

This document is received on 26 MAY 2026.
The Town Planning Board will formally acknowledge
the date of receipt of the application only upon receipt
of all the required information and documents.

e-form No. S16-III
電子表格第 S16-III 號

**APPLICATION FOR PERMISSION
UNDER SECTION 16 OF
THE TOWN PLANNING ORDINANCE
(CAP. 131)**

根據《城市規劃條例》(第131章)
第16條遞交的許可申請

**Applicable to Proposal Only Involving Temporary Use/Development of
Land and/or Building Not Exceeding 3 Years in Rural Areas or Regulated
Areas, or Renewal of Permission for such Temporary Use or Development***

**適用於祇涉及位於鄉郊地區或受規管地區土地上及/或建築物內進行
為期不超過三年的臨時用途/發展或該等臨時用途/發展的許可續期的建議***

**Form No. S16-I should be used for other Temporary Use/Development of Land and/or Building (e.g. temporary use/developments in the Urban Area) and Renewal of Permission for such Temporary Use or Development.*

**其他土地上及/或建築物內的臨時用途/發展(例如位於市區內的臨時用途或發展)及有關該等臨時用途/發展的許可續期，應使用表格第S16-I號。*

Applicant who would like to publish the notice of application in local newspapers to meet one of the Town Planning Board's requirements of taking reasonable steps to obtain consent of or give notification to the current land owner, please refer to the following link regarding publishing the notice in the designated newspapers:
https://www.tpb.gov.hk/en/plan_application/apply.html

申請人如欲在本地報章刊登申請通知，以採取城市規劃委員會就取得現行土地擁有人的同意或通知現行土地擁有人所指定的其中一項合理步驟，請瀏覽以下網址有關在指定的報章刊登通知：
https://www.tpb.gov.hk/tc/plan_application/apply.html

General Note and Annotation for the Form

填寫表格的一般指引及註解

"Current land owner" means any person whose name is registered in the Land Registry as that of an owner of the land to which the application relates, as at 6 weeks before the application is made

「現行土地擁有人」指在提出申請前六星期，其姓名或名稱已在土地註冊處註冊為該申請所關乎的土地的擁有人的人

& Please attach documentary proof 請夾附證明文件

^ Please insert number where appropriate 請在適當地方註明編號

Please fill "NA" for inapplicable item 請在不適用的項目填寫「不適用」

Please use separate sheets if the space provided is insufficient 如所提供的空間不足，請另頁說明

Please insert a 「✓」 at the appropriate box 請在適當的方格內上加上「✓」號

20260519 DOA
(2601256)

19/5

Gpass

For Official Use Only 請勿填寫此欄	Application No. 申請編號	A/I-TOF/19
	Date Received 收到日期	26 MAY 2026

- The completed form and supporting documents (if any) should be sent to the Secretary, Town Planning Board (the Board), 15/F, North Point Government Offices, 333 Java Road, North Point, Hong Kong.
申請人須把填妥的申請表格及其他支持申請的文件 (倘有), 送交香港北角渣華道 333 號北角政府合署 15 樓城市規劃委員會 (下稱「委員會」) 秘書收。
- Please read the "Guidance Notes" carefully before you fill in this form. The document can be downloaded from the Board's website at <http://www.tpb.gov.hk/>. It can also be obtained from the Secretariat of the Board at 15/F, North Point Government Offices, 333 Java Road, North Point, Hong Kong (Tel: 2231 4810 or 2231 4835), and the Planning Enquiry Counters of the Planning Department (Hotline: 2231 5000) (17/F, North Point Government Offices, 333 Java Road, North Point, Hong Kong and 14/F, Sha Tin Government Offices, 1 Sheung Wo Che Road, Sha Tin, New Territories).
請先細閱《申請須知》的資料單張, 然後填寫此表格。該份文件可從委員會的網頁下載 (網址: <http://www.tpb.gov.hk/>), 亦可向委員會秘書處 (香港北角渣華道 333 號北角政府合署 15 樓 - 電話: 2231 4810 或 2231 4835) 及規劃署的規劃資料查詢處 (熱線: 2231 5000) (香港北角渣華道 333 號北角政府合署 17 樓及新界沙田上禾輦路 1 號沙田政府合署 14 樓) 索取。
- This form can be downloaded from the Board's website, and obtained from the Secretariat of the Board and the Planning Enquiry Counters of the Planning Department. The form should be typed or completed in block letters. The processing of the application may be refused if the required information or the required copies are incomplete.
此表格可從委員會的網頁下載, 亦可向委員會秘書處及規劃署的規劃資料查詢處索取。申請人須以打印方式或以正楷填寫表格。如果申請人所提交的資料或文件副本不齊全, 委員會可拒絕處理有關申請。

1. Name of Applicant 申請人姓名/名稱

The Hong Kong Polytechnic University (Organisation 機構)

2. Name of Authorised Agent (if applicable) 獲授權代理人姓名/名稱 (如適用)

Alessandro Stocchino (Mr. 先生)

3. Application Site 申請地點

(a) Full address / location / demarcation district and lot number (if applicable) 詳細地址/地點/丈量約份及地段號碼 (如適用)	a. Tai O - Imhoff Wastewater Treatment T9-SW-18C b. Tai O - Old Pier T9-SW-22B Government Land in D.D. 302L, Tai O, Lantau Island
(b) Site area and/or gross floor area involved 涉及的地盤面積及/或總樓面面積	☒ Site area 地盤面積 31.86 sq.m 平方米 ☒ About 約 ☐ Gross floor area 總樓面面積 sq.m 平方米 ☐ About 約
(c) Area of Government land included (if any) 所包括的政府土地面積 (倘有)	31.86 sq.m 平方米 ☒ About 約

(d) Name and number of the related statutory plan(s) 有關法定圖則的名稱及編號	a. Approved Tai O Fringe Outline Zoning Plan No. S/I-TOF/2 b. Approved Tai O Town Centre Outline Zoning Plan No. S/I-TOTC/2 and S/ITOF/2
(e) Land use zone(s) involved 涉及的土地用途地帶	a. CPA and OU(STW) b. GB (TOTC) and CPA (TOF)
(f) Current use(s) 現時用途	Not accessible areas (If there are any Government, institution or community facilities, please illustrate on plan and specify the use and gross floor area) (如有任何政府、機構或社區設施，請在圖則上顯示，並註明用途及總樓面面積)
(g) Additional Information (if applicable) 附加資料（如適用）	

4. "Current Land Owner" of Application Site 申請地點的「現行土地擁有人」

The applicant 申請人 –

- ☐ is the sole "current land owner" #& (please proceed to Part 6 and attach documentary proof of ownership).
是唯一的「現行土地擁有人」 #& (請繼續填寫第 6 部分，並夾附業權證明文件)。
- ☐ is one of the "current land owners" #& (please attach documentary proof of ownership).
是其中一名「現行土地擁有人」 #& (請夾附業權證明文件)。
- ☐ is not a "current land owner" #.
並不是「現行土地擁有人」 #。

- ☒ The application site is entirely on Government land (please proceed to Part 6).
申請地點完全位於政府土地上（請繼續填寫第 6 部分）。

5. Statement on Owner's Consent/Notification**就土地擁有人的同意/通知土地擁有人的陳述**

- (a) According to the record(s) of the Land Registry as at (DD/MM/YYYY), this application involves a total of "current land owner(s)"#.

根據土地註冊處截至 (日/月/年) 的記錄，這宗申請共牽涉 名「現行土地擁有人」#。

- (b) The applicant 申請人 –

- ☐ has obtained consent(s) of "current land owner(s)"#.

已取得 名「現行土地擁有人」#的同意。

Details of consent of "current land owner(s)"# obtained 取得「現行土地擁有人」#同意的詳情		
No. of 'Current Land Owner(s)' 「現行土地擁有人」數目	Lot number/address of premises as shown in the record of the Land Registry where consent(s) has/have been obtained 根據土地註冊處記錄已獲得同意的地段號碼／處所地址	Date of consent obtained (DD/MM/YYYY) 取得同意的日期 (日/月/年)

(Please use separate sheets if the space of any box above is insufficient. 如上列任何方格的空間不足，請另頁說明)

- ☐ has notified "current land owner(s)"#

已通知 名「現行土地擁有人」#。

Details of the "current land owner(s)"# notified 已獲通知「現行土地擁有人」#的詳細資料		
No. of 'Current Land Owner(s)' 「現行土地擁有人」數目	Lot number/address of premises as shown in the record of the Land Registry where notification(s) has/have been given 根據土地註冊處記錄已發出通知的地段號碼／處所地址	Date of notification given (DD/MM/YYYY) 通知日期(日/月/年)

(Please use separate sheets if the space of any box above is insufficient. 如上列任何方格的空間不足，請另頁說明)

- ☐ has taken reasonable steps to obtain consent of or give notification to owner(s):
已採取合理步驟以取得土地擁有人的同意或向該人發給通知。詳情如下：

Reasonable Steps to Obtain Consent of Owner(s) 取得土地擁有人的同意所採取的合理步驟

- ☐ sent request for consent to the "current land owner(s)"[#] on _____ (DD/MM/YYYY)
於 _____ (日/月/年)向每一名「現行土地擁有人」[#]郵遞要求同意書[&]

Reasonable Steps to Give Notification to Owner(s) 向土地擁有人發出通知所採取的合理步驟

- ☐ published notices in local newspapers[&] on _____ (DD/MM/YYYY)
於 _____ (日/月/年)在指定報章就申請刊登一次通知[&]
- ☐ posted notice in a prominent position on or near application site/premises[&] on _____ (DD/MM/YYYY)
於 _____ (日/月/年)在申請地點／申請處所或附近的顯明位置貼出關於該申請的通知[&]
- ☐ sent notice to relevant owners' corporation(s)/owners' committee(s)/mutual aid committee(s)/management office(s) or rural committee[&] on _____ (DD/MM/YYYY)
於 _____ (日/月/年)把通知寄往相關的業主立案法團/業主委員會/互助委員會或管理處，或有關的鄉事委員會[&]

Others 其他

- ☐ others (please specify)
其他（請指明）

Note: May insert more than one 「✓」.

Information should be provided on the basis of each and every lot (if applicable) and premises (if any) in respect of the application.

