
East Asian Crossing (EAC) Cable System (TKO) – Segment C

Work Plan for Emergency Cable Repair Works

Project No.: 0374299

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Document history

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1. INTRODUCTION

The East Asian Crossing (EAC) Cable System (TKO) project, involving laying of two international fibre-optic telecommunication cables in Hong Kong Special Administrative Region (HKSAR) waters to a single landing site and manhole location in the Tseung Kwan O (TKO) Industrial estate, was issued with Environmental Permit (No. EP-81/2000) on 4 October 2000 as per Project Profile No. PP-101/2000. Subsequently, as per application for a Variation of Environmental Permit, VEP-568/2019 submitted on 14 October 2019, the Environmental Protection Department Permit granted an amendment of the EP to cable owner Telstra International Limited on 5 November 2019, as No. EP-081/2000/A.

EAC-1 Segment C (EAC1-C) has suffered a fault and needs emergency repair. A new Condition 3.1 now forms part of the Environmental Permit as detailed below:

For cable repair works of the Project which involves dredging operation, the Permit Holder shall, no later than 4 weeks before the commencement of cable repair works, deposit with the Director three hardcopies and one electronic copy of the work plan. The work plan shall include, but not limited to, the following information:

- i. The location(s) and alignment of cable repair works, the installation method and duration, work schedule, burial depth and trench width;
- ii. A review to confirm any coral communities and water sensitive receivers located less than 500m from cable repair works; and
- iii. Precautionary measures to avoid and minimize potential impact on coral communities and water sensitives receivers, and to minimize potential disturbance to marine mammals, in particular finless porpoise.

Following this Introduction in **Section 1**, this document is the Work Plan required under condition 3.1 detailed above and is set out to include:

- Section 2 - Details of the emergency cable repair works as required for Condition 3.1 (i)
- Section 3 - Details of the coral communities and water sensitive receivers less than 500m from the cable repair works as required for Condition 3.1 (ii)
- Section 4 - Details the precautionary measures during cable repair works as required for Condition 3.1 (iii)

