSRs During Cable Installation

CATEGORY	ID	SENSITIVE RECEIVERS	CLOSEST DISTANCE FROM CABLE ALIGNMENT (M)	POTENTIAL FOR ADVERSE IMPACT
Seawater Intake	I1	Ocean Park Training Yard Seawater Intake	>5km	None due to >>180m distance between WSR and cable trench
	I2	Ocean Park Main Seawater Intake	>5km	None due to >>180m distance between WSR and cable trench
	I3	Seawater Intake for The University of Hong Kong Swire Institute of Marine Science	>5km	None due to >>180m distance between WSR and cable trench
Gazetted Bathing Beach	B1	Chung Hom Kok Beach (other side of peninsula)	2,300*	None due to >>180m distance between WSR and cable trench
	B2	St. Stephen's Beach	580	None due to >>180m distance between WSR and cable trench
FCZ	F1	Po Toi FCZ	1,420	None due to >>180m distance between WSR and cable trench
Fish Spawning Grounds	**F2**	**The southern and eastern waters through which the cable alignment passes**	**0**	**Possible due to <180m distance between WSR and cable trench**
SSSI	S1	Tai Tam Reservoir Catchment SSSI	980	None due to >>180m distance between WSR and cable trench
	S2	Cape D'Aguilar SSSI	>5km	None due to >>180m distance between WSR and cable trench
Marine Reserve	M1	Cape D'Aguilar Marine Reserve	>5km	None due to >>180m distance between WSR and cable trench
Coral Communities of Ecological Concern	C1	Coral communities along coast of Round Island	2,080	None due to >>180m distance between WSR and cable trench
	C2	Coral communities along coast of southwest of Chung Hom Kok	920	None due to >>180m distance between WSR and cable trench
	C3	Coral communities along coast of Beaufort Island	2,786	None due to >>180m distance between WSR and cable trench
	C4	Coral communities along coast of Po Toi Island	1,020	None due to >>180m distance between WSR and cable trench
	C5	Coral communities along coast of Sung Kong Islands	>3km	None due to >>180m distance between WSR and cable trench
	C6	Coral communities along coast of Waglan Island	>3km	None due to >>180m distance between WSR and cable trench

Notes: * This is the shortest distance sediment could travel through the sea between the alignment and Chung Hom Kok Beach.

Other than the Fish Spawning Grounds, none of these WSRs are located within the 180m maximum sediment settlement distance from the cable trench, which means none will be directly affected by the Project.

Based on distance from the cable trench, WSRs within 180m, shown in Bold, might possibly be affected by the cable installation works.

A.6 Mitigation Measures

Shore-end Cable Installation

A.6.1 No adverse impacts are expected to occur during shore-end cable installation at SST Beach in CHK, but the following mitigation measures will nevertheless be followed to avoid potential water quality impacts due to surface runoff and oil spillage:

- Stockpiles of any materials will be covered with tarpaulin or similar fabric to minimise runoff during the rainy season.
- Care will be taken during the cable landing to avoid any spillage of materials to the adjacent marine waters and to ensure that any spoil materials are not discharged into adjacent waters.
- Machinery shall be checked before being in use at the work sites to ensure the land based area as well as water near the shore would not be polluted with oil/fuel spillage from the machinery. Maintenance and repair of machinery shall be carried out off-site to prevent chemical spillage during such servicing. In the event that such maintenance and repair are unavoidable on-site, measures such as drip trays shall be provided at any fuel connection point, e.g. between the delivery pipe and the fuel tank. Any spilled fuel shall be collected and taken off-site for proper treatment/disposal.
- All construction waste and drainage will be handled and disposed of in accordance with the *Waste Disposal Ordinance* and *Practice Note for Professional Persons, Construction Site Drainage (ProPECC PN1/94)*.
- Best Management Practices (BMPs) will be applied to avoid and minimise any contaminated runoff from work sites, marine plant and vessels.
- Provision of chemical toilet for workforce.

A.6.2 The cable alignment passes through Stanley Bay, which is used for water sports activities. The peak season for water sports activities is from mid-July to end-August and all days of Dragon Boat racing during the Tuen Ng Festival in June. To minimise potential nuisance to users of Stanley Bay (e.g. bathers at St. Stephen's Beach, participants of Dragon Boat races, etc.), including the St. Stephen's Beach Water Sports Centre (SSBWSC), the following measures will be implemented:

- Marine works within Stanley Bay will be avoided throughout the period from 1 June to 31 August inclusive. .
- The Project Proponent shall appoint a liaison officer for the Project so as to ensure effective communication during the marine works within Stanley Bay. Prior to the commencement of the work in Stanley Bay, the Project Proponent will liaise with LCSD and any other relevant parties (e.g. District Office regarding Dragon Boat race schedule) to establish an appropriate notification system prior to and during installation.
- The speed of the installation barge will be limited to a maximum of 1km per hour.

Marine Installation with Cable Burial Machine

A.6.3 No adverse impacts are expected to occur during marine installation of the cable with the cable burial tool, but the following measures will be followed:

- The crane barge used for the transport of any debris recovered from the seabed during route clearance shall be fitted with tight bottom seals in order to prevent leakage of material during loading and transport to the disposal site.
- The crane barge shall be filled to a level that ensures that material does not spill over during loading and transport and that adequate freeboard is maintained to ensure that the decks are not washed by wave action.
- The speed of the installation barge will be limited to a maximum of 1km per hour.

A.6.4 EM&A will be carried out along the cable project area which are near FCZ and spawning grounds of commercial fisheries resources as a precautionary measure. Details of monitoring locations are provided in **Appendix F**.

Emergency Cable Repair Works

A.6.5 Emergency cable repairs will be carried out by either the burial tool or divers using jetting tools that is of either same or less powerful than those used during cable installation. The repair works will be only for short sections of cable where damage is found and be carried out in a matter of hours. The seabed can be expected to naturally reinstate to before-work level and conditions shortly after completion of the repair works, similar to that of the cable installation As such, no significant water quality impact is anticipated for emergency cable repair works carried out by divers.

A.7 Conclusion

A.7.1 There will be limited use of machinery for the shore-end cable installation, oil spillage from machinery could be a potential source of water quality impact. However, oil spillage could be prevented with the implementation of measures and good site practice.

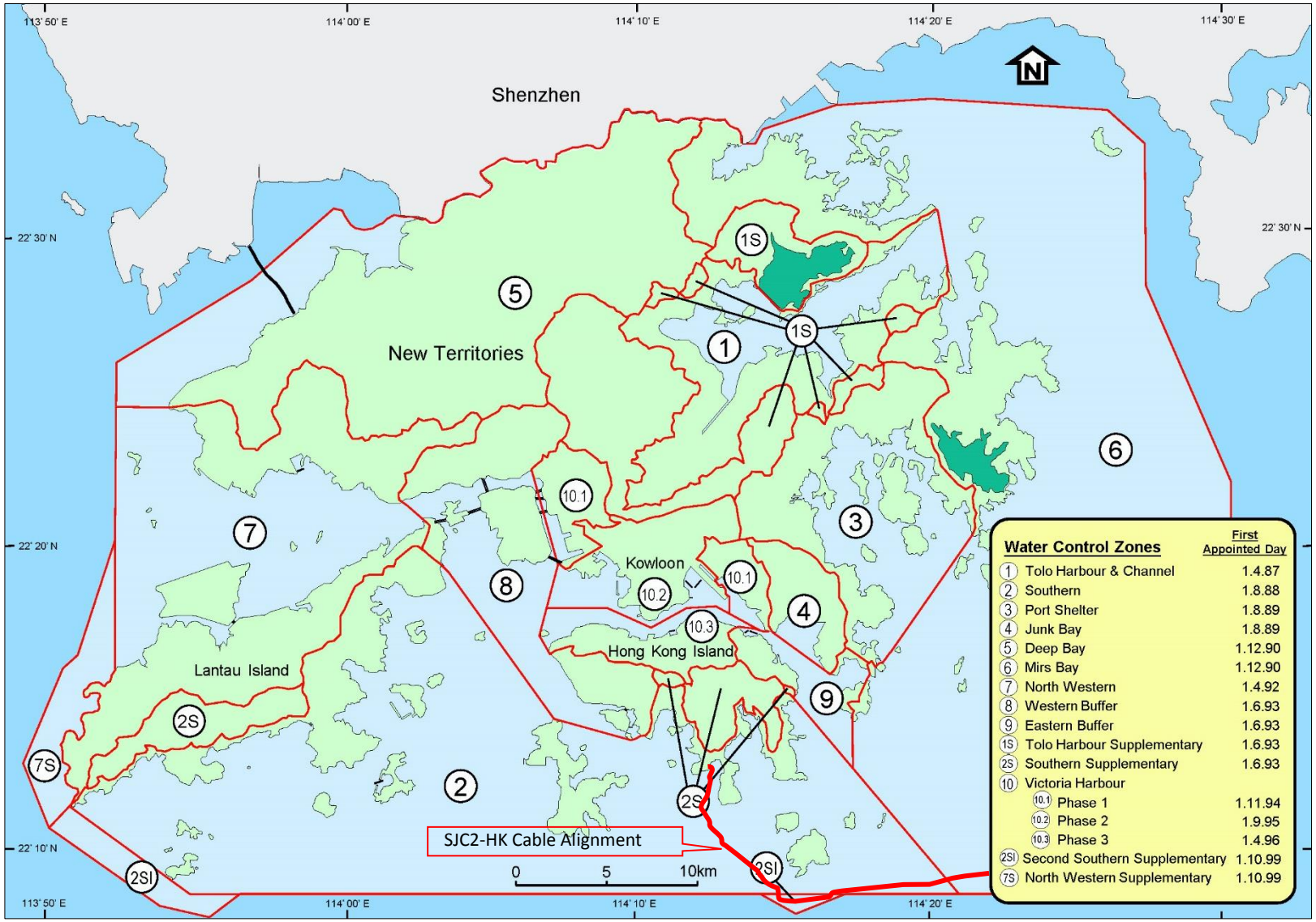
A.7.2 There is potential for small scale and localised water quality impacts to occur from cable installation works. The calculation of sediment transport from the cable laying works indicates that sediments disturbed during use of the cable burial tool will settle back to the seabed within a maximum of 180m of the cable alignment within about 3.5 minutes.

A.7.3 A total of 16 no. WSRs have been identified, including seawater intakes, gazetted bathing beaches, a FCZ, Fish Spawning Grounds, SSSIs, a Marine Reserve, and coral communities of ecological concern. The nearest of these to the cable alignment is St Stephen's Beach, a gazetted bathing beach, which is 580m from the cable alignment.

A.7.4 The cable (and the majority of other existing cables) passes through Fish Spawning Grounds and so there may be short-term impacts during installation. None of the other WSRs are located within the 180m maximum sediment settlement distance from the cable trench, which means none will be directly affected by the Project. Also, the other WSRs are located far beyond 180m of the cable trench, which means that they will unlikely be affected by the Project.

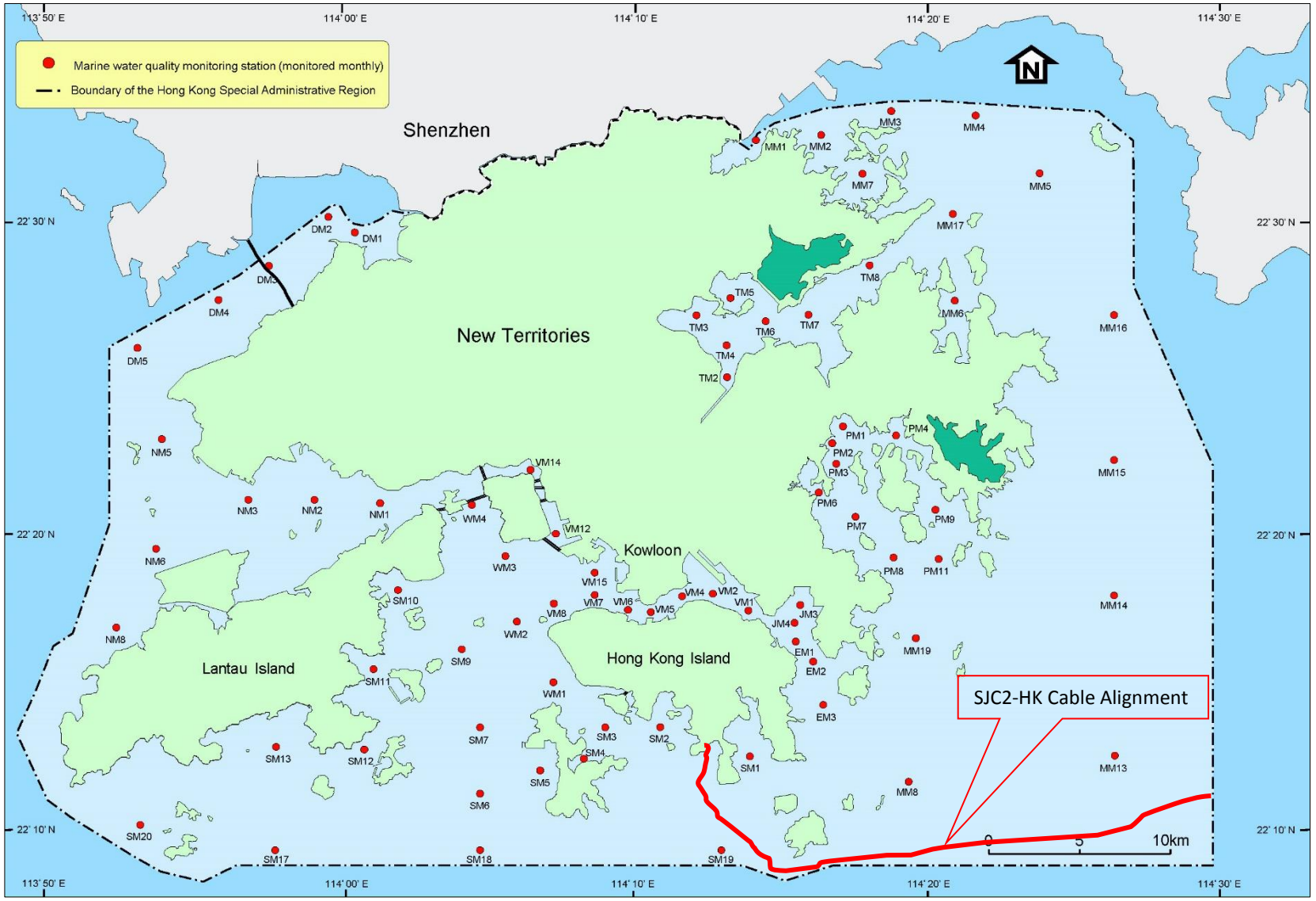
A.7.5 Overall, with the recommended mitigation measures in place, no adverse water quality impacts are anticipated from the cable installation works.

Figure A.1: Water Control Zones in Hong Kong



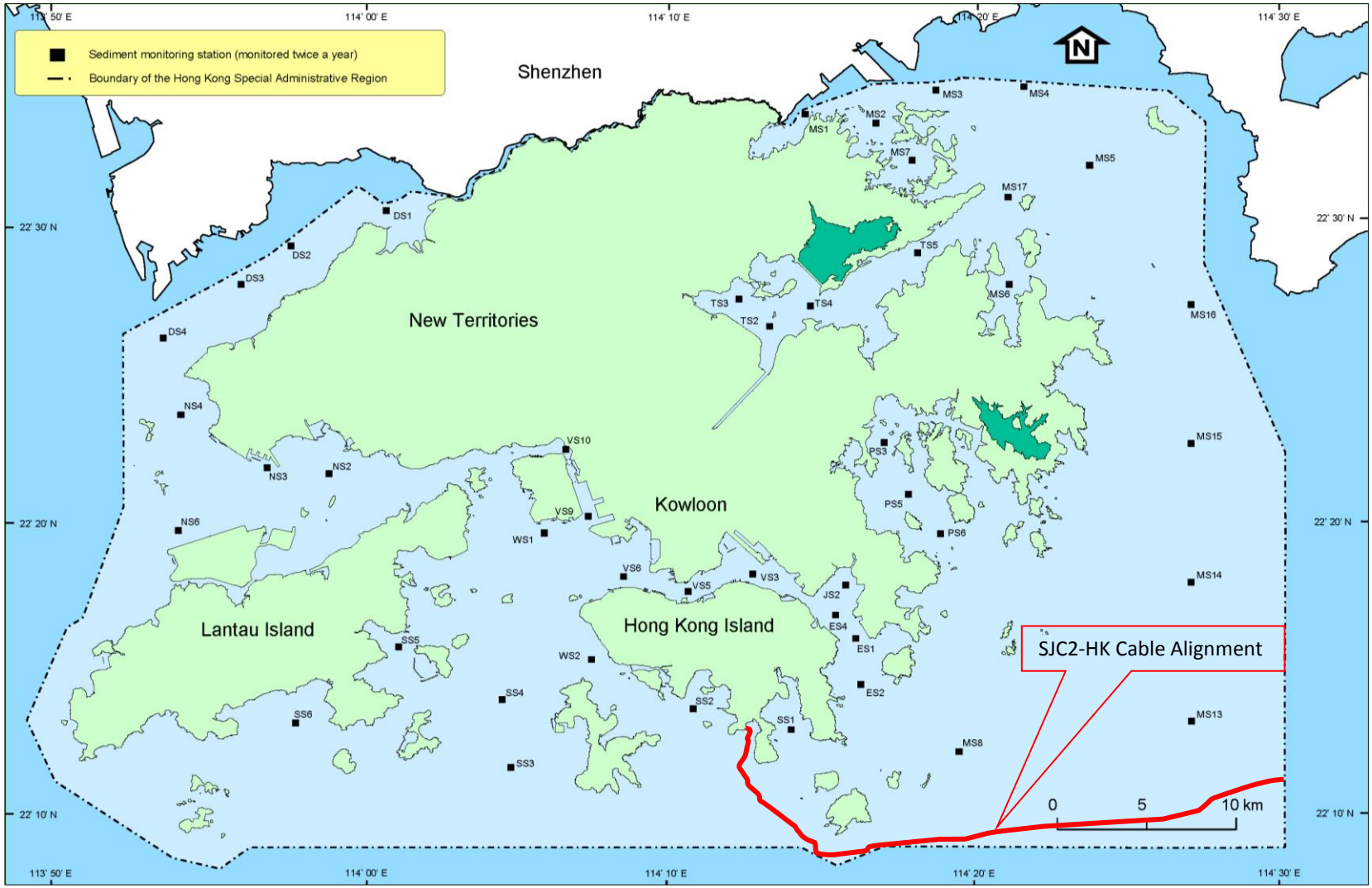
Source: EPD

Figure A.2: EPD's Marine Water Quality Monitoring Stations



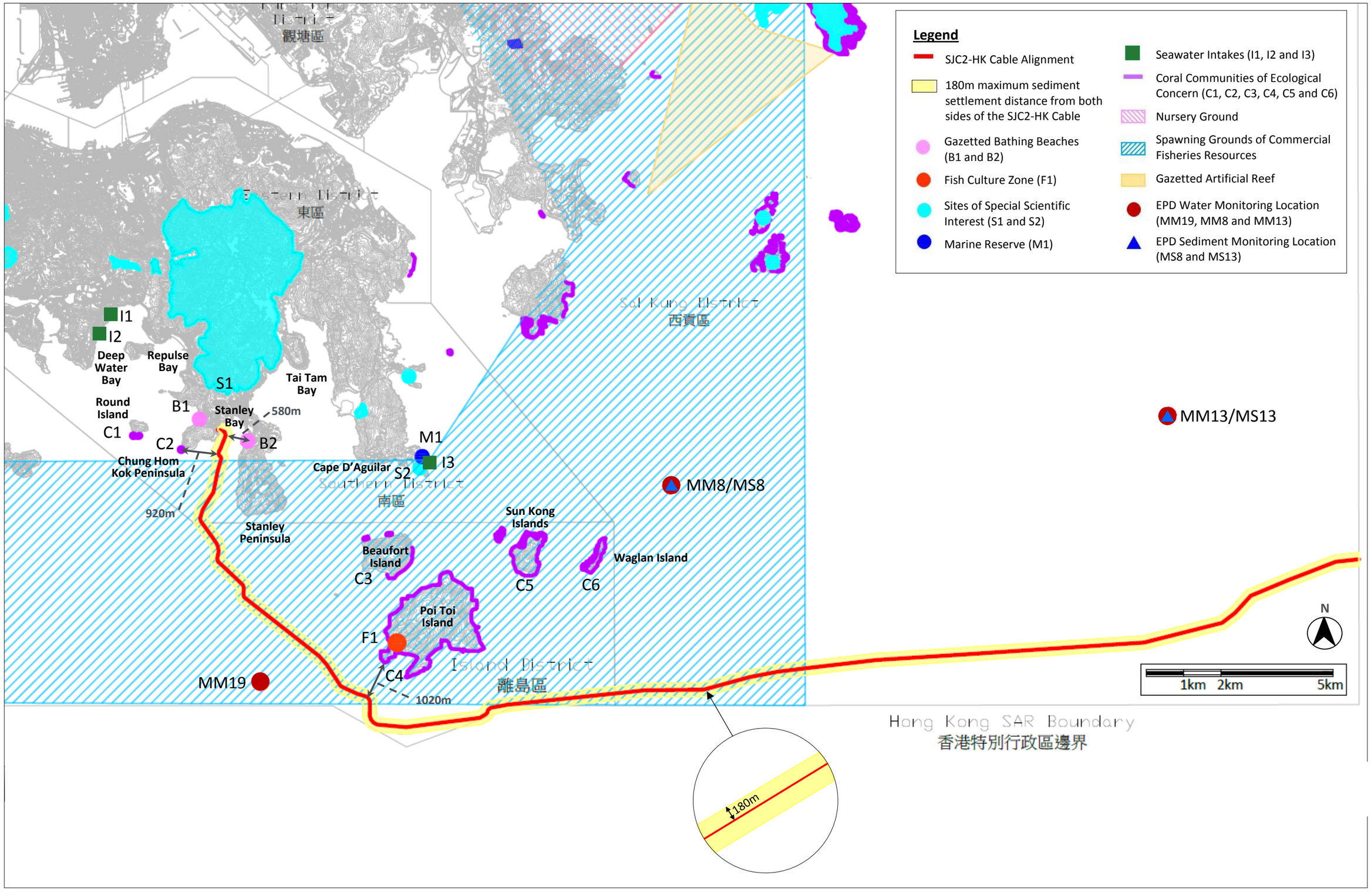
Source: EPD

Figure A.3: EPD's Marine Sediment Monitoring Stations



Source: EPD

Figure A.4: WSRs and EPD Monitoring Stations in the Vicinity of the SJC2-HK Cable Alignment



Annex

SUMMARY OF PARAMETERS USED IN SEDIMENT PLUME CALCULATIONS FOR OTHER SELECTED CABLE PROJECTS

PROJECT	SEDIMENT RELEASE RATE (KG/S)	INITIAL CONCENTRATION (KG/M^3)	DEPTH OF DISTURBANCE (M)	WIDTH OF DISTURBANCE (M)	MAXIMUM CROSS-SECTIONAL AREA (M^2)	LOSS RATE (%)	SPEED OF BURIAL TOOL (M/S)	IN-SITU DRY DENSITY (KG/M^3)	CURRENT VELOCITY (M/S)	HEIGHT OF SEDIMENT PLUME (M)	WIDTH OF SEDIMENT PLUME (M)
SJC2-HK (this Project)	**83.4**	**15.44**	**5**	**0.5**	**2.5**	**20**	**0.278**	**600**	**0.9**	**1**	**6**
Justification for Value Adopted	*Standard formula*	*Standard formula*	*As required by project*	*As required by project*	*Standard formula*	*Worst case amongst PPs*	*Adopted in most other PPs*	*Adopted in all other PPs*	*Adopted in most other PPs*	*Adopted in most other PPs*	*Adopted in all other PPs*
COMPARISON WITH OTHER PARAMETERS USED IN SEDIMENT PLUME CALCULATIONS FOR OTHER SELECTED CABLE PROJECTS											
HKA Submarine Cable - Chung Hom Kok (AEP-567/2019)	35.028	6.4867	5	0.21	1.05	20	0.278	600	0.9	1	6
Ultra Express Link (UEL) – Tseung Kwan O/Chai Wan (AEP-543/2017)	83.4	15.44	5	0.5	2.5	20	0.278	600	0.9	1	6
Pacific Light Cable Network (PLCN), Deep Water Bay (AEP-539/2017)	83.4	15.44	5	0.5	2.5	20	0.278	600	0.9	1	6
AAE-1 Cable – Cape D'Aguilar (AEP-508/2016)	(i) 500m to 2.5km = 24.9 (ii) 2.5km to 27.65km = 83.4	(i) 500m to 2.5km = 14.88 (ii) 2.5km to 27.65km = 15.44	5	0.5	2.5	20	(i) 500m to2.5km = 0.083m/s (ii) 2.5km to 27.65km =0.278m/s	600	(i) In vicinity of Cape D'Aguilar = 0.28 m/s (ii) In existing cable corridor = 0.90 m/s	1	6
Tseung Kwan O Express – Cable System (TKO-E) – Tseung Kwan O /Chai Wan (AEP-509/2016)	83.4	15.44	5	0.5	2.5	20	0.278	600	0.9	1	6
Asia Pacific Gateway (APG) – Tseung Kwan O (AEP-485/2014)	83.4	15.44	5	0.5	2.5	20	0.278	600	0.9	1	6
Asia Submarine-cable Express (ASE) – Tseung Kwan O (AEP-433/2011)	83.4	15.44	5	0.5	2.5	20	0.278	600	0.9	1	6
South-East Asia Japan Cable System (SJC) Hong Kong Segment (AEP-423/2011)	33.0	6.11	5	0.5	2.5	10	0.220	600	0.9	1	6
VSNL Intra Asia Submarine Cable System – Deep Water Bay (AEP-294/2007)	41.7	7.72	5	0.5	2.5	10	0.278	600	0.9	1	6
Proposed 132kV Submarine Cable Route for Airport "A" to Castle Peak Power Station Cable Circuit (AEP 267/2007)	13.2	1.47	5	2.0	5.0	20	0.022	600	1.5	1	6
132 kV Submarine Cable Installation for Wong Chuk Hang – Chung Hom Kok 132 kV Circuits (AEP132/2002)	3.33	1.39	5	1.0	2.5	20	0.011	600	0.4	1	6
Flag North Asian Loop (AEP099/2001)	41.7	4.63	5	0.25	1.25	20	0.278	600	0.5	3	6
New T&T Hong Kong Limited: Domestic Cable Route (AEP-086/2001)	37.53	3.48	9	0.25	2.25	10	0.278	600	0.9	2	6
C2C Cable Network – Hong Kong Section: Chung Hom Kok (AEP-087/2001)	20.85	2.90	5	0.25	1.25	10	0.278	600	0.6	2	6

Appendix B MARINE ECOLOGY ASSESSMENT

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Appendix B

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B MARINE ECOLOGY ASSESSMENT

B.1 Introduction

B.1.1 This appendix provides an assessment of marine ecology impacts associated with the installation of the SJC2-HK Cable, and may be read in conjunction with the water quality assessment in **Appendix A**.

B.2 Relevant Legislation and Assessment Criteria

B.2.1 The following legislation and associated guidance or non-statuary guidelines are applicable to the evaluation of ecological impacts:

- Environmental Impact Assessment Ordinance (Cap. 499. S.16) and the Technical Memorandum on EIA Process (EIAO-TM), Annexes 8 and 16
- Water Pollution Control Ordinance (WPCO)

EIAO-TM

B.2.2 Annexes 8 and 16 of the EIAO-TM provide general guidelines and criteria to be used in assessing ecological impacts. Besides magnitude and scale of impact, the EIAO-TM recognises that the significance of an ecological impact is also related to the asserted importance of the habitat or species affected – in general, the impact on an important habitat or species will be more significant in comparison to other less important ones.

Water Pollution Control Ordinance (WPCO)

B.2.3 The WPCO is the primary legislation for the control of water pollution and water quality in Hong Kong. There are a total of ten Water Control Zones (WCZ) and four supplementary WCZs in Hong Kong. Each WCZ has its own set of Water Quality Objectives (WQOs).

B.2.4 The WQOs recognise that marine waters need to be protected to ensure that they are fit for marine life growth and different human uses in a sustainable manner. In general, waters with more sensitive uses, including sanctuaries for important species such as the Chinese White Dolphin, require a higher level of protection (i.e. with more stringent WQOs) compared to water bodies with less sensitive uses such as navigation. Sensitive water bodies are mostly found in the eastern and southern waters of Hong Kong.

B.3 Description of the Marine Environment

B.3.1 Calculations in **Appendix A** indicate that the sediments disturbed during cable laying works will settle onto the seabed within a maximum of 180m of the cable trench and will settle within about 3.5 minutes.

B.3.2 As shown in **Table A.5**, the closest ecologically sensitive receiver, a coral community of ecological concern, is some 920m from the cable alignment. The next closest ecologically sensitive receiver, a Site of Special Scientific Importance (SSSI), is some 980m from the cable alignment. The Cape D'Aguilar Marine Reserve is >5km from the cable alignment.

Coastal Protection Area (CPA)

B.3.3 The BMH and shore beach section of the cable route are within land zoned as CPA, which stretches along the length of the coastline of CHK and is discussed in **Section 3.3.2** and in **Section 3.3.3**. The following sections assess the assemblages below the CPA and environment near the landing point.

Coral Communities

B.3.4 **Figure B.1** shows the coral communities of ecological concern identified along the SJC2-HK Cable. The closest coral communities to the cable alignment include those along coast of southwest of Chung Hom Kok (920m) and along coast of Po Toi (1,030m). Other coral communities are more than 1,500m from the cable alignment and so will not be affected.

B.3.5 The following description is based on a review of previous marine ecological assessments carried out for similar projects in the same area, in particular South-East Asia Japan Cable System (SJC) and Hong Kong-America (HKA) Submarine Cable Network, which have the same landing site and similar alignment to the SJC2-HK Cable, and are considered applicable to the SJC2-HK Cable.

Intertidal Soft Bottom Assemblages

B.3.6 The landing site at Sha Shek Tan Beach (SST Beach) is located on a sandy beach sandwiched between rocky/boulder headlands at each end, which is typical of the Southern coastline of Hong Kong Island.

B.3.7 A survey of intertidal soft bottom assemblages carried out at the SST Beach landing site for the C2C Cable Network Study in 2000[Ref.#1] shows that the landing point is a natural, semi-exposed sandy shore. The landing site is suspected to have been subject to human disturbance since some remains of village houses were seen at the back of the beach. The substratum of the shore was mainly composed of fine sand and small-sized gravels. The intertidal assemblages recorded on the sandy shore in the 2000 survey were mainly composed of bivalves (clams), a common species, with an abundance of 668.4/m^2. No species of conservation interest were recorded.

B.3.8 Another survey of intertidal soft bottom assemblages carried out more recently in 2018 for the HKA Cable[Ref.#2] shows similar results to the 2000 survey, with two common species of clams with an abundance of 354/m^2 recorded. Again, no species of conservation importance were identified.

B.3.9 It can be concluded from the surveys in 2000 and 2018 that while the intertidal soft bottom assemblages at the landing site have high abundance, the diversity is low and so the landing point is considered to have low ecological value.

Intertidal Hard Bottom Assemblages

B.3.10 Two surveys[Ref.#1,#3] of intertidal hard bottom assemblages were conducted within or in close to SST Beach in 2000. One of the surveys conducted in the vicinity of the landing site indicated that the assemblage structure on the shores was considered to be typical of semi-exposed rocky shores in Hong Kong and no species of conservation importance were recorded. The abundance of mobile organisms, including limpets and snails, ranged from 16.8/m^2 to 102.7/m^2 and the percentage coverage of sessile organisms, including bivalves, barnacles and macroalgae, ranged from 0.01% to 1.6%. The other survey was conducted along the southern side of CHK Headland and similar results to the landing site at CHK were obtained. The areas were found to be typical of semi-exposed or exposed intertidal assemblages in Hong Kong. No species of conservation interest or that are regarded as rare were recorded. The abundance of mobile organisms, including limpets and snails, ranged from 26.7/m^2 to 61.6/m^2 and the percentage coverage of sessile organisms, including bivalves, barnacles and macroalgae, ranging from 2.4% to 21.1%.

B.3.11 Another survey of intertidal hard bottom assemblages carried out more recently in 2018 for the HKA Cable[Ref.#2] found a total of 37 flora and fauna species, all of which were considered to be common and widespread species, typical of Hong Kong's rocky shores. This survey showed that both the abundance and density of mobile species and percentage cover of sessile species were low to moderate, ranging from 62/m^2 to 175/m^2 and from 24% to 51%, respectively.

1. Environmental Permit (EP-087/2000) Project Profile for C2C Cable Network – Hong Kong Section: Chung Hom Kok, GB21 (Hong Kong Limited).
2. Environmental Permit (EP-567/2019) Project Profile for HKA Submarine Cable – Chung Hom Kok.
3. Environmental Permit (EP-086/2001) Project Profile for New T&T Hong Kong Limited Domestic Cable Route.

B.3.12 It can be concluded from the surveys in 2000 and 2018 that while the intertidal hard bottom assemblages at the landing site have generally low to moderate abundance and density and so the landing point is considered to have low to moderate ecological value.

Subtidal Soft Bottom Assemblages

B.3.13 The *Consultancy Study on Marine Benthic Communities in Hong Kong* (referenced in the Project Profile for HKA Cable[Ref.#2]) provides information on the subtidal soft bottom assemblages in the area around the HKA Cable. Twelve sampling stations (Sampling Nos. 63-74) along the HKA Cable alignment are also applicable to the SJC2-HK Cable alignment and so data from these stations are considered to be representative of the subtidal soft bottom assemblages along the alignment of the SJC2-HK Cable.

B.3.14 The *Consultancy Study* revealed that the substratum of the sampling stations was covered by very fine sand and/or silt/clay. The benthic assemblages of these stations were typical of Hong Kong waters and similar to benthic assemblages in many of the other subtidal habitats in Hong Kong. For the summer season, the average number of species was medium (35/0.5m^2), while the average number of individuals (170/m^2) and average wet weight (41.7g/m^2) were low when compared with average values of Hong Kong (33 species/0.5m^2, 540 individuals/m^2 and 71.2g/m^2 wet weight). For the winter season, the average number of species (29/0.5 m^2) and average wet weight (32.0g/m^2) were medium, while the average number of individuals (170/m^2) was low in comparison with average values of benthic assemblages in Hong Kong (34 species/0.5m^2, 450 individuals/m^2 and 28g/m^2 wet weight). For the summer season, five stations showed high diversity (>3) while seven showed only medium diversity (2 to 3) in comparison with other survey areas. Species diversity was lower for the winter season with only two stations showing high diversity while others were of medium diversity. For both summer and winter seasons, no species of conservation importance were found in the vicinity of the SJC2-HK Cable.

B.3.15 It can be concluded that the landing point is considered to have low ecological value in terms of subtidal soft bottom assemblages.

Subtidal Hard Bottom Assemblages

B.3.16 A survey of subtidal hard bottom assemblages carried out in 2000 for the C2C Cable Network Study [Ref.#1] shows that both hard coral and octocoral species were identified in the shallow (-2 to -5mCD) and deep (-6 to -8.5mCD) water regions at SST Beach and its surrounding areas. Both hard corals and soft corals were observed in this survey and both had a percentage cover that varied between only 1 and 10%. A total of 11 species of hard corals were found, including *Favia speciosa, Favites abdita, Goniastrea aspera, Platygyra sinensis, Stylocoeniella guentheri, Goniopora columna, Porites lobata and Psammocora superficialis*. Octocoral, such as *Dendronephthya* spp and other Gorgonians, were found, however, most of them were not identified to genus level. The ecological value of the subtidal hard bottom habitat in the surroundings of SST Beach was considered low.

B.3.17 According to a more recent survey of subtidal hard bottom assemblages carried out for the SJC Cable in 2011[Ref.#4], no rare species of conservation interest were identified. There were patches of hard corals found, but the abundance of these organisms was very low. Also, in the vicinity of the SST Beach landing site, hard coral cover was below 5% and only 12 colonies (16 to 480/cm^2) of nine coral species were recorded. All species are commonly found in local waters. Among these species, *Plesiastrea versipora, Goniopora stutchburyi and Oulastrea crispate* are more tolerate to sedimentation and more common in the southern and western Hong Kong waters.

4. Environmental Permit (EP-433/2011) Project Profile for South-East Asia Japan Cable System (SJC) Hong Kong Segment, Chung Hom Kok (China Telecom (Hong Kong) International Limited).

B.3.18 Another survey of subtidal hard bottom assemblages carried out even more recently in 2018 for the HKA Cable[Ref.#2] recorded corals at the landing site at SST Beach, but all coral species are considered common species and have a widespread distribution throughout Hong Kong's nearshore waters. Surveys conducted near the proposed landing site at SST Beach showed that the shallow depth zone (-2 to -5mCD) was dominated by sands, bedrocks and large boulders. A total of six, seven and two common hard coral species were recorded at the three survey stations at SST Beach. The estimated hard coral covers were below 5% while octocorals and black corals were not recorded at the shallow depth zone of these three stations.

B.3.19 This survey also revealed that five species of macroalgae were also recorded at the proposed landing site, with high estimated cover of 31 to 75%. The majority of the macroalgae was *Colpomenia sinuosa* and *Sagassum hemiphyllum*, with most individuals of *Sagassum hemiphyllum* having large size of around 0.5 –3.0 m in length. The indicative locations of the subtidal hard coral is shown in **Figure B.2**. The results from this recent survey showed that sparse hard coral colonies of locally common, widely-distributed species are present in the vicinity of the landing site.

B.3.20 It can be concluded from the surveys in 2000, 2011 and 2018 that the overall abundance and diversity of hard corals below in the context of subtidal hard bottom habitats in Hong Kong, and so the landing point is considered to have low ecological value.

B.3.21 Overall, the subtidal areas in the vicinity of the SJC2-HK Cable landing and route are of low to medium ecological value in comparison to other areas of Hong Kong[Ref.#1 to #5].

B.3.22 There are coral communities of high ecological value along the entire coast of Po Toi Island, Sung Kong and Waglan Island and along the south-eastern coast of Beaufort Island as well as along the south-western coast of Chung Hom Kok. The shortest distance of the cable alignment to the southern Po Toi coast is around 1,030m and to the southwest Chung Hom Kok coast is around 920m.

Marine Mammals

B.3.23 The Indo-pacific Humpbacked Dolphin (*Sousa chinensis*), locally known as the Chinese White Dolphin, and the Indo-Pacific Finless Porpoise (*Neophocaena phocaenoides*) are the two species of marine mammals regularly sighted in Hong Kong waters. They are also the only two residential marine mammal species in Hong Kong.

B.3.24 Based on the latest research[Ref.#6], in 2018 important Chinese White Dolphin habitats are mostly located along the coastal waters of West Lantau, stretching from Tai O Peninsula to Fan Lau and Kau Ling Chung. In the past seven years, Chinese White Dolphin habitat use patterns were mostly consistent in West Lantau, but their usage there has progressively diminished in 2016 and 2017. In Southwest Lantau waters, Chinese White Dolphin usage was higher and more evenly spread in 2014-17 than in earlier years. In the North Lantau region, Chinese White Dolphin occurrence has greatly diminished in recent years, and was largely confined to the area around Lung Kwu Chau in 2016. However, the dolphin numbers in Northwest Lantau in 2017 have bounced back to the 2014 levels, albeit still at a very low level when compared to earlier years. **Figure B.3** shows the distribution of Chinese White Dolphins in Hong Kong waters over the past six years. The proposed cable alignment of SJC2-HK will travel south and southeast after leaving the landing point at CHK and will not pass through any of the identified areas with sightings of the Chinese White Dolphin found.

5. Environmental Permit (EP-294/2007) Project Profile for VSNL Intra Asia Submarine Cable System – Deep Water Bay.

6. Monitoring of Marine Mammals in Hong Kong Waters (2017-18) Final Report (1 April 2017 to 31 March 2018) dated 10 July 2018, Hong Kong Cetacean Research Project Ref. AFCD/SQ/174/16, published by AFCD.