註：可在多於一個方格內加上「✓」號

申請人須就申請涉及的每一地段（倘適用）及處所（倘有）分別提供資料

6. Type(s) of Application 申請類別

(A) Temporary Use/Development of Land and/or Building Not Exceeding 3 Years in Rural Areas or Regulated Areas

位於鄉郊地區或受規管地區土地上及/或建築物內進行為期不超過三年的臨時用途/發展

(For Renewal of Permission for Temporary Use or Development in Rural Areas or Regulated Areas, please proceed to Part (B)).

(如屬位於鄉郊地區或受規管地區臨時用途/發展的規劃許可續期，請填寫(B)部分)

(a) Proposed use(s)/development
擬議用途/發展

Proposed Temporary Radar Installation for Coastal monitoring and data acquisition (Coastal High Frequency Radar Network) with Ancillary Facility for a period of 3 years

(Please illustrate the details of the proposal on a layout plan) (請用平面圖說明擬議詳情)

(b) Effective period of permission applied for
申請的許可有效期

☒ year(s) 年 3

☐ month(s) 個月

(c) Development Schedule 發展細節表		
Proposed uncovered land area 擬議露天土地面積	 sq.m	☐ About 約
Proposed covered land area 擬議有上蓋土地面積	 sq.m	☐ About 約
Proposed number of buildings/structures 擬議建築物／構築物數目	.....	
Proposed domestic floor area 擬議住用樓面面積	 sq.m	☐ About 約
Proposed non-domestic floor area 擬議非住用樓面面積	31.86 sq.m	☒ About 約
Proposed gross floor area 擬議總樓面面積	 sq.m	☐ About 約
Proposed height and use(s) of different floors of buildings/structures (if applicable) 建築物/構築物的擬議高度及不同樓層的擬議用途 (如適用) (Please use separate sheets if the space below is insufficient) (如以下空間不足，請另頁說明)		
14 antennas (W x L x H): 0.25 x 0.25 x 2m each (total 0.875 sq.m)		
14 antennas (W x L x H): 0.3 x 0.3 x 2m each (total 1.26 sq.m)		
1 serve room (W x L x H): 1.2 x 1.2 x 2m (total 1.44 sq.m)		
area covered by the cables (28.30 sq.m)		
Proposed number of car parking spaces by types 不同種類停車位的擬議數目		
Private Car Parking Spaces 私家車車位	.....	
Motorcycle Parking Spaces 電單車車位	.....	
Light Goods Vehicle Parking Spaces 輕型貨車泊車位	.....	
Medium Goods Vehicle Parking Spaces 中型貨車泊車位	.....	
Heavy Goods Vehicle Parking Spaces 重型貨車泊車位	.....	
Others (Please Specify) 其他 (請列明)	.....	
Proposed number of loading/unloading spaces 上落客貨車位的擬議數目		
Taxi Spaces 的士車位	.....	
Coach Spaces 旅遊巴車位	.....	
Light Goods Vehicle Spaces 輕型貨車車位	.....	
Medium Goods Vehicle Spaces 中型貨車車位	.....	
Heavy Goods Vehicle Spaces 重型貨車車位	.....	
Others (Please Specify) 其他 (請列明)	.....	
Proposed operating hours 擬議營運時間		
(d) Any vehicular access to the site/subject building? 是否有車路通往地盤／有關建築物？	Yes 是	☒ There is an existing access. (please indicate the street name, where appropriate) 有一條現有車路。(請註明車路名稱(如適用)) <u>a. Kat Hing Back St.</u> <u>b. Shek Tsai Po St</u>
☐ There is a proposed access. (please illustrate on plan and specify the width) 有一條擬議車路。(請在圖則顯示，並註明車路的闊度)		

		No 否	☐																														
(e) Impacts of Development Proposal 擬議發展計劃的影響 (If necessary, please use separate sheets to indicate the proposed measures to minimise possible adverse impacts or give justifications/reasons for not providing such measures. 如需要的話，請另頁註明可盡量減少可能出現不良影響的措施，否則請提供理據/理由。)																																	
(i) Does the development proposal involve alteration of existing building? 擬議發展計劃是否包括現有建築物的改動?	Yes 是 ☐ Please provide details 請提供詳情 No 否 ☒																																
(ii) Does the development proposal involve the operation on the right? 擬議發展是否涉及右列的工程?	Yes 是 No 否 ☐	☒ (Please indicate on site plan the boundary of concerned land/pond(s), and particulars of stream diversion, the extent of filling of land/pond(s) and/or excavation of land) (請用地盤平面圖顯示有關土地/池塘界線，以及河道改道、填塘、填土及/或挖土的細節及/或範圍) ☐ Diversion of stream 河道改道 ☐ Filling of pond 填塘 Area of filling 填塘面積 _____ sq.m 平方米 ☐ About 約 Depth of filling 填塘深度 _____ m 米 ☐ About 約 ☐ Filling of land 填土 Area of filling 填土面積 _____ sq.m 平方米 ☐ About 約 Depth of filling 填土厚度 _____ m 米 ☐ About 約 ☒ Excavation of land 挖土 Area of excavation 挖土面積 0.23 _____ sq.m 平方米 ☒ About 約 Depth of excavation 挖土深度 0.1 _____ m 米 ☒ About 約																															
(iii) Would the development proposal cause any adverse impacts? 擬議發展計劃會否造成不良影響?	<table border="0"> <tr> <td>On environment 對環境</td> <td>Yes 會 ☐</td> <td>No 不會 ☒</td> </tr> <tr> <td>On traffic 對交通</td> <td>Yes 會 ☐</td> <td>No 不會 ☒</td> </tr> <tr> <td>On water supply 對供水</td> <td>Yes 會 ☐</td> <td>No 不會 ☒</td> </tr> <tr> <td>On drainage 對排水</td> <td>Yes 會 ☐</td> <td>No 不會 ☒</td> </tr> <tr> <td>On slopes 對斜坡</td> <td>Yes 會 ☐</td> <td>No 不會 ☒</td> </tr> <tr> <td>Affected by slopes 受斜坡影響</td> <td>Yes 會 ☐</td> <td>No 不會 ☒</td> </tr> <tr> <td>Landscape Impact 構成景觀影響</td> <td>Yes 會 ☒</td> <td>No 不會 ☐</td> </tr> <tr> <td>Tree Felling 砍伐樹木</td> <td>Yes 會 ☐</td> <td>No 不會 ☒</td> </tr> <tr> <td>Visual Impact 構成視覺影響</td> <td>Yes 會 ☐</td> <td>No 不會 ☒</td> </tr> <tr> <td>Others (Please Specify) 其他 (請列明)</td> <td>Yes 會 ☐</td> <td>No 不會 ☐</td> </tr> </table>			On environment 對環境	Yes 會 ☐	No 不會 ☒	On traffic 對交通	Yes 會 ☐	No 不會 ☒	On water supply 對供水	Yes 會 ☐	No 不會 ☒	On drainage 對排水	Yes 會 ☐	No 不會 ☒	On slopes 對斜坡	Yes 會 ☐	No 不會 ☒	Affected by slopes 受斜坡影響	Yes 會 ☐	No 不會 ☒	Landscape Impact 構成景觀影響	Yes 會 ☒	No 不會 ☐	Tree Felling 砍伐樹木	Yes 會 ☐	No 不會 ☒	Visual Impact 構成視覺影響	Yes 會 ☐	No 不會 ☒	Others (Please Specify) 其他 (請列明)	Yes 會 ☐	No 不會 ☐
On environment 對環境	Yes 會 ☐	No 不會 ☒																															
On traffic 對交通	Yes 會 ☐	No 不會 ☒																															
On water supply 對供水	Yes 會 ☐	No 不會 ☒																															
On drainage 對排水	Yes 會 ☐	No 不會 ☒																															
On slopes 對斜坡	Yes 會 ☐	No 不會 ☒																															
Affected by slopes 受斜坡影響	Yes 會 ☐	No 不會 ☒																															
Landscape Impact 構成景觀影響	Yes 會 ☒	No 不會 ☐																															
Tree Felling 砍伐樹木	Yes 會 ☐	No 不會 ☒																															
Visual Impact 構成視覺影響	Yes 會 ☐	No 不會 ☒																															
Others (Please Specify) 其他 (請列明)	Yes 會 ☐	No 不會 ☐																															

	Please state measure(s) to minimise the impact(s). For tree felling, please state the number, diameter at breast height and species of the affected trees (if possible) 請註明盡量減少影響的措施。如涉及砍伐樹木，請說明受影響樹木的數目、及胸高度的樹幹直徑及品種(倘可) <u>specific landscape impact mitigation measure will be adopted, such as color coating of the antennas and of the small portable cabin similar to the surroundings. More details are provided in the attached document</u>
--	---

(B) Renewal of Permission for Temporary Use or Development in Rural Areas or Regulated Areas 位於鄉郊地區或受規管地區臨時用途/發展的許可續期	
(a) Application number to which the permission relates 與許可有關的申請編號	A/ /
(b) Date of approval 獲批給許可的日期	 (DD 日/MM 月/YYYY 年)
(c) Date of expiry 許可屆滿日期	 (DD 日/MM 月/YYYY 年)
(d) Approved use/development 已批給許可的用途/發展	

(e) Approval conditions 附帶條件	☐ The permission does not have any approval condition 許可並沒有任何附帶條件 ☐ Applicant has complied with all the approval conditions 申請人已履行全部附帶條件 ☐ Applicant has not yet complied with the following approval condition(s): 申請人仍未履行下列附帶條件： Reason(s) for non-compliance: 仍未履行的原因： (Please use separate sheets if the space above is insufficient) (如以上空間不足，請另頁說明)
(f) Renewal period sought 要求的續期期間	☐ year(s) 年 ☐ month(s) 個月

7. Justifications 理由

The applicant is invited to provide justifications in support of the application. Use separate sheets if necessary.
現請申請人提供申請理由及支持其申請的資料。如有需要，請另頁說明）。

This application seeks permission for the temporary use of land to deploy a local High-Frequency Radar (HFR) network. This network is designed to monitor the sea conditions in two key areas of Hong Kong waters: the Central Waters and the exit of the Pearl River Estuary.

The radar network is funded by a grant from the Research Grants Council of Hong Kong. (Proj. No. C5032-22EF).

This application should be considered as a non-standard application for two main reasons: first, the area of land required is minimal and is strictly limited to the footprint necessary for the installation of essential equipment; second, the purpose of the land use is non-profit and serves the public interest by contributing to enhanced coastal resilience and public safety.