2. DETAILS OF EMERGENCY CABLE REPAIR WORKS

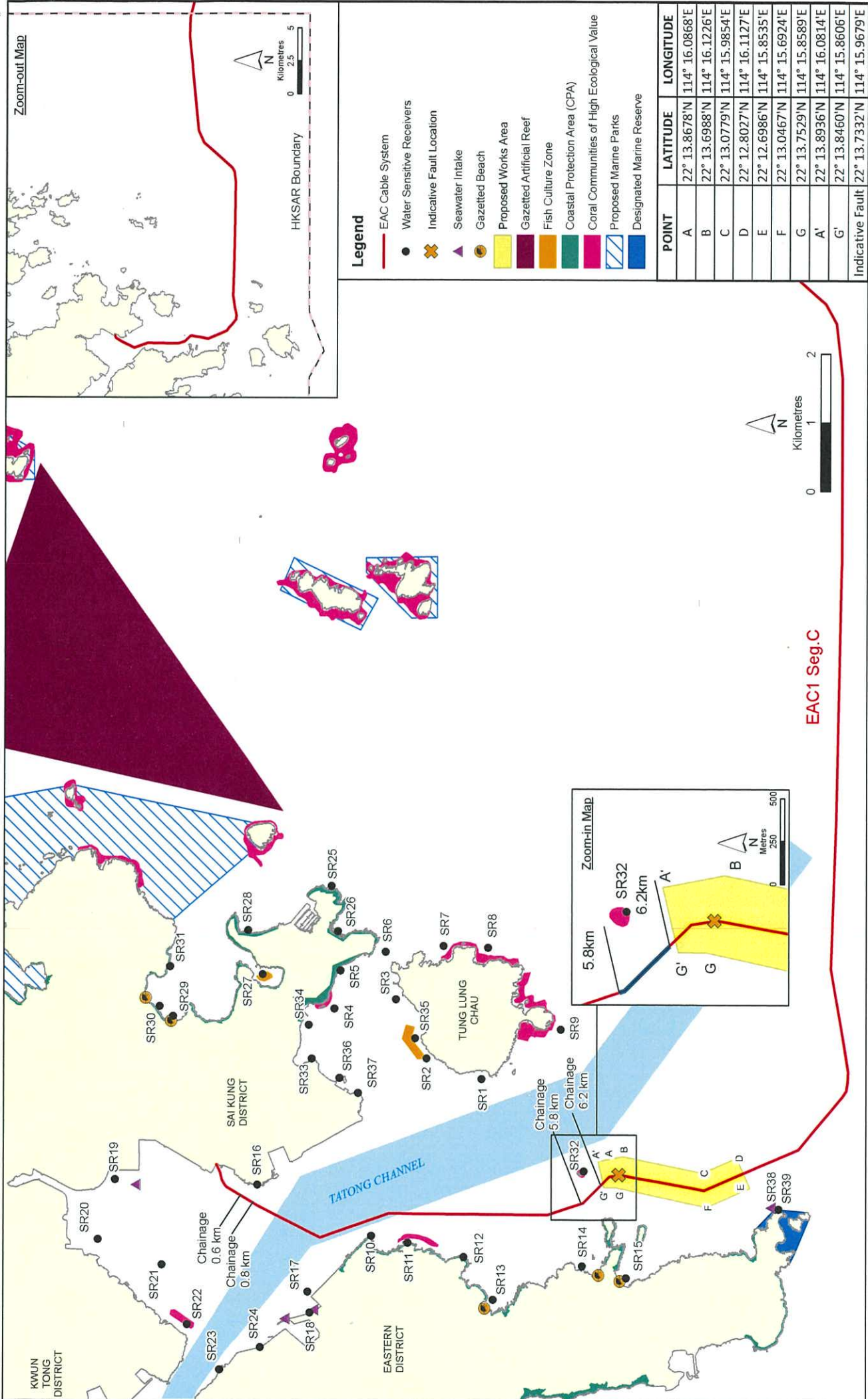
The proposed repair work in this Work Plan follows the work details in the VEP supporting document submitted to EPD in October 2019, which was approved by EPD in November 2019. This Work Plan reports the works for a specific fault cable section. Hence, the repair and installation methods are precise and site-specific, selecting only the relevant information from the general work details presented in the VEP supporting document.

To fulfil EP Condition 3.1 (i), **Table 1** below sets out the location and alignment of the proposed cable repair works, the repair installation method and duration, work schedule, burial depth and trench width.

Table 1 Details of Emergency Repair of EAC-C Segment 1 Cable

Item	Details of Emergency Repair of a Cable Fault along the EAC1 Segment C
1. Location and alignment	The indicative fault location is shown in Figure 1 , which also shows the extent of the possible Works Area. The estimated length of cable section in the Works Area is 2,015m with an estimated 750m that may need to be repaired.
2. Repair & Installation Method	<p>Below is a brief description of how the submarine repair works will be undertaken. One (1) Cable Vessel named 'Resolute' will be employed for the cable repair works.</p> <p>a) Terminal Testing: Testing from cable station terminal, to try and determine fault location as precisely as possible using optical or electrical characteristics of the submarine cable;</p> <p>b) Initial Inspection: Cable will be inspected (tone detection survey) using Remotely Operated Vehicle (ROV) from cable vessel 'Resolute', or divers where appropriate to determine the precise fault location and nature if unknown. If the cable is buried, tracking equipment will be used;</p> <p>c) Cut Faulty cable, Buoy off, Recover to vessel: If necessary to cut the cable at the fault area, either an ROV or cutting grapnel will be used, or if feasible, divers. ROV uses jetting technique to uncover buried cable. Grapnels penetrate the seabed without jetting to pick up the cable. The cable ends will be recovered to the vessel, using diver, ROV and/ or gripper grapnel. 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.</p> <p>d) Cable Splice and Repair: 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.</p> <p>e) Replacement of Repaired Cable: Once the cable has been fully repaired and connected, it will be lowered onto the seabed, along the 'as-laid' cable route. Any protective measures, such as articulated piping, URADUCT® or other means would be added to the cable prior to re-laying. Once the repaired cable is in the 'as-laid' cable route alignment, a diver and/ or ROV will perform an inspection of the repair area, including determining the beginning and ending of unburied cable.</p> <p>f) Post Repair Inspection and Burial (PRIB): Should burial at the repair area be necessary, it will be carried out to best endeavour or pre-determined target depth, using diver and/ or ROV jetting. If</p>