B.3.25 The Finless Porpoise is the most common and important species of cetacean in the southern waters of Hong Kong. The distribution of this species appears to vary on both a temporal and spatial basis. Overall, abundance in Hong Kong appears to peak in spring and be lowest in the autumn[Ref.#7].

B.3.26 Based on the latest research[Ref.#6], during the 2017-18 monitoring period, most of the finless porpoise sightings were concentrated in waters around Shek Kwu Chau and Tai A Chau, and between these two islands. Some porpoise groups were also sighted in Pui O Wan, between Cheung Chau and Shek Kwu Chau, and around the Po Toi Islands. There were a handful of sightings made around Cheung Chau, near Lamma Island, at the offshore waters of Sai Kung survey area, and at the juncture of Po Toi and Ninepins survey areas. Most of the sightings of porpoise near Po Toi Islands and at the juncture of Po Toi and Ninepins Islands are sightings made during summer/autumn months. **Figure B.4** shows the distribution of Finless Porpoises in Hong Kong waters over the past four years during the wet season and the dry season.

B.4 Impact Assessment

Direct Impact to Coral Communities

Intertidal Hard Bottom Assemblages

B.4.1 The BMH, where the cable will land, is above the intertidal area. The proposed landing site is a sandy beach, and without a rocky substrate, coral communities will not be present. As concluded in the water quality assessment in **Appendix A**, with the recommended mitigation measures in place, no adverse water quality impacts are anticipated from the shore-end cable installation works. On this basis, no adverse impact to intertidal shore assemblages from the installation of the SJC2-HK Cable is expected. No direct impact is therefore expected as a result of the shore-end construction activities.

Intertidal and Subtidal Soft Bottom Assemblages

B.4.2 The soft bottom benthic assemblages present at the intertidal and subtidal habitats along the cable trench will be affected directly in short term period. However, once cable laying operations are completed, the benthic fauna similar to the assemblages presented before construction activities commenced are expected to recolonise the soft bottom habitats. Thus, direct impacts to soft bottom benthic assemblages are anticipated to be short term and insignificant.

Subtidal Hard Bottom Assemblages

B.4.3 As the cable will land at an existing BMH and enter an existing conduit under the concrete ramp at the top of the beach, the subtidal rocky habitat along the coastline of SST Beach will not be affected. The cable laying and electrical earthing system will be installed by diver(s) in a shallow area near the proposed landing point to avoid direct impacts on the hard bottom habitats and minimise the impacts on coral colonies. Sparse hard coral colonies of locally common, widely-distributed species were found in the vicinity of the landing site by a recent survey. Therefore, installation by diver(s) using less powerful hand held jetting tools and by selecting a route in soft bottom habitat with low coral coverage and ecological value will avoid direct impacts on the hard bottom habitats and coral colonies near the landing site. As a result, no direct impact to the coral colonies of the sparse hard coral colonies in the vicinity of the proposed cable alignment near SST Beach is anticipated. However, as a precautionary measure, a pre-installation and post-installation coral survey in the vicinity of the landing site will be implemented to verify corals near the landing site, if any, would not be directly affected by the installation – this is discussed in more detail in **Section B.6** and in **Appendix F**.

7. Jefferson TA, Hung SK, Law L, Torey M, Tregenza N (2002) Distribution and Abundance of Finless Porpoises in Hong Kong and Adjacent Waters of China. Raffles Bulletin of Zoology, Supplement 10: 43-55 (cited in the Project Profile for the APG Cable System).

B.4.4 There will be no direct impact to the coral communities of ecological concern located along the entire coast of Po Toi Island, Sung Kong Islands and Waglan Island and along the south-eastern coast of Beaufort Island as well as along the south-western coast of Chung Hom Kok. This is because of the significant distance of over 900m from the cable alignment to these coral communities . As concluded in the water quality assessment in **Appendix A**, with the recommended good site practices in place, no adverse water quality impacts are anticipated from the cable installation works. On this basis, no adverse impact to sub-tidal hard bottom assemblages from the installation of SJC2-HK Cable is expected.

Indirect Impact to Coral Communities

B.4.5 Based on a number of assumptions that are commonly adopted for many cable projects (see **Annex to Appendix A**), including the forward speed of the cable-laying vessel being limit to a maximum of 1 km per hour, calculations in **Appendix A** show that sediments disturbed during use of the cable burial tool will settle back to the seabed within a maximum of 180m of the trench within about 3.5 minutes. Thus, the maximum extent of any plume generated by cable laying works will be 180m.

B.4.6 Given that the coral communities of ecological concern closest to the cable alignment, i.e. along south-western coast of CHK and along coast of Po Toi, are located far away – 920m and 1,030m from the alignment – potential disturbance from the plume generated by the cable laying works is not expected. Also, considering the short duration of disturbance from the cable burial tool at a single time at single location, the impact arising from the installation works will be insignificant.

Direct Impact to Marine Mammals

B.4.7 There is record[Ref.#8] showing that vessel collisions could be one of the factors contributing to death of cetaceans and the animals had probably been killed by vessels routinely travelling at speeds in excess of 40km/h. It is believed that collisions caused by the high-speed vessels pose a high risk to cetaceans. Considering that the maximum speed of the cable-laying vessel will be just 1km/h, the risk of vessel collisions with cetaceans will be very small. Thus, direct impact to marine mammals caused by vessel collision is not anticipated.

Indirect Impact to Marine Mammals

B.4.8 An increase in underwater noise and vibration is anticipated to occur during the cable installation works, from both marine vessels and water jet. Marine mammals, in particular Finless Porpoises that frequent the south-eastern waters of Hong Kong during the wet season (June to November), are sensitive to the impacts of marine noise, because they use sonar clicks for communication, navigation and prey location.

B.4.9 Studies of the Finless Porpoise suggest that it produces sonar clicks at a peak frequency of 142kHz[Ref.#9]. With regard to the potential construction phase impacts, marine jetting works and cable laying barges typically emit sound in the range of 0.02 to 1 kHz[Ref.#9,#10], which is generally below the hearing range of Finless Porpoises. Construction noise levels are also generally below the 8 to 90 kHz hearing range of Chinese White Dolphins[Ref.#11], although this species is uncommon outside its preferred estuarine habitat in the western waters of Hong Kong.

8. E. C. M. Parsons and T. A. Jefferson (2000) Post-Mortem Investigations on Stranded Dolphins and Porpoises from Hong Kong Waters. Journal of Wildlife Diseases: April 2000, Vol. 36, No. 2, pp. 342-356.

9. Goold J.C. and Jefferson T.A. (2002). Acoustic signals from free-ranging finless porpoises (*Neophocaena phocaenoides*) in waters around Hong Kong. The Raffles Bulletin of Zoology Supplement 10:131-139.

10. Popper, A.N., Fay, R.R., Platt, C. and Sand, O. (2003). Sound Detection Mechanisms and Capabilities of Teleost Fishes. In: Collin, S.P. and Marshall, N.J. (eds.). Sensory Processing in Aquatic Environments. Springer Verlag, New York, 3-38.

11. Richardson, W.J., Greene, C.R. Jr., Malme, C.I. and Thomson, D.H. (1995). Marine Mammals and Noise. Academic Press, San Diego, 576 pp

B.4.10 Considering that the marine jetting works and cable laying barges typically emit sound which is of much lower frequency than the sonar clicks produced by Finless Porpoises, the works will not affect marine mammals. Thus, it is anticipated the operation of the jetting works and vessels will not cause indirect impact to the Finless Porpoise.

B.4.11 As shown in **Figure B.3**, the cable is not located in areas frequented by the Chinese White Dolphin and so this species will not be adversely impacted by cable laying.

B.4.12 As shown in **Figure B.4**, part of the SJC2-HK Cable, i.e. from the CHK landing point to south of the CHK landing point, will be in areas where the Finless Porpoise was observed during dry season (from December to May), whereas while the remainder of the Cable, i.e. in the southern to south-eastern waters, will be located in an area that where Finless Porpoise has been observed during wet season.

B.4.13 Calculations in **Appendix A** show that sediments disturbed during use of the cable burial tool are not expected to rise more that 1m above the seabed and so any disturbed sediment will be confined near the seabed and will settle back to the seabed within a maximum of 180m of the trench within about 3.5 minutes.. Indirect impacts may occur due to the suspended sediment but are anticipated to be short-term and transient at any location.

B.4.14 The anticipated timing for landing and installation the cable is during the second quarter (April to June) of 2020, as stated in **paragraph 2.2.1**. Although the anticipated construction programme implies that landing and installation of cable will straddle the dry and wet seasons, marine mammals are highly mobile and can swim into open waters to avoid short term and localised seabed disturbance. Also, marine mammals are air-breathing so that any sediment plume they may encounter will have no effect on their respiration. Thus, it is anticipated the landing and installation of cable will not cause indirect impact to the Finless Porpoise.

B.4.15 These marine mammals feed on numerous species of fish, including lion head fish *Collichthys lucida*, various croakers *Johnius spp* and anchovies *Thryssa* spp. Impacts due to suspended sediments will be short-term and transient, and so are not anticipated to adversely impact the availability of fish. Hence, there is unlikely to be any significant impact to the food sources for marine mammals.

B.4.16 Nevertheless, as a precautionary measure, a marine mammal exclusion zone will be implemented during cable laying to mitigate potential indirect impacts on Finless Porpoises – this is discussed in more detail in **Section B.6** and in **Appendix F**.

B.4.17 Given the temporal and spatial distribution of Chinese White Dolphins and Finless Porpoises, and with the implementation of recommended mitigation measures as needed, it is not anticipated that there will be any significant adverse impact on marine mammals caused by cable installation works, which will be temporary and carried out by one slow-moving cable installation barge.

Direct and Indirect Impact to Species of Conservation Importance

B.4.18 Ecological surveys carried out for previous cables with similar alignments and the same landing point at SST, such as the HKA Cable, SJC Cable, C2C Cable, did not identify any species of conservation importance – such as Amphioxous – that could be impacted, directly or indirectly by the installation and operation of cables.

B.4.19 Similarly, it is not considered that the installation and operation of the SJC2-HK Cable would impact directly or indirectly any species of conservation importance.

Direct Impact to CPA

B.4.20 The BMH and short beach section of the cable route are within land zoned as CPA, which stretches along the length of the coastline of CHK. Considering the small scale and very short period of cable burial works to be carried out at the landing site, the impacts arising from the works at the landing site, which is within the CPA, will be insignificant. A limited amount of existing concrete and soft sand will be removed and reinstated. These works will be minimal and temporary. Flora and fauna will not be affected and the works area will be reinstated once the land based works are completed. Ecological surveys carried out for previous cables with the same landing point at SST, such as the HKA Cable, SJC Cable, C2C Cable, did not identify any species of conservation importance. There will be overall no terrestrial ecological impacts caused by the Project. Therefore, the CPA will not be permanently affected by this Project.

B.4.21 Although the cable unavoidably land within the CPA, this is an established use as there are several other cables have also landing within the CPA. The proposed SJC2-HK Cable will utilise the existing BMH and existing conduits that are used by other cables for connection to the CLS. Thus, the installation works have this been kept minimal and the impacts arising from the works at the landing site within the CPA will be insignificant.

B.4.22 The works area within the CPA is a sandy beach and existing BMH within an area of concrete hardstanding. Based on desk study and site inspection, no species of conservation importance have been identified in the works area.

Impact During Operation

B.4.23 During normal operation of the SJC2-HK Cable, impacts to marine ecological resources are not anticipated. However, in the event that the cable becomes damaged, repair work at the same location will be required. The cable repair works will be carried out by either the burial tool or divers using jetting tools that is of either same or less powerful than those used during cable installation, and so the seabed can be expected to naturally reinstate to before-work level and conditions shortly after completion of the repair works, similar to that of the cable installation. The impacts from any future cable repair work are expected to be smaller than for the cable installation and so no adverse marine ecological impacts are anticipated during operation.

Cumulative Impacts

B.4.24 While there are two projects planned in the vicinity of the SJC2-HK Cable, none of them will be constructed concurrently with the SJC2-HK Cable. The Project Proponent of SJC2-HK Cable will appoint a Liaison Officer who will be responsible for liaising with the Project Proponent of other projects to avoid overlapping of marine works with other projects. As discussed in **Section 3.4**, given that the installation of the SJC2-HK Cable will not coincide with other projects, cumulative marine ecological impacts will not be an issue.

B.5 Impact Evaluation

B.5.1 An evaluation of the impact in accordance with the EIAO TM Annex 8 Table 1 is presented below.

Habitat Quality

B.5.2 Short-term direct impact are predicted to occur to subtidal soft bottom habitat along the cable trench and short-term indirect impacts to intertidal and subtidal hard bottom habitats in the vicinity of the cable route, such as the natural soft sandy beach at the landing site, as well as the identified patches of hard corals. Nevertheless, no rare species of conservation interest and importance are susceptible to direct impact and the indirect impact is not expected to be significant.

Species

B.5.3 No species considered to be of high ecological value have been identified in proximity to the cable alignment, and so will not be directly affected. The closest coral communities of ecological concern is identified at over 900m from the cable alignment and are unlikely to be affected by the cable installation since they are located in great distant beyond the 180m maximum sediment settlement distance. Also considering the short disturbance time at a single location during cable laying, significant adverse impacts are not expected from the cable installation works.

B.5.4 Vessel collisions could be one of the factors contributing to death of cetaceans and the animals had probably been killed by vessels routinely travel at speeds in excess of 40km/h. Considering that the maximum speed of the cable-laying vessel will be just 1km/h, the risk of vessel collisions with cetaceans will be very small. Thus, direct impact to marine mammals caused by vessel collision is not anticipated.

B.5.5 The Chinese White Dolphin is not recorded as being present in the south-eastern waters where the SJC2-HK Cable will be laid and so will not be directly or indirectly affected. Part of the cable, from the CHK landing point to south of the CHK landing point, will be in areas where the Finless Porpoise was observed during dry season (from December to May), whereas while the remainder of the cable, i.e. in the southern to south-eastern waters, will be located in areas where the Finless Porpoise were observed during wet season (from June to November).

B.5.6 Although the anticipated construction programme implies that landing and installation of Cable will straddle the dry and wet seasons, marine mammals are highly mobile and can swim into open waters to avoid short term and localised seabed disturbance. Also, marine mammals are air-breathing so that any sediment plume they may encounter will have no effect on their respiration.

B.5.7 Given the temporal and spatial distribution of Chinese White Dolphins and Finless Porpoises, it is not anticipated that there would be any significant adverse impact on marine mammals caused by the cable installation works. Nevertheless, as a precautionary measure, a marine mammal exclusion zone will be implemented during cable laying to mitigate potential indirect impacts on Finless Porpoise.

Size/Abundance

B.5.8 Within Hong Kong waters, the length of the cable will be about 37.9km and it has a diameter of 47mm. No seabed dredging will be required for the cable laying. Instead, it will be buried using a cable burial tool that will affect approximately 0.5m of the seabed in width along the alignment.

Duration

B.5.9 The duration of the cable laying will be for around five months.

Reversibility

B.5.10 Impacts to both the hard and soft bottom marine communities are expected to be short term and recolonization of the sediments and hard substrates is expected to occur.

Magnitude

B.5.11 No unacceptable adverse impacts to ecologically important organisms or habitats are predicted to occur. The magnitude of impacts during the laying of the cables is expected to be of low severity and is considered acceptable, given that the disturbances are of small scale, short term and localised.

B.6 Mitigation Measures During Cable Installation

B.6.1 In accordance with the guidelines in the EIAO-TM on marine ecology impact assessment, the general policy for mitigating impacts to marine ecological resources, in order of priority, are:

- **Avoidance.** Potential impacts should be avoided to the maximum extent practicable by adopting suitable alternatives.
- **Minimisation.** Unavoidable impacts should be minimised by taking appropriate and practicable measures, such as constraints on intensity of works operations (e.g. dredging rates) or timing or works operations.
- **Compensation.** The loss of important species and habitats may be provided for elsewhere as compensation. Enhancement and other conversation measures should always be considered whenever possible.

B.6.2 Based on the above, mitigation measures are discussed below.

Avoidance of Impacts

B.6.3 Impacts to marine ecological resources during cable laying have been avoided through the selection of a landing site and cable alignment that avoids direct impacts to coral communities and through the use of cable laying techniques that result in minimal disruption to the marine environment. The SJC2-HK Cable alignment has been carefully considered (see **Section 1.5**) to maximise, as far as practicable, the distance to known coral communities of ecological concern, while also minimising the number of crossings of existing cables.

Minimisation of Impacts

B.6.4 Mitigation measures recommended to minimise impacts to water quality will equally minimise impacts to marine ecology. These measures are listed in **Section A.6** for shore-end cable installation, marine installation with cable burial machine, and for emergency cable repair works.

B.6.5 As precautionary measures, coral monitoring through pre-installation survey and post-project survey will be carried out in the vicinity of the landing area to ensure no adverse impacts to corals, and a marine mammal exclusion zone within a radius of 250m from the cable installation barge will be set up to mitigate potential indirect impacts on Finless Porpoise during the cable laying works. Full details of the EM&A requirements are given in **Appendix F**.

B.6.6 With the implementation of the above mitigation measures, no adverse ecological impacts are expected.

Compensation

B.6.7 Based on the above mitigation measures, no compensation will be required as no unacceptable residual impacts to marine ecological resources are predicted to occur.

B.7 Conclusion

B.7.1 The review of the existing information on the marine ecological resources in the vicinity of the cable landing point at SST Beach in CHK and the cable alignment in Hong Kong waters has identified the area where the cable is to be laid to be of generally low ecological value.

B.7.2 Although soft bottom assemblages will be disturbed during cable laying, the habitat will be reinstated by similar communities within a short period of time and thus the impacts are considered acceptable.

B.7.3 The landing point is composed of natural soft sandy beaches and previous survey also found no rare species of conservation interest was identified, as such, are considered to be of low ecological value and thus any impacts are not regarded as significant.

B.7.4 The closest coral community of ecological concern is identified at over 900m from the cable alignment. It is unlikely to be affected by the cable installation as it located a significant distance beyond the 180m maximum sediment dispersion. Due to the small scale of the works, the short duration of impacts and the limited dispersion of sediment plume, potential impacts are considered to be unlikely at these coral communities.

B.7.5 The closest SSSI is the Tai Tam Reservoir SSSI, a terrestrial site about 980m from the closest alignment of the cable while the Cape D'Aguilar SSSI and Marine Park is located over 5km to the north of the cable alignment. Since these SSSIs and the Marine Park are located a significant distance from the cable alignment, they will not be affected by this Project.

B.7.6 Considering that the maximum speed of the cable-laying vessel will be just 1km/h, the risk of vessel collisions with cetaceans will be very small. Thus, direct impact to marine mammals caused by vessel collision is not anticipated. Studies of the Finless Porpoise suggest that it produces sonar clicks at a peak frequency of 142kHz. With regard to the potential construction phase impacts, marine jetting works and large marine vessels typically emit sound in the range of 0.02 to 1 kHz, which is generally below the hearing range of Finless Porpoises. Construction noise levels are also generally below the 8 to 90 kHz hearing range of Chinese White Dolphins[Ref.#11], although this species is uncommon outside its preferred estuarine habitat in the western waters of Hong Kong. Considering that the marine jetting works and large marine vessels typically emit sound which is of much lower frequency than the sonar clicks produced by Finless Porpoises, the works will not affect marine mammals. Thus, it is anticipated the operation of the jetting works and vessels will not cause indirect impact to the Finless Porpoise.

B.7.7 The Chinese White Dolphin is not recorded as being present in the south-eastern waters where the SJC2-HK Cable will be laid and so will not be affected. Part of the cable, i.e. from the CHK landing point to south of the CHK landing point will cover the areas where the Finless Porpoise has been observed in the dry season, from December to May. The rest of the cable, i.e. southern to south-eastern waters, will be located in an area that where Finless Porpoise has been observed during wet season, from June to November. The anticipated timing for landing and installation of cable is during the second quarter (April to June) of 2020. Although the anticipated construction programme implies that landing and installation of cable will straddles across the dry and wet seasons, marine mammals are highly mobile and can swim into open waters to avoid short term and localized seabed disturbance. Also, marine mammals are air breathing so that sediment plume will have no effect on their respiratory surfaces. Given the temporal and spatial distribution of Chinese White Dolphins and Finless Porpoises, it is not anticipated there would be any adverse impact on marine mammals caused by the cable installation works.

B.7.8 As precautionary measures, coral monitoring through pre-installation survey and post-project survey will be carried out in the vicinity of the landing area to ensure no adverse impacts to corals, and a marine mammal exclusion zone within a radius of 250m from the cable installation

barge will be set up to mitigate potential indirect impacts on Finless Porpoise during the cable laying works. Full details of the EM&A requirements are given in **Appendix F**.

B.7.9 Impacts to marine ecological resources have largely been avoided during cable laying through the selection of a landing site, careful consideration for cable alignment, and use of cable laying techniques that result in little disturbance to the marine environment. Due to the small scale of the works, the short duration of impacts and the limited dispersion of sediment plumes, adverse impacts to marine ecology are not expected to be significant and will be minimised during the cable installation and cable repair works.

B.7.10 Precautionary measures/good site practices recommended to minimise impacts to water quality will also minimise impacts to marine ecological resources. Water quality monitoring will be carried out during marine works to demonstrate that no adverse impact has occurred.

Figure B.1: Coral Communities of Ecological Concern along SJC2-HK Alignment

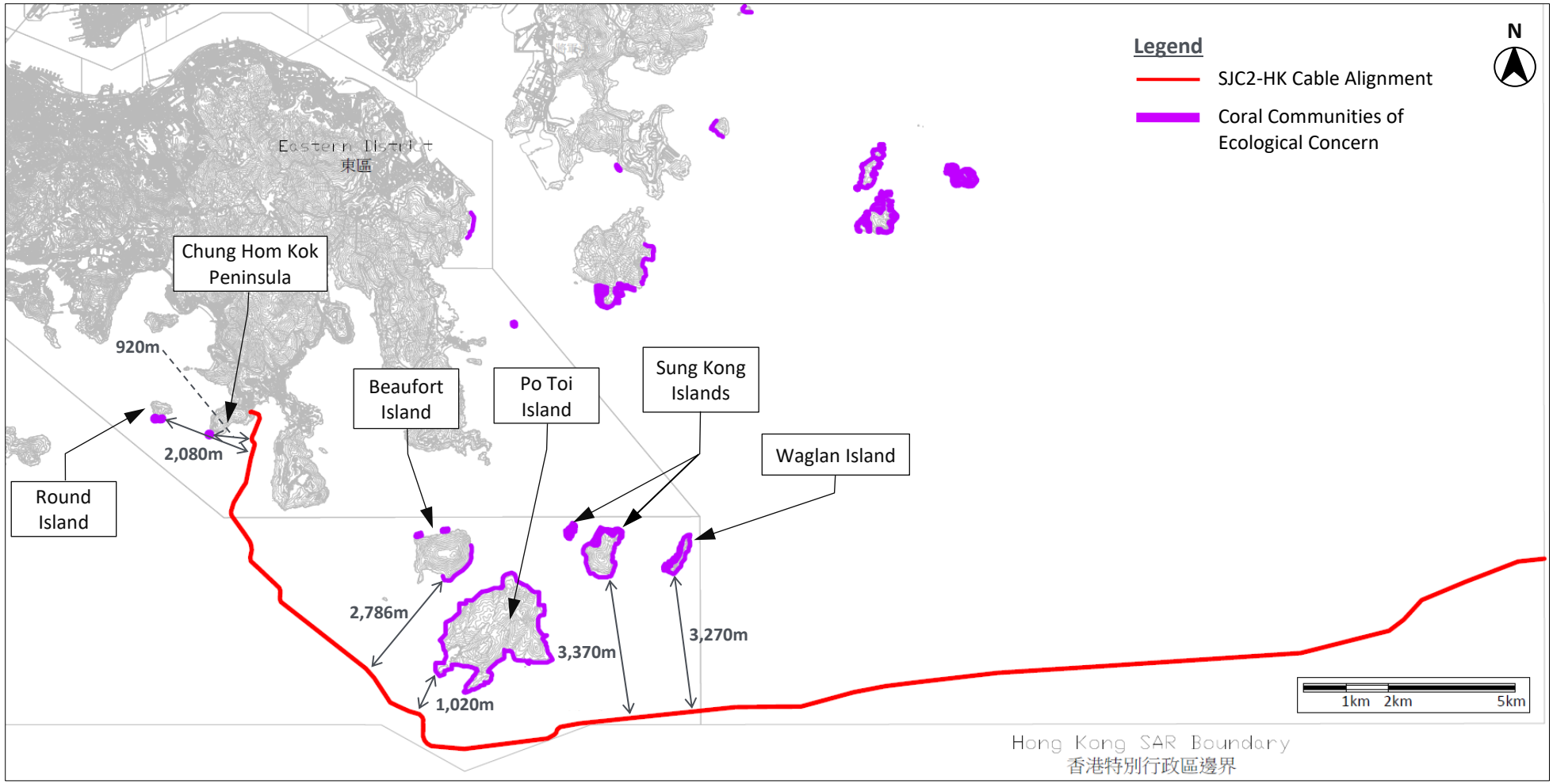


Figure B.2: Indicative Locations of Subtidal Hard Coral

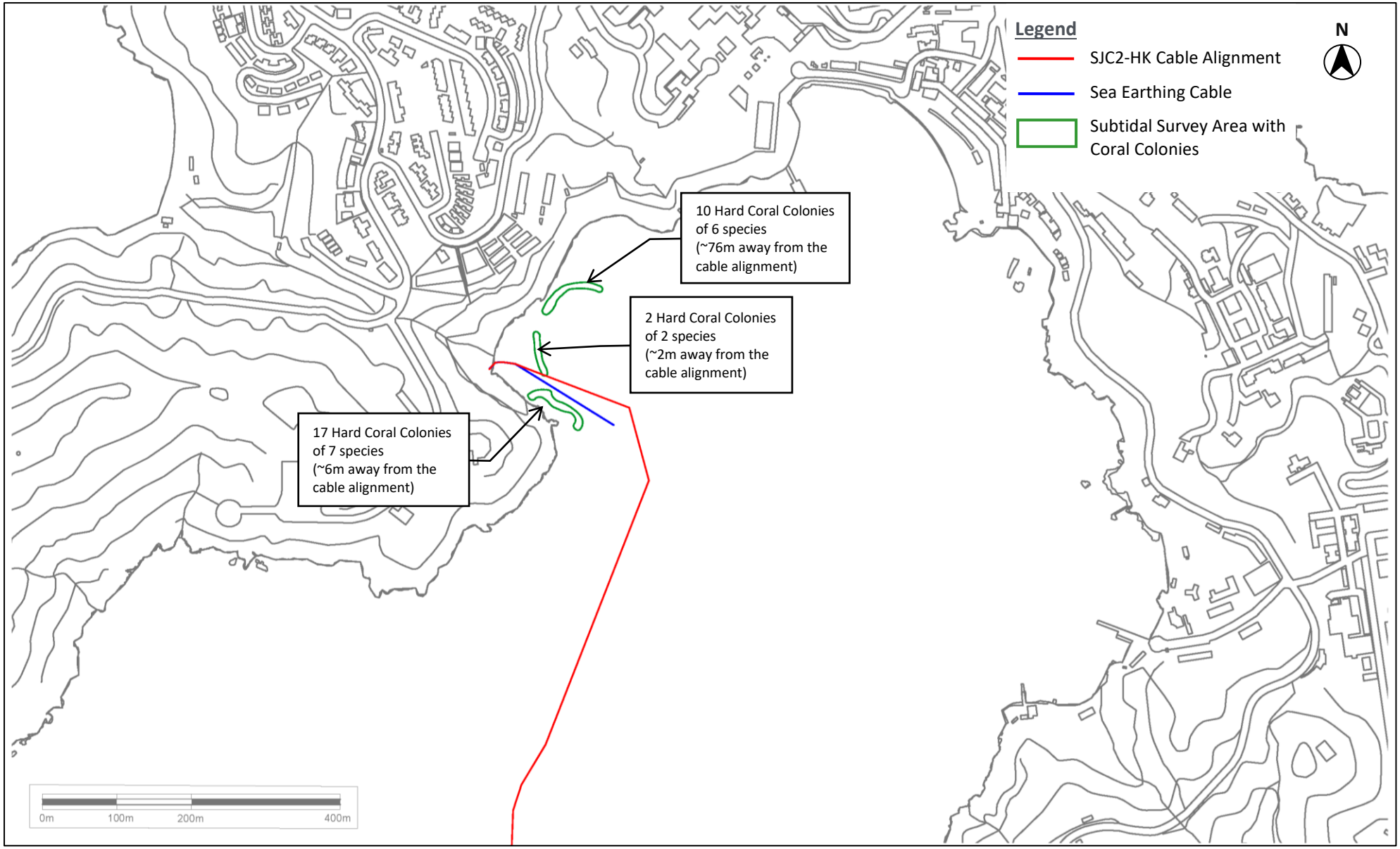
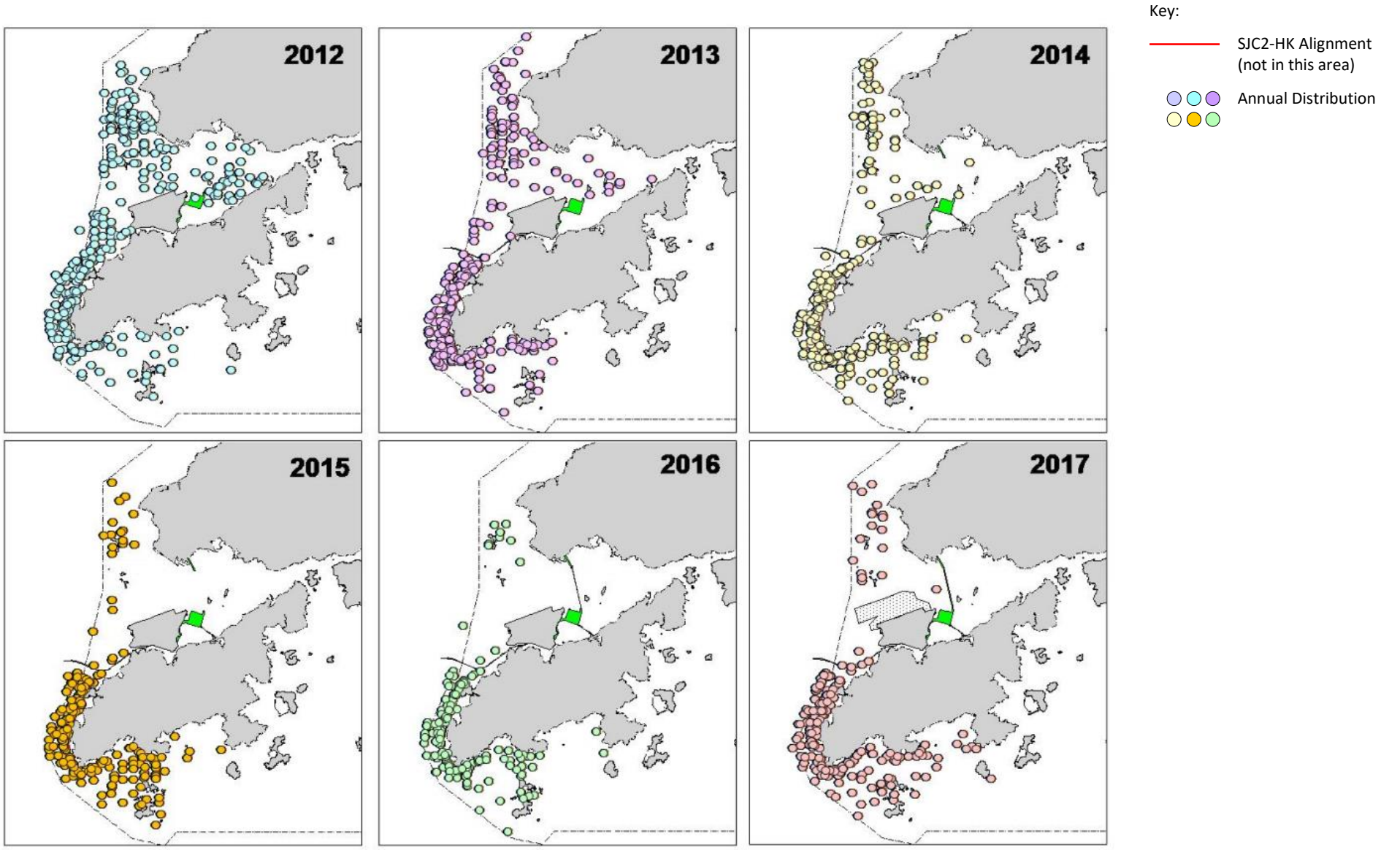
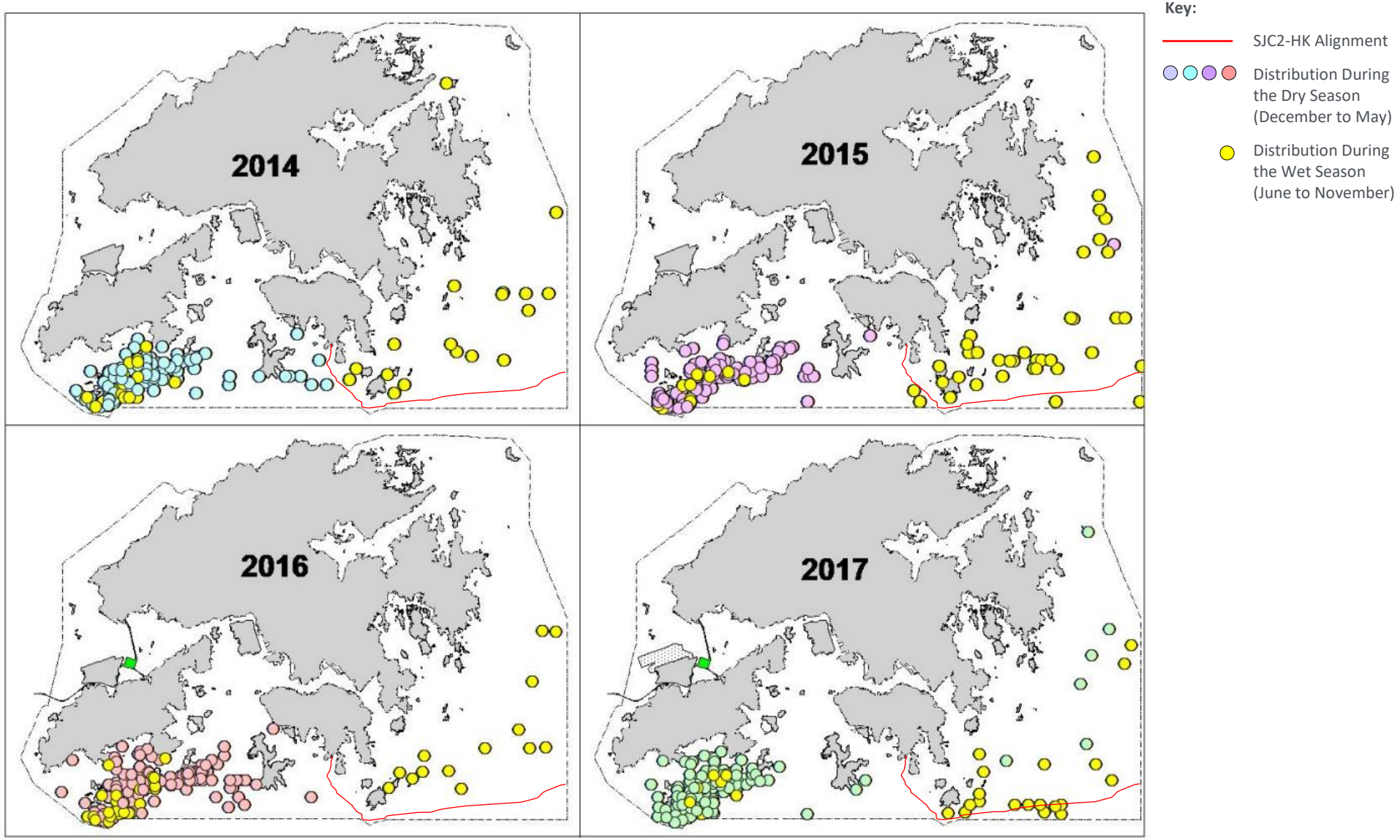


Figure B.3: Chinese White Dolphin Distribution Patterns in Hong Kong Waters (2012 to 2017)



Source: Figure 8 from *Monitoring of Marine Mammals in Hong Kong Waters (2017-18) Final Report (1 April 2017 to 31 March 2018)*.

Figure B.4: Finless Porpoise Distribution Patterns in Hong Kong Waters (2014 to 2017)



Source: Figure 10 from *Monitoring of Marine Mammals in Hong Kong Waters (2017-18) Final Report (1 April 2017 to 31 March 2018)*

Appendix C FISHERIES IMPACT ASSESSMENT

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C FISHERIES ASSESSMENT

C.1 Introduction

C.1.1 This appendix provides an assessment of impacts to the existing fisheries resources and fishing operations within and adjacent to the proposed SJC2-HK Cable alignment and evaluates the potential impacts to these resources.

C.1.2 No environmental impacts are expected to occur during normal operation of the cable, however, there may be a future requirement for maintenance work (i.e. cable repair at particularly fault location due to unexpected damage) to be carried out. Cable repairs will be carried out by divers using less powerful, hand-held jetting tools and the seabed can be expected to naturally reinstate to before-work level and conditions shortly after completion of the repair works. No dredging will be required for cable repair works.

C.1.3 The following assessments therefore relate only to the installation of the cable and any potential repair works that may be needed in the future during the operation stage.

C.1.4 Baseline information has been obtained from the AFCD website[Ref.#1] and from recent relevant studies in the vicinity of the SJC2-HK Cable alignment to determine whether the waters surrounding the SJC2-HK Cable are important spawning grounds or nursery areas for commercial fisheries – the most up-to-date Port Survey[Ref.#2] (the "Port Survey 2016/17") has been referenced, together with relevant studies, including the final report for Fisheries Resources and Operations in Hong Kong Waters[Ref.#3]. Mariculture information was obtained from the latest AFCD Annual Report 2017-2018[Ref.#4].

C.1.5 There are no gazetted Fish Culture Zones (FCZs) within 500m of the cable trench (the distance normally adopted as the study area for water quality impacts), with the nearest FCZ being the Po Toi FCZ, located about 1,420m from the cable alignment. The cable alignment does not pass through any nursery areas, although the cable (and the majority of other existing cables) passes through Fish Spawning Grounds.

C.1.6 The western part of the SJC2-HK Cable near the landing point lies within Southern Water Control Zone (WCZ). The SJC2-HK Cable also passes through the Second Southern Supplementary and Mirs Bay WCZs. Special attention has been given to the fishing grounds, fishing activities and spawning grounds along the alignment, and to Po Toi FCZ which is located further away.

C.2 Relevant Legislation

C.2.1 The following legislation and associated guidance or non-statuary guidelines are applicable to the evaluation of fisheries impacts and the regulation of fishing practices:

- Environmental Impact Assessment Ordinance (Cap. 499. S.16) and the Technical Memorandum on EIA Process (EIAO-TM), Annexes 9 and 17
- Fisheries Protection Ordinance (Cap 171)
- Marine Fish Culture Ordinance (Cap 353)

1. https://www.afcd.gov.hk/english/fisheries/fish_aqu/fish_aqu_mpo/fish_aqu_mpo.html
2. *Port Survey 2016/17*, AFCD (2018).
3. ERM-Hong Kong, Ltd (1998) *Fisheries Resources and Operations in Hong Kong Waters*. Final Report for the AFCD.
4. *AFCD Annual Report 2017-2018.*

C.3 Existing Situation

Fishing Background

C.3.1 Commercial fishing provides an important contribution to Hong Kong in maintaining a steady supply of fresh marine fish to local consumers. In 2018, Hong Kong fishermen provided an estimated 124,000 tonnes of fisheries produce. According to the AFCD website, the industry now consists of some 5,050 fishing vessels and 10,200 local fishermen and also provides employment in ancillary sectors servicing the fishing industry.