The critical importance of this initiative has been recognized and endorsed by the Development Bureau and other relevant Departments (CEDD, HKO, DSD). The present initiative is aligned with the Hong Kong SAR Government's broader strategic policies, particularly the Climate Action Plan 2050.

8. Declaration 聲明

I hereby declare that the particulars given in this application are correct and true to the best of my knowledge and belief.
本人謹此聲明，本人就這宗申請提交的資料，據本人所知及所信，均屬真實無誤。

I hereby grant a permission to the Board to copy all the materials submitted in this application and/or to upload such materials to the Board's website for browsing and downloading by the public free-of-charge at the Board's discretion. 本人現准許委員會酌情將本人就此申請所提交的所有資料複製及/或上載至委員會網站，供公眾免費瀏覽或下載。

Signature
簽署

Signed with recognised
e-signature
Signer: Alessandro Stocchino

☐ Applicant 申請人 / ☒ Authorised Agent 獲授權代理人

Name
姓名

Position (if applicable)
職位 (如適用)

Professional Qualification(s) ☐ Member 會員 / ☐ Fellow of 資深會員
專業資格

☐ HKIP 香港規劃師學會 / ☐ HKIA 香港建築師學會 /
☐ HKIS 香港測量師學會 / ☐ HKIE 香港工程師學會 /
☐ HKILA 香港園境師學會 / ☐ HKIUD 香港城市設計學會 /

☐ RPP 註冊專業規劃師
Others 其他

On behalf of 代表

Remark 備註

The materials submitted in this application and the Board's decision on the application would be disclosed to the public. Such materials would also be uploaded to the Board's website for browsing and free downloading by the public where the Board considers appropriate.

委員會會向公眾披露申請人所遞交的申請資料和委員會對申請所作的決定。在委員會認為合適的情況下，有關申請資料亦會上載至委員會網頁供公眾免費瀏覽及下載。

Warning 警告

Any person who knowingly or wilfully makes any statement or furnish any information in connection with this application, which is false in any material particular, shall be liable to an offence under the Crimes Ordinance.

任何人在明知或故意的情況下，就這宗申請提出在任何要項上是虛假的陳述或資料，即屬違反《刑事罪行條例》。

Statement on Personal Data 個人資料的聲明

- The personal data submitted to the Board in this application will be used by the Secretary of the Board and Government departments for the following purposes:
委員會就這宗申請所收到的個人資料會交給委員會秘書及政府部門，以根據《城市規劃條例》及相關的城市規劃委員會規劃指引的規定作以下用途：
 - the processing of this application which includes making available the name of the applicant for public inspection when making available this application for public inspection; and
處理這宗申請，包括公布這宗申請供公眾查閱，同時公布申請人的姓名供公眾查閱；以及
 - facilitating communication between the applicant and the Secretary of the Board/Government departments.
方便申請人與委員會秘書及政府部門之間進行聯絡。
- The personal data provided by the applicant in this application may also be disclosed to other persons for the purposes mentioned in paragraph 1 above.
申請人就這宗申請提供的個人資料，或亦會向其他人士披露，以作上述第 1 段提及的用途。
- An applicant has a right of access and correction with respect to his/her personal data as provided under the Personal Data (Privacy) Ordinance (Cap. 486). Request for personal data access and correction should be addressed to the Secretary of the Board at 15/F, North Point Government Offices, 333 Java Road, North Point, Hong Kong.
根據《個人資料(私隱)條例》(第 486 章)的規定，申請人有權查閱及更正其個人資料。如欲查閱及更正個人資料，應向委員會秘書提出有關要求，其地址為香港北角渣華道 333 號北角政府合署 15 樓。

Gist of Application 申請摘要 (Please provide details in both English and Chinese <u>as far as possible</u> . This part will also be circulated to relevant consultees, uploaded to the Town Planning Board's Website for browsing and free downloading by the public and available at the Planning Enquiry Counters of the Planning Department for general information.) (請盡量以英文及中文填寫。此部分會發送予相關諮詢人士、上載至城市規劃委員會網頁供公眾免費瀏覽及下載及於規劃署規劃資料查詢處供一般參閱。)			
Application No. 申請編號	(For Official Use Only) (請勿填寫此欄)		
Location/address 位置/地址	a. Tai O - Imhoff Wastewater Treatment T9-SW-18C b. Tai O -Old Pier T9-SW-22B Government Land in D.D. 302L, Tai O, Lantau Island		
Site area 地盤面積	31.86 sq. m 平方米 ☒ About 約 (includes Government land of 包括政府土地 31.86 sq. m 平方米 ☒ About 約)		
Plan 圖則	a. Approved Tai O Fringe Outline Zoning Plan No. S/I-TOF/2 b. Approved Tai O Town Centre Outline Zoning Plan No. S/I-TOTC/2 and S/ITOF/2		
Zoning 地帶	a. CPA and OU(STW) b. GB (TOTC) and CPA (TOF)		
Type of Application 申請類別	☒ Temporary Use/Development in Rural Areas or Regulated Areas for a Period of 位於鄉郊地區或受規管地區的臨時用途/發展為期 ☒ Year(s) 年 3 ☐ Month(s) 月 ☐ Renewal of Planning Approval for Temporary Use/Development in Rural Areas or Regulated Areas for a Period of 位於鄉郊地區或受規管地區臨時用途/發展的規劃許可續期為期 ☐ Year(s) 年 ☐ Month(s) 月		
Applied use/ development 申請用途/發展	Proposed Temporary Radar Installation for Coastal monitoring and data acquisition (Coastal High Frequency Radar Network) with Ancillary Facility for a period of 3 years		
(i) Gross floor area and/or plot ratio 總樓面面積及/或地積比率		sq.m 平方米	Plot Ratio 地積比率
	Domestic 住用	☐ About 約 ☐ Not more than 不多於	☐ About 約 ☐ Not more than 不多於
	Non-domestic 非住用	31.86 ☒ About 約 ☐ Not more than 不多於	☐ About 約 ☐ Not more than 不多於

(ii) No. of blocks 幢數	Domestic 住用	
	Non-domestic 非住用	
(iii) Building height/No. of storeys 建築物高度／層數	Domestic 住用	m 米 ☐ (Not more than 不多於)
		Storeys(s) 層 ☐ (Not more than 不多於)
	Non-domestic 非住用	m 米 ☐ (Not more than 不多於)
		Storeys(s) 層 ☐ (Not more than 不多於)
(iv) Site coverage 上蓋面積		% ☐ About 約
(v) No. of parking spaces and loading / unloading spaces 停車位及上落客貨車位數目	Total no. of vehicle parking spaces 停車位總數 _____	
	Private Car Parking Spaces 私家車車位 _____ Motorcycle Parking Spaces 電單車車位 _____ Light Goods Vehicle Parking Spaces 輕型貨車泊車位 _____ Medium Goods Vehicle Parking Spaces 中型貨車泊車位 _____ Heavy Goods Vehicle Parking Spaces 重型貨車泊車位 _____ Others (Please Specify) 其他 (請列明) _____ _____	
	Total no. of vehicle loading/unloading bays/lay-bys 上落客貨車位／停車處總數 _____	
	Taxi Spaces 的士車位 _____ Coach Spaces 旅遊巴車位 _____ Light Goods Vehicle Spaces 輕型貨車車位 _____ Medium Goods Vehicle Spaces 中型貨車車位 _____ Heavy Goods Vehicle Spaces 重型貨車車位 _____ Others (Please Specify) 其他 (請列明) _____ _____	

Submitted Plans, Drawings and Documents 提交的圖則、繪圖及文件		
	Chinese 中文	English 英文
Plans and Drawings 圖則及繪圖		
Master layout plan(s)/Layout plan(s) 總綱發展藍圖／布局設計圖	☐	☐
Block plan(s) 樓宇位置圖	☐	☐
Floor plan(s) 樓宇平面圖	☐	☐
Sectional plan(s) 截視圖	☐	☐
Elevation(s) 立視圖	☐	☐
Photomontage(s) showing the proposed development 顯示擬議發展的合成照片	☐	☐
Master landscape plan(s)/Landscape plan(s) 園境設計總圖／園境設計圖	☐	☐
Others (please specify) 其他（請註明）	☐	☐
Reports 報告書		
Planning Statement/Justifications 規劃綱領/理據	☐	☐
Environmental assessment (noise, air and/or water pollutions) 環境評估（噪音、空氣及／或水的污染）	☐	☐
Traffic impact assessment (on vehicles) 就車輛的交通影響評估	☐	☐
Traffic impact assessment (on pedestrians) 就行人的交通影響評估	☐	☐
Visual impact assessment 視覺影響評估	☐	☐
Landscape impact assessment 景觀影響評估	☐	☐
Tree Survey 樹木調查	☐	☐
Geotechnical impact assessment 土力影響評估	☐	☐
Drainage impact assessment 排水影響評估	☐	☐
Sewerage impact assessment 排污影響評估	☐	☐
Risk Assessment 風險評估	☐	☐
Air Ventilation Assessment 空氣流通評估	☐	☐
Management Plan 管理計劃	☐	☐
Social Impact Assessment 社會影響評估	☐	☐
Heritage Impact Assessment	☐	☐
Ecological Impact Assessment 生態影響評估	☐	☐
Conservation Management Plan 保育管理計劃	☐	☐
Others (please specify) 其他（請註明）	☐	☐
<u>detailed description of the proposed installation</u>	☐	☒

Note: The information in the Gist of Application above is provided by the applicant for easy reference of the general public. Under no circumstances will the Town Planning Board accept any liabilities for the use of the information nor any inaccuracies or discrepancies of the information provided. In case of doubt, reference should always be made to the submission of the applicant.