Item	Details of Emergency Repair of a Cable Fault along the EAC1 Segment C
3. Duration	burial is not possible, other means of protection may be considered such as articulated piping, URADUCT® or other means. Once completed one final diver and/ or ROV inspection will be carried out before repair works are completed. The expected duration is 9 days after commencement, based on operating on a 24 hour per day basis (Construction Noise Permit already received on 1 November 2019)
4. Work Schedule	Intended Programme of Works: Day 0: Arrive Hong Kong, Clear in Day 1: Arrive Cable Ground Days 2-7: Steps 2. a) – e) of Repair & Installation Method above Days 7-8: Step 2. f) of Repair & Installation Method above By Day 9: Completion of Repair Works
5. Burial Depth	Target burial depth is 1.5m
6. Trench Width	The jetting width will be approximately 100 mm



Legend

- EAC Cable System
- Water Sensitive Receivers
- ✕ Indicative Fault Location
- ▲ Seawater Intake
- Gazetted Beach
- Proposed Works Area
- Gazetted Artificial Reef
- Fish Culture Zone
- Coastal Protection Area (CPA)
- Coral Communities of High Ecological Value
- ▨ Proposed Marine Parks
- Designated Marine Reserve

POINT	LATITUDE	LONGITUDE
A	22° 13.8678'N	114° 16.0868'E
B	22° 13.6988'N	114° 16.1226'E
C	22° 13.0779'N	114° 15.9854'E
D	22° 12.8027'N	114° 16.1127'E
E	22° 12.6986'N	114° 15.8535'E
F	22° 13.0467'N	114° 15.6924'E
G	22° 13.7529'N	114° 15.8589'E
A'	22° 13.8936'N	114° 16.0814'E
G'	22° 13.8460'N	114° 15.8606'E

Indicative Fault: 22° 13.7332'N 114° 15.9679'E

EAC1 Seg.C



Environmental Resources Management

Identified Major Water Sensitive Receivers near the EAC Cable Alignment

Figure 1

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Date: 21/1/2020

3. REVIEW OF CORAL COMMUNITIES AND WATER SENSITIVE RECEIVERS

This section provides a review to confirm whether any coral communities and water sensitive receivers (WSRs) are located less than 500m from cable repair works.

As is evident in **Figure 1**, most of the WSRs identified for this Project, are far from the cable fault and works area. **Table 2** sets out the closest approximate geodetic distance between the WSRs that are in the vicinity, including coral communities, and the EAC1-Seg.C cable repair works area, as well as the geodesic distance to the cable alignment within the cable repair works area. It shows that only the coral community at Tai Long Pai (SR32) is located less than 500m away from the cable alignment within the cable repair works area, while both Tai Long Pai (SR32) and the Swire Institute of Marine Science (Seawater Intake) (SR38) are located less than 500m away from the cable repair works boundary.

Table 2 Distance between EAC-1 Segment Cable Repair Works Area and Identified Coral Communities and Other Water Sensitive Receivers

ID	Water Sensitive Receivers (Nature)	Approximate Geodesic Distance [^] to EAC1-Seg C Cable Alignment (m)	Approximate Geodesic Distance [^] to EAC1 Seg C Cable Repair Works Area (m)
SR1	Tung Lung Chau (Coral Community)	2,330	2,070
SR9	Tung Lung Chau (Coral Community)	2,550	2,000
SR10	Cape Collinson (Coastal Protection Area)	3,590	3,460
SR11	Cape Collinson (Coastal Protection Area)	3,095	2,970
SR12	Cape Collinson (Coral Community)	2,430	2,270
SR13	Big Wave Bay (Gazetted Bathing Beach & Coastal Protection Area)	2,470	2,300
SR14	Rocky Bay (Gazetted Bathing Beach)	1,360	1,190
SR15	Shek O (Gazetted Bathing Beach)	1,500	1,240
SR32	Tai Long Pai (Coral Community)	390	240
SR38	Swire Institute of Marine Science (Seawater Intake)	660	410
SR39	Cape d'Aguilar (Marine Reserve)	740	520

Note: [^] Geodesic distance refers to the shortest straight-line distance between two locations, without regard on the physical obstacles in between.