C.3.2 The fisheries industry in Hong Kong comprises capture and culture fisheries. In 2017, the combined production of these for mariculture sectors accounted for about 20% of all seafood consumed in Hong Kong[Ref.#4].

C.3.3 The latest comprehensive survey of fisheries was undertaken as part of the *Port Survey 2016/17*, which provided a grid analysis of fishing operations covering Hong Kong waters, with each grid cell representing 720ha. The study compiled information on fisheries production and fishing operations in Hong Kong.

C.3.4 The following assessment has been based on the *Port Survey 2016/17*, other relevant and more recent studies, and from a review of information from AFCD's Annual Reports.

Capture Fisheries

C.3.5 Capture fishing activities for Hong Kong are mainly conducted in the waters adjacent to the continental shelf in the South China Sea. The majority of fishing vessels are family-operated businesses with the main fishing methods being long-lining, gill-netting and purse-seining.

Fisheries Operations

C.3.6 The southern and eastern waters of Hong Kong have been identified as important spawning grounds for commercial fisheries resources.

C.3.7 The SJC2-HK Cable traverses 15 Port Survey Grids, in which five grids showed 0 vessels, two grids showed >0 to 50 vessels, four grids showed >200 to 400 vessels and four grids showed >400 to 600 vessels, as shown on **Figure C.1**.

C.3.8 The distribution of fishing operations with sampan is shown on **Figure C.2**, where six grids showed 0 vessels, one grid showed >0 to 50 vessels, four grids showed >100 to 200 vessels and four grids showed >200 to 400 vessels.

C.3.9 The distribution of fishing operations with other types of fishing vessels is shown on **Figure C.3**, where five grids showed 0 vessels, two grids showed >0 to 50 vessels, three grids showed >100 to 200 vessels and five grids showed >200 to 400 vessels.

Fisheries Production

C.3.10 The *Port Survey 2016/17* shows that overall fisheries production from the grids traversed by the SJC2-HK Cable range from 0 kg/ha to >300 to 400kg/ha, in which the majority of the grids show less than 300kg/ha, as shown on **Figure C.4**.

C.3.11 Fisheries production with Sampan was highest (>50 to 100 kg/ha) in the cable section west of Beaufort Island and the value decreases (0 to 50 kg/ha) in the cable section from west to east of Po Toi, as shown on **Figure C.5**.

C.3.12 Fisheries production with other types of fishing vessels was highest (>300 to 400 kg/ha) in the cable section south of Po Toi and the value decreases (0 to 200 kg/ha) in the cable section east of Po Toi, as shown on **Figure C.6**.

C.3.13 A *Hong Kong Fisheries Resources Monitoring Report* conducted by South China Sea Fisheries Research Institute was published by AFCD in December 2017, where demersal fisheries surveys were conducted at 16 stations across four areas in Hong Kong (i.e. north-eastern, south-eastern, south-western and north-western waters) every two months from 2010-2015, where the alignment of SJC2-HK falls within south-eastern waters. The commercially important species within the Study Area include Stromateidae, Nemipteridae, Sciaenidae, Portunidae, Stomatopoda, Polynemidae, Sparidae, Platycephalidae, Leiognathidae, Terapontidae, Clupeidae, Synodontidae and Cynoglossidae.

Fish Fry Production / Spawning Grounds and Nursery Areas

C.3.14 The south-eastern and eastern waters have been recognised[Ref.#3] as spawning grounds for high value commercial species. The key species recorded spawning in the southern waters include *Cynoglossus macrolepidotus* (Largescale Tonguesole) and *Pseudosciaena crocea* (Yellow Croaker). Species recorded spawning in the eastern waters include *Apogon quadrifasciatus* (Twostripe Cardinal), *Parapristipoma trilineatum* (Chicken Grunt), *Sebastiscus marmratus* (Common Rockfish), *Trichiurus lepturus* (Hairtail), *Upeneus sulphureus* (Sulphur Goatfish) and *Upeneus tragula* (Freckled Goatfish).

C.3.15 As stated in the *Port Survey 2016/17,* it is anticipated that fish fry production from the area traversed by SJC2-HK Cable is very low. However, this area was determined as an important spawning ground for commercial fisheries resources[Ref.#3].

C.3.16 Generally, the seasonal abundance of fry in Hong Kong is at its highest between March and September for most commercial fish species, with a peak between June and August; the majority of spawning of these species is concentrated between June and September[Ref.#3]. Commercially important crustaceans spawn between April and December.

C.3.17 **Figure C.7** shows the location of the Fish Spawning Grounds and the SJC2-HK Cable Alignment.

C.3.18 Nursey areas in Hong Kong waters are important habitat area for a number of commercial juvenile fish and crustacean species, which have been previously identified across southern waters from Lantau Island to Lamma Island. However, as shown on **Figure C.7**, there are no nursery grounds in the vicinity of the SJC2-HK Cable alignment.

Artificial Reef Deployment

C.3.19 An Artificial Reef Deployment programme has been in effect since 1998 to enhance existing marine habitats and fisheries resources through the siting, construction and deployment of Artificial Reefs. Artificial Reefs provide hard bottom, high profile habitat in areas without natural cover and may potentially act as fish enhancement devices. AFCD deployed a total of 103,270m^3 of Artificial Reefs on the seabed of the outer Port Shelter WCZ to prevent trawling and enhance habitat quality and marine resources. As shown on **Figure C.7**, there are no Artificial Reefs in the vicinity of the SJC2-HK Cable alignment.

Fisheries Importance

C.3.20 The fishing operations and fisheries production in the vicinity of the SJC2-HK Cable are of low to moderate, with a short section passes areas with high fisheries production. Apart from the low to moderate fisheries production, the size of the fishing areas that will be temporarily occupied by the cable installation vessel as it traverses through Hong Kong waters is considered to be small. On this basis, the Project is considered to be of low importance to the Hong Kong fishing industry.

Sensitive Receivers

C.3.21 The identified sensitive receivers are listed in **Table C.2**.

Table C.1: Shortest Navigation Distances of Fisheries Sensitive Receivers to the Cable Alignment

ID	SENSITIVE RECEIVER DESCRIPTION	SHORTEST NAVIGATION DISTANCE TO SJC2-HK CABLE
F1	Po Toi FCZ	1,420m to the northeast
-	Nursery Grounds	>13km to the north
F2	Fish Spawning Grounds	0m – Cable passes through
-	Artificial Reefs in Port Shelter WCZ	>13km to the north

C.4 Impact Assessment

Direct Impacts

C.4.1 Direct impacts are those where the Project will tangibly affect a sensitive receiver due to The cable (and the majority of other existing cables) passes directly through Fish Spawning Grounds and so there may be short-term impacts during installation on spawning grounds of commercial fisheries resources.

C.4.2 SST Beach in CHK, which is the landing point of the SJC2-HK cable, is approx. 830m north of the recognised Fish Spawning Ground in the Southeastern Waters WCZ. The seabed near the landing point is sandy and a number of other cables have landed in this location over the years. Installation of the cable in SST Beach in CHK should have no significant impact on the Fish Spawning Ground to the south and east, or on fisheries in general.

C.4.3 As the cable-laying vessel traverses across Hong Kong waters it will occupy part of the sea surface, which is thus unavailable for use by other marine vessels, including fishing vessels. However, this "temporary loss" of fishing grounds will be limited to 70m x 25m at any one time (i.e. the "footprint" of the vessel) and impacts from the presence of the cable-laying vessel are no different to those from any other marine vessel passing through Hong Kong waters. Other than area occupied by the cable-laying vessel, there is no other temporary loss of fishing grounds.

C.4.4 Although movement of the cable-laying vessel might be considered as an interruption to any fishing operations that may have been occurring, it is no different than any other marine vessel – from sampans to container ships – traversing Hong Kong waters. On the other hand, the cable burial tool – typically 6m x 1m – will occupy the seabed, not the surface, as it buries the cable that is fed down from the cable-laying vessel above. As such, there will be no interruption to any fishing activities due to the operation of the cable burial tool on the seabed.

C.4.5 The EIAO-TM states that Fish Spawning Grounds can be regarded as an important habitat type as they are critical to the regeneration and long-term survival of many organisms and their populations. After the cable burial tool has buried the cable, the seabed will be reinstated naturally by resettlement of disturbed sediments, following which there will be immediate recolonization by benthic fauna that provide food for fish. Also, the disturbed area at one time during cable installation shall be limited. Thus, there is only short-term and a minor disturbance to the seabed within the Spawning Grounds and this should not cause any significant impact to fisheries production.

C.4.6 Overall, no long-term direct impacts to fisheries resources or fishing operations are expected to occur that would affect either fisheries resources or fishing operations, i.e. the direct impacts are not considered to be significant.

Indirect Impacts

C.4.7 Indirect impacts may occur through elevation in suspended solids resulting from the disturbance of the seabed during the burial of the cable. However, this disturbance will be localised, temporary and of short duration. As calculated in **Appendix A**, based on worst case assumptions the maximum predicted extent of any sediment plume arising from the cable laying works is 180m from the cable trench, and will settle back onto the seabed within 3.5 minutes. Thus, the seabed will be reinstated naturally by resettlement of disturbed sediments, following which there will be immediate recolonization by benthic fauna that provide food for fish.

C.4.8 Any water sensitive receivers, such as fisheries, within 180m may be affected. Any water sensitive receivers, such as fisheries, more than 180m away are unlikely to be affected. The greater the distance from the cable trench, the less likely there is to be any indirect impact on sensitive receivers. As indicated in **Table C.2**, the cable alignment is a significant distance from the FCZs, Nursery Grounds and Artificial Reefs.

C.4.9 The nearest FCZ, Poi Toi FCZ, is 1,420m away, almost 8x the maximum predicted extent of any sediment plume. As such, it is not expected there will be any water quality impact at the FCZ and hence no unacceptable indirect impact on the associated fisheries. The Nursery Grounds and Artificial Reefs are more than 13km away, more than 70x the maximum predicted extent of any sediment plume. As such, it is not expected there will be any water quality impact at the Nursery Grounds or Artificial Reefs and hence no unacceptable indirect impact on the associated fisheries.

C.4.10 Overall, no long-term indirect impacts to fisheries resources or fishing operations are expected to occur that would affect either fisheries resources or fishing operations, i.e. the indirect impacts are not considered to be significant.

Fisheries Impact Evaluation

C.4.11 An evaluation fisheries impact is presented in **Table C.3** in accordance with EIAO-TM Annex 9:

Table C.2: Evaluation of Fisheries Impact

ASPECT	EVALUATION OF IMPACT
Nature of Impact	Beyond shore-end cable installation at SST Beach in CHK, the cable will be directly laid and buried using a cable burial tool, below the seabed. Direct impacts to the immediate seabed will result from cable laying and indirect impacts may result from elevation in suspended solids in the water column as a result of the burial process. The impact shall be localised and short-term.
Size of Affected Area	The total length of the cable in Hong Kong waters is approximately 38.8km from SST Beach in CHK to the eastern boundary of Hong Kong. The temporary loss of fishing grounds, will be limited to the area occupied by the cable-laying vessel, i.e. approximately 70m x 25m at any one time, along 38.8km. Cable laying will take around 4 months for the entire alignment within Hong Kong.
Loss of Fisheries Resources and Production	Fisheries production in the affected area ranges from 0 kg/ha to >300 to 400 kg/ha in terms of catch weight of fish, in which the majority of the grids show less than 300kg/ha. Fisheries production with Sampan was highest (>50 to 100 kg/ha) in the cable section west to Beaufort Island and the value decreases (0 to 50 kg/ha) in the cable section from west to east of Po Toi. Fisheries production with other types of fishing vessels was highest (>300 to 400 kg/ha) in the cable section south to Po Toi and the value decreases (0 to 200 kg/ha) in the cable section east of Po Toi. As the cable laying will only take around 4 months for the entire alignment within Hong Kong and the disturbance from suspended solids is considered localised and short-term. Also, the seabed will be reinstated soon after the disturbed sediments settled onto the seabed. Thus, unacceptable impact on the fisheries resources and production is not expected.

ASPECT	EVALUATION OF IMPACT
Destruction and Disturbance of Spawning and Nursery Grounds	The cable does not pass through any recognised Nursery Grounds. The south-eastern and eastern waters through which the cable will be laid have been recognised as spawning grounds for commercial species. After the cable burial tool has buried the cable, the seabed will be reinstated naturally by resettlement of disturbed sediments, following which there will be immediate recolonization by benthic fauna that provide food for fish. In terms of indirect impacts, the maximum predicted extent of suspended solids is expected to be 180m from the cable trench and would settle back onto the seabed within 3.5 minutes, based on worst case assumptions. Given the above, there is only short-term and a minor disturbance to the seabed within the Spawning Grounds. Also, due to the small area occupied by the cable-laying vessel and short duration for cable installation in any one location, potential impacts on fishing vessel transit and fishing activities along the cable alignment will not be significant.
Impact on Fishing Activities	Fishing operations and fisheries production along the cable alignment are of low to moderate and the size of the fishing areas that will be temporarily occupied by the cable-laying vessel as it traverses through Hong Kong waters is considered to be small. On this basis, the impacts arisen from the Project to the fishing industry is considered to be minimal.
Impact on Aquaculture Activity	The nearest FCZ is Po Toi FCZ, located at some 1.4km from the cable. Given this distance, no impact from cable burial works is expected at FCZ.

Cumulative Impacts

C.4.12 While there are two projects planned in the vicinity of the SJC2-HK Cable, none of them will be constructed concurrently with the SJC2-HK Cable. As discussed in **Section 3.4**, given that the installation of the SJC2-HK Cable will not coincide with other projects, cumulative water quality impacts will not be an issue.

C.5 Mitigation Measures

C.5.1 As no adverse impacts to fisheries resources are expected to occur, no specific mitigation measures to fisheries are required. However, the mitigation measures proposed in **Section A.6** to protect water quality shall also be of benefit to fisheries resources and shall be fully implemented.

C.5.2 As mentioned in **paragraph A.5.16**, considering the potential short-term impact to the Fish Spawning Grounds through which the cable (and the majority of other existing cables) passes and also to detect any unpredicted fisheries impact arising from the cable laying works on the nearest FCZ (although the nearest, Po Toi FCZ, is over 1.4 km from the cable trench and so adverse impact from the cable laying works is unlikely), it is recommend that water quality monitoring to be carried out along the cable project area which are near FCZ and spawning grounds of commercial fisheries resources as a precautionary measure, as per **Section A.6**.

C.6 Residual Impact

C.6.1 The residual impacts to fisheries resources, habitats and fishing operations during construction phase are considered to be within acceptable level and no specific fisheries monitoring programme is found to be necessary.

C.7 Conclusion

C.7.1 A review of existing information on the fisheries resources and fishing operations along the alignment of the SJC2-HK Cable has found the majority of the area supports fisheries resources with low to moderate fisheries production.

C.7.2 There is a recognized Spawning Ground of commercial fisheries resources at south-eastern waters through which the SJC2-HK Cable passes, which might be directly affected. Fisheries production in this area ranges from 0 kg/ha to >300 to 400kg/ha in terms of catch weight of fish, in which the majority of the grids show less than 300kg/ha. Fisheries production with Sampan was highest (>50 to 100 kg/ha) in the cable section west of Beaufort Island and the value decreases (0 to 50 kg/ha) in the cable section from west to east of Po Toi. Fisheries production with other types of fishing vessels was highest (>300 to 400 kg/ha) in the cable section south of Po Toi and the value decreases (0 to 200 kg/ha) in the cable section east of Po Toi.

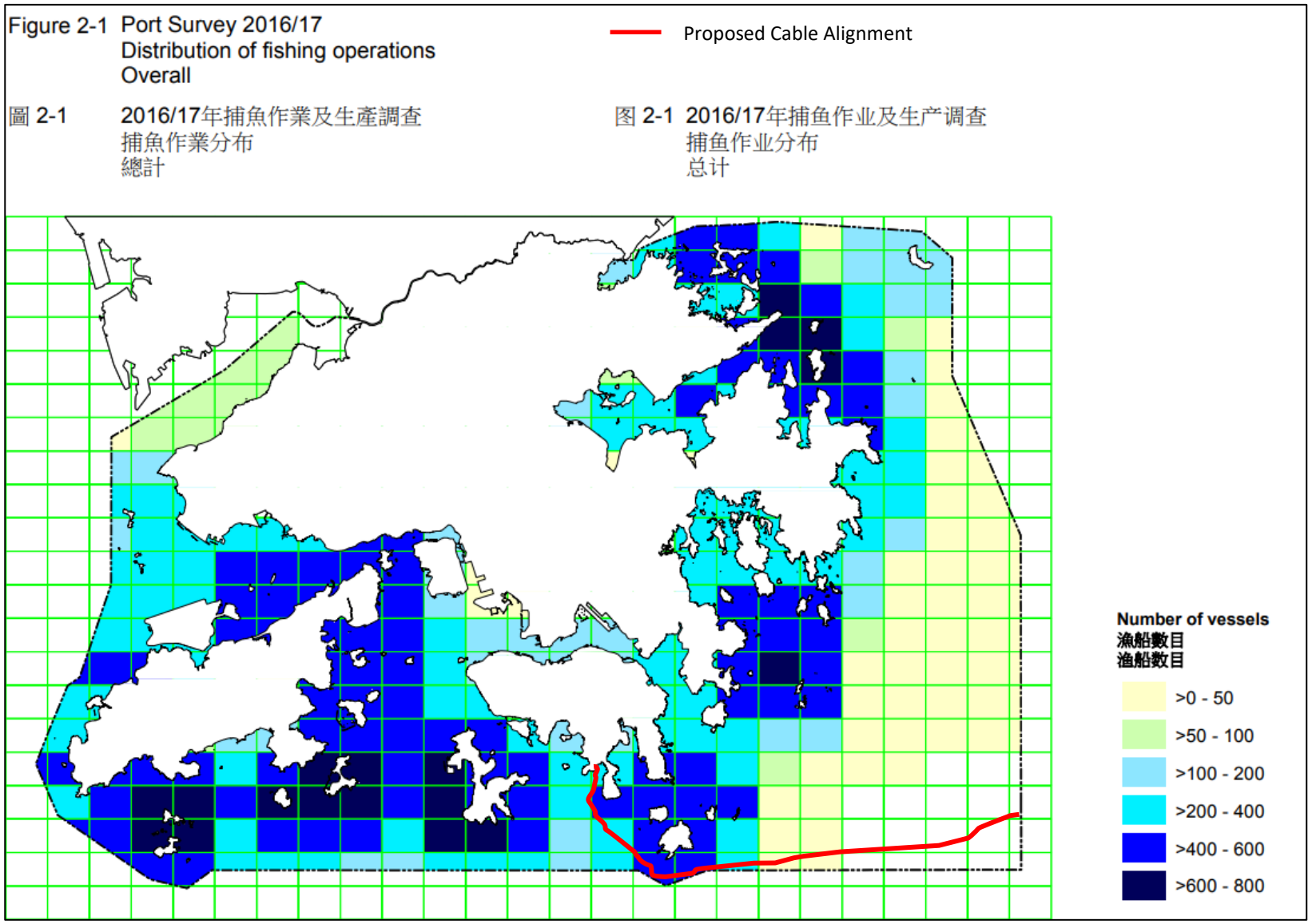
C.7.3 The south-eastern and eastern waters through which the cable will be laid have been recognised as spawning grounds for high value commercial species. After the cable burial tool has buried the cable, the seabed will be reinstated naturally by resettlement of disturbed sediments, following which there will be immediate recolonization by benthic fauna that provide food for fish. In terms of indirect impacts, the maximum predicted extent of suspended solids is expected to be 180m from the cable trench and would settle back onto the seabed within 3.5 minutes, based on worst case assumptions. Given the above, there is only short-term and a minor disturbance to the seabed within the Spawning Grounds. Due to the small area occupied by the cable-laying vessel and short duration required for the cable installation in any one location, potential impacts on fishing vessel transit, fishing activities and Spawning Grounds along the cable alignment will not be significant.

C.7.4 In terms of indirect impact, based on worst case assumptions the maximum predicted extent of any sediment plume arising from the cable laying works is 180m from the cable trench, and will settle back onto the seabed within 3.5 minutes. Thus, the seabed will be reinstated naturally by resettlement of disturbed sediments, following which there will be immediate recolonization by benthic fauna that provide food for fish.

C.7.5 The greater the distance from the cable trench, the less likely there is to be any indirect impact on sensitive receivers. Nursery Grounds and Artificial Reefs are >13km from the cable alignment and the nearest FCZ is >1.4km away. At these distances, the Nursery Grounds, Artificial Reefs and FCZ are unlikely to be affected by the Project.

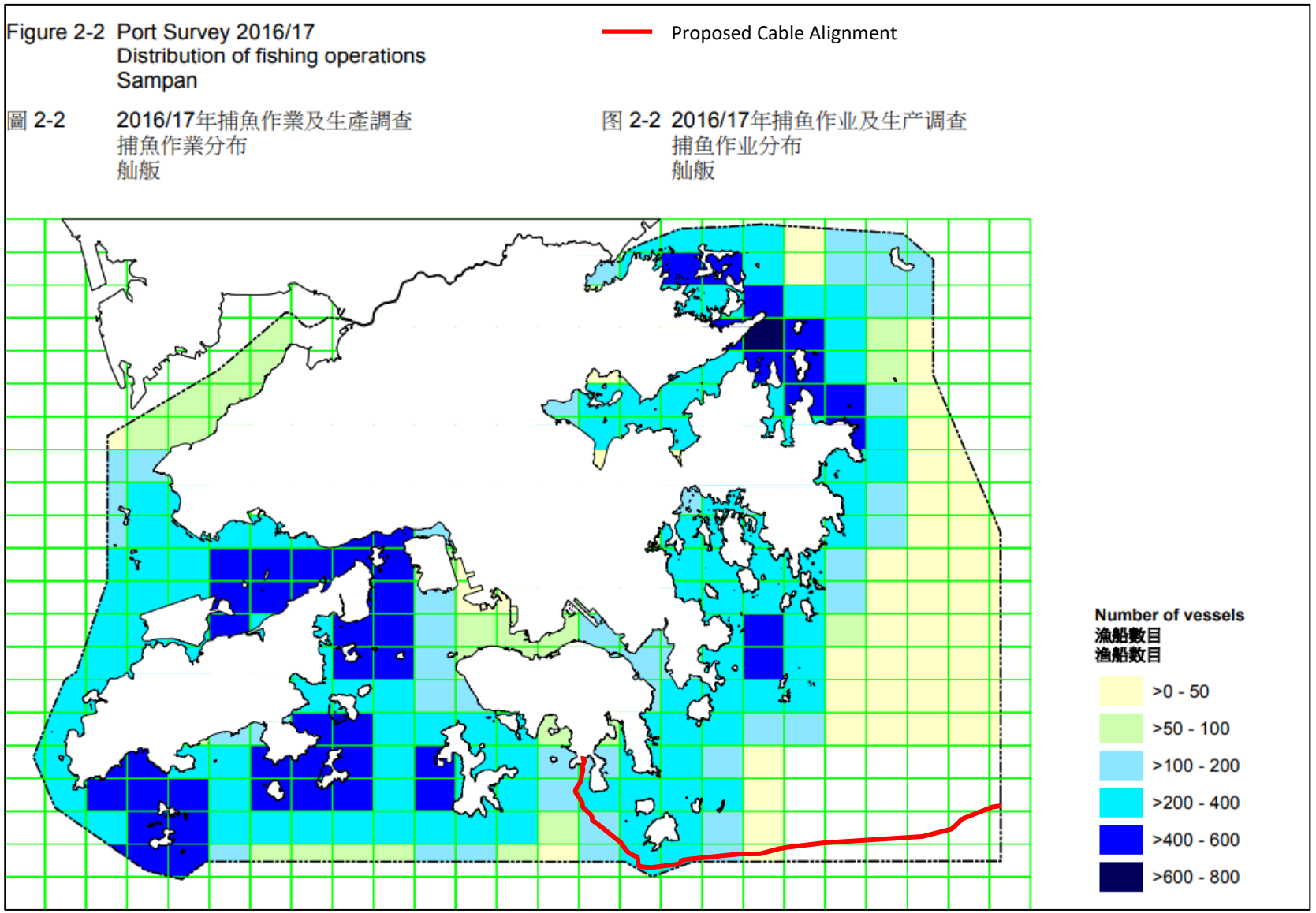
C.7.6 Given the above, adverse impacts are not expected to arise from the cable laying works. No environmental impacts are expected to occur during normal operation of the cable, however, there may be a future requirement for maintenance work (i.e. cable repair at particularly fault location due to unexpected damage) to be carried out. The cable repairs will be carried out by divers using less powerful, hand-held jetting tools and the seabed can be expected to naturally reinstate to before-work level and conditions shortly after completion of the repair works. Overall, no unacceptable impacts are predicted to occur to fisheries resources or fishing operations as a result of this Project.

Figure C.1: Distribution of Fishing Operations in Hong Kong Waters and Location of the SJC2-HK Cable



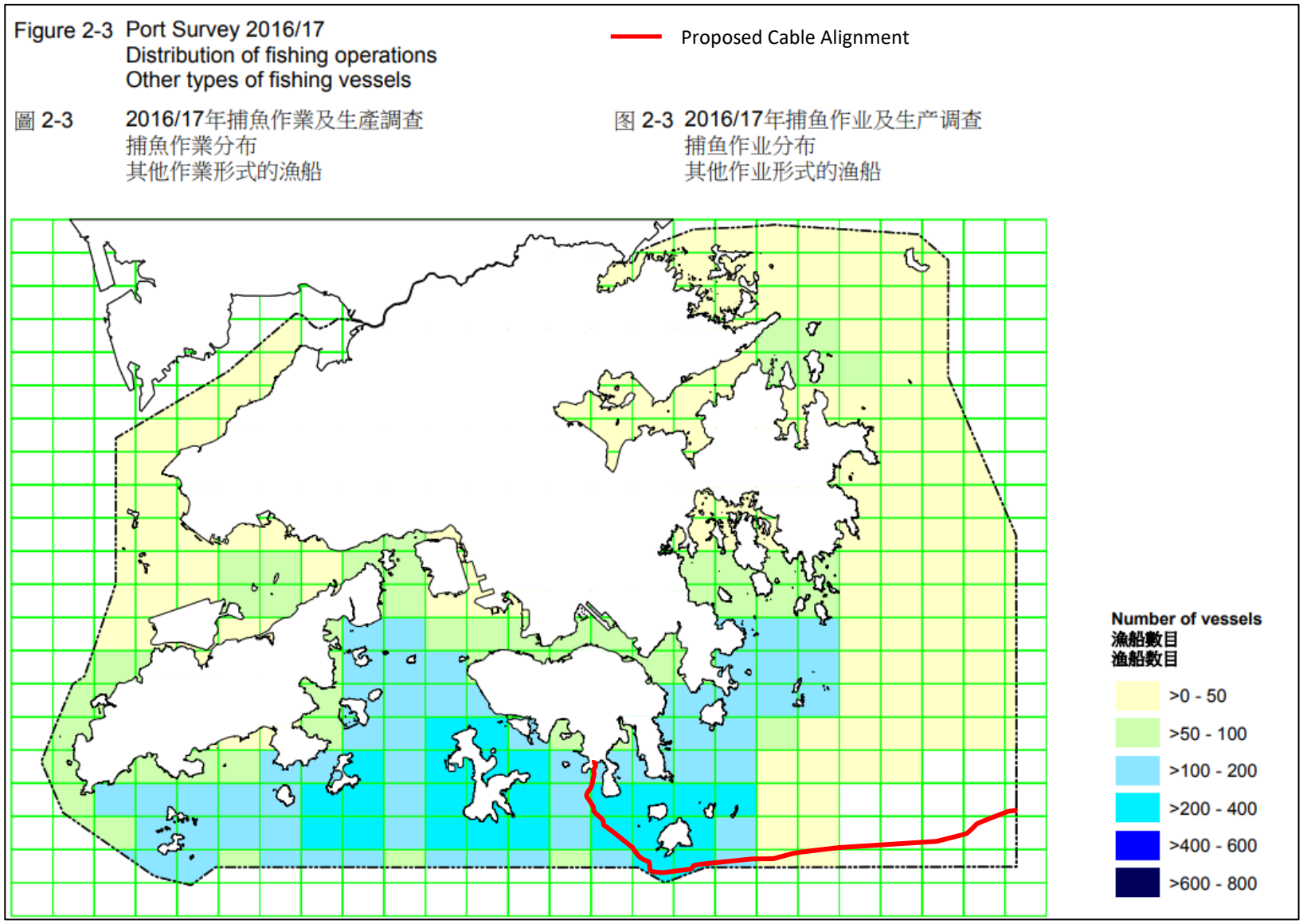
Source: Port Survey 2016/17, AFCD.

Figure C.2: Distribution of Fishing Operations (Sampan) and Location of the SJC2-HK Cable



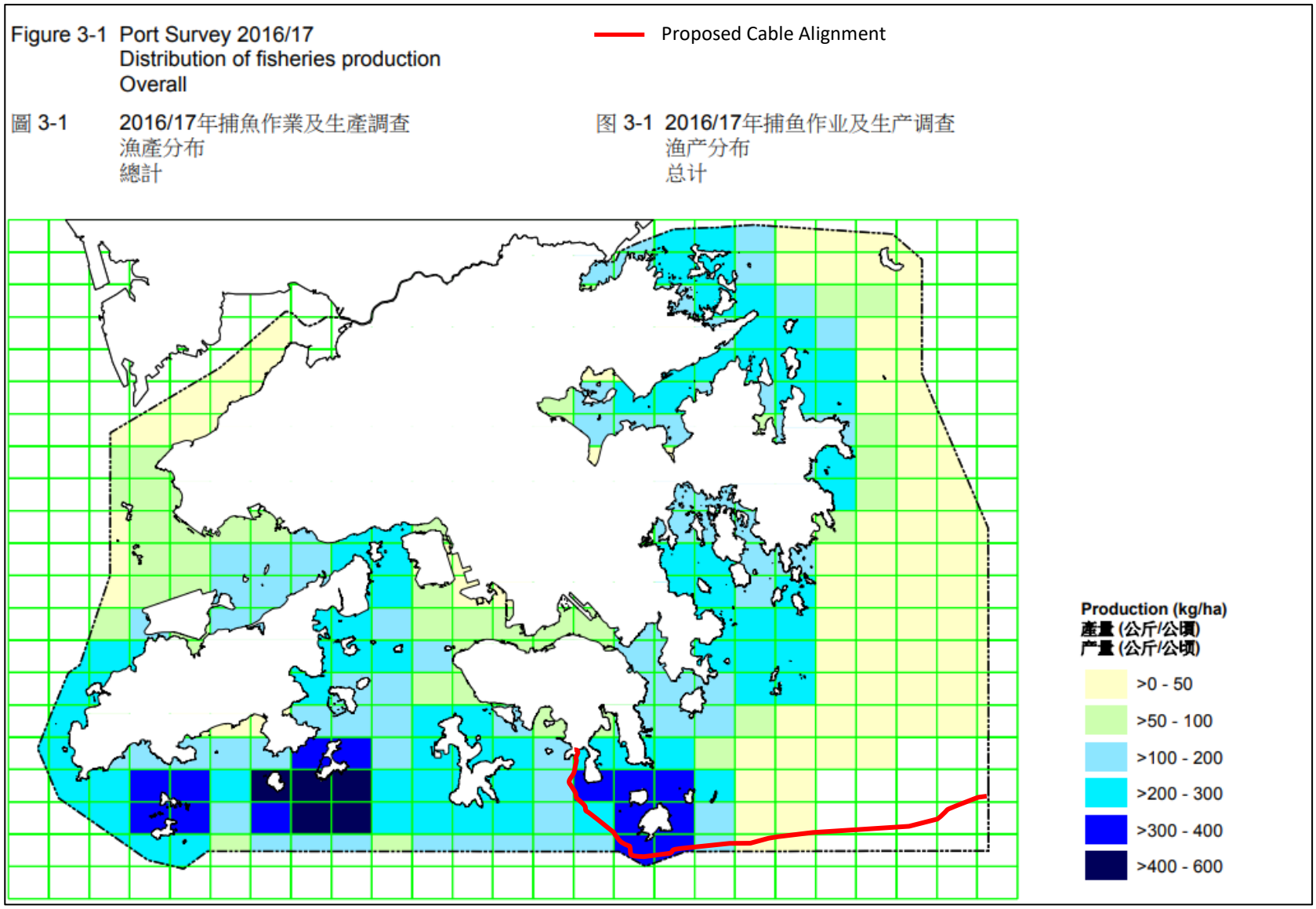
Source: Port Survey 2016/17, AFCD.

Figure C.3: Distribution of Fishing Operations (Other Types of Fishing Vessels) and Location of the SJC2-HK Cable



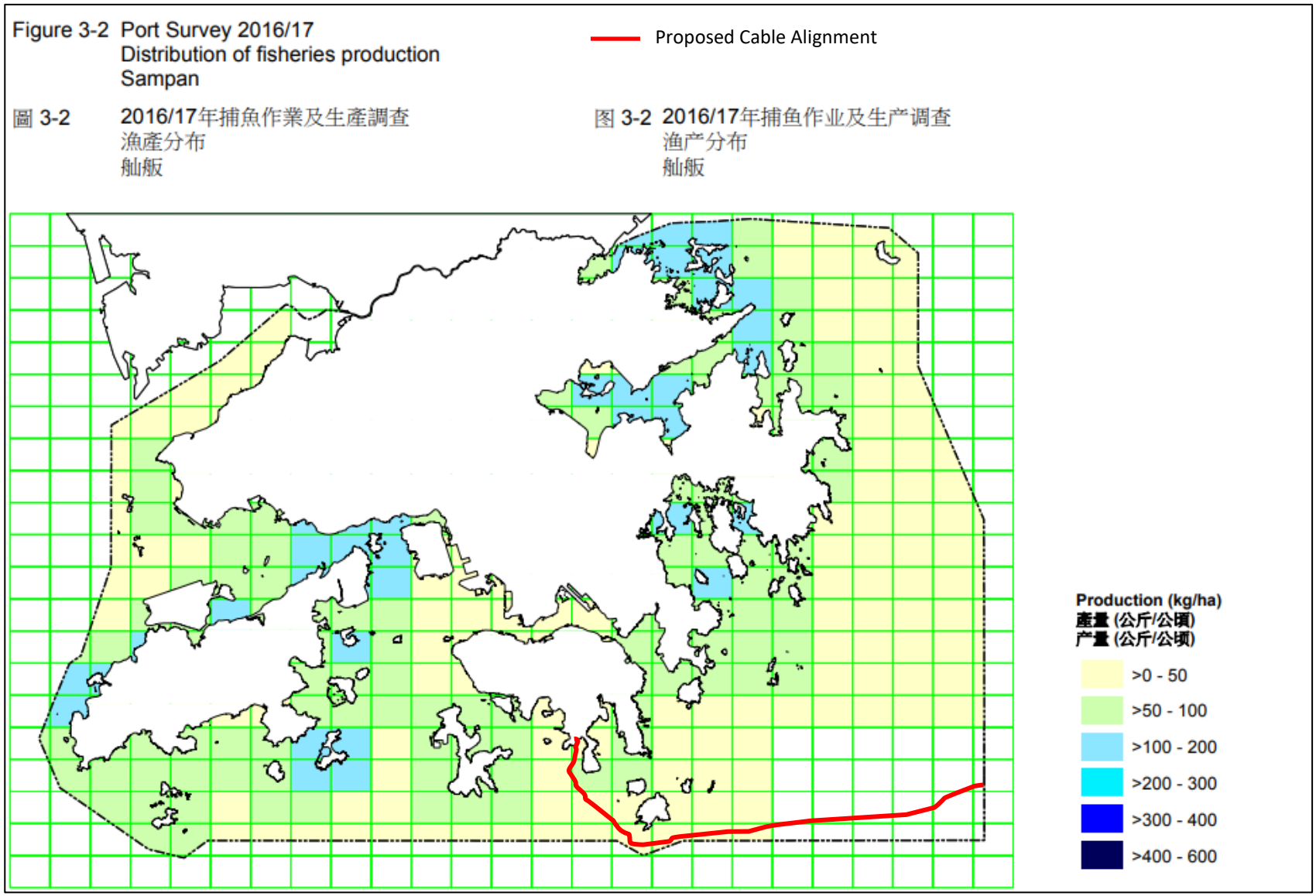
Source: Port Survey 2016/17, AFCD.

Figure C.4: Distribution of Fisheries Production and Location of the SJC2-HK Cable



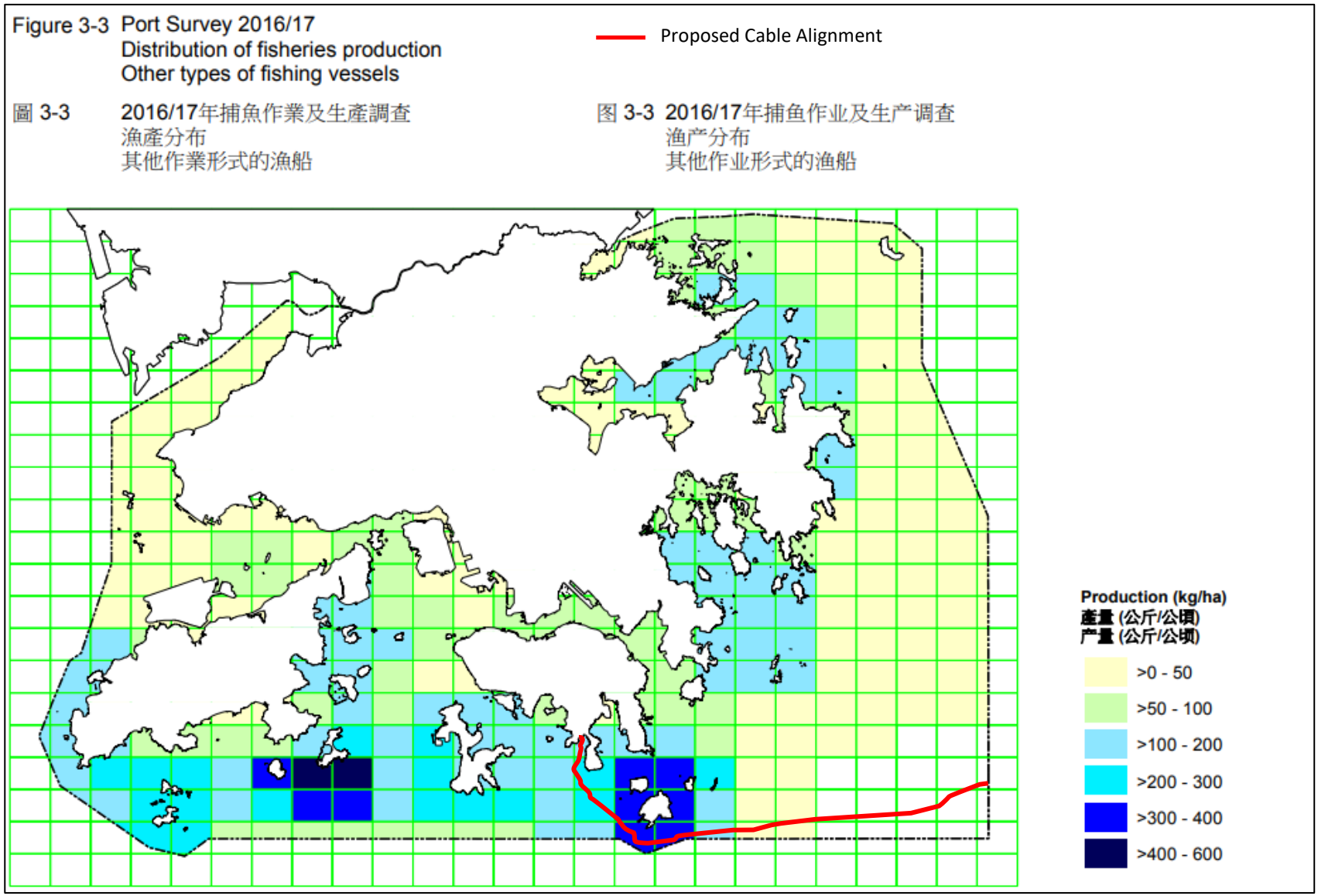
Source: Port Survey 2016/17, AFCD.