註：上述申請摘要的資料是由申請人提供以方便市民大眾參考。對於所載資料在使用上的問題及文義上的歧異，城市規劃委員會概不負責。若有任何疑問，應查閱申請人提交的文件。



THE HONG KONG
POLYTECHNIC UNIVERSITY
香港理工大學



DEPARTMENT OF
CIVIL AND ENVIRONMENTAL ENGINEERING
土木及環境工程學系

THE HONG KONG POLYTECHNIC UNIVERSITY CEE

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

email: [REDACTED]

Application for Permission under Sec. 16
of the Town Planning Ordinance
(CAP.131): Temporary Radar Installation
for Coastal Monitoring and Data
Acquisition (Coastal High Frequency
Radar Network) with Ancillary Facility
and Associated Excavation and Filling of
Land for a period of 3 years

Contents

1	Introduction	1
2	Relevance and Impact	2
3	Target Beneficiaries	3
4	Area of Interest	4
5	Station: Tai O - Wastewater Treatment Station	9
5.1	Overview of the site layout	9
5.2	Current state of the area	11
5.3	Installation details	13
5.3.1	Plan view	13
5.3.2	Cross sections	14
5.3.3	Antennas supports	14
5.3.4	Cable routing	14
5.3.5	Noise and Land Impact assessment	15
6	Station: Tai O - Pier	17
6.1	Overview of the site layout	17
6.2	Current state of the area	19
6.3	Installation details	21
6.3.1	Plan view	21
6.3.2	Cross sections	21
6.3.3	Antennas supports	23
6.3.4	Cable routing	23
6.3.5	Noise and Land Impact assessment	23
7	Support Letters	25
A	Tai O - Wastewater Treatment Station - Detailed Plan View	33
B	Tai O - Wastewater Treatment Station - Section AA	34
C	Tai O - Wastewater Treatment Station - Section BB	35
D	Tai O - Wastewater Treatment Station - Antennas Details	36
E	Tai O - Pier Station - Detailed Plan View	37
F	Tai O - Pier Station - Section AA	38
G	Tai O - Pier Station - Section BB	39
H	Tai O - Pier Station - Section CC	40
I	Tai O - Pier Station - RX Details	41

J Tai O - Pier Station - TX Details	42
K Cable details - Section 1	43
L Cable details - Section 2	44

1 Introduction

The purpose of this Application for Permission under Sec. 16 is to request the temporary use of Hong Kong land in order to deploy a local High Resolution Radars (HFRs) network to cover two of the most interesting spots of the Hong Kong Waters, namely the Central Waters and the exit of the Pearl River Estuary. The new non-profit network will greatly enhance regional ocean monitoring capabilities and the data will be made available on a free basis to a wide range of stakeholders, from the scientific community to all government departments involved in coastal engineering, flood and extreme event mitigation and environmental management, as well as contributing to several future research projects.

High Frequency Radar (HFR) technology refers to land based remote sensing equipment capable of measuring surface currents and waves over distance up to few hundreds of kilometres. Coastal radar technology is now widely recognized as a cost-effective and highly reliable tool to monitor coastal regions for both superficial current and wave climate in real time, overcoming several limitations of more standard oceanographic techniques based on ship-mounted instruments or moorings. The success of this technology is demonstrated by the steadily increasing number of radar stations worldwide. The interest for a real-time areal ocean and coastal monitoring has now gone beyond the boundaries of the scientific community, reaching the interest of the government authorities responsible for protecting the coastal environments and managing the risks associated with natural events and human activities.

The application is part of the activity planned in the framework of the Research Grants Council (RGC) with Reference No. C5032-22EF (https://www.ugc.edu.hk/eng/rgc/funding_opport/crf/funded%20research/crf22_lay_sum.html#C5032). In particular, the application regards the allocation from Collaborative Research Fund (CRF) 2022/2023 for Equipment Grant.

Owing to the importance of the coastal radar monitoring network for increasing the coastal resilience against flooding risk, the project has already received support from the Development Bureau (DEVB), as well as other departments (HKO, CEDD and DSD) with interests in coastal processes and coastal defence. Support letters are attached in Section 7.

The need for accurate monitoring of ocean surface currents and wave fields is nowadays recognized not only from the scientific community, but also from public and private sectors. This aspect was decisive in encouraging a joint effort for the expansion of ocean observations and the technological development of new systems suitable for covering ever greater coastal and open ocean areas. It is in this context that the proposed equipment steps in, filling the gap between local (buoys and ships) and long range (low frequency radar) measurements.

In accordance to the provision of law of the Hong Kong SAR government, we submitted and obtained the permit for operation the HF-radars emissions. The permission was issued by the Office of the Communication Authority (OFCA). This parallel process is essential to ensure that all regulatory requirements are met and that the system can operate seamlessly upon approval of the tenancy.

2 Relevance and Impact

This project is driven by strong commitment to the public benefit, to ensure that the valuable data collected is made available on a non-profit basis to a wide range of stakeholders. Indeed, the network will represent a key resource for both the academic/ scientific community and government departments involved in coastal engineering, flood and extreme event mitigation, and environmental management. The access to the data will be open and free of any charges, promoting a culture of transparency and collaboration that will allow for more informed decision making and innovative solutions.

High-Frequency Radar (HFR) networks have become essential tools for ocean and coastal waters monitoring. What really distinguishes HFR from other ocean monitoring methods is that HFR provide hourly updates of total velocity fields over large areas with high spatial resolution. Indeed, these networks can offer a clear and frequent picture of the ocean weather condition over a wide area. HFR's ability to monitor large areas continuously and real-time is essential to early warning systems for natural hazards such as storms and tsunamis, for improving safety of maritime navigation and for supporting Search and Rescue operation and rapid response in case of marine pollution events.

To fully understand the expected impacts of the Project, it is important to start from the local societal needs and environmental pressures. The local ocean waters and coastal areas represent a perfect example of the future challenges that the Hong Kong community will face to pursue sustainable development and to contrast climate changes. The region is highly vulnerable to extreme weather events, particularly typhoons, which can cause significant damage to coastal infrastructure, affect daily life and pose serious risks to public safety.

Moreover, a real-time data acquisition network, integrated with an early warning system, enables proactive and informed decision-making. Indeed, during typhoons, these systems track wind speeds, wave heights and storm surges, allowing authorities to predict potential flooding, erosion, and infrastructure damages. This real-time information is essential for implementing emergency measures such as evacuations, road closures and strengthening critical infrastructure. It also helps with the long-term planning and design of coastal defences, such as breakwalls and flood barriers, to ensure they can withstand future storms.

One of the most important aspect of the HFRs networks is their long expected lifetime and the possibility of easy extensions. In long term, we expect that the interest on HFRs network will increase and new coastal sites will be covered by the network with the aim to fully cover the HKSAR waters. This will represent a great success in light of the vital importance of coastal lands for the local community.

3 Target Beneficiaries

A comprehensive coastal monitoring system, such as the High-Frequency Radar (HFR) network, provides essential data and insights for a wide range of stakeholders, from local government agencies to the tourism sector.

Several local stakeholders in Hong Kong have already expressed great interest in our project, underlining its relevance and potential impact. Their support not only confirms the importance of our initiative, but also demonstrate an openness to meaningful collaborations. These expressions of interest are documented in the support letters, included in Section 7. These letters serve as a proof of the alignment between the goal of our project and the needs of the local community, and they provide a strong foundation for building partnerships and securing further engagement.

In particular, the Hong Kong Observatory (HKO) will use our data for refining their weather forecasting and monitoring, ensuring accurate and timely information for public safety. The Civil Engineering and Development Department (CEDD) will employ our data for coastal works design. Moreover, CEDD also monitors the sea through the use of buoys, thus an integration between the two measuring systems will help with the maintenance and management of coastal protection measures. In addition, the Drainage Services Department (DSD) will use our data to address flooding issues, enabling them to implement effective drainage and flood prevention strategies. To conclude, our data plays a vital role in supporting these government agencies in their respective missions.

Indeed, HFR data can greatly assist local governments in developing more informed coastal management policies, urban planning and even improving emergency response systems. Real-time data of surface currents, waves and other oceanographic conditions enable local authorities to make more informed decisions on the sustainability and resilience of their coastal zones: this information facilitates the development of sustainable strategies and resource allocation policies.

In the maritime industry, the use of HFR could bring several benefits. For example, shipping companies may optimize vessels routes: this not only lowers operating costs, but also reduces the environmental impact of shipping activities by reducing fuel consumption and travel time. Port authorities could manage operations more efficiently with real-time information, scheduling of ship arrivals and departures according to wave conditions, reducing waiting times and optimising the use of port facilities. Finally, fisheries may use oceanographic data to locate areas rich in nutrients and fish populations, and target the fishing operations to increase catch, while minimising the environmental impact.

In general, the whole coastal communities will benefit significantly from the data provided by the network, experiencing improved safety, economic stability, and an enhanced quality of life. The safety will be enhanced by providing early warnings and real-time monitoring of oceanographic conditions, allowing for timely alerts and evacuations in the event of natural disasters. By having access to accurate and up-to-date information, residents can take proactive measures to protect lives and property. In this way, coastal communities will also experience a better economic stability, optimising the resources and preserving high-valued infrastructures a-priori.

4 Area of Interest

The Areas of Interest (AOIs), proposed in the present application, are shown in figure 1.

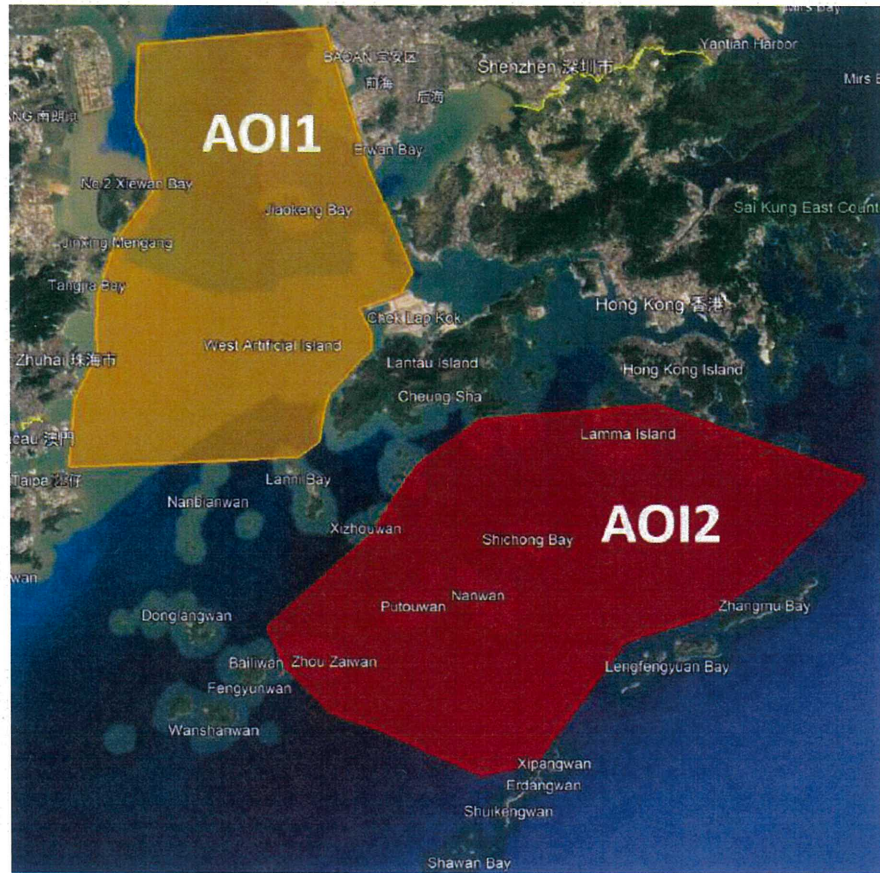


Figure 1: AOIs considered in the present project. Pearl River Estuary (AOI1 in orange) and Hong Kong Central Waters (AOI2 in red).