As per VEP-568/2019, sediments disturbed during cable laying works are expected to settle onto the seabed within approximately 180 m of the cable alignment. Other underwater works for cable repair works as described in **Section 2** above will have limited or no contact / disturbance to the seabed. It is expected such works would not result in potential sediment loss exceeding that of the jetting for recovering and reburial/ laying of the cable.

All WSRs are located beyond this predicted maximum 180m distance. It is expected that the suspended solids in the water column will be back to background level before reaching any WSRs. No significant elevation is therefore expected at WSRs and hence no unacceptable change in water quality is expected at WSRs, or would be expected from the jetting associated with the uncovering and reburial of cable during cable repair works.

No unacceptable water quality impact is therefore expected at coral communities or other WSRs due to the cable repair works.

4. PRECAUTIONARY MEASURES

The cable alignment within the whole cable repair works area runs from chainage 6.25 to chainage 8.39. This is further than 500m from any Coastal Protection Area (CPA) or other WSRs except the alignment is within 500m of coral communities at Tai Long Pai (SR32) and the works area is within 500m of the seawater intake for Swire Institute of Marine Science (SR38). It is noted that mobile silt curtains located 60 m away from cable alignment (repair area) shall be deployed and maintained during cable reparation works near Tai Long Pai (SR32) if between chainage 0.6 km to Ch. 0.8 km or between chainage 5.8 km to Ch. 6.2 km on Segment C. Since the current cable repair works area starts at chainage 6.25 km, this falls outside the cable alignment where mobile silt curtains would be required on Segment C (see **Figure 1**), and this measure is therefore not included.

The following **precautionary measures** are considered appropriate to implement during the cable repair works.

- To minimize water quality impact and to safeguard the coral communities at Tai Long Pai (SR32):
 1. the speed of the cable repair vessel for cable repair works shall be restricted to a maximum of no more than 500 meters per hour.
- To minimize potential disturbance to marine mammals, in particular finless porpoise, and based on the Monitoring Of Marine Mammals In Hong Kong Waters Report (2018-19):
 - A marine mammal exclusion zone within a 250 m radius from the cable repair vessel shall be implemented in daylight hours during the cable repair works.
 - The marine mammal exclusion zone will be monitored by qualified observer(s) ⁽¹⁾ with an unobstructed, elevated view of the area. The view will be undertaken from the cable repair vessel.
 - The qualified observer(s) will stand on the open upper decks of the vessel, allowing for observer eye heights of around 4 m above water level and relatively unobstructed 180° visibility. Vessel-based observation by the observer(s) shall be conducted by searching a 180° swath where the repair works are being conducted at the centre, with appropriate marine binoculars, scanning the same area with the naked eyes and occasional binocular check.
 - The qualified observer(s) will scan the 250 m exclusion zone for at least 30 minutes prior to the start of cable repair works and during repair works in daylight hours.
 - No cable installation works shall be carried out until the marine mammal exclusion zone is confirmed by the qualified observer(s) as clear of marine mammal(s) for a period of 30 minutes continuously.
 - During cable installation, if marine mammals are spotted within the exclusion zone, cable installation works will cease and will not resume until the observer confirms that the zone has been continuously clear of marine mammals for a period of 30 minutes.

(1) The qualification and experience of the qualified observer(s) shall be to the satisfaction of the Director of Agriculture, Fisheries and Conservation (DAFC). The qualified observer(s) for the marine mammal monitoring must be suitably trained to conduct the visual monitoring works. CVs of the qualified observer(s) should be provided to the DAFC prior to commencement of the repair works.