Figure C.5: Distribution of Fisheries Production (Sampan) and Location of the SJC2-HK Cable



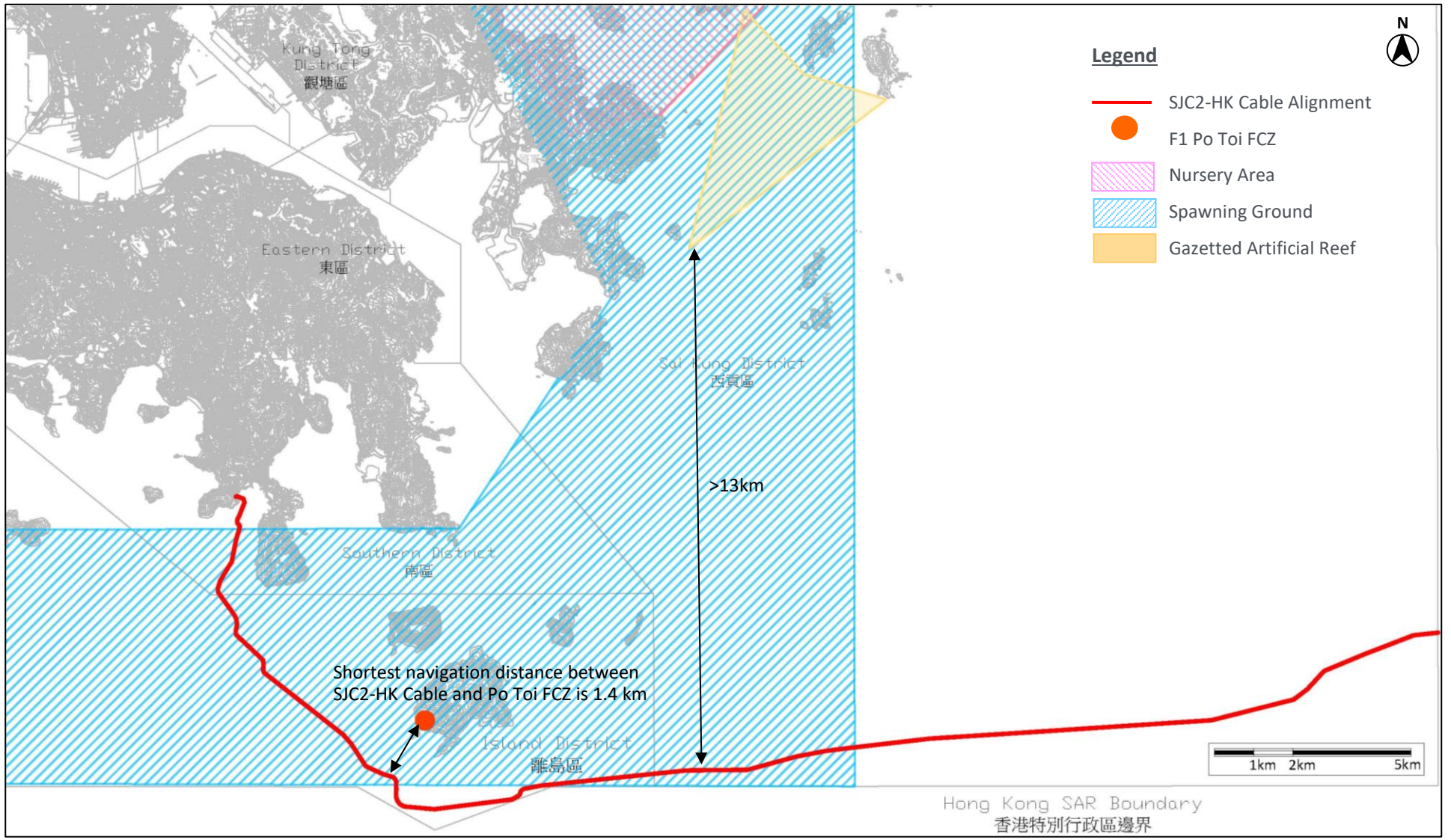
Source: Port Survey 2016/17, AFCD.

Figure C.6: Distribution of Fisheries Production (Other Types of Fishing Vessels) and Location of the SJC2-HK Cable



Source: Port Survey 2016/17, AFCD.

Figure C.7: Fisheries Sensitive Receivers



Appendix D CULTURAL HERITAGE ASSESSMENT

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D CULTURAL HERITAGE ASSESSMENT

D.1 Introduction

D.1.1 This appendix contains an assessment of cultural heritage associated with the Project.

D.2 Relevant Legislation and Guidelines

D.2.1 The following legislation and guidelines are applicable to the assessment of cultural heritage impact in Hong Kong:

- Environmental Impact Assessment Ordinance (Cap 499) and the associated Technical Memorandum on the EIAO Process (EIAO-TM), Annexes 10 and 19
- Antiquities and Monuments Ordinance (Cap. 53)
- Hong Kong Planning Standards and Guidelines (HKPSG)
- Guidelines for Marine Archaeological Investigation (MAI) issued by the Antiquities and Monuments Office (AMO)

EIAO-TM

D.2.2 The EIAO-TM and its Annexes outline the approach and criteria for assessment of impact on Sites of Cultural Heritage.

D.2.3 Annex 10 provides the criteria for evaluating impact on sites of cultural heritage and also notes the general presumption in favour of the protection and conservation of sites of cultural heritage and that adverse impacts on sites of cultural heritage shall be kept to the absolute minimum.

D.2.4 Annex 19 notes that preservation is the preferred solution and if full preservation is not feasible, due to site constraints and other factors, this must be fully justified with alternative proposals or layout designs, which confirm the impracticability of total preservation.

Antiquities and Monuments Ordinance, Cap 53

D.2.5 The *Antiquities and Monuments Ordinance* (Cap. 53) provides statutory protection against the threat of development on declared or proposed monuments, to enable their preservation for posterity. The Ordinance also establishes statutory procedures to be followed in making such a declaration.

Hong Kong Planning Standards and Guidelines

D.2.6 Chapter 10 of HKPSG on Conservation provides general guidelines and measures for the conservation of historic buildings, sites of archaeological interest and other antiquities.

Guidelines for MAI

D.2.7 The Guidelines for MAI detail the standard practice, procedures and methodology which must be undertaken in determining the marine archaeological potential, presence of archaeological artefacts and defining suitable mitigation measures.

D.3 Assessment Methodology

D.3.1 The objectives of the MAI are to conduct a phased review/investigation of the Study Area in accordance with the *Guidelines for MAI*. The Study Area refers to the assessment corridor along the cable alignment with 25m width on both sides, i.e. 50m wide in total. The MAI shall include a Phase I Assessment, which shall determine if a Phase II Assessment is required.

D.3.2 During a Phase I Assessment, the following was undertaken by a qualified marine archaeologist:

- Baseline review of the Study Area including a review of existing MAI studies
- Review of Geophysical Survey data
- Establish marine archaeological potential
- Conduct marine archaeological impact assessment

D.3.3 Based on the results of the first stage MAI, further investigation may or may not be required. Should a Phase II Assessment be required, the following shall be undertaken:

- Remote Operated Vehicle/Visual Diver Survey/Watching Brief if potential sites are identified during Phase I work.
- Provide a Report on these aspects.

D.4 Baseline Review

D.4.1 The SJC2-HK Cable alignment and landing site at SST Beach in CHK is within a similar assessment corridor as the previous MAI of other submarine cable systems, such as the C2C, SJC and VSNL Cables. Information from the MAI for C2C, SJC and VSNL Cables has been extracted into this Appendix to describe and support the existing conditions and findings within the Study Area.

Inventory of Heritage within Study Area

D.4.2 According to AMO's *List of Sites of Archaeological Interest in Hong Kong*, the Chung Hom Wan Site of Archaeological Interest is located approx. 470m west of the landing site, as shown on **Figure D.1**. It is dated to the Middle Neolithic (c.4000-2500 BC) and archaeological deposits have been recorded at this location. No declared monuments, proposed monuments, graded historic sites/buildings, and government historic sites identified by AMO are found within 500m of the cable landing site.

D.4.3 In terms of marine archaeological resources, SJC2-HK Cable is in the vicinity of several other submarine cable systems such as the C2C, SJC, VSNL & HKA that already landed at SST Beach in CHK and have been subject to previous MAIs, as shown in **Figure 1.2**. None of the previous MAIs at the same location identified any previously known marine archaeological resources, or seabed features with marine archaeological potential. It is therefore possible to conclude that no marine archaeological resources fall within the Study Area of the MAI for the proposed SJC2-HK Cable overlapping the study areas of the previous MAIs.

D.4.4 A review of the United Kingdom Hydrographic Office (UKHO) wrecks database identified two wrecks in the vicinity of the cable alignment but the closest, UKHO 71910 shown in **Figure D.1** and **Figure D.2**, is located 270m from the SJC2-HK Cable and is outside the Study Area

Possible Threats to Terrestrial Cultural Heritage

D.4.5 At the SST Beach landing point, the only works will be a shallow excavation to enable the cable to enter the existing BMH. As no new construction is required there is also no threat to any Sites of Archaeological Interest. No declared monuments, proposed monuments, graded historic sites/buildings, and government historic sites identified by AMO are found within 500m of the cable landing site. As such, the remainder of this assessment will focus on marine archaeological resources.

Possible Threats to Marine Archaeological Resources

D.4.6 The distances between the cable alignment and the potential marine archaeological objects identified in the previous MAI for SJC are shown on **Figure D.1** and **Figure D.2**. To ascertain whether any of these objects are marine archaeological resources, a MAI has been carried out for the SJC2-HK Cable in **Section D.5**.

D.4.7 Installation of the first 140m of the cable from the shore-end installation in marine mud/sand will be achieved by divers using jetting. The remainder of the cable will be installed using an injector burial tool which fluidizes the seabed 0.5m width to a depth of 5m. The Study Area is set at 25m either side of the cable alignment to allow a buffer zone for the installation work.

D.5 Review of Geophysical Survey Data

United Kingdom's Hydrographic Office (UKHO)

D.5.1 The UKHO in Taunton maintains a database of known shipwrecks and other underwater obstructions in Hong Kong waters, and this was reviewed. The database of the Hong Kong Underwater Heritage Group analysing and consolidating data for almost 300 Hong Kong sites was also reviewed.

D.5.2 With reference to the UKHO database, a total of two sites were found in the vicinity of the cable alignment. **Figure D.1** and **Figure D.2** show the indicative locations of these two sites. The two shipwreck sites are of UKHO Wreck numbers of 46766 and 71910, located approx. 400m and 270m, respectively, from the cable alignment. Neither is located within the Study Area. **Table D.1** summarises details of these two identified shipwreck sites.

Table D.1: UKHO Shipwreck Sites

WRECK NUMBER	STATUS (HK MARINE SURVEY DATE)	INDICATIVE GEOGRAPHICAL COORDINATES	INDICATIVE DISTANCE FROM THE CABLE ROUTE
UKHO 46766	Dead (18 October, 2005)	Easting: 856754.0 Northing: 801885.7	400m
UKHO 71910	Live (5 July, 2008)	Easting: 862947.4 Northing: 803006.8	270m

Geophysical Surveys

D.5.3 SJC2-HK Cable is in the vicinity of several other submarine cable systems and the baseline review made reference to previous projects, including:

- C2C Cable Network – Hong Kong Section (Chung Hom Kok) (Application No. DIR-109/2000).
- VSNL Intra Asia Submarine Cable System – Deep Water Bay Project Profile (Application No. DIR-155/2007).
- South-East Asia Japan Cable System (SJC) Hong Kong Segment Project Profile (Application No. DIR-213/2011).
- Hong Kong-America (HKA) Cable – Chung Hom Kok Project Profile (Application No. DIR-265/2018)

D.5.4 All of the previous MAI findings concluded that no features of archaeological value are present in these areas. The details of each previous survey are set out below.

D.5.5 To supplement the above information, a new geophysical survey for SJC2-HK Cable was undertaken in May 2018 and encompassed an assessment of the depth and nature of the seabed sediments and any seabed and sub- bottom anomalies – this is discussed in **Section D.6**.

C2C Cable

D.5.6 In 2000 the first Marine Archaeological Investigation at CHK was completed for the above cable. A comprehensive desk based review, geophysical survey and diver survey was completed on the only seabed feature located with archaeological potential. No archaeological remains were located and it was concluded that there were no marine archaeological resources in the study

area. It was noted from the side scan sonar data that there were a particularly large number of deeply incised trawl scars. An informal discussion was held with staff from the Department of Agriculture, Fisheries and Conservation. They confirmed that the study area was a popular fishing ground for shrimp trawlers and to a lesser extent stern trawlers and pair trawlers. While no official data were available, the representatives indicated that it is possible that the seabed within the study area was trawled several times a week. Trawling was banned in 2012 but the damage to the seabed remains visible in the 2018 geophysical survey. The trawling activities may have served to destroy or redistribute archaeological material, if present, thereby reducing the archaeological potential of the study area. It is therefore possible that the study area may contain isolated artefacts rather than intact shipwrecks. However, such objects would generally be of reduced scientific value since they are not *in situ* and thus would have no contextual information to assist in their dating and evaluation.

VSNL Cable

D.5.7 The section of the VSNL Cable from the west of Beaufort Island to the south of Po Toi Island is similar to the route of the SJC2-HK Cable. Although no geophysical survey was carried out, a MAI based on literature review was conducted and identified a wreck located approx. 375m east of the cable route adjacent to the western coast of Middle Island. It was concluded that no impact to the shipwreck is expected and the cable route area was considered to have low marine archaeological potential.

D.5.8 This identified shipwreck is over 5km from the route alignment of the SJC2-HK Cable and so its marine archaeological potential is not a concern.

SJC Cable Survey in 2011

D.5.9 The sections of the SJC Cable from the landing site at SST Beach to the west of Stanley Peninsular and from the west of Beaufort Island to the south of Po Toi Island are in the vicinity of the Study Area of the SJC2-HK Cable. A geophysical survey was carried out and sonar contacts for the section of SJC2-HK Cable are listed in **Table D.2** and shown on **Figure D.1** and **Figure D.2**. There are six sonar contacts within 100m from the SJC2-HK Cable alignment and classified as debris/boulder/dredging dump. They required no further investigation and it was concluded that there were no features of archaeological value in the vicinity of the SJC Cable.

Table D.2: Side Scan Sonar Contacts from the 2011 SJC Geophysical Survey

REF	LATITUDE LONGITUDE	SIZE (m)*	DESCRIPTION
SC014	22° 12.856' N 114° 12.461' E	1 x 1 x <1	Debris/Boulder
SC019	22° 12.802' N 114° 12.444' E	2.5 x 1.5 x <1	Debris/Boulder
SC021	22° 12.652' N 114° 12.359' E	2 x <1 x <1	Debris/dredging dump
SC025	22° 12.220' N 114° 12.351' E	2 x 1 x <1	Debris/dredging dump
SC028	22° 11.979' N 114° 12.322' E	1.5 x <1 x <1	Debris
SC030	22° 11.902' N 114° 12.295' E	2 x 1 x <1	Debris

Source: Extracted from Section F3, Project Profile for SJC Cable System Hong Kong Segment, June 2011

HKA Cable Survey in 2018

D.5.10 A geophysical survey for the HKA cable alignment was carried out in 2018, which comprised a side scan sonar, sub bottom Profiler, echo sounder and magnetic survey covering the MAI Study Area. Many sonar contacts were identified in the MAI Study Area, with two being identified for further review as they appeared to be possible man-made features that may be of archaeological interest. One was a possible wreck (SC246), potentially a small fishing vessel given the nature of the wreck (see Figure E2 of HKA's Project Profile). However, it was 198m from the cable and would not be impacted by the cable installation. Another one (SC072) was considered to be man-made debris and the Magnetic Survey reading at this location was low. It is therefore not considered as an iron object of archaeological potential. It was 38m from the cable. No debris was found within 5m of the cable and it was concluded that there were no features of archaeological value in the Study Area of the HKA Cable.

Table D.3: Side Scan Sonar Contacts from the 2018 HKA Geophysical Survey

REF	EASTING NORTHING	SIZE (m)*	DESCRIPTION
SC072	2451406.4E 8065105.7N	2.56 x 1.14 x 0.9	Debris
SC246	2475298.1E 8067674.6N	21.5 x 3.4 x nmh	Possible Wreck

Source: Table E.4.2, Project Profile for HKA Submarine Cable – Chung Hom Kok, November 2018.

Note: nmh = no measurable height.

D.6 2018 Marine Archaeological Investigation

D.6.1 Local marine surveying company EGS (Asia) Limited (EGS) carried out a geophysical survey for the SJC2-HK Cable in mid-2018, and have previously carried out geophysical surveys for other cable projects along the SJC2-HK Cable alignment, including SJC. Data from these geophysical surveys was processed by EGS' geophysicists and reviewed by a qualified marine archaeologist, Sarah HEAVER, of SDA Marine Limited.

D.6.2 The following equipment was employed during the SJC2-HK Cable geophysical survey:

- C-Nav GcGPS (Globally corrected GPS)
- Single-beam Echo Sounder
- Multi-beam Echo Sounder
- Side Scan Sonar System
- Sub-bottom Profiler
- Marine Magnetometer System

D.6.3 Debris and boulders were found by the side scan sonar survey along the length of SJC2-HK Cable alignment. The seabed in the Study Area is covered by thick sediment, comprising very soft to soft sandy gravelly clay. The seabed is characterized by scattered scars and debris/boulder along the whole SJC2-HK Cable alignment. Numerous scars are observed as the cable approaches the eastern end. Image records of the geophysical survey for SJC2-HK Cable are shown on **Figure D.3**.

D.6.4 The survey findings for SJC did not identify any items with archaeological potential interest within the 50m Study Area corridor the SJC2-HK Cable. The results of the survey data indicated that the sonar contacts within the survey area were all surface debris and therefore of no archaeological significance. There were no magnetic or buried contacts associated with any of the sonar contacts.

D.6.5 The geophysical survey of the SJC2-HK Cable alignment revealed that the seabed has numerous scars and debris/boulder along the alignment and identified a "new" wreck (SC003) close to the landing site. The wreck appears to be that of a small sampan, located 2m from the SJC2-HK Cable alignment. An image of this is shown on **Figure D.3** and the location is detailed in Table D4. This wreck was also identified as SC002 on Figure E4-1 of the Project Profile for HKA Submarine Cable – Chung Hom Kok, November 2018, but was not further referenced in that Project Profile.

D.6.6 This wreck (SC003) was not identified in the geophysical survey for SJC Cable in 2011, nor was it identified in the Project Profiles for C2C Cable in 2000, both of which also landed at SST Beach. This is possibly because the sampan was sunk after 2011. Assuming, therefore, that this wreck (SC003) is recent, it is not considered to have any archaeological potential.

D.6.7 Except for this "new" wreck (SC003) near the landing beach, the survey results of the SJC2-HK Cable alignment are in accordance with the findings of previous surveys, i.e. no evidence of any marine archaeological resources.

D.6.8 Sonar contacts from the SJC2-HK geophysical survey in 2018 are listed in **Table D.4** and shown on **Figure D.1** and **Figure D.2**. Nineteen sonar contacts are located within the 50m corridor and all of them are classified as debris/possible discarded man-made object/boulder, except for the wreck mentioned above. The sonar contacts of debris/possible discarded man-made object contain abandon ropes, nets, etc. which would be of no marine archaeological potential. Some example images of some debris/abandon nets are shown in **Figure D.3** and the copy of data showing each of the side scan sonar contacts is presented in **Figure D.4**.

Table D.4: Side Scan Sonar Contacts Identified within the 50m Study Area corridor in the SJC2-HK Geophysical Survey in 2018

REF	LATITUDE LONGITUDE	SIZE (m)*	DESCRIPTION
SC002	22° 12.891' N 114° 12.459' E	<1 x <1 x <1	Debris/Possible discarded man-made object
SC003	22° 12.886' N 114° 12.465' E	3 x 1 x <1	Wreck
SC004	22° 12.881' N 114° 12.467' E	1 x 1 x nmh	Debris/Possible discarded man-made object
SC005	22° 12.891' N 114° 12.482' E	1 x <1 x <1	Debris/Possible discarded man-made object
SC009	22° 12.882' N 114° 12.485' E	4 x <1 x <1	Debris/Possible discarded man-made object
SC012	22° 12.869' N 114° 12.474' E	<1 x <1 x nmh	Debris/Possible discarded man-made object
SC013	22° 12.866' N 114° 12.469' E	3 x 2 x nmh	Debris/Possible discarded man-made object
SC014	22° 12.870' N 114° 12.494' E	2 x 1 x <1	Debris/Boulder
SC023	22° 12.818' N 114° 12.480' E	3 x <1 x <1	Debris/Boulder
SC024	22° 12.809' N 114° 12.488' E	1 x 1 x <1	Debris/Boulder
SC033	22° 12.675' N 114° 12.420' E	1 x <1 x <1	Debris

REF	LATITUDE LONGITUDE	SIZE (m)*	DESCRIPTION
SC057	22° 11.860' N 114° 12.208' E	4 x 2 x <1	Debris
SC096	22° 9.364' N 114° 14.156' E	1 x 1 x <nmh	Debris
D-SC065	22° 10.195' N 114° 13.170' E	7 x 2 x nmh	Possible debris
D-SC066	22° 10.194' N 114° 13.200' E	3 x <1.5 x nmh	Debris
D-SC067	22° 10.185' N 114° 13.209' E	8.5 x <1.5 x nmh	Linear debris
D-SC068	22° 10.159' N 114° 13.238' E	11 x <1.5 x nmh	Linear debris
D-SC093	22° 9.730' N 114° 13.835' E	3.5 x 2 x nmh	Debris
D-SC114	22° 9.148' N 114° 14.386' E	2 x 1.5 x nmh	Debris

Note: nmh = no measurable height.

D.6.9 Magnetic surveys were carried out for the SJC2-HK Cable in 2018 to locate existing cables and pipelines along the alignment. The findings are listed in **Table D.5** and shown on **Figure D.1** and **Figure D.2**. Sixteen magnetic contacts are located within the 50m corridor and all of them are regarded as unknown objects. A copy of magnetic data presentation is shown in **Figure D.5**.

Table D.5: Magnetic Contacts from the SJC2-HK Geophysical Survey in 2018

REF	LATITUDE LONGITUDE	MAGNETIC ANOMALY (nT)	DESCRIPTION
MC003	22° 12.847’ N 114° 12.500’ E	23.7	Possible in-service cable
MC009	22° 12.823’ N 114° 12.492’ E	21.7	Unknown
MC014	22° 12.654’ N 114° 12.431’ E	262.5	Possible in-service cable
MC015	22° 12.594’ N 114° 12.394’ E	2.1	Unknown
MC034	22° 12.331’ N 114° 12.390’ E	53.1	Unknown
MC049	22° 12.062’ N 114° 12.303’ E	28.9	Unknown
MC060	22° 11.965’ N 114° 12.283’ E	7.5	Unknown
MC061	22° 11.960’ N 114° 12.268’ E	8.6	In-service cable
MC078	22° 11.844’ N 114° 12.200’ E	8	In-service cable

REF	LATITUDE LONGITUDE	MAGNETIC ANOMALY (nT)	DESCRIPTION
MC092	22° 11.731' N 114° 12.144' E	12.7	Out-of-service cable
MC095	22° 11.710' N 114° 12.138' E	3.9	Unknown
MC101	22° 11.619' N 114° 12.100' E	7.7	Unknown
MC170	22° 8.864' N 114° 14.738' E	156.3	Unknown
MC185	22° 9.350' N 114° 20.849' E	36.3	Unknown
D-MC026	22° 10.580' N 114° 12.780' E	13.4	In-service cable
D-MC028	22° 10.575' N 114° 12.770' E	129.5	In-service cable

D.6.10 In total, sixteen magnetic contacts were located within the 50m corridor. Six of these are associated with in service cables. The seabed within the study area is unusually congested with the proposed cable making eight crossings with five in-service cables, fifteen crossings with ten out of service cables and one crossing with one cable of unknown status. All of the in-service cables were positively delineated by magnetometer survey. The side scan sonar data also indicated that there is a lot of modern debris on the seabed across the study area. EGS, who completed the marine geophysical survey are very confident about the location of all in service and out of service cables as they have worked on them previously. In their report they conclude that it is very likely that all of the sixteen magnetic contacts are associated with either the previous or existing cables, or modern debris.

D.6.11 EGS' evaluations above have been reviewed by a qualified marine archaeologist, Sarah HEAVER, who considers the SJC2 cable to be unusual in that it is very close to four other cables. For each of these cables an MAI was carried out, which did not locate any marine archaeological resources. There would also have been some disturbance to the seabed during the installation of these four cables. The qualified marine archaeologist therefore concurs with the conclusion made by EGS that all of the sixteen magnetic contacts are associated with either the previous or existing cables, or modern debris. More accurate assessment cannot be provided without diver inspection but it was concluded that it in this case it was not required.

D.6.12 Other magnetic contacts and sub-bottom anomalies that were found during the geophysical surveys have been identified as related to other cables, gas pipeline, and dumped materials/debris given their association with these types of seabed features.

D.7 Conclusion

D.7.1 There will be no impact to terrestrial cultural heritage from marine works. At the SST Beach landing point, the only works will be shallow excavation works to enable the cable to enter the existing BMH. No new construction is required and so there is also no threat to the nearest Site of Archaeological Interest. Hence no mitigation measures need to be put in place.

D.7.2 The geophysical surveys of previous MAIs and the one carried out for the SJC2-HK Cable in 2018 reveal that seabed along the SJC2-HK Cable alignment has been heavily impacted from trawling and the dumping of materials and installation of the previous cables. It also found the nature of the sediments to be very soft to soft sandy gravelly clay. The previous seabed disturbance from

historic dredging and previous cable installation would have significantly reduced the archaeological potential of the seabed in the vicinity of the cable.

D.7.3 The geophysical survey of the SJC2-HK Cable alignment revealed that the seabed has numerous scars and debris/boulders along the alignment. It identified 19 no. sonar contacts within the 50m corridor, but with one exception, all of these are identified as debris/possible discarded man-made objects/boulders.

D.7.4 The exception is a "new" wreck (SC003) close to the landing site. The wreck appears to be that of a small sampan, located 2m from the SJC2-HK Cable alignment located close to the landing site. This wreck was also identified as SC002 on Figure E4-1 of the Project Profile for HKA Submarine Cable – Chung Hom Kok, November 2018. This wreck (SC003) was not identified in the geophysical survey for SJC Cable in 2011, nor was it identified in the Project Profiles for C2C Cable in 2000, both of which also landed at SST Beach. This is possibly because the sampan was sunk after 2011. Assuming, therefore, that this wreck (SC003) is recent, it is not considered to have any archaeological potential.

D.7.5 In total, sixteen magnetic contacts were located within the 50m corridor. Six of these are associated with in service cables. The seabed within the study area is unusually congested with the proposed cable making eight crossings with five in-service cables, fifteen crossings with ten out of service cables and one crossing with one cable of unknown status. All of the in-service cables were positively delineated by magnetometer survey. The side scan sonar data also indicated that there is a lot of modern debris on the seabed across the study area. EGS, who completed the marine geophysical survey are very confident about the location of all in service and out of service cables as they have worked on them previously. In their report they conclude that it is very likely that all of the sixteen magnetic contacts are associated with either the previous or existing cables or modern debris.

D.7.6 Evaluations in the report has been reviewed by the qualified marine archaeologist, Sarah HEAVER, who considered the SJC2 cable is very unusual because it is very close to four other installed cables. Each of these had an MAI investigation which did not locate any archaeological resources. There would also have been considerable disturbance to the seabed during the installation of the previous four cables. In this case it is agreed that this is the most likely explanation for the magnetic contacts. More accurate assessment cannot be provided without diver inspection but it was concluded that it in this case it was not required.

D.7.7 Other magnetic contacts and sub-bottom anomalies that were found during the geophysical surveys relate to other cables, the HKE Gas Pipeline, and dumped materials/debris.

D.7.8 A review of the UKHO wrecks database identified two wrecks in the vicinity of the cable alignment but the closest one is 270m away and outside the 50m cable alignment corridor.

D.7.9 The MAI established that there is no evidence for marine archaeological resources and hence no marine archaeological impacts are expected. No mitigation measures or further action will therefore be required.

D.8 References

Project Profile for HKA Submarine Cable – Chung Hom Kok, November 2018 (PP-573/2018).

Project Profile for South-East Asia Japan Cable System (SJC) Hong Kong Segment, 22 June 2011 (PP-444/2011).

Project Profile for VSNL Intra Asia Submarine Cable System – Deep Water Bay, 31 August 2007 (PP-324/2007).

Project Profile for C2C Cable Network – Hong Kong Section: Chung Hom Kok, 5 December 2000 (PP-109/2000).

Figure D.1: Location of Site of Archaeological Interest and Potential Marine Archaeological Resources

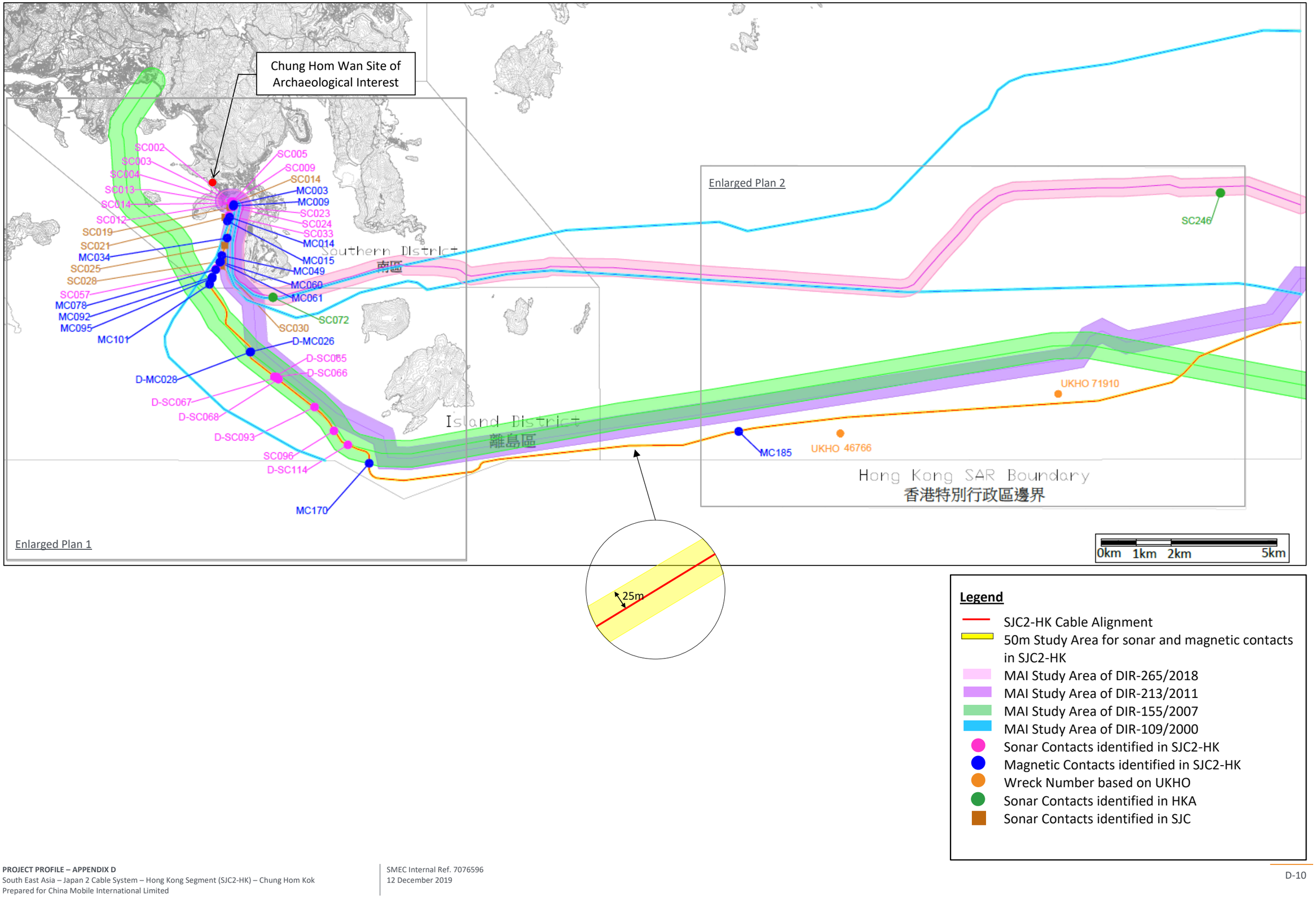


Figure D.2: Enlarged Plans Showing Potential Marine Archaeological Resources

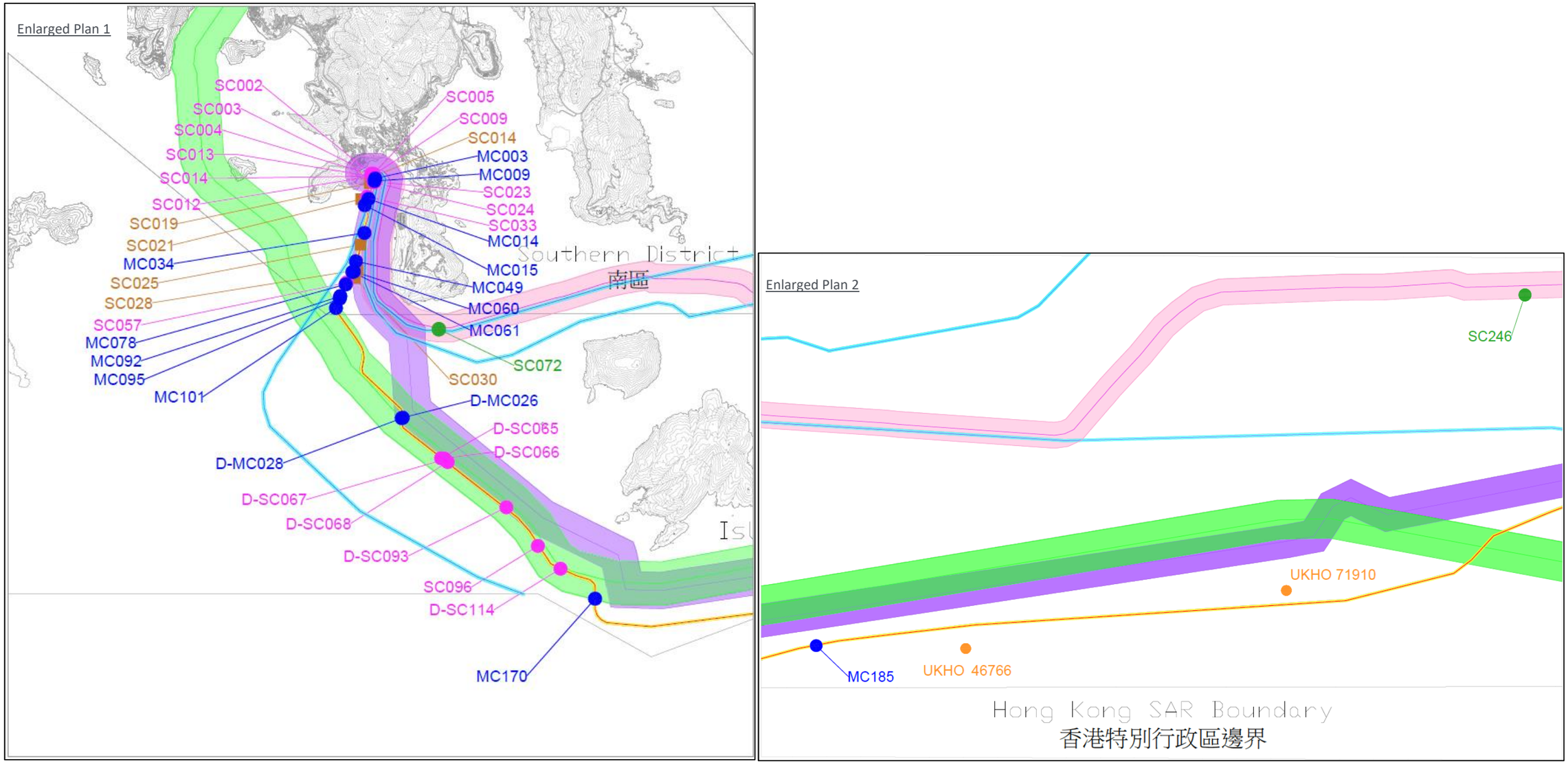
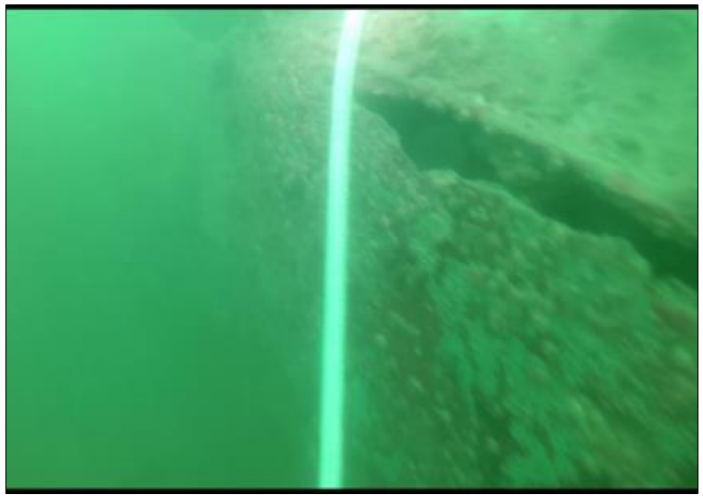
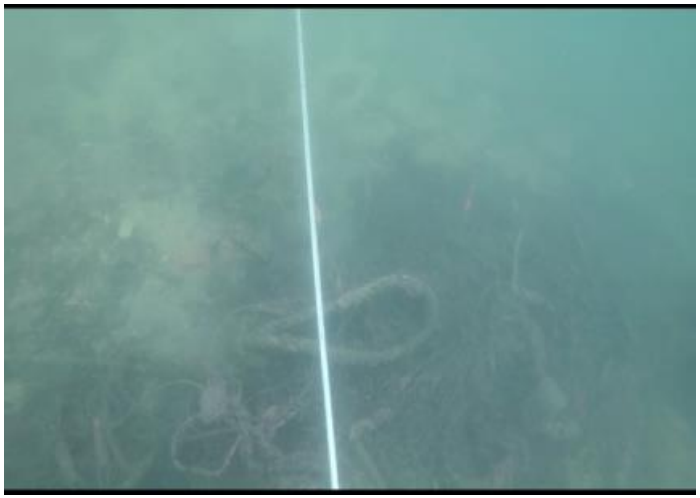
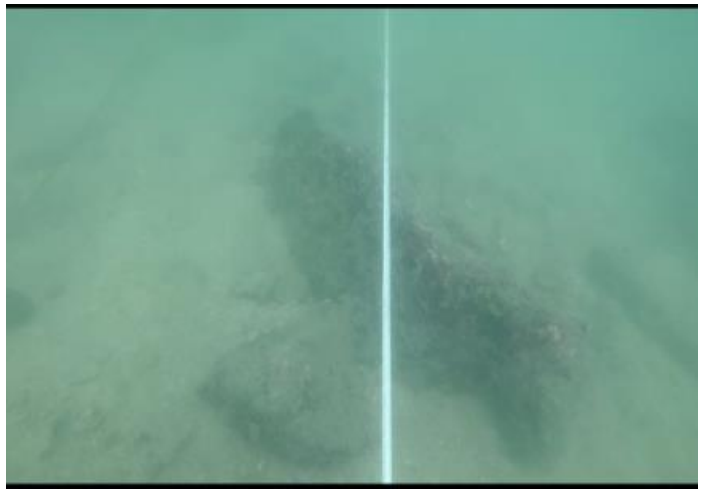
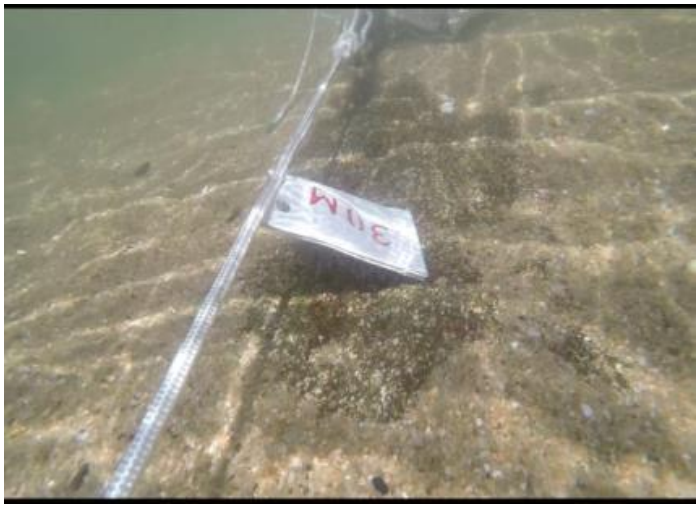
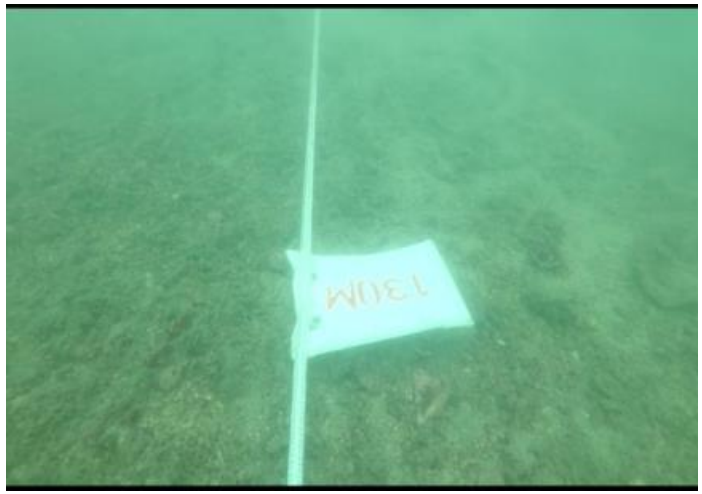
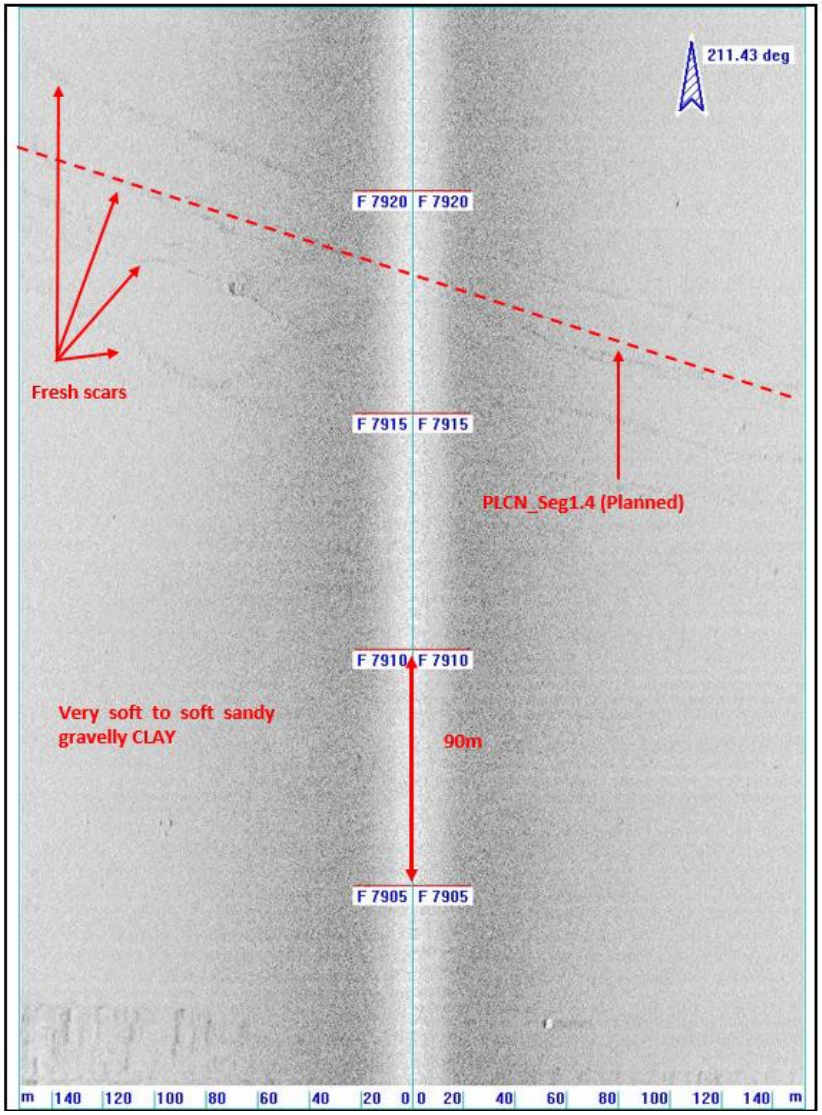