AOI1 covers the Pearl River Estuary: this region had been already deeply studied since its dynamic is one of the most important drivers for the circulations in the Hong Kong SAR waters. AOI2 focuses on the core of the HKSAR waters, the Central Waters.

The Central Water is already a focus of sea waves and water levels monitoring. Several pointwise measuring stations are installed in the Hong Kong Waters and have been collecting data for several years. The instruments are managed by different institutions, namely the Hong Kong Observatory, the Hydrographic Office of Marine Department, the Airport Authority and the Drainage Services Department. The data are available online from the website of the Hong Kong Observatory.

Moreover, the Port Works Division of the Civil Engineering and Development Department have been maintaining a long term wave monitoring programme since 1994. Two monitoring stations have been set up in the Central Waters (harbour near Kau Yi Chau and at the West Lamma Channel) and in the future the number of mooring stations is planned to be increased based on the need to increase the monitoring capabilities for the coastal management of Hong Kong. Therefore, the

present proposal is in line with the long term strategy of ocean monitoring and the HFRs, once operating, will contribute to increase the knowledge of the main coastal processes and will represent a powerful tool for future planning of coastal defences and extreme events preparedness actions.

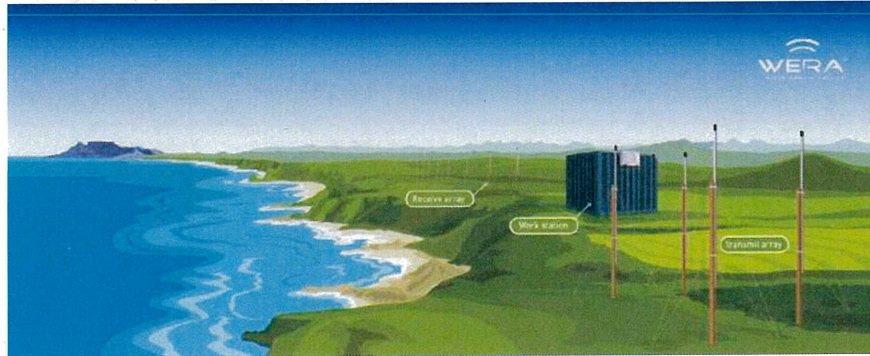


Figure 2: Sketch of WERA Ocean Remote Sensing System.

Figure 2 provides a detailed sketch of a typical coastal monitoring system configuration, illustrating the essential layout for modern oceanographic observation. Strategically situated along the coastline, the 'Receive array' and 'Transmit array' antennas are arranged in a calibrated grid pattern to optimise the capture of high-frequency signals across the marine environment. These arrays are interconnected via high-bandwidth cable links and connected to a fully equipped workstation that serves as the operational nerve centre for data acquisition, processing and analysis. This integrated setup is representative of a state-of-the-art ocean remote sensing net-

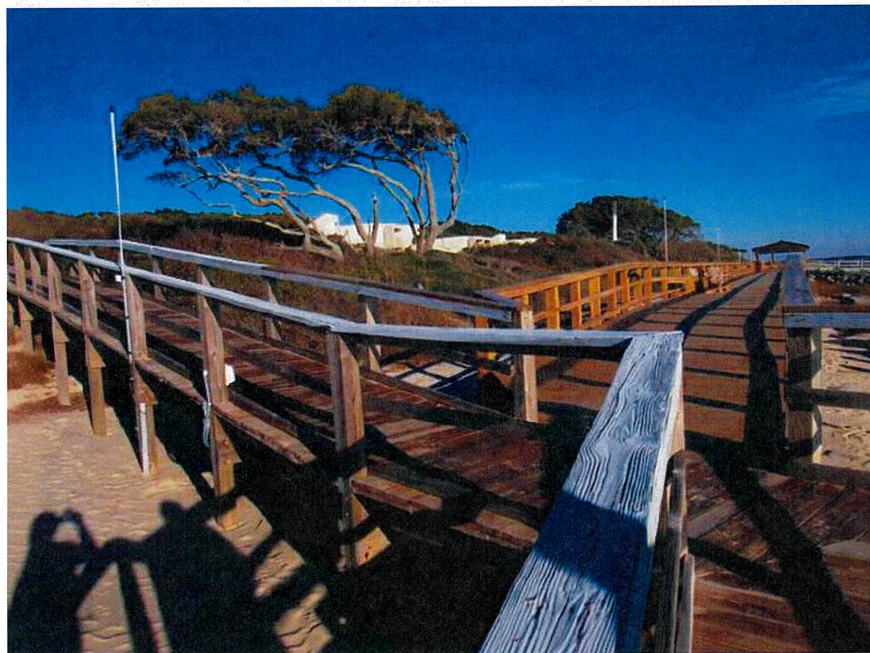


Figure 3: Antenna Array integrated along a boardwalk in Georgia, USA.

work designed to monitor parameters such as surface currents and wave dynamics.



Figure 4: Antenna Array surrounded by nature in Capo Granitola, Sicily, Italy.

The system combines advanced antenna technology with computational infrastructure to enhance our understanding and stewardship of coastal zones.

Various installations of the Ocean Remote Sensing System are operational worldwide, with some examples illustrated in the images in this section.

Figure 3 captures an antenna array positioned on a wooden boardwalk along the coast of Georgia, integrated into a public space frequently visited by tourists. The design reflects careful consideration of both functionality and aesthetics, allowing the structure to fulfill its purpose without disrupting the natural or recreational use of the area. In figure 4, the antenna array is situated within the scenic landscape of



Figure 5: Antenna Array along a public beach in Liverpool Bay, UK.

Capo Garinola, nestled among vibrant wildflowers and Mediterranean vegetation. This setting demonstrates that the presence of the antennas do not hinder ecological restoration of the site, while also highlights how such installations can maintain a low visual profile and blend harmoniously with their surroundings.

Lastly, figures 5 and 6 showcase antenna arrays deployed along public beaches. Both cases reveal how these structures are engineered to withstand saltwater exposure, high winds, and public interaction, demonstrating their adaptability to coastal environments.



Figure 6: Antenna Array along a public beach in South Florida, USA.

These images underscore the remarkable versatility and widespread applicability of modern antenna arrays, confirming their role as unobtrusive yet robust components in diverse environmental settings, from urban waterfronts to natural habitats.



Figure 7: Example of a small portable cabin, used as local server room.

The following sections provide a comprehensive overview of the individual monitoring stations and their constituent components. In general, each station is composed of a standardized yet flexible configuration designed for robust performance in varied environmental conditions. A typical setup includes an array of 12 receive antennas (denoted as RX), arranged to optimize signal reception and spatial resolution, along with either 2 or 4 transmitting antennas (TX), with the exact number determined by site-specific requirements such as coverage area and target resolution.

In addition to the antenna arrays, each station features a dedicated server room housed within a compact, portable cabin (see Figure 7), which provides a secure and controlled environment for the computational and networking equipment essential for real-time data processing and system operation. This cabin is designed to withstand outdoor conditions while ensuring thermal stability and physical security. A designated power supply point, often supported by backup systems such as uninterruptible power supplies (UPS), ensures continuous operation and reliability even in remote or off-grid locations. Together, these elements form an integrated, self-sufficient station capable of sustained high-performance monitoring.

5 Station: Tai O - Wastewater Treatment Station

5.1 Overview of the site layout



Figure 8: Approximate position of the Tai O - Wastewater Treatment Station site in respect to Lantau Island (red squared box).

The Imhoff wastewater treatment station in Tai O is a facility designed to manage and treat wastewater in the area. The wastewater treatment station is operated and maintained by the Drainage Services Department (DSD) of the Hong Kong Government.

Figure 8 indicates the approximate position of the site in respect to Lantau Island, whereas figure 9 shows an areal close up of the site.

An in situ survey was conducted in order to determine the GPS positions of the different components of the network within the study area. This survey involved the direct measurement of coordinates on the ground, ensuring precise and reliable data



Figure 9: Areal view of Tai O - Wastewater Treatment Station site.



Figure 10: GPS positions reported on the geospatial information service provided by the Hong Kong Special Administrative Region (HKSAR) Government (GeoInfo Map).

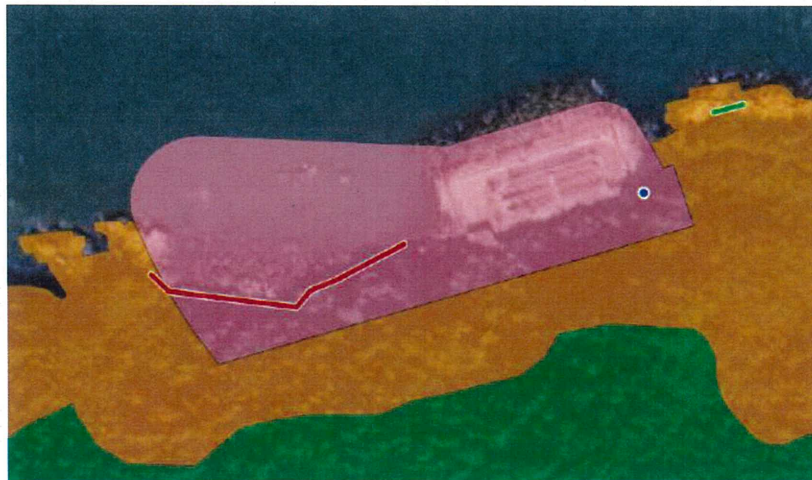


Figure 11: Outline Zoning Plan. Pink: Other Specified Uses; Orange: Coastal Protection Area; Green: green belt. The red and green line represents the Rx and Tx positions, respectively. The power connection is marked by the blue dot.

collection. A sketch of the GPS position is provided in figure 10 and the coordinates, in HK1980 reference, are listed in table 1. The antennas are positioned at a safe distance from the High Water Mark Line.