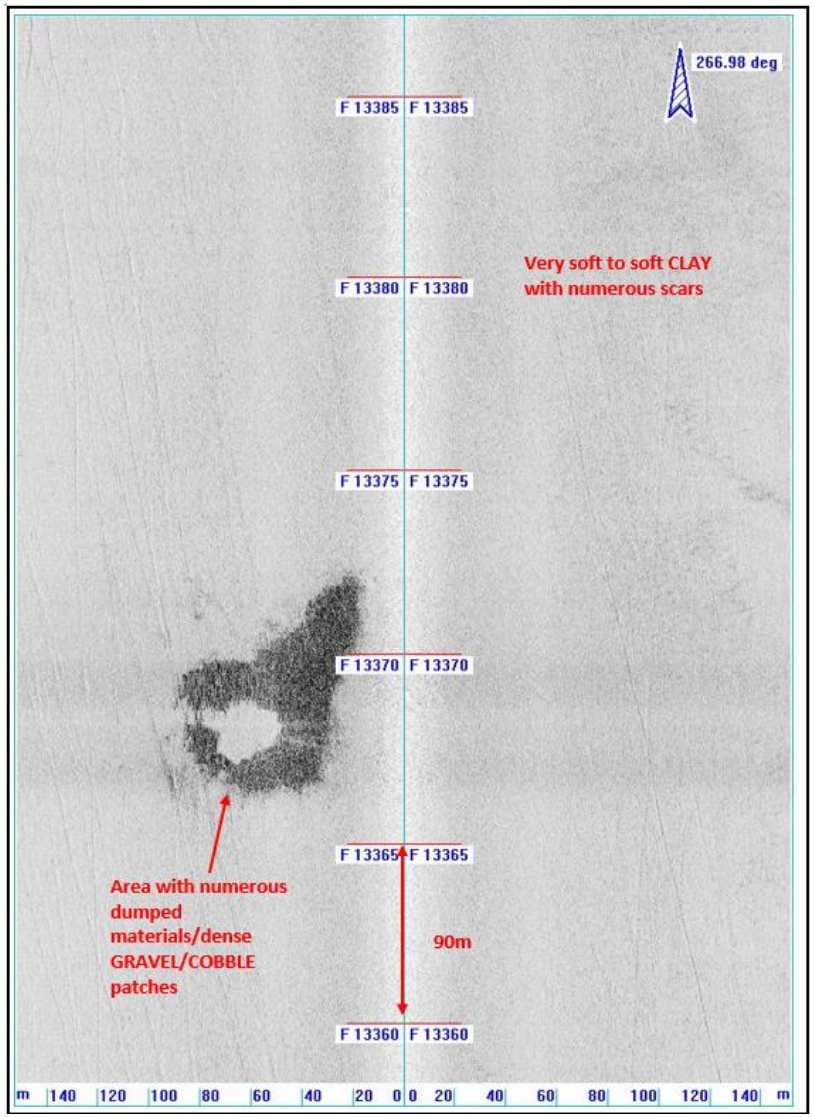
Figure D.3: Photographs from the diver survey completed as part of the Geophysical Survey for SJC2-HK Cable

	
Small abandoned sampan (SC003)	Abandoned fishing net
	
Debris	Debris

	
Sand & Gravel	Debris & Shell

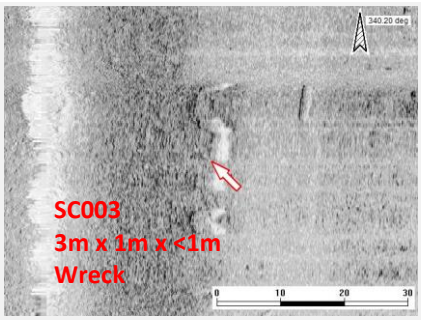
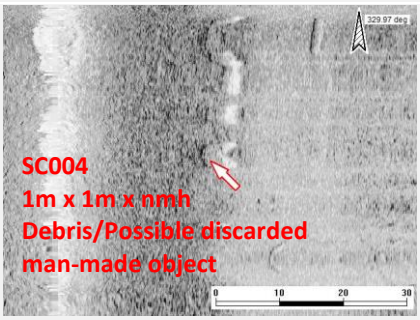
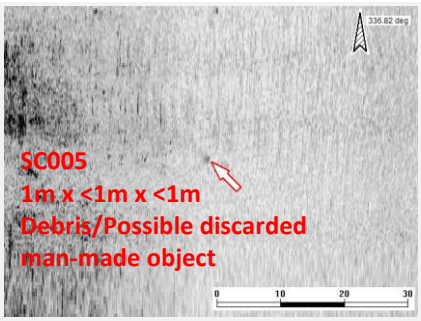
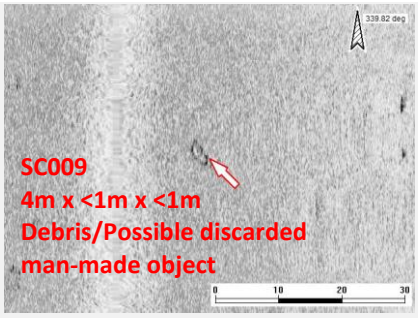
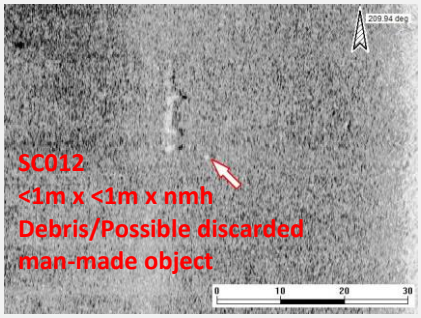
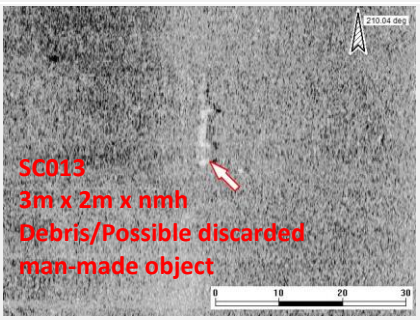
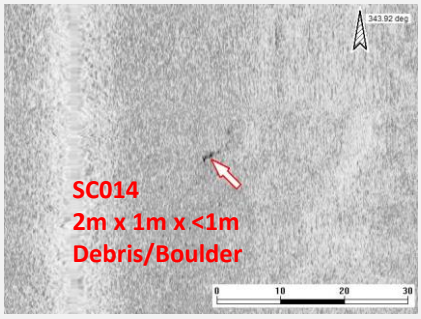
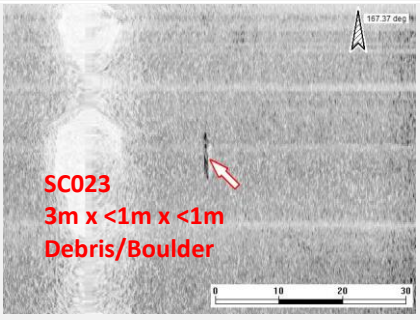
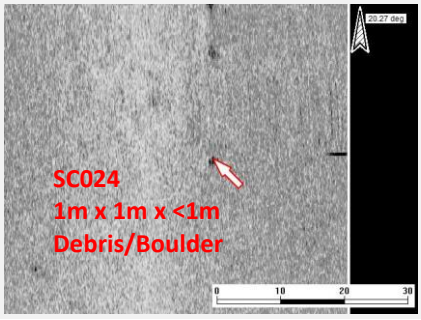


Fresh Scars near Planned Cable



Modern Dumped Materials

Figure D.4: Copy of Side Scan Sonar Data

SONAR CONTACT NUMBER	SIDE SCAN SONAR DATA	SONAR CONTACT NUMBER	SIDE SCAN SONAR DATA
SC002		SC003	
SC004		SC005	
SC009		SC012	
SC013		SC014	
SC023		SC024	

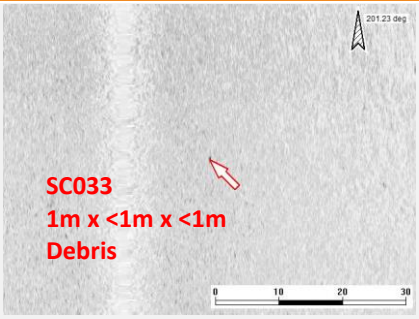
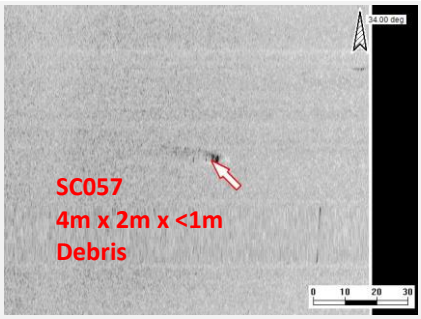
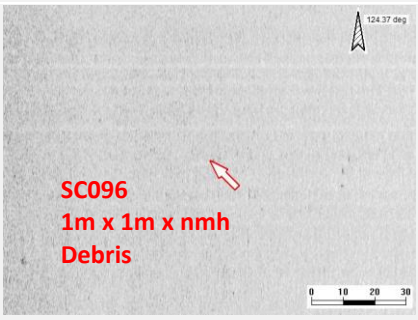
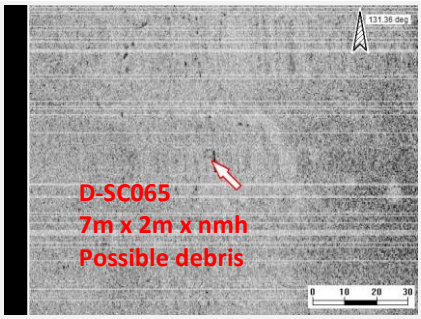
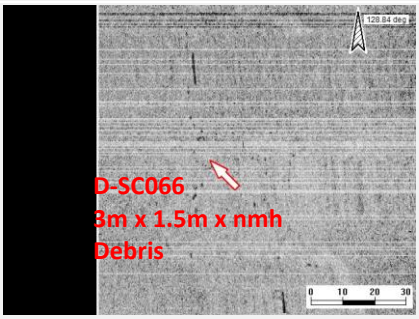
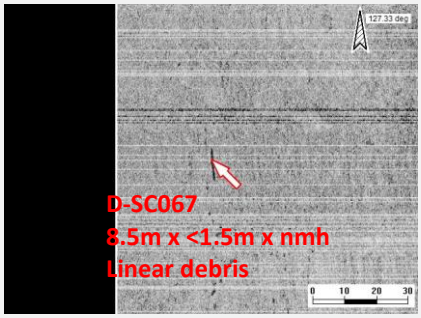
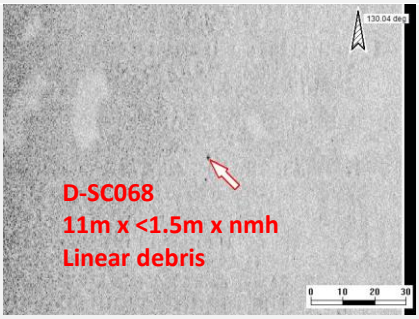
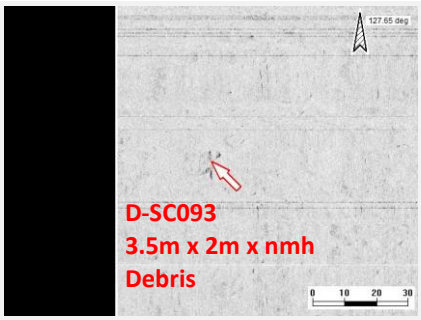
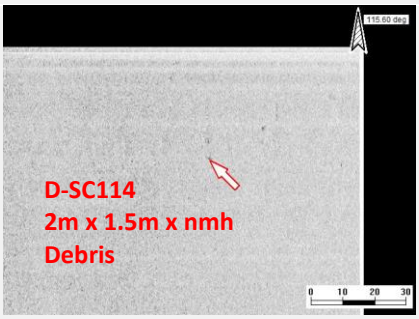
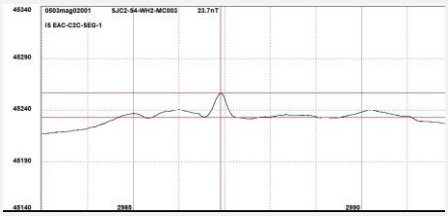
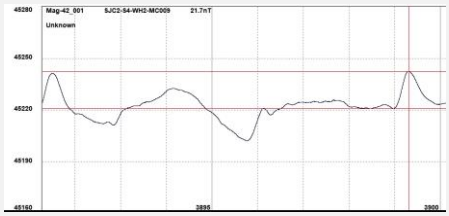
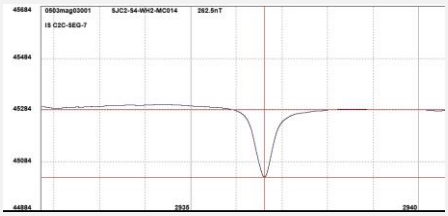
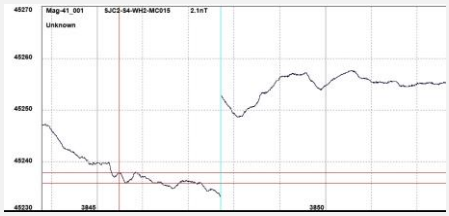
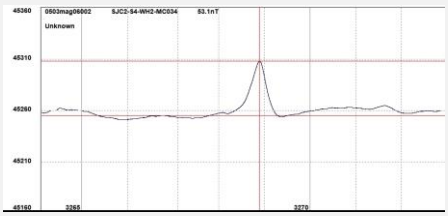
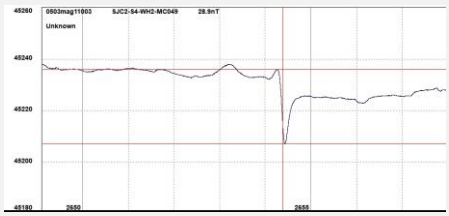
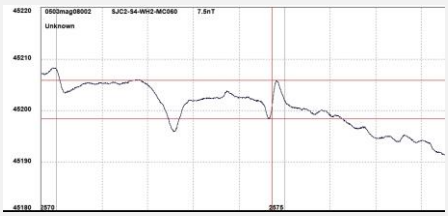
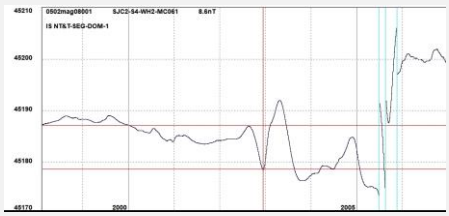
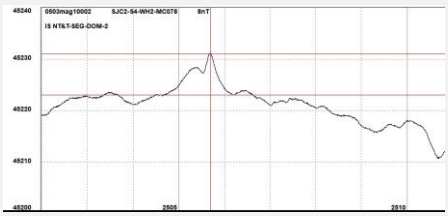
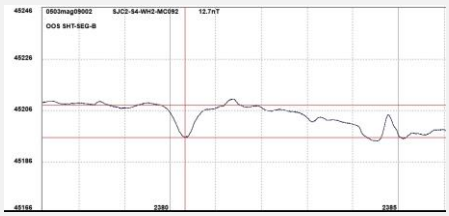
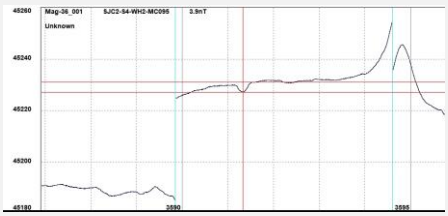
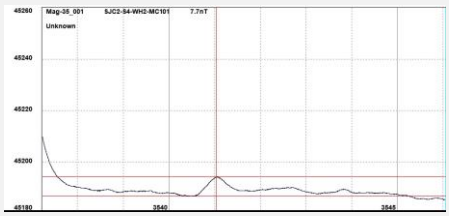
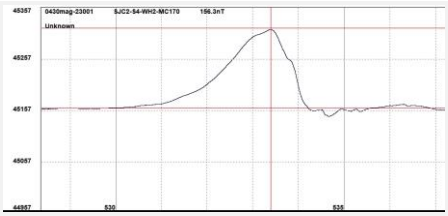
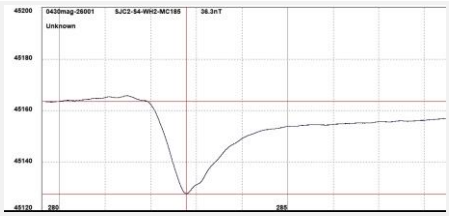
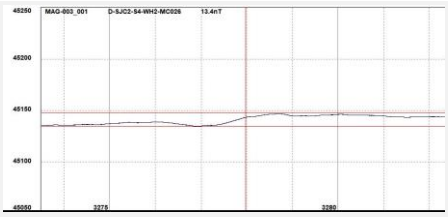
SONAR CONTACT NUMBER	SIDE SCAN SONAR DATA	SONAR CONTACT NUMBER	SIDE SCAN SONAR DATA
SC033		SC057	
SC096		D-SC065	
D-SC066		D-SC067	
D-SC068		D-SC093	
D-SC114			

Figure D.5: Copy of Magnetic Data Presentation

CONTACT NUMBER	MAGNETIC DATA PRESENTATION	CONTACT NUMBER	MAGNETIC DATA PRESENTATION
MC003		MC009	
MC014		MC015	
MC034		MC049	
MC060		MC061	
MC078		MC092	
MC095		MC101	
MC170		MC185	
D-MC026		D-MC028	

Annex GEOPHYSICAL SURVEY RESULTS

Hong Kong

Chung Hom Kok

Stanley Peninsula

ContactNumber	Easting	Northing	Dimensions	Description
SJC2-S4-WH2-SC001	6533285.565	3370096.537	<1x<1x1m	Debris/Possible discarded man-made object
SJC2-S4-WH2-SC002	6533329.724	3370074.395	1x<1x1	Debris/possible discarded man-made object
SJC2-S4-WH2-SC003	6533393.868	3370063.970	3x1x1	Wreck
SJC2-S4-WH2-SC004	6533374.420	3370055.330	1x1mmh	Debris/boulder
SJC2-S4-WH2-SC005	6533302.642	3370073.658	1x<1x1	Debris/possible discarded man-made object
SJC2-S4-WH2-SC006	6533348.187	3370173.645	2x1x1	Debris/boulder
SJC2-S4-WH2-SC007	6533341.756	3370133.057	1x1x<1	Debris/boulder
SJC2-S4-WH2-SC008	6533431.913	3370111.849	1x1x1	Debris
SJC2-S4-WH2-SC009	6533305.888	3370057.046	4x<1x<1	Debris/possible discarded man-made object
SJC2-S4-WH2-SC010	6533386.995	3370083.764	1x1mmh	Debris/boulder
SJC2-S4-WH2-SC011	6533304.417	3370101.467	2x1x<1	Debris/boulder
SJC2-S4-WH2-SC012	6533396.215	3370032.975	<1x<1xmmh	Debris/possible discarded man-made object
SJC2-S4-WH2-SC013	6533377.371	3370027.333	3x2xmmh	Debris/possible discarded man-made object
SJC2-S4-WH2-SC014	6533320.941	3370034.599	2x1x<1	Debris/boulder
SJC2-S4-WH2-SC015	6533387.732	3370033.649	1x1x<1	Debris/boulder
SJC2-S4-WH2-SC016	6533319.758	3369985.022	1x1mmh	Debris/boulder
SJC2-S4-WH2-SC017	6533478.831	3370009.560	2x<1x<1	Debris/boulder
SJC2-S4-WH2-SC018	6533438.545	3369963.359	<1x<1xmmh	Debris/boulder
SJC2-S4-WH2-SC019	6533477.220	3369914.717	1x<1xmmh	Debris/boulder
SJC2-S4-WH2-SC020	6533402.973	3369904.378	<1x<1xmmh	Debris/boulder
SJC2-S4-WH2-SC021	6533538.849	3369882.811	<1x<1x1	Debris/boulder
SJC2-S4-WH2-SC022	6533387.436	3369917.648	1x<1x<1	Debris/boulder
SJC2-S4-WH2-SC023	6533397.515	3369927.589	2x<1x<1	Debris/boulder
SJC2-S4-WH2-SC024	6533310.665	3369919.043	1x<1x<1	Debris/boulder
SJC2-S4-WH2-SC025	6533368.529	3369898.910	4x3x<1	Debris/possible discarded man-made object
SJC2-S4-WH2-SC026	6533318.197	3369863.367	1x<1xmmh	Debris/boulder
SJC2-S4-WH2-SC027	6533272.116	3369779.450	1x1x<1	Debris/boulder
SJC2-S4-WH2-SC028	6533324.066	3369711.567	3x<1x<1	Debris
SJC2-S4-WH2-SC029	6533315.611	3369772.376	1x1mmh	Debris/boulder
SJC2-S4-WH2-SC030	6533153.916	3369757.458	1x1mmh	Debris/boulder
SJC2-S4-WH2-SC031	6533133.938	3369713.585	1x<1x1	Debris/possible discarded man-made object
SJC2-S4-WH2-SC032	6533394.013	3369701.365	1x1xmmh	Debris
SJC2-S4-WH2-SC033	6533192.176	3369668.658	1x<1x<1	Debris
SJC2-S4-WH2-SC034	6533112.275	3369666.625	1x<1x<1	Debris
SJC2-S4-WH2-SC035	6533144.387	3369589.328	<1x<1x1	Debris
SJC2-S4-WH2-SC036	6533307.823	3369473.106	3x<1x1	Debris
SJC2-S4-WH2-SC037	6533394.409	3369432.300	1x<1xmmh	Debris/possible metallic object
SJC2-S4-WH2-SC038	6533350.869	3369448.454	1x<1x1	Debris
SJC2-S4-WH2-SC039	6533348.209	3369350.481	1x<1x1	Debris
SJC2-S4-WH2-SC040	6533087.939	3369294.778	2x<1x1	Debris
SJC2-S4-WH2-SC041	6533279.402	3369202.845	<1x<1x1	Debris
SJC2-S4-WH2-SC042	6533067.735	3369173.627	<1x<1x1	Debris
SJC2-S4-WH2-SC043	6533396.777	3369078.260	1x<1x1	Debris
SJC2-S4-WH2-SC044	6533214.535	3369113.531	3x1x1	Debris
SJC2-S4-WH2-SC045	6533377.362	3369072.719	<1x<1x1	Debris
SJC2-S4-WH2-SC046	6533210.821	3369058.592	<1x<1x1	Debris
SJC2-S4-WH2-SC047	6533153.649	3369037.107	<1x<1x1	Debris/possible ship anchor
SJC2-S4-WH2-SC048	6532983.490	3369048.647	1x1xmmh	Debris
SJC2-S4-WH2-SC049	6532919.208	3369066.163	1x<1x1	Debris
SJC2-S4-WH2-SC050	6532833.702	3369087.214	1x1xmmh	Debris
SJC2-S4-WH2-SC051	6533051.870	3368778.133	2x1xmmh	Debris
SJC2-S4-WH2-SC052	6533076.479	3368810.967	3x<1x1	Debris
SJC2-S4-WH2-SC053	6533181.937	3368730.831	1x1xmmh	Debris
SJC2-S4-WH2-SC054	6533148.257	3368697.493	2x2x<1	Debris
SJC2-S4-WH2-SC055	6533077.033	3368238.464	1x1x<1	Debris
SJC2-S4-WH2-SC056	6533068.054	3368036.449	2x1x<1	Debris
SJC2-S4-WH2-SC057	6533022.143	3368142.072	4x2x<1	Debris
SJC2-S4-WH2-SC058	6532615.225	3367383.254	3x1x<1	Debris
SJC2-S4-WH2-SC059	6532868.286	3367845.819	3x1x<1	Debris
SJC2-S4-WH2-SC060	6532791.068	3367723.224	3x1x<1	Debris
SJC2-S4-WH2-SC061	6532818.229	3367553.235	3x<1x<1	Debris
SJC2-S4-WH2-SC062	6532409.731	3367508.234	2x2x<1	Debris
SJC2-S4-WH2-SC063	6532541.487	3367378.078	3x2x<1	Debris
SJC2-S4-WH2-SC064	6532388.862	3367203.282	2x1x<1	Debris/boulder
SJC2-S4-WH2-SC065	6532302.457	3367197.935	1x1x<1	Debris/boulder
SJC2-S4-WH2-SC066	6532318.469	3367220.867	3x1x<1	Debris
SJC2-S4-WH2-SC067	6532088.514	3367236.435	1x<1x<1	Debris
SJC2-S4-WH2-SC068	6532253.516	3367064.906	2x2x<1	Debris
SJC2-S4-WH2-SC069	6532427.888	3367055.511	2x2x<1	Debris

ContactNumber	Easting	Northing	Dimensions	Description
D-SJC2-S4-WH2-MC001	6532724.130	3367372.880	46.9	Unknown

ContactNumber	Easting	Northing	Dimensions	Description
D-SJC2-S4-WH2-MC002	6532743.220	3367362.870	29.5	OOS Hong Kong-Manilla
D-SJC2-S4-WH2-MC003	6532873.840	3367440.800	99.1	IS SMW3-SEG-1.11

ContactNumber	Easting	Northing	Dimensions	Description
D-SJC2-S4-WH2-SC001	6532622.626	3367626.591	6.5x<1.5xmmh	Debris
D-SJC2-S4-WH2-SC002	6532596.988	3367599.415	2x1xmmh	Debris
D-SJC2-S4-WH2-SC003	6532552.037	3367790.967	3x1xmmh	Debris
D-SJC2-S4-WH2-SC004	6532376.313	3367610.598	8x2x<1	Debris
D-SJC2-S4-WH2-SC005	6532670.120	3367698.658	1.5x1.5x<1	Debris
D-SJC2-S4-WH2-SC006	the wreck	3367619.871	210x5<1	Dumped material
D-SJC2-S4-WH2-SC007	6532680.344	3367694.348	6x3xmmh	Possible debris
D-SJC2-S4-WH2-SC008	6532779.636	3367668.490	3x3x1	Debris
D-SJC2-S4-WH2-SC009	6532536.101	3367522.624	2x1.5xmmh	Debris
D-SJC2-S4-WH2-SC010	6532557.614	3367429.678	3x3xmmh	Debris
D-SJC2-S4-WH2-SC011	6533066.984	3367529.630	4x2xmmh	Possible debris
D-SJC2-S4-WH2-SC012	6532936.981	3367407.401	1.5x<1.5x<1	Debris
D-SJC2-S4-WH2-SC013	6533035.622	3367290.153	3x2x<1	Debris
D-SJC2-S4-WH2-SC014	6533306.051	3367188.452	2.5x<1.5xmmh	Debris

SampleNumber	Easting	Northing	Penetration	Description
SJC2-S4-WH9-DS001	6533114.1896	3370105.5915	N/A	Loose gravelly coarse SAND
SJC2-S4-WH9-DS002	6533200.9852	3370085.9417	N/A	Loose gravelly SAND
SJC2-S4-WH9-DS003	6533249.4581	3370073.5025	N/A	Very soft slightly gravelly CLAY
SJC2-S4-WH9-DS004	6533294.3165	3370052.8379	N/A	Very soft slightly sandy gravelly CLAY

SampleNumber	Easting	Northing	Penetration	Description
SJC2-S4-WH8-DP001	6533154.1896	3370105.5915	0.4	SAND
SJC2-S4-WH8-DP002	6533200.9852	3370085.9417	0.5	SAND
SJC2-S4-WH8-DP003	6533249.4581	3370073.5025	3.0	CLAY
SJC2-S4-WH8-DP004	6533294.3165	3370052.8379	3.0	CLAY

SampleNumber	Easting	Northing	Penetration	Description
SJC2-S4-CH9-BP001	6533108.5530	3370133.5175	N/A	BMH metal cover
SJC2-S4-CH9-BP002	6533116.3275	3370106.3274	N/A	Concrete
SJC2-S4-CH9-BP003	6533126.1607	3370108.6672	0.3	SAND
SJC2-S4-CH9-BP004	6533135.0124	3370111.1273	0.3	SAND