Another information needed is the Outline Zoning Plan. The purpose of an Outline Zoning Plan is to provide a comprehensive framework for guiding and regulating the development and use of land. The Outline Zoning Plan is provided by the Town Planning Board (<https://www.ozp.tpb.gov.hk/>) and it is shown in figure 11. The transmitting antennas falls in the so called *Coastal Protection Area*. However, the network is primarily located within the area designated as *Other Specified Uses*. Specifically, the Imhoff Wastewater Treatment facility is managed by the Drainage Services Department. We have already contacted DSD, and they agreed to host the server and electronics inside the technical room of the Plant, see email in section 7.

		Lon	Lat
RX	1	803497.79	813602.63
	2	803502.22	813598.47
	3	803508.28	813595.33
	4	803514.15	813596.35
	5	803519.08	813597.10
	6	803524.87	813595.41
	7	803529.64	813596.42
	8	803534.03	813598.71
	9	803538.72	813600.94
	10	803543.88	813602.89
	11	803548.72	813604.67
	12	803555.29	813608.05
TX	1	803618.82	813640.21
	2	803624.82	813641.12
	power	803603.67	813622.06
	server room	803569.13	813610.98

Table 1: Tai O - Wastewater Treatment Station - HK1980 GPS coordinates of the antennas, power supply and server room.

5.2 Current state of the area

The site surrounding the Tai O Wastewater Treatment Facility provides an ideal environment in which operate an antenna array securely and without interruption. The terrain is characterised by a natural, rocky coastline, as shown in figure 12.

The area is distinctly non-recreational; the rugged, inaccessible shoreline naturally discourages public access, thereby eliminating potential conflicts and minimising the risk of vandalism or accidental interference. Furthermore, although vegetation is present, it naturally recedes from the rocky coast, ensuring a permanent, unobstructed line of sight for radio frequencies. The area currently shows signs of neglect, with accumulations of tidal debris and a lack of active landscaping (bottom right panel of figure 12).



Figure 12: Station Tai O Wastewater Treatment Current State. Top left: view from the last Rx toward the Wastewater Plant Station; Top right: view toward the Rx position from the Wastewater Plant Station; Bottom left: Tx positions (Wastewater Plant Station on the back); Bottom right: accumulation of garbage due to flooding.

5.3 Installation details

5.3.1 Plan view

A detailed plan view of the project area is provided in Appendix A. This drawing shows the layout of the 12 passive receiving (RX) antenna array, positioned on the west side of the Tai O Wastewater Treatment Facility, and the 2 passive transmitting (Tx) antennas, which will be installed on a flat rock outcrop to the east. A rendering of the antennas is provided in figure 13.



Figure 13: Rendering showing the antennas on the rocky coastline.

The server equipment will be housed within an existing technical room (figure 14), owned by the Drainage Services Department (DSD). This represents a positive reuse of built infrastructure, requiring no new land consumption or additional visual footprint. We are also prepared to install appropriate fire extinguishers within the server room to ensure full compliance with fire safety regulations.



Figure 14: DSD technical room.

Furthermore, the new electrical supply connection point will be co-located directly adjacent to an existing one (figure 15). This strategic placement minimizes the requirement for new above-ground space.



Figure 15: Power box close to the Facility gate.

5.3.2 Cross sections

The plan view (provided in Appendix A at positions C-6 and C-7) shows the location of Section A-A. The detailed cross-section is presented in Appendix B. This cross-section clarifies the proposed installation geometry with a focus on one RX antenna and illustrates its minimal impact above the natural topography. Section B-B (in squared G-4 and G-5 Appendix A) is reported in Appendix C and it illustrates the cross-section detail of one TX antenna. Both profile views confirm the antennas low-profile design and their negligible visual impact on the surrounding landscape, effectively preserving the area character.

5.3.3 Antennas supports

In Appendix D are shown the antennas constructive details. In particular, the both RX and TX antenna poles are fixed to a wooden. The wooden pole is then inserted on a stainless steel support on a concrete basement placed over the rocks, without any operation of filling or excavation of land, as required in the CPA zone, in accordance with the temporary use of the land.

5.3.4 Cable routing

The cable connection layout is also reported in the plan view, and the types of installation are detailed in Appendix K and L. In Appendix A, in blue are indicated all the cable sections placed above the ground with installation detail as in the blue cables in Appendix K and L; in red (see position F-5 in Appendix A) is indicated

the under-paved section with an installation scheme reported in red in Appendix K and L.

The cabling infrastructure interconnects the twelve-element receiving (Rx) array and the two-element transmitting (Tx) array, terminating at the central server room, which is interfaced with the primary power supply. The cable routing for the Rx array is secured across the rock formations, continues along the landward side perimeter of the Wastewater Treatment facility, traverses the pedestrian walkway, and extends to the coastal Tx antenna locations, as explicitly detailed in the referenced plan view (Appendix A). Installation will be non-intrusive: all cabling will be affixed to rock surfaces or laid on the soil without excavation. No earthworks, including cutting, filling, or land removal, will be undertaken. As the connection to the transmitter (TX) antennas will require the installation of a conduit pathway beneath the existing surface walkways (marked in red line in position F-5 of Appendix A), an *Excavation Permit* and all other related documents will be requested following the approval of this document. A shallow trench shall be excavated crossing the pathway route. The trench for the under-paved pathway cable routing (indicated as a red line in Appendix A at position F-5) shall be:

- 2.43 meters long,
- excavated to a depth of 23.5 centimeters, and
- a total width of 13.5 centimeters.

Centrally laid within this sand envelope is a ϕ 75 mm (7.5 cm) corrugated tube housing the internal ϕ 7 mm coaxial cables, which must be fully covered by an additional layer of sand on both the sides and the top for proper cushioning. Finally, the remaining upper section of the trench shall be backfilled with soil and covered by concrete up to the finished ground level. All excavation shall be performed with care to avoid damaging the edge of the existing concrete slab. We are fully committed to maintaining the structural integrity and surface condition of the existing pathway throughout the entire duration of the temporary permit. Furthermore, upon the conclusion of the permit period and the subsequent decommissioning and removal of all installation components, we will undertake a thorough reinstatement of the pathway to its original, pre-existing condition, ensuring no lasting impact on its function or appearance.

5.3.5 Noise and Land Impact assessment

A thorough preliminary site assessment confirmed that the proposed installation area is entirely clear of any tree root systems or overhead canopy coverage. This placement ensures that the installation will have zero impact on the existing wooded area, thereby completely eliminating the need for any tree felling, trimming, or removal. This approach underscores our commitment to preserving the natural landscape and maintaining the existing ecosystem. Furthermore, to minimize any potential disruption to the soil structure and the sub-terrain environment, the cabling that traverses the wooded area behind the Sewage Treatment Plant will not require any trenching or excavation. Instead, the cables will be carefully and securely laid directly on the ground surface. This methodology is not only feasible but is specifically chosen

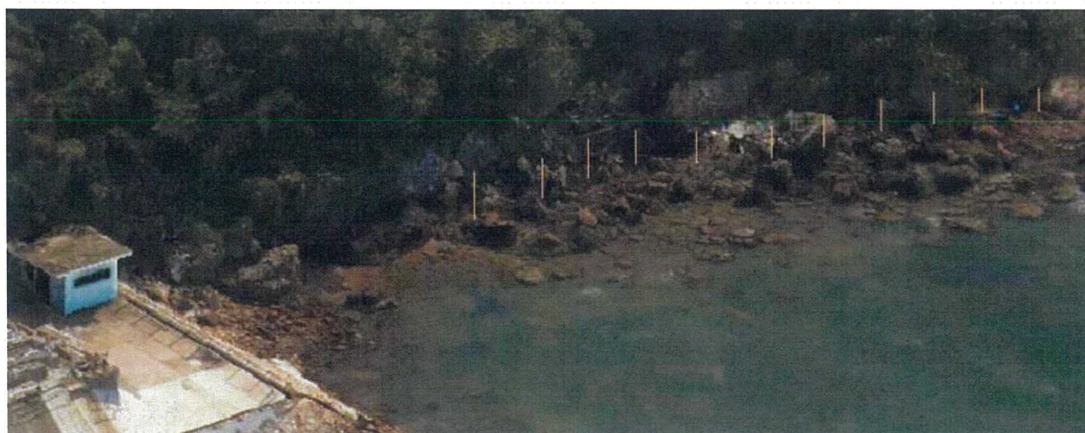


Figure 16: Rendering close up of the receiving antennas.

because the area is designated as a non-public transit zone, meaning there is no risk of interference with pedestrian or vehicular traffic. Consequently, the entire installation process is designed to be non-invasive, protecting both the arboreal and the ground-level habitats from any adverse effects.

The only fixed source of operational noise will be the external AC unit, which is designed not to exceed a level of 50 dB, ensuring minimal acoustic disturbance to the surrounding environment.

All receiving antennas have been positioned specifically to manage their visual presence. Their only potential line of sight is from the sea, and their extremely small diameter (approximately 3 cm) renders them virtually imperceptible at any meaningful distance from the coast. Furthermore, the transmitting antennas will be strategically placed on an inaccessible rock, where they will be effectively screened by existing vegetation. This vegetation will remain entirely intact, as it does not interfere with operations, allowing it to continue providing natural visual screening.

Moreover, the antennas will be painted by a sandy colour coat in order to further minimize their impact on the landscape.

As the provided rendering illustrate (figures 13 and 16), the proposed installation will be assimilated into the landscape with no material change to its character. Given this minimal impact, we are confident that no significant landscape or visual concerns will be raised.