ContactNumber	Easting	Northing	Dimensions	Description
SJC2-S4-WH8-MC001	6533431.457	3370019.299	18.6	IS SJC_SEG-10
SJC2-S4-WH8-MC002	6533559.947	3370054.010	21	Unknown
SJC2-S4-WH8-MC003	6533330.948	3369990.359	23.7	Possible IS C2C-SEG-7
SJC2-S4-WH8-MC004	6533502.587	3370038.689	100	Possible IS EAC-C2C-SEG-2A
SJC2-S4-WH8-MC005	6533477.040	3370038.599	240.2	IS EAC-C2C-SEG-2A
SJC2-S4-WH8-MC006	6533528.622	3369948.959	5	Possible IS EAC-C2C-SEG-2A
SJC2-S4-WH8-MC007	6533422.211	3369948.520	26.8	IS SJC_SEG-10
SJC2-S4-WH8-MC008	6533388.895	3369943.701	18.8	IS C2C-SEG-7
SJC2-S4-WH8-MC009	6533317.663	3369946.086	21.7	Unknown
SJC2-S4-WH8-MC010	6533423.953	3369878.282	28.8	Unknown
SJC2-S4-WH8-MC011	6533490.599	3369744.147	76.3	Possible IS EAC-C2C-SEG-2A
SJC2-S4-WH8-MC012	6533387.213	3369783.328	34.5	Unknown
SJC2-S4-WH8-MC013	6533333.054	3369597.599	25.4	Possible IS EAC-C2C-SEG-1
SJC2-S4-WH8-MC014	6533311.904	3369629.752	262.5	Possible IS C2C-SEG-7
SJC2-S4-WH8-MC015	6533146.429	3369516.549	2.1	Unknown
SJC2-S4-WH8-MC016	6533378.347	3369570.837	14.6	Possible IS SJC_SEG-10
SJC2-S4-WH8-MC017	6533439.994	3369545.597	18.4	IS EAC-C2C-SEG-2A
SJC2-S4-WH8-MC018	6533306.369	3369474.659	3.9	Possible IS EAC-C2C-SEG-1
SJC2-S4-WH8-MC019	6533392.697	3369452.715	11.9	Unknown
SJC2-S4-WH8-MC020	6533191.659	3369423.851	16.4	Unknown
SJC2-S4-WH8-MC021	6533247.984	3369411.600	12.1	Unknown
SJC2-S4-WH8-MC022	6533329.793	3369392.616	13.6	IS SJC_SEG-10
SJC2-S4-WH8-MC023	6533343.036	3369297.705	3.6	Unknown
SJC2-S4-WH8-MC024	6533376.305	3369290.812	39.1	IS EAC-C2C-SEG-2A
SJC2-S4-WH8-MC025	6533160.811	3369332.351	24.6	Unknown
SJC2-S4-WH8-MC026	6533243.143	3369175.186	8.2	Unknown
SJC2-S4-WH8-MC027	6532992.100	3369259.888	242	Unknown
SJC2-S4-WH8-MC028	6533145.705	3369225.796	50.9	Unknown
SJC2-S4-WH8-MC029	6533208.345	3369198.942	60.7	Possible IS SJC_SEG-10
SJC2-S4-WH8-MC030	6533327.839	3369196.296	38.4	IS SJC_SEG-10
SJC2-S4-WH8-MC031	6533343.180	3369089.547	37	IS EAC-C2C-SEG-2A
SJC2-S4-WH8-MC032	6533215.933	3369114.185	16.4	IS EAC-C2C-SEG-1
SJC2-S4-WH8-MC033	6533285.073	3368995.454	25.9	Unknown
SJC2-S4-WH8-MC034	6533119.887	3369024.224	53.1	Unknown
SJC2-S4-WH8-MC035	6533328.477	3368983.638	21	IS EAC-C2C-SEG-2A
SJC2-S4-WH8-MC036	6533175.173	3369008.643	2.6	IS EAC-C2C-SEG-1
SJC2-S4-WH8-MC037	6533068.667	3368930.113	5.6	Unknown
SJC2-S4-WH8-MC038	6532785.093	3368785.376	4.9	Unknown
SJC2-S4-WH8-MC039	6533322.713	3368681.831	89.3	Unknown
SJC2-S4-WH8-MC040	6533279.950	3368777.232	5	Unknown
SJC2-S4-WH8-MC041	6532918.638	3368749.701	10.5	IS C2C-SEG-7
SJC2-S4-WH8-MC042	6533355.664	3368734.865	2.1	Possible IS NT&T-SEG-DOM-1
SJC2-S4-WH8-MC043	6533246.752	3368630.981	30.4	Unknown
SJC2-S4-WH8-MC044	6533233.513	3368627.473	14.7	IS SJC_SEG-10
SJC2-S4-WH8-MC045	6533174.089	3368599.717	4.1	Unknown
SJC2-S4-WH8-MC046	6533330.331	3368521.243	26.1	Unknown
SJC2-S4-WH8-MC047	6533327.464	3368548.572	2.9	Unknown
SJC2-S4-WH8-MC048	6533283.799	3368443.360	6.9	Unknown
SJC2-S4-WH8-MC049	6532967.968	3368521.638	28.9	Unknown
SJC2-S4-WH8-MC050	6533177.111	3368441.255	5.3	Unknown
SJC2-S4-WH8-MC051	6533863.311	3369470.700	2.3	IS NT&T-SEG-DOM-1
SJC2-S4-WH8-MC052	6533335.820	3368339.640	48.2	Unknown
SJC2-S4-WH8-MC053	6533373.778	3368390.020	7.6	Unknown
SJC2-S4-WH8-MC054	6533256.698	3368305.953	11.4	Unknown
SJC2-S4-WH8-MC055	6533339.067	3368337.801	27.1	Unknown
SJC2-S4-WH8-MC056	6533256.933	3368303.403	3.8	Unknown
SJC2-S4-WH8-MC057	6533301.423	3368364.138	13.6	Unknown
SJC2-S4-WH8-MC058	6532816.367	3368442.888	9.8	IS C2C-SEG-7
SJC2-S4-WH8-MC059	6532805.419	3368437.005	35.4	IS C2C-SEG-7
SJC2-S4-WH8-MC060	6533252.894	3368338.888	7.5	Unknown
SJC2-S4-WH8-MC061	6532926.420	3368329.473	8.6	IS NT&T-SEG-DOM-1
SJC2-S4-WH8-MC062	6532849.902	3368291.249	39.5	Possible OOS Hong Kong-Amoy
SJC2-S4-WH8-MC063	6532879.583	3368378.873	8	Possible OOS Hong Kong-Amoy
SJC2-S4-WH8-MC064	6532866.222	3368187.357	23.7	IS NT&T-SEG-DOM-1
SJC2-S4-WH8-MC065	6532858.742	3368211.000	7.7	IS NT&T-SEG-DOM-2
SJC2-S4-WH8-MC066	6533137.066	3368087.891	38.4	Possible OOS Hong Kong-Amoy
SJC2-S4-WH8-MC067	6533141.441	3368081.683	21.3	Possible OOS Hong Kong-Amoy
SJC2-S4-WH8-MC068	6532964.931	3368175.806	47.8	Possible OOS Hong Kong-Amoy
SJC2-S4-WH8-MC069	6532937.140	3368164.643	21.1	Unknown
SJC2-S4-WH8-MC070	6532812.380	3368354.624	16.6	Unknown
SJC2-S4-WH8-MC071	6533139.554	3368068.047	8.8	Unknown
SJC2-S4-WH8-MC072	6533251.316	3368338.646	6.6	Unknown
SJC2-S4-WH8-MC073	6533422.424	3368335.443	18.2	Unknown
SJC2-S4-WH8-MC074	6532544.532	3368326.591	11.4	Unknown
SJC2-S4-WH8-MC075	6533330.531	3368039.875	27.7	IS NT&T-SEG-DOM-1
SJC2-S4-WH8-MC076	6533188.643	3368026.175	6.4	Unknown
SJC2-S4-WH8-MC077	6532868.525	3368130.189	12.7	Unknown
SJC2-S4-WH8-MC078	6532868.119	3368111.647	8	IS NT&T-SEG-DOM-2
SJC2-S4-WH8-MC079	6532615.731	3368189.851	25.9	IS C2C-SEG-7
SJC2-S4-WH8-MC080	6533451.901	3368283.697	17.7	OOS SHT-SEG-B
SJC2-S4-WH8-MC081	6533208.913	3368183.828	31.4	IS C2C-SEG-7
SJC2-S4-WH8-MC082	6532894.122	3367978.222	7.3	IS NT&T-SEG-DOM-2
SJC2-S4-WH8-MC083	6532555.830	3368149.728	39.7	Unknown
SJC2-S4-WH8-MC084	6533093.996	3367961.056	28	IS NT&T-SEG-DOM-2
SJC2-S4-WH8-MC085	6532491.594	3368133.797	20.9	Unknown
SJC2-S4-WH8-MC086	6532539.868	3368230.564	230.4	IS SMW3-SEG-1.11
SJC2-S4-WH8-MC087	6532637.922	3368037.296	91.1	OOS SHT-SEG-B
SJC2-S4-WH8-MC088	6532480.148	3368127.598	6.1	Unknown
SJC2-S4-WH8-MC089	6532401.295	3368121.166	11.1	Unknown
SJC2-S4-WH8-MC090	6532678.709	3367965.827	50.9	OOS SHT-SEG-B
SJC2-S4-WH8-MC091	6532724.717	3367907.236	32.1	Possible OOS SHT-SEG-B
SJC2-S4-WH8-MC092	6532711.432	3367901.615	12.7	OOS SHT-SEG-A
SJC2-S4-WH8-MC093	6533705.128	3367881.765	24.5	OOS SHT-SEG-B
SJC2-S4-WH8-MC094	6532865.532	3367839.829	18.6	Unknown
SJC2-S4-WH8-MC095	6532899.986	3367862.250	3.9	Unknown
SJC2-S4-WH8-MC096	6532754.538	3367753.212	37.9	OOS SHT-SEG-B
SJC2-S4-WH8-MC097	6532947.522	3367692.410	64.7	IS SMW3-SEG-1.11
SJC2-S4-WH8-MC098	6532585.702	3367844.012	330.4	IS SMW3-SEG-1.11
SJC2-S4-WH8-MC099	6532826.315	3367808.955	77.7	IS SMW3-SEG-1.11
SJC2-S4-WH8-MC100	6532679.533	3367722.908	216.1	IS SMW3-SEG-1.11
SJC2-S4-WH8-MC101	6532823.580	3367691.223	7.7	Unknown
SJC2-S4-WH8-MC102	6532517.848	3367733.920	8.5	Unknown
SJC2-S4-WH8-MC103	6532519.756	3367383.927	9.1	Unknown
SJC2-S4-WH8-MC104	6532484.321	3367391.696	11.3	OOS OLUHO-SEG-LUHO
SJC2-S4-WH8-MC105	6532641.653	3367285.849	13.4	Unknown
SJC2-S4-WH8-MC106	6532602.304	3367303.960	9.8	OOS OLUHO-SEG-LUHO
SJC2-S4-WH8-MC107	6532659.017	3367235.383	61.6	Unknown
SJC2-S4-WH8-MC108	6532639.592	3367226.769	146.4	Possible OOS OLUHO-SEG-LUHO
SJC2-S4-WH8-MC109	6532559.604	3367254.845	23.2	Unknown
SJC2-S4-WH8-MC110	6532388.682	3367346.397	22.3	Unknown
SJC2-S4-WH8-MC111	6532383.145	3367341.194	20.5	Unknown
SJC2-S4-WH8-MC112	6532533.537	3367184.193	651.8	Unknown
SJC2-S4-WH8-MC113	6532270.397	3367297.958	7.7	Unknown
SJC2-S4-WH8-MC114	6532206.607	3367286.433	8.9	Possible IS TGN-IA-SEG-9
SJC2-S4-WH8-MC115	6532227.219	3367235.896	2.9	Possible IS TGN-IA-SEG-9
SJC2-S4-WH8-MC116	6532242.297	3367198.402	13.2	Possible IS TGN-IA-SEG-9
SJC2-S4-WH8-MC117	6532294.743	3367155.088	7.9	Unknown
SJC2-S4-WH8-MC118	6532252.625	3367140.008	12.7	Possible IS TGN-IA-SEG-9
SJC2-S4-WH8-MC119	6532078.830	3367180.916	5	Unknown
SJC2-S4-WH8-MC120	6532039.926	3367086.219	33.9	Unknown
SJC2-S4-WH8-MC121	6531993.936	3367202.675	12.9	Possible OOS SHT-SEG-A
SJC2-S4-WH8-MC122	6532002.966	3367122.808	6.3	Possible OOS SHT-SEG-A
SJC2-S4-WH8-MC123	6532150.457	3367042.776	2.2	Unknown
SJC2-S4-WH8-MC124	6531918.142	3367171.249	6.8	IS C2C-SEG-7
SJC2-S4-WH8-MC125	6532118.383	3367033.054	7.1	Possible OOS SHT-SEG-A
SJC2-S4-WH8-MC126	6531995.039	3367099.237	31.3	Unknown
SJC2-S4-WH8-MC127	6531946.215	3367079.265	18.2	Unknown
SJC2-S4-WH8-MC128	6531900.397	3367105.195	7.7	Unknown
SJC2-S4-WH8-MC130	6531865.919	3367100.914	3.5	IS C2C-SEG-7
SJC2-S4-WH8-MC131	6531905.978	3367061.177	11.1	Unknown
SJC2-S4-WH8-MC132	6531869.983	3367044.079	48.7	Unknown
SJC2-S4-WH8-MC133	6531856.992	3367039.578	25.9	Unknown

SJC2-S4-WH8-GS001
0.00m — Seabed — kPa — kg/cm² — Description: Very soft, grey, CLAY

SJC2-S4-WH8-GS002
0.00m — Seabed — kPa — kg/cm² — Description: Very soft, grey, CLAY

SJC2-S4-WH8-GS003
Seabed — kPa — kg/cm² — Description: Very soft, grey, CLAY

CARTOGRAPHIC SYMBOLS

- Post survey route with kilometre post and reverse kilometre post
- Beach manhole / Alter course
- Point on line (POL)
- Coastline (from Admiralty charts)
- Chart matchline
- Telecommunications cable position, In-service/Out of service/Planned (as-found in magenta)
- Pipeline position, In-service/Out of service/Planned (as-found in magenta)
- Power cable position, In-service/Out of service/Planned (as-found in magenta)
- Maritime boundaries
- Restricted zones and special areas
- Concession block
- Submerged wreck / Exposed wreck / Obstruction / Well / Platform / Explosives dumping ground and symbol or line feature in grey, plotted from desk top study (as-found in magenta). (For general symbols and abbreviations refer to British Admiralty Chart)

BATHYMETRY

- Bathymetric contours in metres. Contour interval may be reduced to aid in clarity.
- Downslope gradient in degrees (°) as measured over the shortest significant distance
- Approximate limit of swath bathymetry coverage (shown only in areas of flat seabed)

SEABED FEATURES

- CORAL
- Gas seepage area with predominant sediment classification
- Boulder field with predominant sediment classification
- Fine sediment (predominantly CLAY/SILT)
- Coarse sediment (SAND and GRAVEL)
- Very coarse sediment (COBBLES and BOULDERS)
- Subcropping ROCK with predominant sediment classification (sediment thickness < target burial depth)
- ROCK outcrop (with veneer of sediments)
- HARDGROUND (very dense/very stiff/consolidated sediments; sediment thickness < target burial depth)
- Sediment or feature boundary
- Inferred sediment or feature boundary
- Approximate limit of side scan sonar coverage
- Seabed scar (trawl or anchor)
- Isopach contours shown at 1m interval with labels every 1m
- Beach probe (BP); Beach sample (BS) location with reference number
- Diver probe (DP); Diver sample (DS) location with reference number
- Isolated sonar contact with reference number (length x width x height in metres where measurable; nmh = no measurable height)
- Linear sonar contact, dashed where partially buried
- Pipeline contact determined by seismic profiling system with reference number and description (level at the top of pipeline is stated in metres +/- equivalent to above or below ambient seabed)
- Unidentified magnetic anomaly with reference number and amplitude (in nano-Tesla)
- Cable/Pipeline position, as determined by magnetometer, with reference number and amplitude (in nano-Tesla)
- Located wreck with reference no. (length x width x height in metres where measurable)
- Gravity core (GC); Grab sample (GS) location with reference number
- MiniCPT (CP) location with reference number
- Small ROCK outcrop with height in metres if discernible
- Seabed depression or pockmark with diameter (d) and depth (D) in metres, where discernible
- General orientation of sandwave crest (Hachures on lee side where observable, with wavelength and height in metres)
- Orientation of megaripple crest (Hachures on lee side where observable, with wavelength and height in metres)
- Orientation of sediment ribbon
- Fault with depth below seafloor (Hachures on footwall)

CHART COMMENT

Cable and Pipelines

The route makes ten (10) crossings with nine (9) cables as follows:

- In-service EAC-C2C-SEG-2A1
- In-service NT&T-SEG-DOM-1
- Out of service Hong Kong-Amoy (TELEGRAPH)
- In-service NT&T-SEG-DOM-2
- Out of service Guam-Hong Kong (TELEGRAPH)
- Out of service SHT-SEG-B
- In-service SMW3-SEG-1.11
- Out of service Hong Kong-Manilla (TELEGRAPH)
- Out of service OLUHO-SEG-LUHO

Hazards and Obstructions

ROCK outcrops surrounded by subcropping ROCK area are present around the landing beach. Isolated ROCK outcrops are present in the subcropping ROCK area.

Two ROCK areas surrounded by subcropping ROCK areas are present in the southern part of the chart.

Areas with numerous debris/discarded man-made object/ 6mmr GRAVEL/COBBLES patches are present in the northern portion of the chart.

Numerous megaripples (wavelength: <1m, height: <1m) are present on the sandy seabed in the northern part of the chart.

Eighty three (83) sonar contacts related to debris/boulder/dumped material/possible discarded man-made object and wreck were observed within the survey corridor. The wreck was identified near to the landing beach.

One hundred thirty five (135) magnetic contacts including forty eight (48) attributed to eight (8) in-service cables; nineteen (19) attributed to four (4) out of service cables; and eighty eight (88) of unknown origin were identified in the chart.

The route runs within the Declared Minefield - East Lamma Channel in the northern part of the chart.

The route exits the Inshore Traffic Zone at the southern part of the chart.

The route runs within Hong Kong Waters..

GENERAL NOTES

	Inshore	Inshore
Survey vessel	MV Wing Hung 8	MV Wing Hung 2
Surface positioning system	C-Nav 3050 GcGPS, C-View Navigation System	C-Nav 3050 GcGPS, C-View Navigation System
Underwater positioning system	-	-
Bathymetry	Knudsen 320M Dual Frequency SBES	R2Sonic 2024 MBES, Knudsen 320M Dual Frequency SBES Knudsen Sounder 1612 Dual Frequency SBES
Morphology and stratigraphy	Innomar SES-2000 Light SBP System	EdgeTech 4200 Side Scan Sonar System, C-Boom Low Voltage Boomer System
Magnetometer survey	Geometrics G-882 Marine Magnetometer	-

Target burial depth: 5.0m from BMH to WD50m. 3.0m from WD50m to WD200m.
Descriptive terms and definitions: 1.5m for WD200m-1500m, no burial for WD >1000m. No burial for Guam.

GEODETIC PARAMETERS

Ellipsoidal parameters
Ellipsoid : WGS84
Semi-major axis (a) (m) : 6378137.000
Inverse flattening (1/f) : 298.257223563

Projection parameters
Projection : Mercator
Longitude of origin : 90°E
Standard parallel : 20°N

Scale factor : 1
False easting : 4 000 000
False northing : 1 000 000

VERTICAL DATUM

In Landfall and Inshore survey charts: Bathymetry data has been reduced to Low Astronomical Tide (LAT) using the relationship between LAT and MSL at Quarry Bay (71100) as stated in Admiralty Tide Tables, Volume 6, 2017 and tidal measurements at the government tide gauges installed at Waglan Island

In Shallow Water survey charts:
N/A

Survey date: Jan 2019

Scale :
NATURAL SCALE 1 : 5,000 at 20°N
(At mid-latitude of chart)
TRUE SCALE 1 : 4926.70
0 100 200 300 400 500 m

Contractor : NEC Corporation

Surveyor : EGS Survey Group

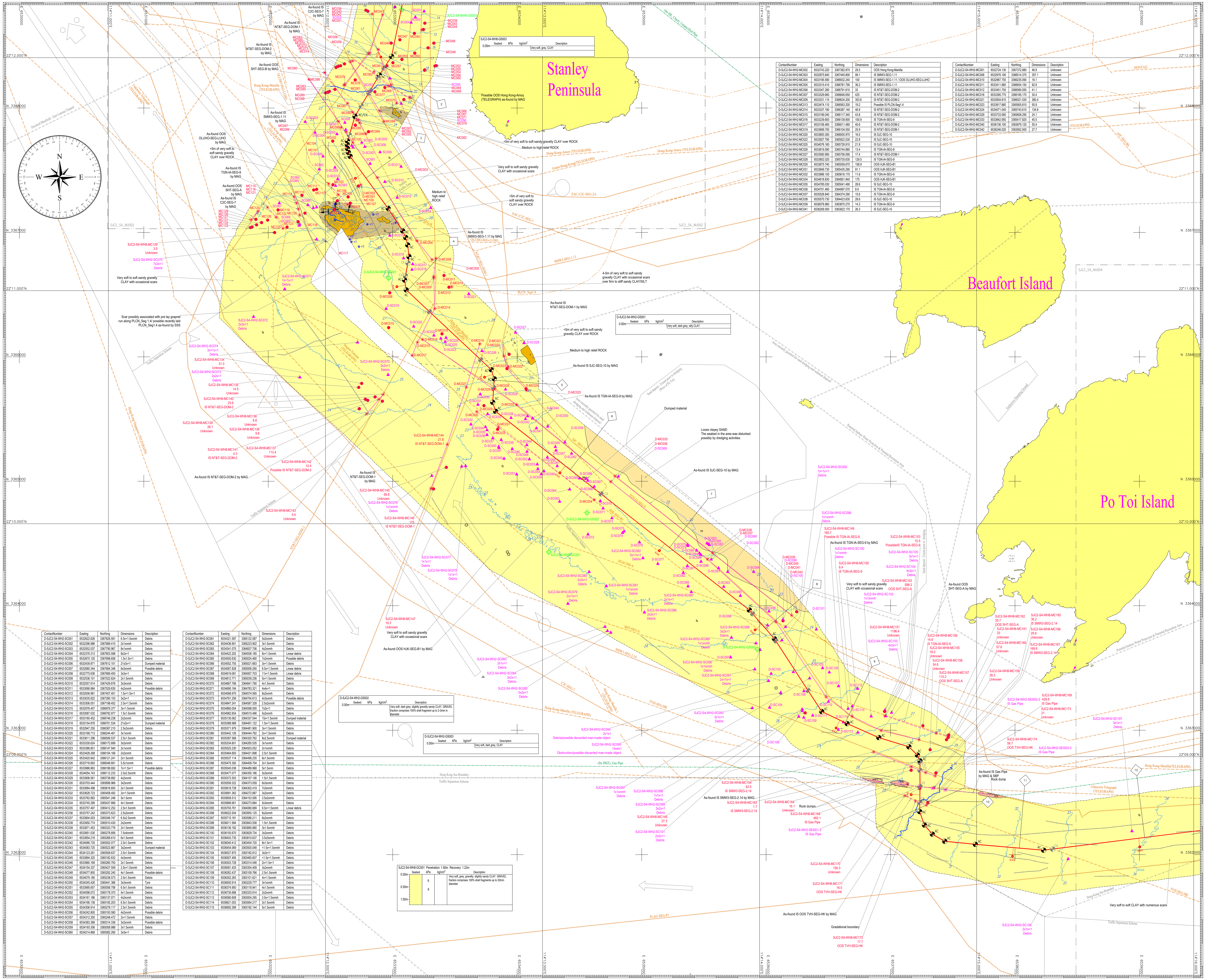
Project name:
SJC2 CABLE SYSTEM
Marine Route Survey

Document title:
SEGMENT S4 (CHUNG HOM KOK - BU3)
NORTH UP CHART
CHART NO. 002 OF 006
(KP 0.00 - KP 3.49)

Rev	Date	Prepared by	Checked by	Approved by
1.1	Feb 2019	C W Quek / K F Lai	Bobby Lee	Even KM Mak
1	Aug 2018	Chester Quek	Philip Wong	Even KM Mak
0	Jun 2018	Chester Quek	Philip Wong	Even KM Mak

Provisional

Route based upon: SJC2_S4(Chung Hom Kok - BU3)_RPL Issue-2.4_06Feb2019.xlsx
File name: SJC2_S4_NU002_005K



ContactNumber	Easting	Northing	Dimensions	Description
D-SJC2-S4-WH2-MC002	6532743.220	3367382.870	29.5	OOS Hong Kong-Manilla
D-SJC2-S4-WH2-MC003	6532875.840	3367440.800	99.1	IS SMW3-SEG-1.11
D-SJC2-S4-WH2-MC004	6533195.590	3366932.240	100	IS SMW3-SEG-1.11 / OOS OLUHO-SEG-LUHO
D-SJC2-S4-WH2-MC005	6533315.410	3366781.790	36.2	IS SMW3-SEG-1.11
D-SJC2-S4-WH2-MC006	6533347.280	3366791.610	33	IS NT&T-SEG-DOM-2
D-SJC2-S4-WH2-MC007	6533329.660	3366646.650	425	IS NT&T-SEG-DOM-2
D-SJC2-S4-WH2-MC009	6533331.110	3366634.200	353.6	IS NT&T-SEG-DOM-2
D-SJC2-S4-WH2-MC013	6533474.110	3366563.200	19.2	Possible IS PLCN-Seg1.4
D-SJC2-S4-WH2-MC014	6533337.180	3366387.140	46.9	IS NT&T-SEG-DOM-2
D-SJC2-S4-WH2-MC015	6533199.040	3366117.340	43.8	IS NT&T-SEG-DOM-2
D-SJC2-S4-WH2-MC016	6533239.600	3366139.900	100.9	IS TGN-IA-SEG-9
D-SJC2-S4-WH2-MC017	6533156.460	3366011.480	40.6	IS NT&T-SEG-DOM-2
D-SJC2-S4-WH2-MC019	6533699.700	3366104.550	25.9	IS NT&T-SEG-DOM-1
D-SJC2-S4-WH2-MC020	6533893.300	3366005.970	16.5	IS SJC-SEG-10
D-SJC2-S4-WH2-MC022	6533927.790	3365922.530	22.8	IS SJC-SEG-10
D-SJC2-S4-WH2-MC025	6534076.160	3365729.910	21.9	IS SJC-SEG-10
D-SJC2-S4-WH2-MC026	6533819.590	3365744.880	13.4	IS TGN-IA-SEG-9
D-SJC2-S4-WH2-MC027	6533590.990	3365756.090	17.4	IS NT&T-SEG-DOM-1
D-SJC2-S4-WH2-MC028	6533802.020	3365735.630	129.5	IS TGN-IA-SEG-9
D-SJC2-S4-WH2-MC030	6533675.740	3365559.670	158.9	OOS HJK-SEG-B1
D-SJC2-S4-WH2-MC031	6533849.730	3365435.290	91.1	OOS HJK-SEG-B1
D-SJC2-S4-WH2-MC032	6533996.100	3365616.170	11.6	IS TGN-IA-SEG-9
D-SJC2-S4-WH2-MC034	6534618.830	3364851.840	175	OOS HJK-SEG-B1
D-SJC2-S4-WH2-MC035	6534785.030	3365041.490	28.6	IS SJC-SEG-10
D-SJC2-S4-WH2-MC036	6534751.460	3364997.070	8.9	IS TGN-IA-SEG-9
D-SJC2-S4-WH2-MC037	6535528.840	3364374.290	15.6	IS TGN-IA-SEG-9
D-SJC2-S4-WH2-MC038	6535570.730	3364423.830	28.6	IS SJC-SEG-10
D-SJC2-S4-WH2-MC039	6536078.960	3363870.270	14.3	IS TGN-IA-SEG-9
D-SJC2-S4-WH2-MC041	6536206.000	3363922.170	26.3	IS SJC-SEG-10

ContactNumber	Easting	Northing	Dimensions	Description
D-SJC2-S4-WH2-MC001	6532724.130	3367372.880	46.9	Unknown
D-SJC2-S4-WH2-MC008	6532976.190	3366514.370	357.1	Unknown
D-SJC2-S4-WH2-MC010	6532967.750	3366235.090	16.1	Unknown
D-SJC2-S4-WH2-MC011	6533411.880	3366654.150	92.9	Unknown
D-SJC2-S4-WH2-MC012	6533451.750	3366560.050	41.1	Unknown
D-SJC2-S4-WH2-MC018	6533395.770	3366185.170	30.4	Unknown
D-SJC2-S4-WH2-MC021	6533934.810	3366021.030	380.4	Unknown
D-SJC2-S4-WH2-MC023	6533917.860	3365905.810	50.9	Unknown
D-SJC2-S4-WH2-MC024	6534071.040	3365743.610	134.8	Unknown
D-SJC2-S4-WH2-MC029	6533733.060	3365608.290	24.1	Unknown
D-SJC2-S4-WH2-MC033	6533842.950	3365417.820	45.5	Unknown
D-SJC2-S4-WH2-MC040	6536136.100	3363879.120	55.4	Unknown
D-SJC2-S4-WH2-MC042	6536246.020	3363952.000	27.7	Unknown

ContactNumber	Easting	Northing	Dimensions	Description
D-SJC2-S4-WH2-SC001	6532622.626	3367826.591	6.5x<1.5xnmh	Debris
D-SJC2-S4-WH2-SC002	6532296.986	3367889.415	2x1xnmh	Debris
D-SJC2-S4-WH2-SC003	6532552.037	3367790.967	8x1xnmh	Debris
D-SJC2-S4-WH2-SC004	6532376.313	3367803.598	8x2x<1	Debris
D-SJC2-S4-WH2-SC005	6532670.120	3367698.658	1.5x1.5x<1	Debris
D-SJC2-S4-WH2-SC006	6532439.871	3367612.101	21x3x<1	Dumped material
D-SJC2-S4-WH2-SC007	6532680.344	3367684.348	6x3xnmh	Possible debris
D-SJC2-S4-WH2-SC008	6532775.636	3367689.450	3x3x<1	Debris
D-SJC2-S4-WH2-SC009	6532536.101	3367522.624	2x1.5xnmh	Debris
D-SJC2-S4-WH2-SC010	6532557.614	3367429.676	3x3xnmh	Debris
D-SJC2-S4-WH2-SC011	6533066.984	3367529.630	4x2xnmh	Possible debris
D-SJC2-S4-WH2-SC012	6532936.981	3367407.401	1.5x<1.5x<1	Debris
D-SJC2-S4-WH2-SC013	6533035.822	3367280.153	3x2x<1	Debris
D-SJC2-S4-WH2-SC014	6533306.051	3367198.452	2.5x<1.5xnmh	Debris
D-SJC2-S4-WH2-SC015	6532976.407	3366976.377	3x<1.5xnmh	Debris
D-SJC2-S4-WH2-SC016	6533087.032	3366792.977	1.5x1.5xnmh	Debris
D-SJC2-S4-WH2-SC017	6533160.452	3366746.238	2x2xnmh	Debris
D-SJC2-S4-WH2-SC018	6533154.878	3366701.534	21x2x<1	Dumped material
D-SJC2-S4-WH2-SC019	6532947.250	3366387.210	2.5x2xnmh	Debris
D-SJC2-S4-WH2-SC020	6533168.713	3366244.461	3x1xnmh	Debris
D-SJC2-S4-WH2-SC021	6533611.296	3366506.537	2.5x1.5xnmh	Debris
D-SJC2-S4-WH2-SC022	6533330.624	3366172.699	3x2xnmh	Debris
D-SJC2-S4-WH2-SC023	6533386.851	3366147.940	2x1xnmh	Debris
D-SJC2-S4-WH2-SC024	6533428.268	3366154.166	2x2xnmh	Debris
D-SJC2-S4-WH2-SC025	6533420.842	3366121.241	2x1.5xnmh	Debris
D-SJC2-S4-WH2-SC026	6533716.693	3366048.691	5.5x1xnmh	Debris
D-SJC2-S4-WH2-SC027	6533986.863	3366196.692	7x<1.5x<1	Possible debris
D-SJC2-S4-WH2-SC028	6534054.743	3366112.233	2.5x2.5xnmh	Debris
D-SJC2-S4-WH2-SC029	6533906.561	3365738.892	4x2xnmh	Debris
D-SJC2-S4-WH2-SC030	6533703.444	3365699.966	3x2xnmh	Debris
D-SJC2-S4-WH2-SC031	6533684.496	3365616.693	2x1.5xnmh	Debris
D-SJC2-S4-WH2-SC032	6533628.723	3365458.492	2x<1.5xnmh	Debris
D-SJC2-S4-WH2-SC033	6533762.883	3365541.246	5x1.5xnm	Debris
D-SJC2-S4-WH2-SC034	6533745.289	3365437.666	4x1.5xnmh	Debris
D-SJC2-S4-WH2-SC035	6533757.497	3365412.252	2.5x1.5xnmh	Debris
D-SJC2-S4-WH2-SC036	6533757.242	3365373.623	2.5x2xnmh	Debris
D-SJC2-S4-WH2-SC037	6533804.003	3365346.747	6.5x2.5xnmh	Debris
D-SJC2-S4-WH2-SC038	6533950.774	3365510.430	2x2xnmh	Debris
D-SJC2-S4-WH2-SC039	6533871.453	3365333.776	2x1.5xnmh	Debris
D-SJC2-S4-WH2-SC040	6533851.030	3365278.856	7.5x4xnmh	Debris
D-SJC2-S4-WH2-SC041	6533854.216	3365268.610	6x1.5xnmh	Debris
D-SJC2-S4-WH2-SC042	6534066.735	3365502.077	2.5x1.5xnmh	Debris
D-SJC2-S4-WH2-SC043	6534083.725	3365523.867	3x2xnmh	Dumped material
D-SJC2-S4-WH2-SC044	6534123.281	3365506.637	2.5x1.5xnmh	Debris
D-SJC2-S4-WH2-SC045	6533894.325	3365182.632	4x3xnmh	Debris
D-SJC2-S4-WH2-SC046	6533960.169	3365260.793	2x1.5xnmh	Debris
D-SJC2-S4-WH2-SC047	6534154.337	3365427.509	2.5x<1.5xnmh	Debris
D-SJC2-S4-WH2-SC048	6534077.800	3365292.240	4x1.5xnmh	Possible debris
D-SJC2-S4-WH2-SC049	6534079.180	3365238.573	2.5x1.5xnmh	Debris
D-SJC2-S4-WH2-SC050	6534245.426	3365441.386	3x3xnmh	Tyre
D-SJC2-S4-WH2-SC051	6533995.657	3365056.706	6.5x1.5xnmh	Debris
D-SJC2-S4-WH2-SC052	6534098.072	3365178.370	4x1.5xnmh	Debris
D-SJC2-S4-WH2-SC053	6534161.186	3365137.071	4x2xnmh	Debris
D-SJC2-S4-WH2-SC054	6534166.138	3365100.203	6.5x1.5xnmh	Debris
D-SJC2-S4-WH2-SC055	6534306.914	3365278.117	2.5x1.5xnmh	Debris
D-SJC2-S4-WH2-SC056	6534242.800	3365193.580	4x2xnmh	Possible debris
D-SJC2-S4-WH2-SC057	6534312.200	3365248.472	2x<1.5xnmh	Debris
D-SJC2-S4-WH2-SC058	6534383.389	3365314.336	3x2xnmh	Possible debris
D-SJC2-S4-WH2-SC059	6534193.306	3365058.988	3x1.5xnmh	Debris
D-SJC2-S4-WH2-SC060	6534214.868	3365082.290	3x3x<1	Debris

ContactNumber	Easting	Northing	Dimensions	Description
D-SJC2-S4-WH2-SC061	6534321.597	3365122.587	5x2xnmh	Debris
D-SJC2-S4-WH2-SC062	6534436.951	3365223.902	3x1.5xnmh	Debris
D-SJC2-S4-WH2-SC063	6534341.075	3364837.706	4x2xnmh	Debris
D-SJC2-S4-WH2-SC064	6534422.202	3364936.185	6x<1.5xnmh	Linear debris
D-SJC2-S4-WH2-SC065	6534500.630	3365024.460	7x2xnmh	Possible debris
D-SJC2-S4-WH2-SC066	6534552.755	3365021.663	3x<1.5xnmh	Debris
D-SJC2-S4-WH2-SC067	6534567.828	3365006.290	8.5x<1.5xnmh	Linear debris
D-SJC2-S4-WH2-SC068	6534619.081	3364957.703	11x<1.5xnmh	Linear debris
D-SJC2-S4-WH2-SC069	6534812.771	3365039.236	5x<1.5xnmh	Debris
D-SJC2-S4-WH2-SC070	6534667.786	3364841.790	4x1.5xnmh	Debris
D-SJC2-S4-WH2-SC071	6534690.184	3364783.321	4x4x<1	Debris
D-SJC2-S4-WH2-SC072	6534568.970	3364574.565	6x2xnmh	Debris
D-SJC2-S4-WH2-SC073	6534761.256	3364704.613	4x3xnmh	Possible debris
D-SJC2-S4-WH2-SC074	6534847.241	3364587.328	2.5x2xnmh	Debris
D-SJC2-S4-WH2-SC075	6534860.054	3364598.500	7x2x<1	Debris
D-SJC2-S4-WH2-SC076	6534982.654	3364510.466	5x2xnmh	Debris
D-SJC2-S4-WH2-SC077	6535130.062	3364337.544	15x<1.5xnmh	Dumped material
D-SJC2-S4-WH2-SC078	6535368.968	3364491.122	1.5x<1.5xnmh	Debris
D-SJC2-S4-WH2-SC079	6535371.979	3364481.900	3x<1.5xnmh	Debris
D-SJC2-S4-WH2-SC080	6535442.126	3364444.782	2x<1.5xnmh	Debris
D-SJC2-S4-WH2-SC081	6535367.568	3364320.762	8x2.5xnmh	Dumped material
D-SJC2-S4-WH2-SC082	6535334.601	3364265.535	3x1xnmh	Debris
D-SJC2-S4-WH2-SC083	6535525.230	3364503.052	2x1xnmh	Debris
D-SJC2-S4-WH2-SC084	6535464.693	3364421.898	2.5x1.5xnmh	Debris
D-SJC2-S4-WH2-SC085	6535537.114	3364496.235	6x1.5xnmh	Debris
D-SJC2-S4-WH2-SC086	6535475.392	3364409.704	2x1.5xnmh	Debris
D-SJC2-S4-WH2-SC087	6535545.036	3364489.968	5x1.5xnm	Debris
D-SJC2-S4-WH2-SC088	6535477.077	3364355.186	5x3xnmh	Debris
D-SJC2-S4-WH2-SC089	6535372.553	3364157.106	1.5x1.5xnmh	Debris
D-SJC2-S4-WH2-SC090	6535559.322	3364373.059	6x3xnmh	Debris
D-SJC2-S4-WH2-SC091	6535618.728	3364302.419	7x3xnmh	Debris
D-SJC2-S4-WH2-SC092	6535691.362	3364272.887	3x2xnmh	Debris
D-SJC2-S4-WH2-SC093	6535659.512	3364153.595	3.5x2xnmh	Debris
D-SJC2-S4-WH2-SC094	6535899.901	3364273.884	5x3xnmh	Debris
D-SJC2-S4-WH2-SC095	6535793.761	3364080.689	9.5x<1.5xnmh	Linear debris
D-SJC2-S4-WH2-SC096	6536022.934	3363955.125	6x2xnmh	Debris
D-SJC2-S4-WH2-SC097	6535715.181	3363586.211	6x2xnmh	Debris
D-SJC2-S4-WH2-SC098	6536011.994	3363843.558	1.5x1.5xnmh	Debris
D-SJC2-S4-WH2-SC099	6536136.182	3363890.880	3x1.5xnmh	Debris
D-SJC2-S4-WH2-SC100	6536155.670	3363829.734	3x2xnmh	Debris
D-SJC2-S4-WH2-SC101	6536403.735	3363810.637	3.5x3xnmh	Debris
D-SJC2-S4-WH2-SC102	6536040.412	3363454.720	8x1.5x<1	Debris
D-SJC2-S4-WH2-SC103	6536454.069	3363500.048	<1.5x<1.5xnmh	Debris
D-SJC2-S4-WH2-SC104	6536027.870	3363182.812	3x2x<1	Debris
D-SJC2-S4-WH2-SC105	6536507.495	3363465.607	<1.5x<1.5xnmh	Debris
D-SJC2-S4-WH2-SC106	6536303.728	3363314.546	2x<1.5x<1	Debris
D-SJC2-S4-WH2-SC107	6536581.425	3363354.409	3x2xnmh	Debris
D-SJC2-S4-WH2-SC108	6536262.437	3363109.766	2.5x1.5xnmh	Debris
D-SJC2-S4-WH2-SC109	6536302.263	3363101.621	4x<1.5xnmh	Debris
D-SJC2-S4-WH2-SC110	6536500.914	3363229.777	3x1xnmh	Debris
D-SJC2-S4-WH2-SC111	6536374.900	3363118.941	4x1.5xnmh	Debris
D-SJC2-S4-WH2-SC112	6536735.688	3363333.914	2x2xnmh	Debris
D-SJC2-S4-WH2-SC113	6536580.608	3363004.295	3.5x<1.5xnmh	Debris
D-SJC2-S4-WH2-SC114	6536621.053	3363064.217	2x1.5xnmh	Debris
D-SJC2-S4-WH2-SC115	6536692.289	3363192.144	5x1.5xnmh	Debris

CARTOGRAPHIC SYMBOLS

- Post survey route with kilometre post and reverse kilometre post (KP, KPR)
- Beach manhole / Alter course (BMH/AC)
- Point on line (POL)
- Coastline (from Admiralty charts)
- Chart matchline
- Telecommunications cable position, In-service/Out of service/Planned (as-found in magenta)
- Pipeline position, In-service/Out of service/Planned (as-found in magenta)
- Power cable position, In-service/Out of service/Planned (as-found in magenta)
- Maritime boundaries
- Restricted zones and special areas
- Concession block
- Submerged wreck / Exposed wreck / Obstruction / Well / Platform / Explosives dumping ground and symbol or line feature in grey, plotted from desk top study (as-found in magenta). (for general symbols and abbreviations refer to British Admiralty Chart)

BATHYMETRY

- Bathymetric contours in metres. Contour interval may be reduced to aid in clarity. (30)
- Downslope gradient in degrees (°) as measured over the shortest significant distance (6°)
- Approximate limit of swath bathymetry coverage (shown only in areas of flat seabed)

SEABED FEATURES

- cor — CORAL
- fs/cs/vcs — Gas seepage area with predominant sediment classification
- fs/cs/vcs — Boulder field with predominant sediment classification
- Sediments:
  - fs — Fine sediment (predominantly CLAY/SILT)
  - cs — Coarse sediment (SAND and GRAVEL)
  - vcs — Very coarse sediment (COBBLES and BOULDERS)
- Rock:
  - fs/cs/vcs — Subcropping ROCK with predominant sediment classification (sediment thickness < target burial depth)
  - r — ROCK outcrop (with veneer of sediments)
  - hs — HARDGROUND (very dense/very stiff/consolidated sediments; sediment thickness < target burial depth)
- Sediment or feature boundary
- Inferred sediment or feature boundary
- Approximate limit of side scan sonar coverage
- Seabed scar (trawl or anchor)
- Isopach contours shown at 1m interval with labels every 1m (1, 2)
- BP001 / BS001 — Beach probe (BP); Beach sample (BS) location with reference number
- DP001 / DS001 — Diver probe (DP); Diver sample (DS) location with reference number
- SC001 5x5x1 — Isolated sonar contact with reference number (length x width x height in metres where measurable; nmh = no measurable height)
- 50x0.5x1 — Linear sonar contact, dashed where partially buried
- SEI001 -2.5 — Pipeline contact determined by seismic profiling system with reference number and description (level at the top of pipeline is stated in metres, +/- equivalent to above or below ambient seabed)
- MC001 5.0 — Unidentified magnetic anomaly with reference number and amplitude (in nano-Tesla)
- MC002 5.0 — Cable/Pipeline position, as determined by magnetometer, with reference number and amplitude (in nano-Tesla)
- SC001 20x10x7 — Located wreck with reference no. (length x width x height in metres where measurable)
- GC001 — Gravity core (GC); Grab sample (GS) location with reference number
- CP001 — MiniCPT (CP) location with reference number
- 0.5 — Small ROCK outcrop with height in metres if discernible
- d/D — Seabed depression or pockmark with diameter (d) and depth (D) in metres, where discernible
- 50/3 — General orientation of sandwave crest (Hachures on lee side where observable, with wavelength and height in metres)
- 4/0.8 — Orientation of megaripple crest (Hachures on lee side where observable, with wavelength and height in metres)
- Orientation of sediment ribbon
- -25 — Fault with depth below seafloor (Hachures on footwall)

CHART COMMENT

Cable and Pipelines

The route makes twenty-four (24) crossings with seventeen (17) cables as follows:

- In-service NT&T-SEG-DOM-1
- Out of service Hong Kong-Amoy (TELEGRAPH)
- In-service NT&T-SEG-DOM-2
- Out of service Guam-Hong Kong (TELEGRAPH)
- Out of service SHT-SEG-B
- In-service SMW3-SEG-1.11
- Out of service Hong Kong-Manilla (TELEGRAPH)
- Out of service OLUHO-SEG-LUHO
- Planned PLCN_Seg1.4
- Out of service Hong Kong-Manilla 1 (TELEGRAPH)
- In-service TGN-IA-SEG-9
- Out of service SEACOM-A
- Out of service HJK-SEG-B1
- Out of service SHT-SEG-A
- In-service SMW3-SEG-2.14
- Unknown Telegraph
- Out of service TVH-SEG-HK

Hazards and Obstructions

Areas with numerous debris/discarded man-made object/dense GRAVEL/COBBLES patches are present in the northern portion of the chart.
ROCK outcrops surrounded by subcropping ROCK areas are present in the southern part of the chart.
Areas of rock dumps which probably in associated with this Gas Pipe were object along its alignment.
In the southeast corner of the chart, the seabed comprises very soft CLAY with undrained shear strength of <5kPa measured at the top 0.5m.
In the southeast corner of the chart, numerous trawl scars are present upon the seabed.
One hundred seventy one (171) sonar contacts related to debris, dumped material, boulders or possible discarded man-made object were observed within the survey corridor.
One hundred seventy nine (179) magnetic contacts including sixty four (64) attributed to eight (8) in-service cables; twenty eight (28) attributed to seven (7) out of service cables; two (2) attributed to an IS Gas Pipe; and eighty five (85) of unknown origin were identified in the chart.
Three (3) seismic contacts attributed to an IS Gas Pipe were identified in the chart.
The route exits the Inshore Traffic Zone at the southern part of the chart.
The route runs within Hong Kong Waters.