During the construction phase, environmental impacts will be rigorously minimized. Noise pollution will be negligible, as the installation requires no heavy machinery. The primary activities, such as the placement of pre-assembled equipment and cabling, are manual and low-impact. Similarly, air and environmental pollution will be absent; there will be no burning, concrete pouring, or earth moving that might generates dust or runoff. All works will be conducted using hand held tools and existing pathways to avoid disturbing the surrounding habitat, ensuring that both auditory and ecological disruptions are kept to an absolute minimum.

6 Station: Tai O - Pier

6.1 Overview of the site layout

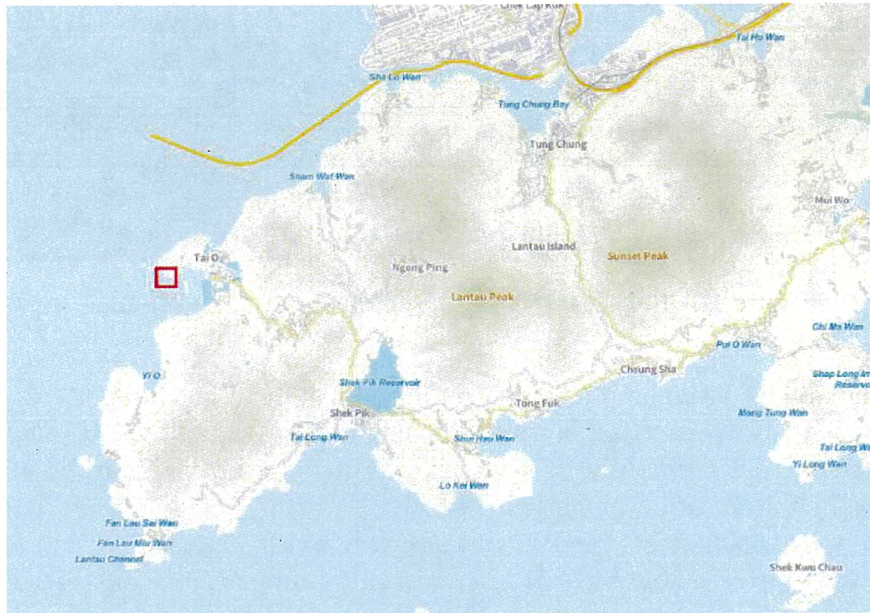


Figure 17: Approximate position of the Tai O - Pier site in respect to Lantau Island (red squared box).

The Tai O Pier is a significant feature of the Tai O fishing village on Lantau Island. The Tai O Pier has been a crucial part of the local community for many years, serving as a hub for transportation and trade. It has facilitated the movement of people and goods, connecting Tai O to other parts of Hong Kong and the mainland.

The area of coastline behind Tai O Old Pier is not open to the public, with no designated entry points or infrastructure for public use. This isolation, coupled with unobstructed sightline extending across the water towards Zhuhai, makes it an ideal location for offshore radar measurement installations. The absence of physical



Figure 18: Areal view of Tai O - Pier site.

obstructions in front of the antennas, such as buildings or islands, ensures clear



Figure 19: GPS positions reported on the geospatial information service provided by the Hong Kong Special Administrative Region (HKSAR) Government (GeoInfo Map).



Figure 20: Outline Zoning Plan. Pink: Other Specified Uses; Orange: Coastal Protection Area; Green: green belt. The red and green line represents the Rx and Tx positions, respectively. The server room is marked by the orange dot, whereas the blue one indicates the power connection.

signal propagation and accurate data collection, while its seclusion minimizes the risk of public disturbance. Figure 17 indicates the approximate position of the site in respect to Lantau Island, whereas figure 18 shows an areal close up of the site. An in situ survey was conducted in order to determine the GPS position of the different components of the network within the study area. This survey involved the direct measurement of coordinates on the ground, ensuring precise and reliable data collection. A sketch of the GPS position is provided in figure 19 and the coordinates, in HK1980 reference, are listed in table 2. The antennas are positioned at a safe distance from the High Water Mark Line, ensuring compliance with coastal regulatory guidelines. Another information needed is the Outline Zoning Plan. The purpose of an Outline Zoning Plan is to provide a comprehensive framework for guiding and regulating the development and use of land. The Outline Zoning Plan is provided by the Town Planning Board (<https://www.ozp.tpb.gov.hk/>) and it is shown in figure 20. The receiving antennas are placed in the *Coastal Protection Area*, whereas all the other components of the network are within the *Green Belt* area.

		Lon	Lat
RX	1	802854.60	812850.66
	2	802853.18	812856.16
	3	802852.47	812861.76
	4	802850.66	812867.05
	5	802847.61	812871.89
	6	802845.10	812877.08
	7	802842.84	812882.50
	8	802839.60	812887.08
	9	802836.90	812891.89
	10	802833.36	812896.14
	11	802829.44	812899.90
	12	802824.20	812901.73
TX	1	802896.15	812758.63
	2	802898.65	812753.16
	power	802901.82	812735.32
	server room	802895.06	812764.17

Table 2: Tai O - Pier - HK1980 GPS coordinates of the antennas, power supply and server room.

6.2 Current state of the area

Situated near the Tai O Old Pier, the site offers an optimal environment for the secure and uninterrupted operation of an antenna array. This application covers two distinct beach areas, see figure 21: the first is a sandy beach clearly visible from the Old Pier, while the second is a rocky beach hidden by the natural curvature of the coastline and therefore obscured from the Pier.



Figure 21: Station Tai O Pier: view of the proposed area from the pier.

The area endures a uniquely harsh maritime environment and it is considered non-recreational. Indeed, the shoreline does not have public access. This eliminates potential conflicts and minimises the risk of vandalism or accidental interference. Its exposition makes the area vulnerable to waves and storms that, even in normal

conditions due to tides, drive the accumulation of debris along the entire seashore (see bottom panel of figure 22).

This exposure is of paramount importance for the effective deployment of our radar network. The unobstructed, open sightline to the horizon is ideal for maximizing radar coverage and accuracy. Furthermore, the position as the first point impacted by storms allows for the earliest possible detection of approaching meteorological phenomena, making it an strategically optimal location for environmental monitoring and hazard early-warning systems.



Figure 22: Station Tai O Pier Current State. Panel 1: Rx positions, from last Rx, toward Tai O Old Pier (hardly visible on right side in the background); Panel 2 and 3: accumulation of garbage on the beach due to tidal run up.

6.3 Installation details

6.3.1 Plan view

A detailed plan view of the site is provided in Appendix E, illustrating the proposed layout of the antenna infrastructure. The 12-element passive receiving (RX) array is situated on the rocky beach, distanced from the Old Pier to minimize visual intrusion. The two passive transmitting (Tx) antennas are to be installed atop the containment wall adjacent to the nearer sandy beach, recognizable in figure 21. A rendering of the Rx antennas is provided in figure 23.



Figure 23: Rendering showing the antennas on the rocky coastline.

As shown in the rendering in figure 24, the portable cabin designated for use as a server room will be positioned atop the retaining wall adjacent to the beach. Its placement will be carefully planned to prevent disruption to the existing canopy and preserve the natural landscape. The impact of the small portable cabin on the landscape will be minimized using a camouflage net. This installation will be supported by a geotechnical study, which will be included as part of the project documentation (see the attached Geotechnical Planning Review Report). Note that the ground surface consists solely of a superficial layer of dead leaves and fallen woody debris, which does not conceal or interfere with any root systems beneath.

The new electrical supply point will be co-located immediately adjacent to an existing one (figure 25), minimizing the need for new above-ground space and further concentrating services.

6.3.2 Cross sections

In the plan view (positions B-3 and B-4), the Section A-A is marked and this section can be found in Appendix F. This cross-section clarifies the proposed installation geometry with a focus on one RX antenna and illustrates its minimal impact above the natural topography. The profile view confirms that the antenna low-profile design and its negligible visual impact on the surrounding landscape, effectively preserving the area character. Section B-B (in squared F-5 and F-6 Appendix E) is reported in Appendix G and it illustrates the cross-section of the small portable cabin positioned atop the containment wall adjacent to the sandy beach. Its compact design ensures it does not disrupt the existing canopy or surrounding vegetation. In fact, we have intentionally incorporated the natural vegetation, along with a



Figure 24: Left panel: Current state of the retaining wall and surrounding landscape. Right panel: AI-generated rendering illustrating the placement of the server cabin above the wall, designed to preserve existing canopy trees.



Figure 25: Existing supply points attached to the wall at the boundary of the beach.

camouflage net as previously mentioned, to effectively mask the cabin and minimize its visual presence within the landscape. Section C-C (in squared G-5 and G-6 Appendix E) is reported in Appendix H. This cross-section shows the installation detail of one TX antenna and illustrates its minimal impact atop of the containment wall, adjacent the sandy beach.

6.3.3 Antennas supports

In Appendix I and Appendix J are shown the receiving and transmitting antennas constructive details, respectively. In particular, the RX antenna pole is fixed to a wooden pole. The wooden pole is then inserted in a stainless steel support attached to a concrete block placed on the gravelled beach to provide a sufficient stability to the antenna base. The gravel will be rearranged so that, once the permit expires, the beach can be restored to its original configuration (see figure 22), in accordance with the temporary use of the land. The height of the support is determined by the tidal range to which this beach is exposed, about 2 meters. The Tx antenna pole is fixed to a wooden pole. The wooden pole is then inserted in a stainless steel support attached to a concrete block placed on the top of the wall at the edge of the sandy beach.

6.3.4 Cable routing

The cable connection layout is also reported in the plan view, and the types of installation are detailed in Appendix K and L with a colour code consistent with the plan view. The cable routing infrastructure is designed for both efficiency and minimal environmental impact. All individual connections and power line are integrated into a unified cable pathway, ensuring a protected, organized, and visually unobtrusive installation that respects the surrounding landscape. A single, cable will connect all twelve antennas in a sequential order before being routed along the beach edge. This main cable will enter the portable cabin, located between the Rx and Tx antenna arrays. Primary power will be supplied to the cabin to operate the server for the data collection and an AC unit. For the temporary nature of the installation, the cables will be securely laid on the rocks using small cemented strips, which will be entirely removed upon the conclusion of operational activities.