GENERAL NOTES

	Inshore	Inshore
Survey vessel	MV Wing Hung 8	MV Wing Hung 2
Surface positioning system	C-Nav 3050 GcGPS, C-View Navigation System	C-Nav 3050 GcGPS, C-View Navigation System
Underwater positioning system	-	-
Bathymetry	Knudsen 320M Dual Frequency SBES	R2Sonic 2024 MBES, Knudsen 320M Dual Frequency SBES, Knudsen Sounder 1612 Dual Frequency SBES
Morphology and stratigraphy	Innomar SES-2000 Light SBP System	EdgeTech 4200 Side Scan Sonar System, C-Boom Low Voltage Boomer System
Magnetometer survey	Geometrics G-882 Marine Magnetometer	-

Target burial depth: 5.0m from BMH to WD50m. 3.0m from WD50m to WD200m.
Descriptive terms and definitions: 1.5m for WD200m-1500m, no burial for WD >1000m. No burial for Guam.

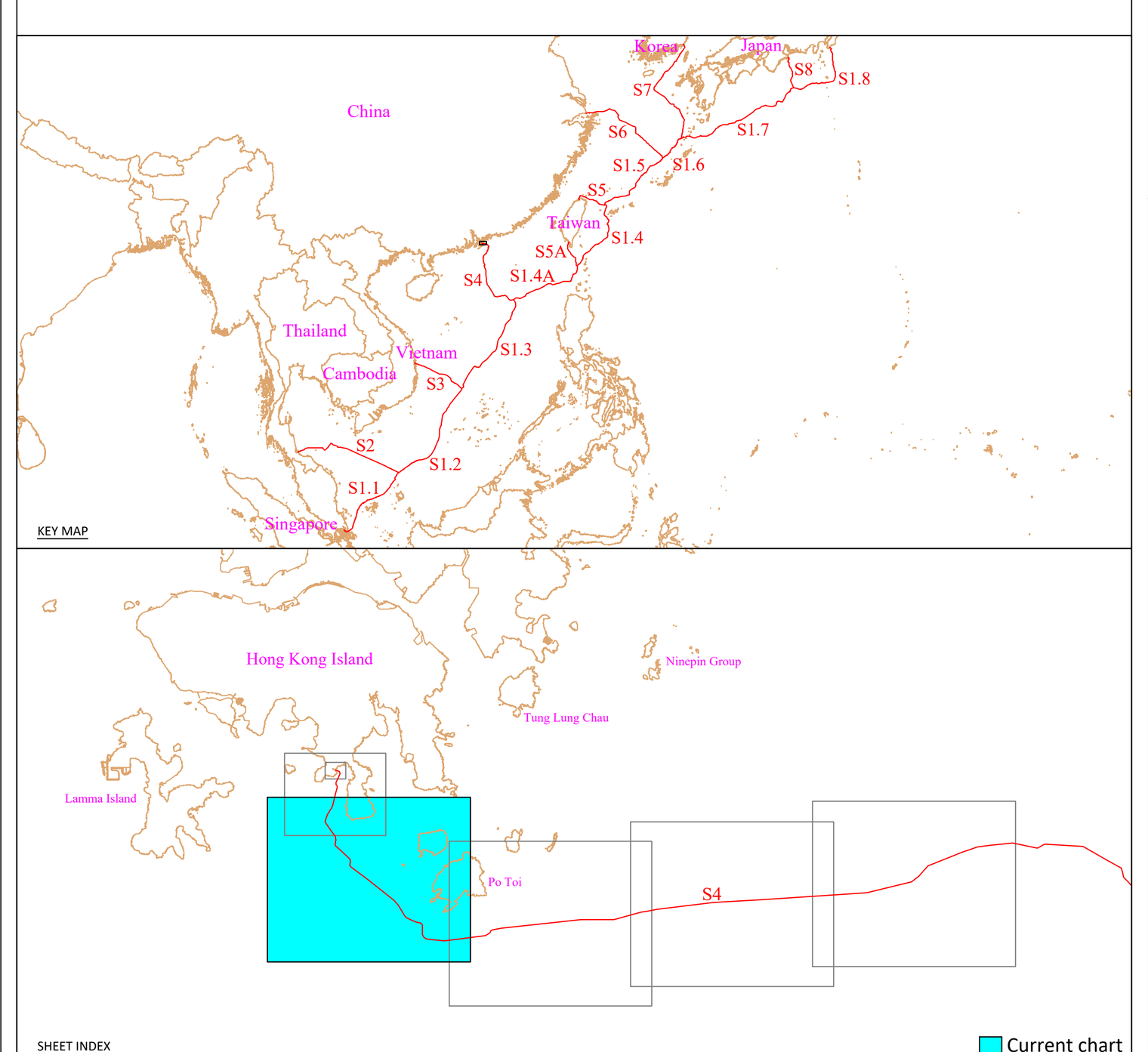
GEODETIC PARAMETERS

Ellipsoidal parameters
Ellipsoid : WGS84
Semi-major axis (a) (m) : 6378137.000
Inverse flattening (1/f) : 298.257223563

Projection parameters
Projection : Mercator
Longitude of origin : 90°E
Standard parallel : 20°N
Scale factor : 1
False easting : 4 000 000
False northing : 1 000 000

VERTICAL DATUM

In Landfall and Inshore survey charts: Bathymetry data has been reduced to Low Astronomical Tide (LAT) using the relationship between LAT and MSL at Quarry Bay (7110) as stated in Admiralty Tide Tables, Volume 6, 2017 and tidal measurements at the government tide gauges installed at Waglan Island
In Shallow Water survey charts:
N/A



Survey date: Jan 2019

Scale : NATURAL SCALE 1 : 10,000 at 20°N
(At mid-latitude of chart)
TRUE SCALE 1 : 9855.92
0.0 0.2 0.4 0.6 0.8 1.0 km

Contractor : NEC Corporation
Surveyor : EGS Survey Group — EARTH SCIENCES & SURVEYING
EGS JOB NO.: HK249218

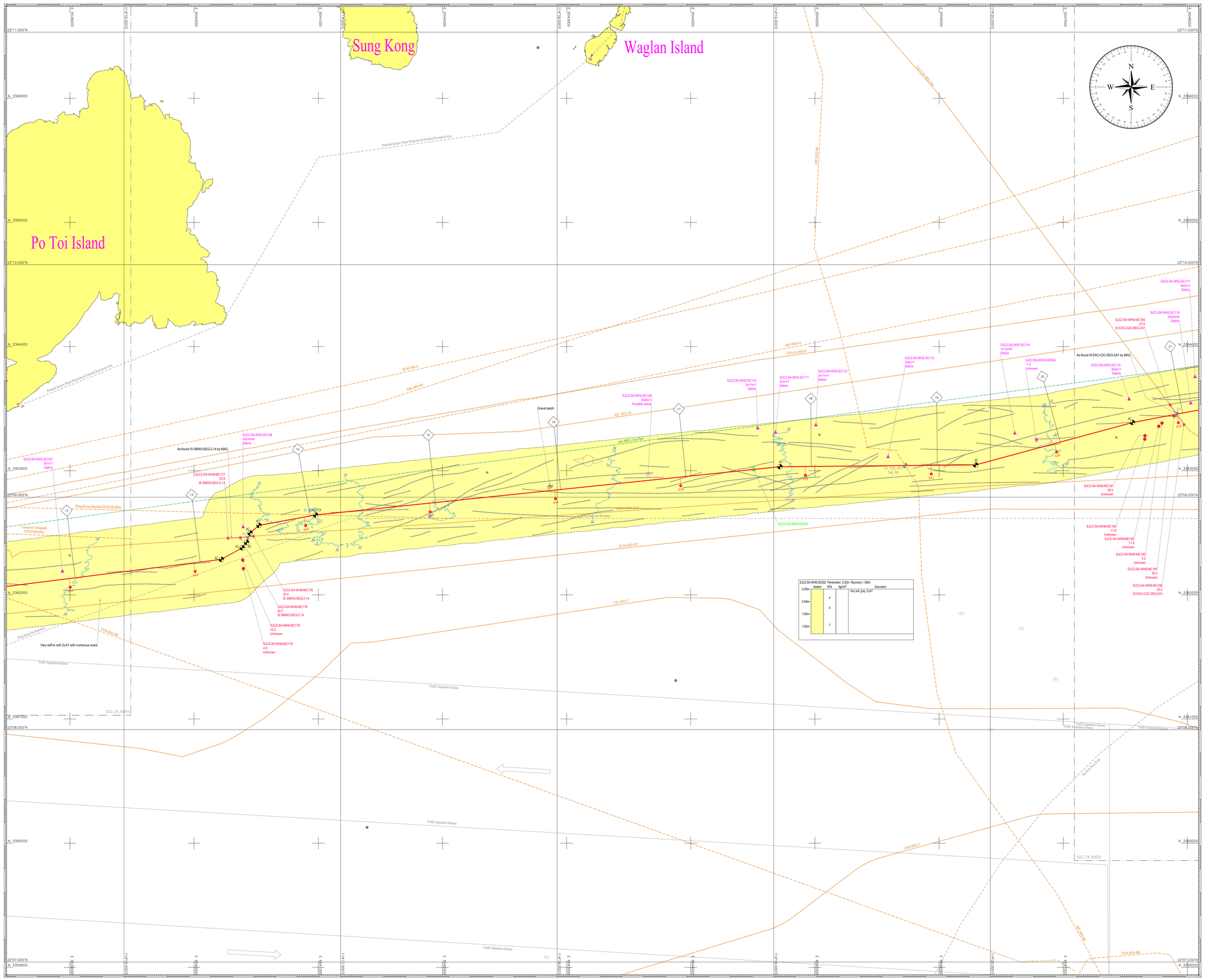
Project name:
SJC2 CABLE SYSTEM
Marine Route Survey

Document title:
SEGMENT S4 (CHUNG HOM KOK - BU3)
NORTH UP CHART
CHART NO. 003 OF 006
(KP 1.48 - KP 12.45)

Rev	Date	Prepared by	Checked by	Approved by
1.1	Feb 2019	C W Quek / K F Lai	Bobby Lee	Even KM Mak
1	Aug 2018	Chester Quek	Philip Wong	Even KM Mak
0	Jun 2018	Chester Quek	Philip Wong	Even KM Mak

Provisional

Route based upon: SJC2_S4(Chung Hom Kok - BU3)_RPL_Issue-2.4_06Feb2019.xlsx
File name: SJC2_S4_NU003_010K



CARTOGRAPHIC SYMBOLS

- Post survey route with kilometre post and reverse kilometre post
- Beach manhole / Alter course
- Point on line (POL)
- Coastline (from Admiralty charts)
- Chart matchline
- Submerged wreck / Exposed wreck / Obstruction / Well / Platform / Explosives dumping ground and symbol or line feature in grey, plotted from desk top study (as-found in magenta). (for general symbols and abbreviations refer to British Admiralty Chart)
- Telecommunications cable position, In-service/Out of service/Planned (as-found in magenta)
- Pipeline position, In-service/Out of service/Planned (as-found in magenta)
- Power cable position, In-service/Out of service/Planned (as-found in magenta)
- Maritime boundaries
- Restricted zones and special areas
- Concession block

BATHYMETRY

- Bathymetric contours in metres. Contour interval may be reduced to aid in clarity.
- Downslope gradient in degrees (°) as measured over the shortest significant distance
- Approximate limit of swath bathymetry coverage (shown only in areas of flat seabed)

SEABED FEATURES

Sediments
- cor — CORAL
- fs/ca/vca — Gas seepage area with predominant sediment classification
- fs/ca/vca — Boulder field with predominant sediment classification
- fs — Fine sediment (predominantly CLAY/SILT)
- cs — Coarse sediment (SAND and GRAVEL)
- vcs — Very coarse sediment (COBBLES and BOULDERS)

Rock
- fs/ca/vcs — Subcropping ROCK with predominant sediment classification (sediment thickness < target burial depth)
- r — ROCK outcrop (with veneer of sediments)
- ha — HARDGROUND (very dense/very stiff/consolidated sediments; sediment thickness < target burial depth)

- Sediment or feature boundary
- Inferred sediment or feature boundary
- Approximate limit of side scan sonar coverage
- Seabed scar (trawl or anchor)
- Isopach contours shown at 1m interval with labels every 1m
- BP001 / BS001 — Beach probe (BP); Beach sample (BS) location with reference number
- DP001 / DS001 — Diver probe (DP); Diver sample (DS) location with reference number
- SC001 0x5x1 — Isolated sonar contact with reference number (length x width x height in metres where measurable; nmh = no measurable height)
- 50x0.4x1 — Linear sonar contact, dashed where partially buried
- Pipeline contact determined by seismic profiling system with reference number and description (level at the top of pipeline is stated in metres, +/- equivalent to above or below ambient seabed)
- SE3001 -2.5
- Unidentified magnetic anomaly with reference number and amplitude (in nano-Tesla)
- MC001 5.0
- Cable/Pipeline position, as determined by magnetometer, with reference number and amplitude (in nano-Tesla)
- MC002 5.0
- SO001 20x10x2 — Located wreck with reference no. (length x width x height in metres where measurable)
- GC001 — Gravity core (GC); Grab sample (GS) location with reference number
- CP001 — MiniCPT (CP) location with reference number
- 0.5 — Small ROCK outcrop with height in metres if discernible
- Sealed depression or pockmark with diameter (d) and depth (D) in metres, where discernible
- 50/3 — General orientation of sandwave crest (Hachures on lee side where observable, with wavelength and height in metres)
- 4/0.8 — Orientation of megaripple crest (Hachures on lee side where observable, with wavelength and height in metres)
- 22 — Orientation of sediment ribbon
- -25 — Fault with depth below seafloor (Hachures on footwall)

CHART COMMENT

Cable and Pipelines

The route makes four (4) crossings with the following cables:
- In-service SMW3-SEG-2.14
- Out of service Hong Kong-Manilla (TELEGRAPH)
- Out of service APC-SEG-B4
- In-service EAC-C2C-SEG-2A1

The in-service Gas Pipe runs parallel with the proposed route. Part of the in-service Gas Pipe runs within the survey corridor. Part of the in-service FLAG-SEG-P1, out of service TVH-SEG-HK and out of service Unknown Telegraph (TELEGRAPH) run within the survey corridor in the western part of the chart.

Hazards and Obstructions

The seabed comprises very soft CLAY with undrained shear strength of <5kPa measured at the top 0.5m.
Numerous trawl scars are present on the seabed.
Twelve (12) sonar contacts related to debris, including a possible wreck, were observed within the survey corridor. The possible wreck was identified in the central part of the chart.
Twelve (12) magnetic contacts including five (5) attributed to two (2) in-service cables and six (6) of unknown origin were identified in the chart.
One (1) seismic contact attributed to unknown origin was identified in the chart.
The route runs within Hong Kong Waters.

GENERAL NOTES

	Inshore	Inshore
Survey vessel	MV Wing Hung 8	MV Wing Hung 2
Surface positioning system	C-Nav 3050 GcGPS, C-View Navigation System	C-Nav 3050 GcGPS, C-View Navigation System
Underwater positioning system	-	-
Bathymetry	Knudsen 320M Dual Frequency SBES	R2Sonic 2024 MBES, Knudsen 320M Dual Frequency SBES Knudsen Sounder 1612 Dual Frequency SBES
Morphology and stratigraphy	Innomar SES-2000 Light SBP System	EdgeTech 4200 Side Scan Sonar System, C-Boom Low Voltage Boomer System
Magnetometer survey	Geometrics G-882 Marine Magnetometer	-

Target burial depth: 5.0m from BMH to WD50m. 3.0m from WD50m to WD200m.
Descriptive terms and definitions: 1.5m for WD200m-1500m, no burial for WD >1000m. No burial for Guam.

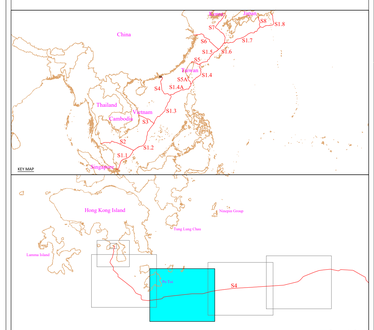
GEODETIC PARAMETERS

Ellipsoidal parameters
Ellipsoid : WGS84
Semi-major axis (a) (m) : 6378137.000
Inverse flattening (1/f) : 298.257223563

Projection parameters
Projection : Mercator
Longitude of origin : 90°E
Standard parallel : 20°N
Scale factor : 1
False easting : 4 000 000
False northing : 1 000 000

VERTICAL DATUM

In Landfall and Inshore survey charts: Bathymetry data has been reduced to Low Astronomical Tide (LAT) using the relationship between LAT and MSL at Quarry Bay (7110) as stated in Admiralty Tide Tables, Volume 6, 2017 and tidal measurements at the government tide gauges installed at Waglan Island
In Shallow Water survey charts:
N/A



Survey date: Jan 2019

Scale : NATURAL SCALE 1 : 10,000 at 20°N

(At mid-latitude of chart)
TRUE SCALE 1 : 9857.21

0.0 0.2 0.4 0.6 0.8 1.0 km

Contractor : NEC Corporation

Surveyor : EGS Survey Group

Project name:

SJC2 CABLE SYSTEM
Marine Route Survey

Document title:

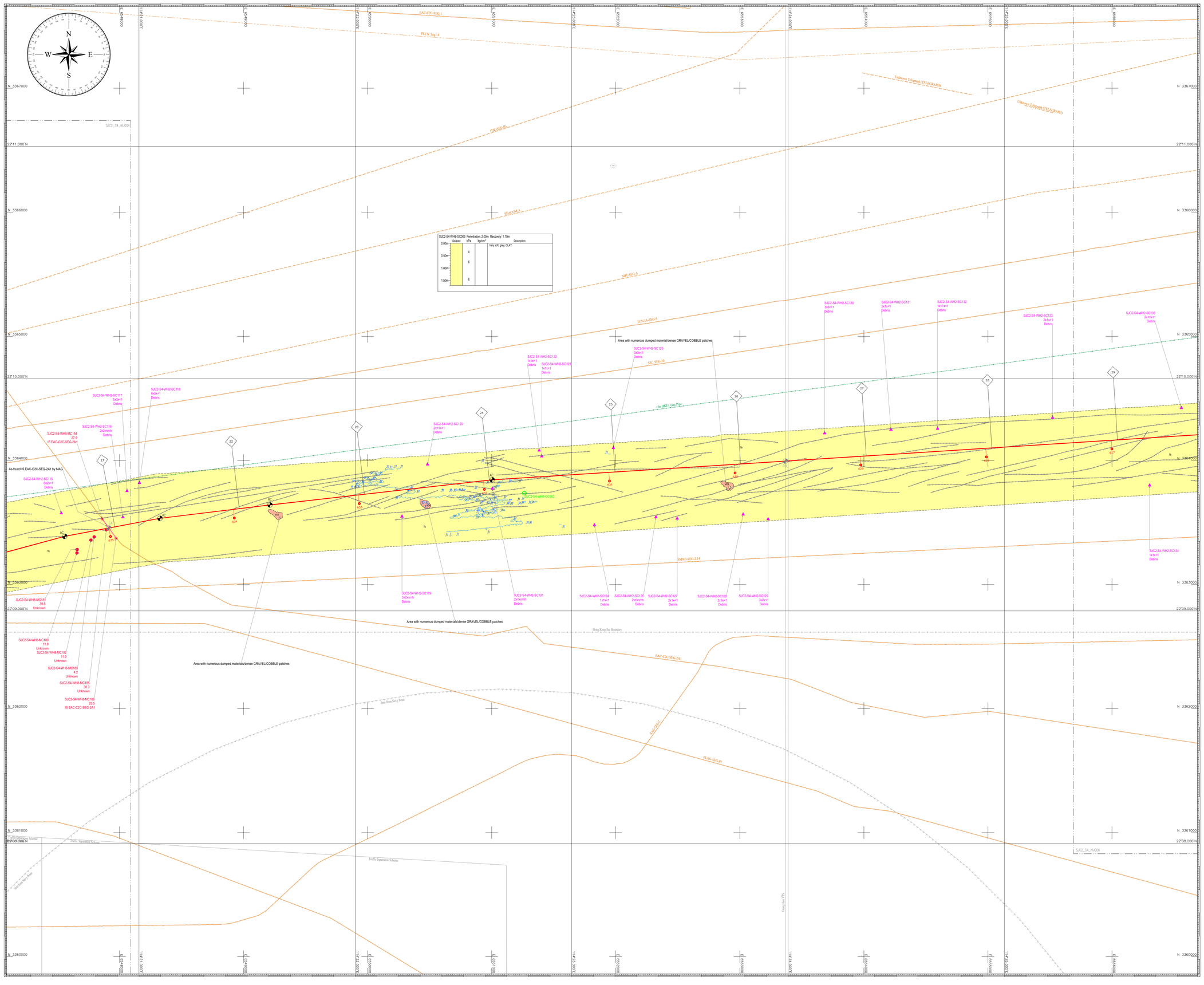
SEGMENT S4 (CHUNG HOM KOK - BU3)
NORTH UP CHART
CHART NO. 004 OF 006
(KP 11.45 - KP 21.13)

Rev	Date	Prepared by	Checked by	Approved by	
1.1	Feb 2019	C W Quek / K F Lai	Bobby Lee	Even KM Mak	
1	Aug 2018	Chester Quek	Philip Wong	Even KM Mak	
0	Jun 2018	Chester Quek	Philip Wong	Even KM Mak	

Provisional

Route based upon: SJC2_S4(Chung Hom Kok - BU3)_RPL Issue-2.4_06Feb2019.xlsx

File name: SJC2_S4_NU004_010K



CARTOGRAPHIC SYMBOLS

- Post survey route with kilometre post and reverse kilometre post
- Beach manhole / Alter course
- Point on line (POL)
- Coastline (from Admiralty charts)
- Chart matchline
- Telecommunications cable position, In-service/Out of service/Planned (as-found in magenta)
- Pipeline position, In-service/Out of service/Planned (as-found in magenta)
- Power cable position, In-service/Out of service/Planned (as-found in magenta)
- Maritime boundaries
- Restricted zones and special areas
- Concession block
- Submerged wreck / Exposed wreck / Obstruction / Well / Platform / Explosives dumping ground and symbol or line feature in grey, plotted from desk top study (as-found in magenta). (For general symbols and abbreviations refer to British Admiralty Chart)

BATHYMETRY

- Bathymetric contours in metres. Contour interval may be reduced to aid in clarity.
- Downslope gradient in degrees (°) as measured over the shortest significant distance
- Approximate limit of swath bathymetry coverage (shown only in areas of flat seabed)

SEABED FEATURES

- CORAL
- Gas seepage area with predominant sediment classification
- Boulder field with predominant sediment classification
- Sediments: Fine sediment (predominantly CLAY/SILT)
- Sediments: Coarse sediment (SAND and GRAVEL)
- Sediments: Very coarse sediment (COBBLES and BOULDERS)
- Rock: Subcropping ROCK with predominant sediment classification (sediment thickness < target burial depth)
- Rock: ROCK outcrop (with veneer of sediments)
- Rock: HARDGROUND (very dense/very stiff/consolidated sediments; sediment thickness < target burial depth)
- Sediment or feature boundary
- Inferred sediment or feature boundary
- Approximate limit of side scan sonar coverage
- Seabed scar (trawl or anchor)
- Isopach contours shown at 1m interval with labels every 1m
- Beach probe (BP); Beach sample (BS) location with reference number
- Diver probe (DP); Diver sample (DS) location with reference number
- SC001 6x5x1 — Isolated sonar contact with reference number (length x width x height in metres where measurable; nmh = no measurable height)
- SDo0.4x1 — Linear sonar contact, dashed where partially buried
- SE3001 2.5 — Pipeline contact determined by seismic profiling system with reference number and description (level at the top of pipeline is stated in metres, +/- equivalent to above or below ambient seabed)
- MC001 5.0 — Unidentified magnetic anomaly with reference number and amplitude (in nano-Tesla)
- MC002 5.0 — Cable/Pipeline position, as determined by magnetometer, with reference number and amplitude (in nano-Tesla)
- SO001 20x10x2 — Located wreck with reference no. (length x width x height in metres where measurable)
- GC001 — Gravity core (GC); Grab sample (GS) location with reference number
- CP001 — MiniCPT (CP) location with reference number
- 0.5 — Small ROCK outcrop with height in metres if discernible
- Seabed depression or pockmark with diameter (d) and depth (D) in metres, where discernible
- General orientation of sandwave crest (Hachures on lee side where observable, with wavelength and height in metres) — 50/3
- Orientation of megaripple crest (Hachures on lee side where observable, with wavelength and height in metres) — 4/0.8
- Orientation of sediment ribbon — 22
- Fault with depth below seafloor (Hachures on footwall) — -25

CHART COMMENT

Cable and Pipelines
The route makes one (1) crossing with the following cable:
- In-service EAC-C2C-SEG-2A1

Part of the in-service Gas Pipe runs within the survey corridor in the western part of the chart.

Hazards and Obstructions
The seabed comprises very soft CLAY with undrained shear strength of <5kPa measured at the top 0.5m.
Numerous trawl scars are present upon the seabed.
Twenty-one (21) sonar contacts related to debris were observed within the survey corridor.
Seven (7) magnetic contacts including two (2) attributed to an in-service cable and five (5) of unknown origin were identified in the chart.
The route runs within Hong Kong Waters.

GENERAL NOTES

Survey vessel	Inshore	Inshore
	MV Wing Hung 8	MV Wing Hung 2
Surface positioning system	C-Nav 3050 GcGPS, C-View Navigation System	C-Nav 3050 GcGPS, C-View Navigation System
Underwater positioning system	-	-
Bathymetry	Knudsen 320M Dual Frequency SBES	R2Sonic 2024 MBES, Knudsen 320M Dual Frequency SBES Knudsen Sounder 1612 Dual Frequency SBES
Morphology and stratigraphy	Innomar SES-2000 Light SBP System	EdgeTech 4200 Side Scan Sonar System, C-Boom Low Voltage Boomer System
Magnetometer survey	Geometrics G-882 Marine Magnetometer	-

Target burial depth: 5.0m from BMH to WD50m. 3.0m from WD50m to WD200m.
Descriptive terms and definitions: 1.5m for WD200m-1500m, no burial for WD >1000m. No burial for Guam.

GEODETIC PARAMETERS

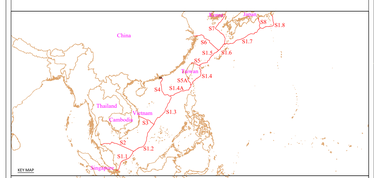
Ellipsoidal parameters
Ellipsoid : WGS84
Semi-major axis (a) (m) : 6378137.000
Inverse flattening (1/f) : 298.257223563

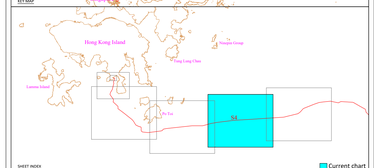
Projection parameters
Projection : Mercator
Longitude of origin : 90°E
Standard parallel : 20°N

Scale factor : 1
False easting : 4 000 000
False northing : 1 000 000

VERTICAL DATUM

In Landfall and Inshore survey charts: Bathymetry data has been reduced to Low Astronomical Tide (LAT) using the relationship between LAT and MSL at Quarry Bay (7110) as stated in Admiralty Tide Tables, Volume 6, 2017 and tidal measurements at the government tide gauges installed at Waglan Island
In Shallow Water survey charts:
N/A





Survey date: Jan 2019

Scale : NATURAL SCALE 1 : 10,000 at 20°N
(At mid-latitude of chart)
TRUE SCALE 1 : 9856.64
0.0 0.2 0.4 0.6 0.8 1.0 km

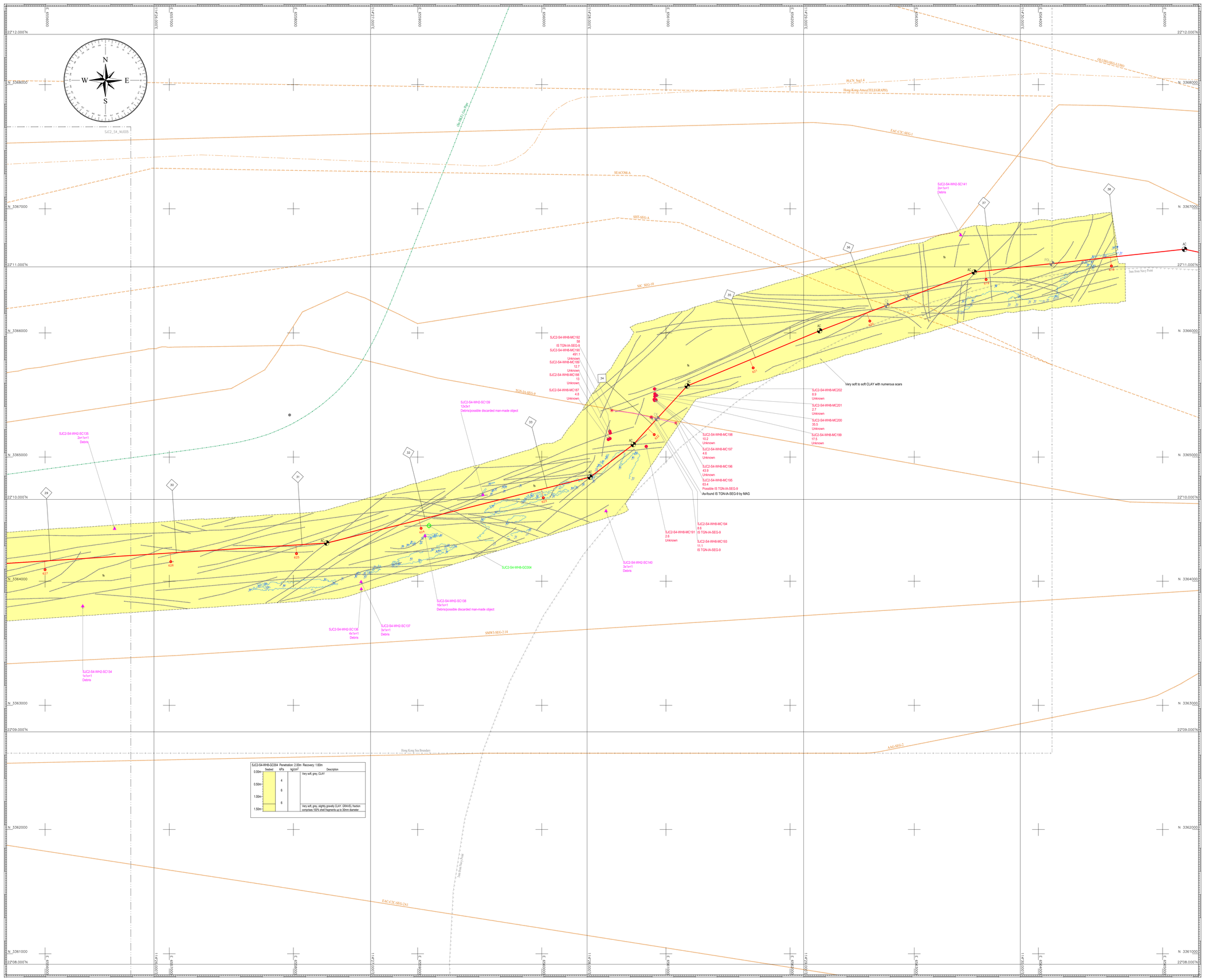
Contractor : NEC Corporation
Surveyor : EGS Survey Group

Project name:
SJC2 CABLE SYSTEM
Marine Route Survey

Document title:
SEGMENT S4 (CHUNG HOM KOK - BU3)
NORTH UP CHART
CHART NO. 005 OF 006
(KP 20.12 - KP 29.64)

Rev	Date	Prepared by	Checked by	Approved by	
1.1	Feb 2019	C W Quek / K F Lai	Bobby Lee	Even KM Mak	Provisional
1	Aug 2018	Chester Quek	Philip Wong	Even KM Mak	
0	Jun 2018	Chester Quek	Philip Wong	Even KM Mak	

Route based upon: SJC2_54CChung Hom Kok - BU3_RPL Issue-2.4_06Feb2019.xlsx
File name: SJC2_54_NU005_010K



CARTOGRAPHIC SYMBOLS

- Post survey route with kilometre post and reverse kilometre post
- Beach manhole / Alter course
- Point on line (POL)
- Coastline (from Admiralty charts)
- Chart matchline
- Telecommunications cable position, In-service/Out of service/Planned (as-found in magenta)
- Pipeline position, In-service/Out of service/Planned (as-found in magenta)
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- Maritime boundaries
- Restricted zones and special areas
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BATHYMETRY

- Bathymetric contours in metres. Contour interval may be reduced to aid in clarity.
- Downslope gradient in degrees (°) as measured over the shortest significant distance
- Approximate limit of swath bathymetry coverage (shown only in areas of flat seabed)

SEABED FEATURES

Sediments
- cor — CORAL
- fs/ca/vca — Gas seepage area with predominant sediment classification
- fs/ca/vca — Boulder field with predominant sediment classification
- fs — Fine sediment (predominantly CLAY/SILT)
- cs — Coarse sediment (SAND and GRAVEL)
- vcs — Very coarse sediment (COBBLES and BOULDERS)

Rock
- fs/ca/vca — Subcropping ROCK with predominant sediment classification (sediment thickness < target burial depth)
- r — ROCK outcrop (with veneer of sediments)
- ha — HARDGROUND (very dense/very stiff/consolidated sediments; sediment thickness < target burial depth)

- Sediment or feature boundary
- Inferred sediment or feature boundary
- Approximate limit of side scan sonar coverage
- Seabed scar (trawl or anchor)
- Isopach contours shown at 1m interval with labels every 1m
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- 50x0.4x1 — Linear sonar contact, dashed where partially buried
- SE001 2.5 — Pipeline contact determined by seismic profiling system with reference number and description (level at the top of pipeline is stated in metres, +/- equivalent to above or below ambient seabed)
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- MC002 5.0 — Cable/Pipeline position, as determined by magnetometer, with reference number and amplitude (in nano-Tesla)
- SO001 20x10x2 — Located wreck with reference no. (length x width x height in metres where measurable)
- GC001 — Gravity core (GC); Grab sample (GS) location with reference number
- CP001 — MiniCPT (CP) location with reference number
- 0.5 — Small ROCK outcrop with height in metres if discernible
- ⌀D — Seabed depression or pockmark with diameter (d) and depth (D) in metres, where discernible
- 50/3 — General orientation of sandwave crest (Hachures on lee side where observable, with wavelength and height in metres)
- 4/0.8 — Orientation of megaripple crest (Hachures on lee side where observable, with wavelength and height in metres)
- 22 — Orientation of sediment ribbon
- -25 — Fault with depth below seafloor (Hachures on footwall)

CHART COMMENT

Cable and Pipelines

The route makes three (3) crossings with the following cables:
- In-service TGN-IA-SEG-9
- Out of service SHT-SEG-A
- Out of service SEACOM-A

Hazards and Obstructions

The seabed comprises very soft CLAY with undrained shear strength of <5kPa measured at the top 0.5m.
Numerous trawl scars are present upon the seabed.
Eight (8) sonar contacts related to debris or possible discarded man-made object were observed within the survey corridor.
Sixteen (16) magnetic contacts including four (4) attributed to an in-service cable and twelve (12) of unknown origin were identified in the chart.
The route deviated to the north in the eastern part of the chart to avoid the area of 3nm from Navy Point.
The route exits the Hong Kong Sea Boundary at the eastern part of the chart.

GENERAL NOTES

	Inshore	Inshore
Survey vessel	M/V Wing Hung 8	M/V Wing Hung 2
Surface positioning system	C-Nav 3050 GcGPS, C-View Navigation System	C-Nav 3050 GcGPS, C-View Navigation System
Underwater positioning system	-	-
Bathymetry	Knudsen 320M Dual Frequency SBES	R2Sonic 2024 MBES, Knudsen 320M Dual Frequency SBES Knudsen Sounder 1612 Dual Frequency SBES
Morphology and stratigraphy	Innomar SES-2000 Light SBP System	EdgeTech 4200 Side Scan Sonar System, C-Boom Low Voltage Boomer System
Magnetometer survey	Geometrics G-882 Marine Magnetometer	-

Target burial depth: 5.0m from BMH to WD50m. 3.0m from WD50m to WD200m.
Descriptive terms and definitions: 1.5m for WD200m-1500m, no burial for WD >1000m. No burial for Guam.

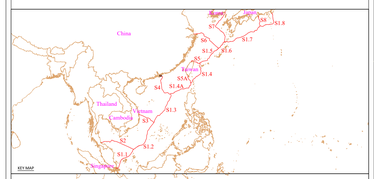
GEODETIC PARAMETERS

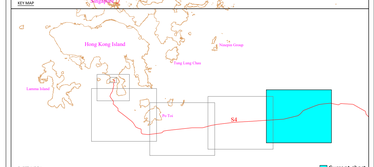
Ellipsoidal parameters
Ellipsoid : WGS84
Semi-major axis (a) (m) : 6378137.000
Inverse flattening (1/f) : 298.257223563

Projection parameters
Projection : Mercator
Longitude of origin : 90°E
Standard parallel : 20°N
Scale factor : 1
False easting : 4 000 000
False northing : 1 000 000

VERTICAL DATUM

In Landfall and Inshore survey charts: Bathymetry data has been reduced to Low Astronomical Tide (LAT) using the relationship between LAT and MSL at Quarry Bay (7110) as stated in Admiralty Tide Tables, Volume 6, 2017 and tidal measurements at the government tide gauges installed at Waglan Island
In Shallow Water survey charts:
N/A





Survey date: Jan 2019

Scale :

NATURAL SCALE 1 : 10,000 at 20°N

(At mid-latitude of chart)
TRUE SCALE 1 : 9856.04

0.0 0.2 0.4 0.6 0.8 1.0 km

Contractor : NEC Corporation

Surveyor : EGS Survey Group

Project name:

SJC2 CABLE SYSTEM
Marine Route Survey

Document title:

SEGMENT S4 (CHUNG HOM KOK - BU3)
NORTH UP CHART
CHART NO. 006 OF 006
(KP 28.65 - KP 38.66)

Rev	Date	Prepared by	Checked by	Approved by	
1.1	Feb 2019	C W Quek / K F Lai	Bobby Lee	Even KM Mak	Provisional
1	Aug 2018	Chester Quek	Philip Wong	Even KM Mak	
0	Jun 2018	Chester Quek	Philip Wong	Even KM Mak	

Route based upon: SJC2_S4(Chung Hom Kok - BU3)_RPL Issue-2.4_06Feb2019.xlsx
File name: SJC2_S4_NU006_010K

Appendix E NOISE IMPACT ASSESSMENT

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E NOISE IMPACT ASSESSMENT

E.1 Introduction

E.1.1 This appendix provides an assessment of potential noise impacts associated with the installation and land works of the SJC2-HK Cable. There is no noise generation from the normal operation of the cable and, therefore, operation noise will not be considered further.

E.2 Relevant Legislation and Guidelines

Noise Control Ordinance (Cap. 400) (NCO)

E.2.1 The *Noise Control Ordinance* (Cap. 400) (NCO) is the main legislation in Hong Kong controlling noise during Restricted Periods also provides means to assess construction noise impacts. Restricted Periods are from 1900 to 0700 daily and any time on Sundays and General Holidays.

E.2.2 There is no expectation that construction works associated with the onshore and offshore submarine cable installation will need to be carried out during Restricted Hours, however, should this be required, then a Construction Noise Permit (CNP) will be applied for under NCO.

E.2.3 Various Technical Memoranda (TMs) that stipulate control approaches and criteria, have been issued under the NCO. The following TMs are applicable to the control of noise impacts from construction activities:

- Technical Memorandum on Noise from Construction Work other than Percussive Piling (GW-TM); and
- Technical Memorandum on Noise from Construction Work in Designated Areas (DA-TM).

EIAO-TM

E.2.4 The main legislation controlling construction noise outside Restricted Periods, i.e.0700 to 1900 hours on any day not being a Sunday or General Holiday is the *Environmental Impact Assessment Ordinance* (EIAO) (Cap. 499). The *Technical Memorandum on Environmental Impact Assessment Process* (EIAO-TM), issued under the EIAO, provides guidelines and noise criteria for evaluating noise impacts.

E.2.5 Under the EIAO, noise impact arising from general construction works during non-restricted hours at openable windows of buildings are to be assessed in accordance with the noise criteria given in EIAO-TM. With reference to the EIAO-TM, the daytime noise standard for domestic premises is Leq, $_{30\,min}$ 75 dB(A).

E.3 Assessment Methodology

E.3.1 The assessment of noise impact associated with cable installation works was undertaken based on the procedure outlined in the *GW-TM*. In general, the procedure to undertake a construction noise assessment is as follows:

- Locate the Noise Sensitive Receivers (NSRs) that may be affected by the Project.
- Locate and list the Powered Mechanical Equipment (PME_ to be used for the Project and identify the Notional Source Positions (NSP) for the Site.
- Aggregate the Sound Power Levels (SWL) of PME based on *GW-TM* or other PME lists.
- Calculate the correction factor based on the distance between the NSP and the NSR, apply corrections for façade reflection and acoustic barriers.
- Predict construction noise level at the NSRs and compare against the daytime noise criterion for construction activities according to the *EIAO-TM Annex 5*.

E.4 Potential Noise Sources

E.4.1 As described in **Section 1.6**, activities for installing the cable will be carried out in the following Works Areas (see **Figure E.1**):

- **Beach Manhole (BMH) to Cable Landing Station (CLS).** Cable laying by hand pulling through existing ducts. Air compressor and generator may be used for clearing the existing ducts, if necessary and these would only be placed at the manhole at the top of the existing ducts at the CLS or at BMH, as shown in **Figure E.1**;
- **BMH to Landing Point.** New duct installation and reinstatement using handheld drill, hand-held grinder and hand-held breaker; beach excavation, cable laying and back filling by small tracked diggers, winch, with some hand digging and hand pulling as required.
- **Offshore Marine Cable Installation** (cable laying works between the landing point and eastern boundary of Hong Kong). Using cable installation barge, divers and work boat.

E.5 Description of the Environment and Identification of NSRs

E.5.1 The existing noise environment of the land point is tranquil, reflecting the rural nature of the site and its coastal location. Low density housing developments are located along the low trafficked Chung Hom Kok Road and Cape Road. The Study Area for the noise impact assessment covers a distance of 300 m from the alignment of the cable, as shown in **Figure E.1**.

E.5.2 Only the first layer of NSRs having direct line of sight towards both of the land and marine alignments have been included in the assessment as NSRs further back are located further away or are screened and therefore will experience less noise impact.

E.5.3 Two identified representative NSRs, designated NSR 1 and NSR 2, are shown on **Figure E.1**, details are presented in **Table E.1** and photographs shown on **Figure E.2**. Also given in **Table E.1** are the horizontal distances between the NSRs and specific works areas where more noise may be generated according to the construction plant inventory described in **Section E.6**.

Table E.1: Representative Noise Sensitive Receivers (NSRs)

NSR	LOCATION	TYPE OF USE	SHORTEST HORIZONTAL DISTANCE (M) BETWEEN SPECIFIC WORKS AREAS AND NSRS		
			ONSHORE CABLE (BMH TO CLS)	ONSHORE CABLE (BMH TO LANDING POINT)	OFFSHORE SUBMARINE CABLE
NSR 1	Block 5, 30 Cape Road	Residential	129	117	133
NSR 2	House 2, Scape, 20-26F Cape Road	Residential	123	119	148

E.6 Impact Assessment

E.6.1 An assumed plant inventory has been established and is presented in **Table E.2**, below. The plant inventory was reviewed by the Design Engineer and was confirmed to be suitable for completing the Project.

Table E.2: Construction Plant Inventory

ITEM OF PME	IDENTIFICATION CODE(NOTE 1)	NO OF UNITS	SOUND POWER LEVELS (SWL) (dB(A))
ONSHORE CABLE (BMH TO CLS)			
Air compressor, air flow≤10m^3/min	CNP 001	1	100
Generator, super silenced	CNP 103	1	95
		Sub-total	**101**
ONSHORE CABLE (BMH TO LANDING POINT)			
Winch	CNP 262	1	95
Generator, super silenced	CNP 103	1	95
Excavator, mini-robot mounted	CNP 081	2	115
Hand-held drill	CNP 065	1	98
Hand-held grinder	CNP 065	1	98
Hand-held breaker, mass≤10kg	CNP 023	1	108
		Sub-total	**116**
OFFSHORE SUBMARINE CABLE			
Tug Boat	CNP 221	1	110
Mobile Crane	CNP 048	1	112
		Sub-total	**114**

Note: 1. PME Identification Codes and SWLs refer to those provided in EPD's GW-TM.

E.6.2 Noise levels at the representative NSRs have been predicted based on the above construction plant inventory and are presented in **Table E.3**. Details of the calculation on construction noise impact assessment are given in the **Annex to Appendix E**.

Table E.3: Predicted Noise Levels at the Representative NSRs

NSR	PREDICTED NOISE LEVELS (dB(A))	NOISE CRITERION (dB(A))	COMPLIANCE
ONSHORE CABLE (BMH TO CLS)			
NSR 1	54	75	Yes
NSR 2	54	75	Yes
ONSHORE CABLE (BMH TO LANDING POINT)			
NSR 1	70	75	Yes
NSR 2	69	75	Yes
OFFSHORE SUBMARINE CABLE			
NSR 1	67	75	Yes
NSR 2	66	75	Yes

E.6.3 The predicted noise levels of all work activities range between 54 and 70 dB(A) and so comply with the noise criterion. Therefore, no noise mitigation measures are required.

E.7 Conclusion

E.7.1 A noise assessment was undertaken to describe and evaluate the potential noise impacts arising from the land, inshore and remaining submarine works associated with cable installation and operation (including maintenance) at two residential NSRs located on Cape Road.

No exceedance at representative NSRs is predicted to occur and so it can be concluded that there will be no unacceptable noise impact resulting from the Project.

Figure E.1: 300m Study Area for Noise Impact Assessment and Representative NSRs

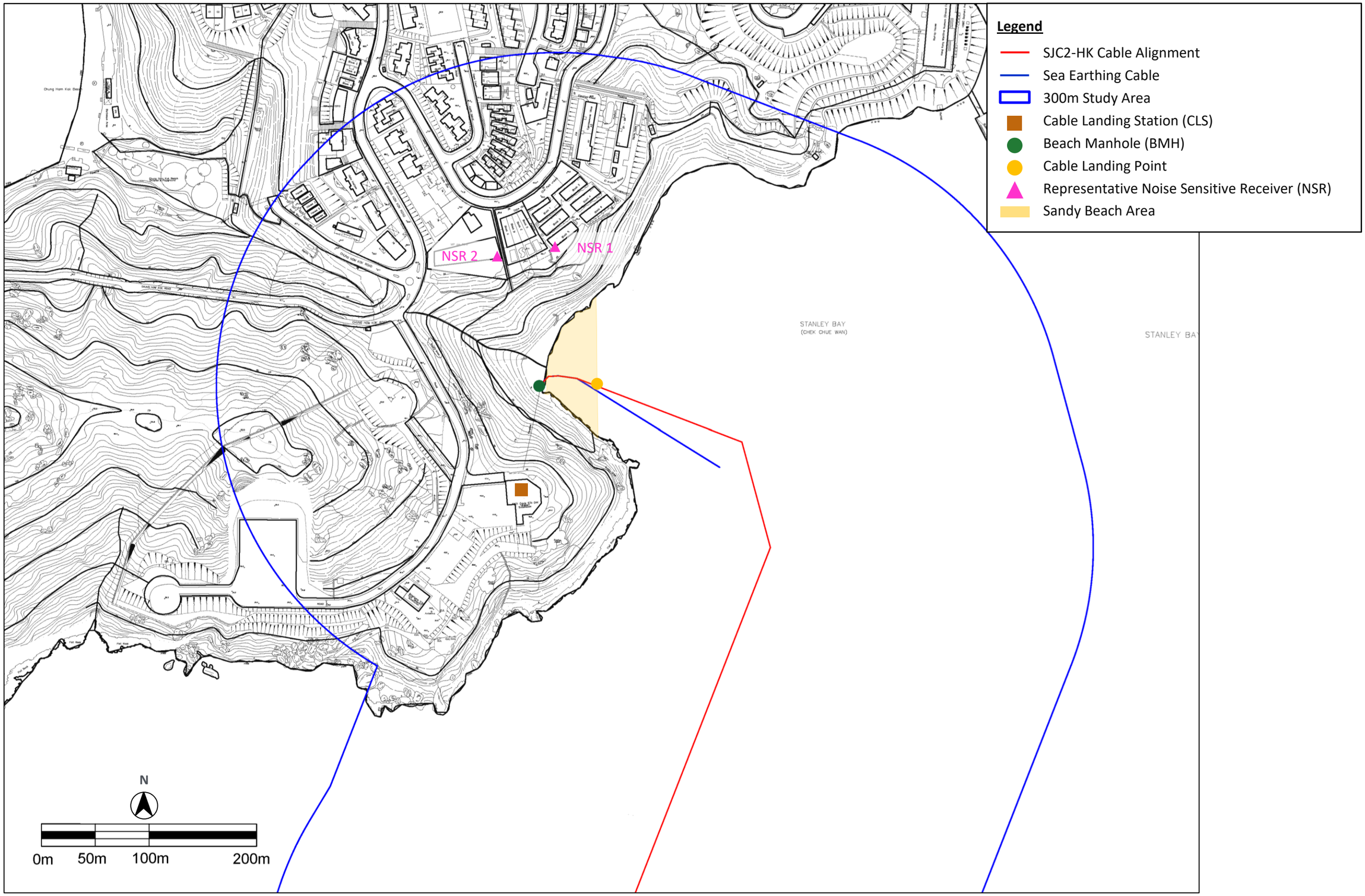

Figure E.2: Representative Noise Sensitive Receivers (NSRs)

Annex

CONSTRUCTION NOISE ASSESSMENT

WORK ACTIVITY	SWL, dB(A	HORIZONTAL DISTANCE, m	DISTANCE CORRECTION, dB(A)	FAÇADE CORRECTION, dB(A)	BARRIER CORRECTION, dB(A)	PREDICTED NOISE LEVEL, dB(A)[NOTE 1]	CRITERION, dB(A)	COMPLIANCE
NSR 1 – BLOCK 5, 30 CAPE ROAD								
Onshore Cable (BMH To CLS)	101	129	-50.2	3	0	54	75	Yes
Onshore Cable (BMH To Landing Point)	116	117	-49.4	3	0	70		Yes
Offshore Submarine Cable	114	133	-50.5	3	0	67		Yes
NSR 2 – HOUSE 2, SCAPE, 20-26F CAPE ROAD								
Onshore Cable (BMH To CLS)	101	123	-49.8	3	0	54	75	Yes
Onshore Cable (BMH To Landing Point)	116	119	-49.5	3	0	69		Yes
Offshore Submarine Cable	114	148	-51.4	3	0	66		Yes

Note: 1. Predicted Noise Level, dB(A) = SWL + distance correction + façade correction + barrier correction.

Appendix F ENVIRONMENTAL MONITORING & AUDIT

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F ENVIRONMENTAL MONITORING AND AUDIT

F.1 Introduction

F.1.1 This appendix specifies the requirements of the Environmental Monitoring and Audit (EM&A) programme for the Project. Overall, the proposed EM&A programme allows for:

- Verification of the predictions in the Water Quality Assessment (**Appendix A**) that the installation of the SJC2-HK Cable will not result in unacceptable impacts on water quality (and thereby also on ecological resources and fisheries resources dependent upon water quality) along the cable alignment.
- Coral monitoring through a Pre-installation Coral Survey and a Post-project Coral Survey in the near shore area of SST in proximity to the proposed cable alignment.
- A marine mammal exclusion zone within a radius of 250m from the cable installation barge to be set up in the southeastern waters during the cable laying works in day-time hours.
- Ensure that the installation of the SJC2-HK Cable is conducted in a careful manner and that appropriate action is undertaken promptly in the event that impacts are identified to sensitive receivers and are found to be caused by the cable installation works.

F.2 Environmental Team

F.2.1 The Permit Holder shall engage an Environmental Team (ET) to implement the EM&A programme. The ET shall be led by an ET Leader who has at least 7 years of experience in EM&A or environmental management, and shall have suitably qualified staff included in the ET.

F.2.2 The ET and ET leader shall not be in any way an associated body of the Project Proponent, any of its contractors, or the Independent Environmental Checker (IEC)/Independent Consultant (EC).

F.2.3 The ET and ET leader shall implement the EM&A programme and shall comply with the Project's environmental performance requirements during cable installation. The ET shall:

- Carry out sampling, analysis and statistical evaluation of monitoring parameters
- Audit compliance with environmental protection, and pollution prevention and control regulations
- Monitor the implementation of environmental mitigation measures
- Monitor compliance with Conditions in the Environmental Permit
- Review the cable installation programme and comment, as necessary
- Review the construction methodology and comment, as necessary
- Prepare and update the EM&A works schedule with reference to the best available cable installation programme
- Investigate non-compliant events, evaluate and identify corrective measures
- Liaise with IEC/IC on all environmental performance matters
- Advise the Project Proponent and its contractors on environment improvement, awareness, enhancement matters, etc.
- Timely submission of the EM&A report to the IEC/IC for verification and thereafter to the EIAO Register Office, as required

F.3 Independent Environmental Checker/Independent Consultant

F.3.1 Prior to commencement of cable laying works, the Permit Holder shall engage an IEC/IC to advise on environmental issues related to the Project. The IEC/IC shall have at least 7 years of experience in EM&A or environmental management, and shall have suitably qualified staff included in the IEC/IC team.

F.3.2 The IEC/IC shall not be in any way an associated body of the Project Proponent or any of its contractors, or the ET.

F.3.3 The IEC/IC shall audit the overall EM&A programme including the implementation of all environmental mitigation measures, submissions relating to EM&A, and any other submission required under this Project Profile.

F.3.4 The main duty of the IEC/IC is to carry out environmental audit of the installation of the cable, including the following:

- Review and audit all aspects of the EM&A programme
- Validate and confirm the accuracy of any marine mammal monitoring that is carried out
- Audit the recommendations and requirements in Project Profile against the status of implementation of environmental protection measures on site
- Review the effectiveness of environmental mitigation measures and Project environmental performance
- On an as needed basis, audit the construction methodology of the Project Proponent and its contractor and agree the least impact alternative
- Investigate complaint cases and check the effectiveness of corrective measures
- Prepare a monthly report to the Authority (in letter format) summarising the above

F.4 Water Quality Monitoring

Parameters Measured

Baseline Monitoring and Impact Monitoring

F.4.1 The parameters to be measured in situ are:

- Dissolved oxygen (DO) (% saturation and mg/L)
- Temperature (°C)
- Turbidity (NTU)

F.4.2 The only parameters to be measured in the laboratory is:

- Suspended Solids (SS) (mg/L)

F.4.3 In addition to the water quality parameters, other relevant data shall also be measured and recorded in field logs, including the location of the sampling stations and cable burial tool at the time of sampling, water depth, time, weather conditions such as wind direction and speed, sea conditions, tidal state, special phenomena and work activities undertaken around the monitoring and works area that may influence the monitoring results.

Equipment

F.4.4 The following equipment shall be supplied by the ET and shall be approved by the IEC/IC:

- **Dissolved Oxygen and Temperature Measuring Equipment.** The instrument shall be a portable, weatherproof dissolved oxygen measuring instrument complete with cable, sensor, comprehensive operation manuals, and shall be operable from a DC power source. It

shall be capable of measuring: dissolved oxygen levels in the range of 0 – 20 mg/L and 0-200% saturation; and a temperature of 0-45°C. It shall have a membrane electrode with automatic temperature compensation complete with a cable of not less than 35m in length. Sufficient stocks of spare electrodes and cable shall be available for replacement where necessary (for example, YSI model 59 meter, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument).

- **Turbidity Measurement Equipment.** Turbidity should be measured from a split water sample from the SS sample. A turbidimeter should be used to measure the turbidity level in Nephelometric Turbidity Units (NTUs).
- **Water Depth Gauge.** No specific equipment is recommended for measuring the water depth. However, water depth gauge affixed to bottom of the water quality monitoring vessel is preferred.
- **Positioning Device.** A Global Positioning System (GPS) shall be used to ensure the accurate recording of the position of the monitoring vessel before taking measurements. The use of GPS is preferred for positioning device, which should be well calibrated at appropriate checkpoint (e.g. Quarry Bay Survey Nail).
- **Water Sampling Equipment.** A water sampler, consisting of a transparent PVC or glass cylinder of not less than 2L, which can be effectively sealed with cups at both ends, shall be used (Kahlsico Water Sampler 13SWB203 or an approved similar instrument). The water sampler shall have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth.

Sampling / Testing Protocols

F.4.5 All in situ monitoring instruments shall be checked, calibrated and certified before use by a laboratory accredited under HOKLAS or other international accreditation scheme. All in situ monitoring instruments shall be subsequently re-calibrated at-monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes shall be checked with certified standard solutions before each use.

F.4.6 For the on-site calibration of field equipment, the *BS 1427: 1993, Guide to Field and On-Site Test Methods for the Analysis of Waters* shall be observed. Sufficient stocks of spare parts shall be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can proceed uninterrupted even when equipment is under maintenance, calibration etc.

F.4.7 Water samples for SS measurements shall be collected in high density polythene bottles, packed in ice (cooled to 4°C without being frozen), and delivered to a HOKLAS laboratory as soon as possible after collection. At least two replicate samples should be collected from each of the monitoring events for in situ measurement and lab analysis.

Laboratory Analysis

F.4.8 All laboratory work shall be carried out in a HOKLAS accredited laboratory. Water samples of about 1L shall be collected at the monitoring and control stations for carrying out the laboratory determinations. The determination work shall start within the next working day after collection of the water samples. The laboratory measurements shall be provided within two days of the sampling event (48 hours).

F.4.9 The analyses shall follow the standard methods as described in *APHA Standard Methods for the Examination of Water and Wastewater, 19th Edition*, unless otherwise specified (APHA 2540D for SS). The submitted information should include pre-treatment procedures, instrument use, Quality Assurance/Quality Control (QA/QC) details (such as blank, spike recovery, number of duplicate samples per-batch, etc.), detection limits and accuracy. The QA/QC details shall be in accordance with requirements of HOKLAS.

Monitoring Locations

Baseline Monitoring and Impact Monitoring

F.4.10 Based on the findings of the water quality assessment in **Appendix A**, a total of six monitoring locations are proposed at Water Sensitive Receivers (WSRs) within 500m of the cable alignment.

F.4.11 Water quality sampling in these locations will be conducted prior to cable laying (Baseline Monitoring), during cable laying (Impact Monitoring) and, if needed, after cable laying (Post-Project Monitoring) to document any impact of the installation works on the WSRs.

F.4.12 The proposed sampling locations are as follows, and are also shown on **Figure F.1** (designations follow the WSR IDs in **Appendix A):**

- **B2** is a monitoring station to identify the impact of cable installation works on the St. Stephen's Bay Beach (representative location within 500m of the cable alignment)
- **C2** is a monitoring station to identify the impact of cable installation works on the coral communities along the southwest coast of Chung Hom Kok (representative location within 500m of the cable alignment)
- **C4/F1** is a monitoring station to identify the impact of cable installation works on the coral communities along the coast of Po Toi and Po Toi FCZ (representative location within 500m of the cable alignment)
- **F2** is a monitoring station to identify the impact of cable installation works on the Fish Spawning Grounds (representative location)
- **G1** is a Gradient Station between St. Stephen's Bay Beach and the proposed cable alignment
- **CS1** is a Control Station approximately 3 km from the proposed cable alignment for monitoring at both Zone A and Zone B, discussed in **Section F.4.17**.

F.4.13 Indicative co-ordinates of these monitoring stations are listed in **Table F.1.** Exact co-ordinates will be determined before commencement of Baseline Monitoring.

Table F.1: Co-ordinates of the Water Quality Monitoring Stations (HK Grid)

STATION	LOCATION	EASTING	NORTHING	CLOSEST DISTANCE FROM CABLE ALIGNMENT (m)
B2	St. Stephen's Bay Beach	839902	808259	580
C2	Coral Communities along Southwest Coast of Chung Hom Kok	838882	807959	920
C4/F1	Coral Communities along the Coast of Po Toi & Po Toi FCZ	843536	801809	C4: 1,020 F1: 1,420
F2	Fish Spawning Grounds	838774	807362	0
G1	Gradient Station	839695	808291	200
CS1	Control Station	837879	801901	3000

Frequency and Duration

Baseline Monitoring

F.4.14 Baseline monitoring shall be carried out for four weeks and shall commence no later than six weeks before the start of cable installation works. Two weeks prior to commencement of baseline monitoring, the ET shall propose a monitoring schedule to the IEC/IC for agreement and then shall submit the agreed schedule to EPD at least one week before baseline monitoring starts.

F.4.15 Monitoring shall be carried out three times each week and the interval between any two sets of monitoring shall not be less than 36 hours. For each set, monitoring shall be undertaken within a 4 hour window of 2 hours before and 2 hours after mid-flood and mid-ebb tides.

F.4.16 At each tide at each location, in situ measurement and samples shall be taken as follows:

- For stations with a water depth of 6m or greater, monitoring shall be carried out at three depths: 1m below sea surface; mid-depth; and 1m above the seabed.
- For stations with a water depth of between 3m and 6m, monitoring shall be carried out at two depths: 1m below the sea surface and 1m above the seabed.
- For stations with a water depth of less than 3m, monitoring shall be carried out at one depth: the mid-depth.

Impact Monitoring

F.4.17 Due to the length of the cable in Hong Kong waters, the impact monitoring stations are divided into two zones to effectively and efficiently monitor the water quality, as shown in **Figure F.1**. Monitoring shall be carried out section by section:

- **Zone A**. Monitoring at stations B2, C2, F2 and CS1 shall be conducted when the cable laying works are within the boundary of Zone A.
- **Zone B**. Monitoring at station CS1 and C4/F1 shall be conducted when cable laying works are within the boundary of Zone B.

F.4.18 Monitoring shall be required in the relevant Zone when cable laying works are being carried out in that Zone. Monitoring shall not be required when the cable-laying barge is outside Zones A or B, or when no cable laying works are conducted. Two weeks prior to the commencement of impact monitoring, the ET shall propose a monitoring schedule to the IEC/IC for agreement and then shall submit the agreed schedule to EPD at least one week before impact monitoring starts.

F.4.19 Monitoring shall be carried out three times each week and the interval between any two sets of monitoring shall not be less than 36 hours. For each set, monitoring shall be undertaken within a 4 hour window of 2 hours before and 2 hours after mid-flood and mid-ebb tides.

F.4.20 At each tide at each location, in situ measurement and samples shall be taken as follows:

- For stations with a water depth of 6m or greater, monitoring shall be carried out at three depths: 1m below sea surface; mid-depth; and 1m above the seabed.
- For stations with a water depth of between 3m and 6m, monitoring shall be carried out at two depths: 1m below the sea surface and 1m above the seabed.
- For stations with a water depth of less than 3m, monitoring shall be carried out at one depth: the mid-depth.

Post-Project Monitoring

F.4.21 The need for post-project monitoring shall be proposed by the ET Leader and shall be agreed by the IEC/IC. The need for post-project monitoring shall depend upon the results of the impact monitoring: Only if the results show consistent exceedances of Action and/or Limit Levels attributable to the Project shall post-project monitoring shall be carried out to demonstrate that environmental conditions have returned to pre-Project (i.e. baseline) values.

F.4.22 If needed, post-project monitoring at each of the six monitoring stations shall commence no later than three weeks after the end of cable installation works. The duration of post-Project monitoring shall be two weeks. Two weeks prior to the commencement of post-Project monitoring, the ET shall propose a monitoring schedule to the IEC/IC for agreement and then shall submit the agreed schedule to EPD at least one week before post-Project monitoring starts.

F.4.23 Monitoring shall be carried out three times each week and the interval between any two sets of monitoring shall not be less than 36 hours. For each set, monitoring shall be undertaken within a 4 hour window of 2 hours before and 2 hours after mid-flood and mid-ebb tides.

F.4.24 At each tide at each location, in situ measurement and samples shall be taken as follows:

- For stations with a water depth of 6m or greater, monitoring shall be carried out at three depths: 1m below sea surface; mid-depth; and 1m above the seabed.
- For stations with a water depth of between 3m and 6m, monitoring shall be carried out at two depths: 1m below the sea surface and 1m above the seabed.
- For stations with a water depth of less than 3m, monitoring shall be carried out at one depth: the mid-depth.

Action and Limit Levels and Event/Action Plan for Impact Monitoring

F.4.25 Impact monitoring results shall be evaluated against Action and Limit levels shown in **Table F.2**, below, with action being taken as per the Event/Action Plan shown in **Table F.3**. Please note that the Event/Action Plan relates only to exceedances that are directly attributable to the cable installation works, over which the installation contractor has control. The advice of the IEC/IC shall be sought in case of any concern.

Table F.2: Action and Limit Levels for Water Quality

PARAMETER	ACTION LEVEL	LIMIT LEVEL
DO in mg/L	Surface and Middle 5th percentile of baseline data for surface and middle layers Bottom 5th percentile of baseline data for bottom layer	Surface and Middle 5mg/L or 1st percentile of baseline for surface and middle layers Bottom 2mg/L or 1st percentile of baseline data for bottom layer
SS in mg/L (Depth-averaged)	95th percentile of baseline data, or 20% exceedance of value at any impact station compared with the control station	99th percentile of baseline data, or 30% exceedance of value at any impact station compared with the control station
Turbidity in NTU (Depth-averaged)	95th percentile of baseline data, or 20% exceedance of value at any impact station compared with corresponding data from the control station	99th percentile of baseline data, or 30% exceedance of value at any impact station compared with corresponding data from the control station

Table F.3: Event / Action Plan for Water Quality

EVENT	CONTRACTOR
Action Level Exceedance	1. Repeat sampling event. 2. Inform EPD and AFCD and confirm notification of the non-compliance in writing. 3. Discuss with cable installation contractor and the IEC/IC the most appropriate method of reducing suspended solids during cable installation and agree with EPD. 4. Repeat measurements after implementation of mitigation for confirmation of compliance. 5. If non-compliance continues, increase measures in Step 3 and repeat measurement in Step 4. If non-compliance occurs a third time, suspend cable laying operations and continue sampling until normal water quality resume.
Limit Level Exceedance	Suspend cable laying operations and undertake Steps 1-4 immediately. Cable laying should only continue when the water quality shows compliance again.

F.5 Coral Monitoring

F.5.1 Direct impact on coral communicates caused by cable laying works during construction and operation is not likely, as assessed in **Appendix B**. With reference to the survey of subtidal hard bottom assemblages carried out in 2018 for the HKA Cable, two common hard coral colonies were identified in the near shore area of SST. Given the proximity between the proposed cable alignment and coral colonies in the vicinity of the cable landing at SST, as a precautionary measure a Pre-installation Coral Survey and a Post-project Coral Survey are proposed.

Pre-installation Coral Survey

Objective

F.5.2 A Pre-installation Coral Survey shall be carried out within four weeks before the commencement of the cable installation works. The objective is to identify the locations of any corals in the near shore area of SST that are in proximity to the proposed cable alignment and to confirm that none will be directly impacted by cable installation works.

F.5.3 In the event that any corals will be directly impacted by the cable installation works, a *Coral Translocation Plan* will be prepared to identify which corals it may be possible to transplant. With the agreement of AFCD, corals shall be transplanted prior to cable installation.

Methodology

F.5.4 One subtidal spot dive survey shall be carried out over the following specified locations prior to the installation of the proposed cable. For each coral colony found, the following data should be recorded:

- GPS location
- Species identification to genus or species level, as far as practicable
- Size (e.g. maximum diameter) and health of identified corals (e.g. degree of sedimentation, partial mortality, sign of bleaching)
- Photographic record
- Survey date and time
- Underwater visibility
- Atmospheric, sea and tidal conditions

Location

F.5.5 The Pre-installation Coral Survey should be undertaken in the near shore area of SST in proximity to the proposed cable alignment, covering the area of 17 hard coral colonies of 7 species and 2 hard coral colonies of 2 species, as indicated on **Figure B.2**.

Post-project Coral Survey

Objective

F.5.6 A Post-project Coral Survey shall be carried out within four weeks after the end of cable installation works. The objective is to verify the corals identified during the Pre-installation Coral Survey have not be directly impacted as a result of the cable installation.

F.5.7 If any corals were translocated prior to installation works, then the Post-project Coral Survey shall also verify their status at their new location, and shall also address any requirements that may have been specified by AFCD in approving the *Coral Translocation Plan*.

Methodology

F.5.8 One subtidal spot dive survey shall be carried out over the following specified locations and coral colonies found during the pre-installation coral survey, within four weeks after the end of cable installation works. For each coral colony found, the following data should be recorded:

- GPS location
- Species identification to genus or species level, as far as practicable
- Size (e.g. maximum diameter) and health of identified corals (e.g. degree of sedimentation, partial mortality, sign of bleaching)
- Photographic record
- Survey date and time
- Underwater visibility
- Atmospheric, sea and tidal conditions.

Location

F.5.9 The Post-project Coral Survey survey should be undertaken at the same locations Pre-installation Coral Survey and, if applicable, at any locations where corals were translocated in accordance with the *Coral Translocation Plan*.

F.6 Marine Mammal Observation

F.6.1 Noise generated by cable laying works is not likely to have significant adverse impact on marine mammals, as assessed in **Appendix B**, since the noise level generated by the jetting works would fall below the hearing ranges of most marine mammals present in Hong Kong waters. As a precautionary measure, when cable laying is being carried out, a marine mammal exclusion zone will be implemented to mitigate and thereby minimize potential impacts on Finless Porpoises.

F.6.2 A marine mammal exclusion zone within a radius of 250m from the cable installation barge will be set up during the cable laying works in day-time hours along the section starting from southern end of Zone A up to the boundary of HKSAR waters, as shown in **Figure F.1**.

F.6.3 Marine mammal observation within the exclusion zone shall be undertaken by a qualified observer, to be engaged by the Project Proponent or Contractor, who shall be suitably trained to conduct the observation work, and whose curriculum vitae shall be provided to AFCD for their approval prior to the commencement of the observation.

F.6.4 Before the installation work starts, the Qualified Observer will stand on the open upper decks of the barge and scan the 250m exclusion zone for at least 30 minutes. The 250m radius of the exclusion zone is typically adopted on other recent underwater cable laying projects, including Hong Kong – Guam Submarine Cable Project (HK-G), Hong Kong-Americas (HKA) Submarine Cable – Chung Hom Kok, Pacific Light Cable Network (PLCN) – Deep Water Bay, Asia-Africa-Europe-1 Cable System (AAE-1) at Cape D'Aguilar, etc.

F.6.5 If cetaceans are observed in the exclusion zone, cable installation works shall be halted until they have left the area. This measure guarantees that the area in vicinity of the cable route is clear of marine mammals before the installation works start and thus could reduce potential disturbance to marine mammals.

F.7 Reporting

ET's Baseline Monitoring Report

F.7.1 Within two weeks of completion of baseline monitoring, a *Baseline Monitoring Report* shall be prepared by the ET. This shall include details of the monitoring carried out, such as location, weather conditions, parameters measured, monitoring results and discussion, etc. and any recommendations for subsequent monitoring.

F.7.2 The *Baseline Monitoring Report* shall be certified by the ET and verified by the IEC/IC, and thereafter submitted to the EIAO Register Office at least two weeks before start of cable installation. The Baseline Monitoring Report shall include the following:

- Brief project background information
- Drawings showing locations of the baseline monitoring stations
- An updated cable installation programme
- Monitoring results together with the information including monitoring methodology, parameters monitored, monitoring locations, monitoring date, time , frequency and duration
- Details on influencing factors, including major activities concerning the Project, if any, being carried out during the period, weather conditions during the period and other factors which might affect the results
- Determination of Action and Limit Levels for each monitoring parameter and statistical analysis of baseline data to determine if there is any significant difference between control and impact stations for the parameters monitored

ET's Monthly Impact Monitoring Report

F.7.3 During cable installation works, a *Monthly Impact Monitoring Report* shall be prepared by the ET detailing the EM&A carried out during that month. The *Monthly Impact Monitoring Report* shall be shall be certified by the ET and verified by the IEC/IC, and thereafter submitted to the EIAO Register Office within the first ten working days of the following month. The *Monthly Impact Monitoring Report* shall include the following:

- Basic project information.
- Summary of EM&A requirements.
- Operating practices of the cable burial tool during sampling and interpretation of monitoring results.
- Implementation status.
- Monitoring results together with the information including monitoring methodology, parameters monitored, monitoring locations, monitoring date, time, frequency and duration.
- Report on non-compliance, complaints, notifications of summons and successful prosecutions.

ET's Post-Project Monitoring Report (if needed)

F.7.4 The need for post-project monitoring shall be proposed by the ET Leader agreed by the IEC/IC depending upon the results of the impact monitoring. Only if the results show consistent exceedances of Action and/or Limit Levels attributable to the Project shall post-project monitoring shall be carried out to demonstrate that environmental conditions have returned to pre-Project (i.e. baseline) values after the completion of works. If post-Project monitoring is needed, within two weeks of completion of monitoring a *Post-Project Monitoring Report* shall be

prepared by the ET. The purpose of the *Post-Project Monitoring Report* is to review the environmental status after cable installation and compare with the results presented in the *Baseline Monitoring Report*. The *Post Project Monitoring Report* shall be certified by the ET and verified by the IEC/IC, and thereafter submitted to the EIAO Register Office. The *Post Project Monitoring Report* shall include the following:

- Basic project background information
- Drawings showing locations of the monitoring stations
- The actual cable installation programme
- Monitoring results together with the information including monitoring methodology, parameters monitored, monitoring locations, monitoring date, time, frequency and duration
- Review of environmental status upon completion of installation by comparison to the baseline monitoring
- Conclusion

IEC/IC's Monthly Report

F.7.5 At the same time that the ET's *Monthly Impact Monitoring Report* (and *Post-Project Monitoring Report*, if needed) is submitted, the IEC/IC shall submit a short report (in letter format) to the Authority summarising the results of the IEC/IC's audit and any other observations on the environmental performance of the Project.

Coral Monitoring Report

F.7.6 A *Pre-installation Coral Survey Report* shall be provided to AFCD and EPD no later than 2 weeks before the commencement of the cable installation works. The report shall include findings of the survey and recommend additional mitigation/precautionary measure(s) (e.g. coral translocation in a *Coral Translocation Plan*), if necessary.

F.7.7 A *Post-project Coral Survey Report* shall be provided to AFCD and EPD within one month after the completion of Post-project Coral Survey, presenting the results of the survey, comparison with the results of the Pre-installation Coral Survey, as well as discussion of any adverse direct impacts to the identified coral communities within and in the vicinity of the landing site area as a result of the cable installation work.

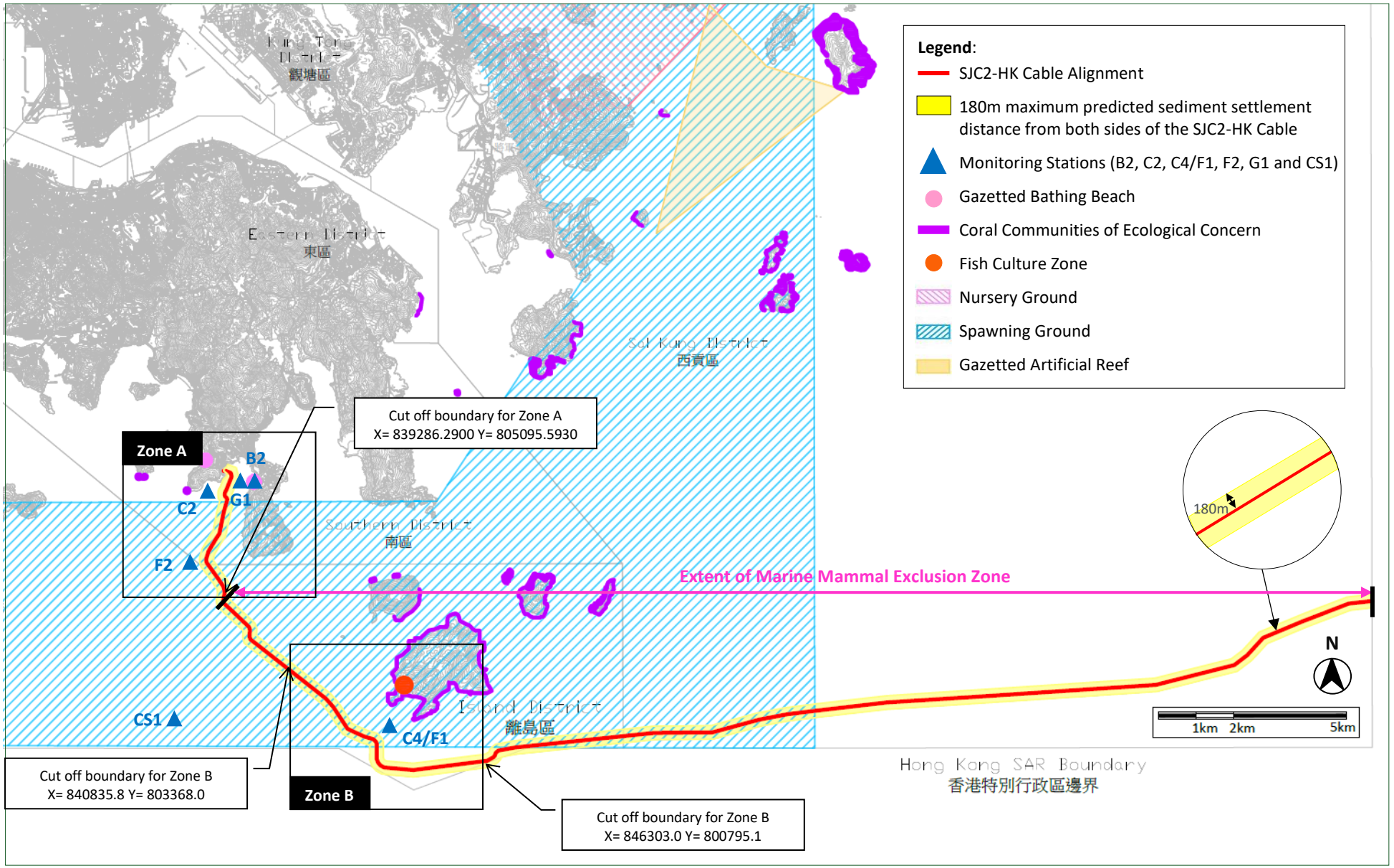
Weekly Marine Mammal Observation Report

F.7.8 In the event that marine mammal observation is carried out, the Qualified Observer shall keep a daily log of all sightings of marine mammals in an appropriate format, including the following:

- Sighting Number
- Mammal Group Size
- Beaufort Sea State
- Perpendicular Distance (in metres) from observation position (on boat) to mammal
- Latitude and Longitude of mammal sighted (WGS84 in Decimal)
- Boat Name
- Photographs of all mammals (dorsal fins) in each sighting

F.7.9 A *Weekly Marine Mammal Observation Report* shall be compiled from daily observations and submitted to the IEC/IC for verification before the end of the following week.

Figure F.1: Water Quality Monitoring Stations and Monitoring Zones



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