6.3.5 Noise and Land Impact assessment

A preliminary site assessment was conducted to evaluate the proposed installation area. This evaluation confirmed that the designated site is clear of any tree root systems, eliminating the risk of disturbing underground biological structures. Even though some groups of trees are located within the area designated for the installation, these trees do not obstruct or interfere with the operational performance of the antennas. As a result, no tree felling, trimming, or removal will be required. This strategic placement ensures the installation will have no adverse impact on the wooded environment and underscores our commitment to preserving the natural landscape and maintaining the integrity of the existing ecosystem. The only fixed source of operational noise will be the external AC unit, which is designed not to exceed a level of 50 dB, ensuring minimal acoustic disturbance to the surrounding

environment. We are also prepared to install appropriate fire extinguishers within the server room to ensure full compliance with fire safety regulations. All receiving antennas have been positioned in such a way that their only potential line of sight is from the sea, and their extremely small diameter (approximately 3 cm) renders them virtually imperceptible at any meaningful distance from the coast. Note that the antennas will be painted by a sandy colour coat in order to minimize the impact on the landscape. During the construction phase, environmental impacts will be rigorously minimized. Noise pollution will be negligible, as the installation requires no heavy machinery. The primary activities, such as the placement of pre-assembled equipment and cabling, are manual and low-impact. Similarly, air and environmental pollution will be absent; there will be no burning, concrete pouring, or earth moving that might generate dust or runoff. All works will be conducted using hand held tools and existing pathways to avoid disturbing the surrounding habitat, ensuring that both auditory and ecological disruptions are kept to an absolute minimum.

7 Support Letters

政府總部
發展局
工務科
香港添馬添美道 2 號
政府總部西翼



Works Branch
Development Bureau
Government Secretariat
West Wing, Central Government Offices,
2 Tim Mei Avenue, Tamar, Hong Kong

本局網址 Our Website: <http://www.devb.gov.hk/>
本局檔號 Our Ref.: DEVB(W) 216/27/32 Pt.1
來函檔號 Your Ref.:

電話 Tel No.: [REDACTED]
傳真 Fax No.: [REDACTED]
電郵 E-mail: psw@devb.gov.hk

By E-mail: [REDACTED]

25 April 2025

Dr Alessandro STOCCHINO
Associate Professor
Department of Civil and Environmental Engineering
The Hong Kong Polytechnic University
Hung Hom, Kowloon, Hong Kong

Dear Dr Stocchino,

**Support Letter for the Research Project
“Hong Kong Coastal HF-Radar Network”**

I am pleased to offer support to your research project “Hong Kong Coastal HF-Radar Network” funded by the Research Grants Council Collaborative Research Fund 2022/23 (Project Reference No. C5032-22EF).

The Government has been actively driving the application of technologies in enhancing the resilience capability in coping with climate change and extreme weather. The project aims to design and deploy a High Frequency Radar network covering the Hong Kong SAR waters, and to establish a data-sharing platform of currents and waves data collected, which would have great potential to enhance real-time monitoring of coastal dynamics as well as formulate coastal wave forecasting and early alert system.

I wish you every success in your research.

Yours sincerely,

(Ricky C K LAU)
Permanent Secretary for Development (Works)



Our Ref : HKOG 1/50/41 Pt.8

11 March 2025

(By email: [REDACTED])

Professor Alessandro Stocchino
Department of Civil and Environmental Engineering
The Hong Kong Polytechnic University
Hung Hom, Kowloon
Hong Kong

Dear Prof Stocchino,

RGC Ref No. C5032-22G: Hong Kong Coastal HF-Radar Network

Reference is made to your email of 8 March 2025 regarding the captioned Collaborative Research Fund project.

The Hong Kong Observatory (HKO) takes note of the enormous potential the project that could bring to our operations with an increased coverage of sea surface monitoring in the local and neighbouring waters of Hong Kong after its implementation. The Observatory is pleased to support the captioned project. We will provide essential meteorological data and climatological statistics as appropriate, and share with the project team HKO's experience in the development, implementation and maintenance of a similar network in the eastern part of Hong Kong.

You are welcome to contact Mr David Hui [REDACTED] for data acquisition and experience sharing as necessary in the future.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Ja an'.

(Dr P W Chan)
Director of the Hong Kong Observatory

科學創新 · 服務用心

Innovate with Science · Serve with Heart

香港九龍彌敦道134A號
134A Nathan Road,
Kowloon, Hong Kong

+852 2926 8200
+852 2311 9448

mailbox@hko.gov.hk
hko.gov.hk

hkweather
香港天文台 HKO

香港天文台 HKO
hk.observatory



Our Ref : HKOG 1/50/41 Pt.8

Your Ref :

11 July 2022

(By email: [REDACTED])

Professor Alessandro Stocchino
Department of Civil and Environmental Engineering,
The Hong Kong Polytechnic University,
Hung Hom, Kowloon,
Hong Kong.

Dear Prof. Stocchino,

RGC Ref No. C5032-22G: Hong Kong Coastal HF-Radar Network

I refer to your email of 23 June 2022 to our Mr ST Chan regarding the captioned Collaborative Research Fund project proposal.

The Hong Kong Observatory (HKO) takes note of the enormous potential the project that could bring to our operations with the increased coverage of sea surface monitoring in the local and neighbouring waters of Hong Kong via the proposed radar networks. The Observatory is pleased to support the proposed project. We will provide essential meteorological data and climatological statistics as appropriate, and share with the project team HKO's experience in the development, implementation and maintenance of a similar network in the eastern part of Hong Kong.

You are welcome to contact Mr David Hui at [REDACTED] for data acquisition and experience sharing as necessary in the future.

We sincerely hope that you will be successful in the application.

Yours sincerely,

(Queenie C.C. Lam)
for Director of the Hong Kong Observatory

科學創新 · 服務用心

Innovate with Science · Serve with Heart

香港九龍彌敦道134A號
134A Nathan Road,
Kowloon, Hong Kong

+852 2926 8200
+852 2311 9448

mailbox@hko.gov.hk
hko.gov.hk

hkweather
香港天文台 HKO

香港天文台 HKO
hk.observatory



Web site 網址 : <http://www.cedd.gov.hk>
 E-mail 電子郵件 :
 Telephone 電話 :
 Facsimile 傳真 :
 Our reference 本署檔號: () in PW-04-0065-5
 Your reference 來函檔號:

土木工程處
 Civil Engineering Office

香港九龍公主道 101 號
 土木工程拓展署大樓
 Civil Engineering and
 Development Building,
 101 Princess Margaret Road,
 Kowloon, Hong Kong

30 June 2022

Dr. Alessandro STOCCHINO
 Department of Civil and Environmental Engineering
 The Hong Kong Polytechnic University
 Kowloon, Hong Kong

By Post

Dear Dr. STOCCHINO,

Support to Application for Collaborative Research Fund 2022/23
"Hong Kong Coastal HF-Radar Network"

We are pleased to offer our support to the above proposal ("the Project") to be submitted to the Research Grants Council.

The geographical position of Hong Kong makes it susceptible to adverse weather-related threats such as tropical cyclones, rainstorms, storm surges and overtopping waves. In particular, some coastal low-lying and windy locations are vulnerable to sea water inundation caused by extreme storm surges and overtopping waves, and have the facilities situated near the seaside damaged as a result. In relation to more frequent and intense extreme weather events, the Civil Engineering and Development Department (CEDD) would adopt a pragmatic multi-layered enhancement measure, in which early alert system would be included to enhance the level of preparedness of the community to cope with the potential coastal risks. CEDD has launched a trial scheme on real-time wave monitoring by Acoustic Doppler Current Profilers (ADCPs) in the Hong Kong waters since 2021 with a view to collecting real-time wave data, which could serve for calibration of wave impact under extreme weather.

卓越工程 建設香港

We Engineer Hong Kong's Development

We understand that the objectives of the Project are to design and deploy a coastal High-Frequency Radar (HFR) network in Hong Kong waters, and to prepare a data sharing platform of current and wave field. We believe that the Project, including the development of technology on coastal monitoring as well as the set-up of data sharing platform, could create synergy with our ADCP trial scheme on wave and current monitoring, and give valuable input in formulation of future coastal wave forecasting and early alert system. Furthermore, the higher spatial resolution of monitoring by HFR network under the Project compared with using ADCPs has a potential to extend the observing capacity on the Hong Kong waters. In view of the above, we are pleased to offer our support to the Project.

We wish you all the success in your application and look forward to hearing from you soon.

Yours sincerely,



(Alan K Y TANG)
Chief Engineer/Port Works
Civil Engineering Office
Civil Engineering and Development Department

Internal
SE/D, E/D1, E/P4D – thro' L/N



香港特別行政區政府 The Government of the Hong Kong Special Administrative Region

渠務署署長 Drainage Services Department

香港灣仔告士打道5號稅務大樓43樓 43/F, Revenue Tower, 5 Gloucester Road, Wan Chai, Hong Kong

電話 Tel: (852) 2594 7001 傳真 Fax: (852) 2827 9477 電子傳真 e-Fax: (852) 3103 0001 電郵 E-mail: alicepang@dsd.gov.hk

來函編號 Your Ref:

本署編號 Our Ref: () DSD T 1/20/15 Pt.5

(2 July 2022

Dr. STOCCHINO Alessandro
Department of Civil and Environmental Engineering,
The Hong Kong Polytechnic University,
Hung Hom, Kowloon, Hong Kong

Dr. STOCCHINO,

**Application for the Collaborative Research Fund for 2022/23
Hong Kong Coastal High-Frequency Radar Network**

Letter of Support

We are pleased to tender our non-financial support to your application for the Collaborative Research Fund (CRF) 2022/23 concerning the research study titled "Hong Kong Coastal High-Frequency Radar Network".

We are glad to learn that your research aims at deploying and operating a coastal High-Frequency Radar (HFR) network in selected sites of the Hong Kong SAR coastal water. By collecting real time data such as HFR currents and waves information, the project would develop a short time forecasting model on wave runup, wave setup and wave overtopping, with the use of machine learning and data mining algorithms.

We expect that the proposed coastal HFR network and short time forecasting model will provide us with useful information for flood risk assessment in coastal urban areas. We hope that the research findings will be beneficial to enhance flood prevention and mitigation and our services to the public.

... / 2

我們的抱負是提供世界級的污水和雨水處理排放服務，以促進香港的可持續發展。
Our VISION is to provide world-class wastewater and stormwater drainage services enabling the sustainable development of Hong Kong.

ISO 9001:2001 &
45001
Certified

- 2 -

We wish you success in your application and look forward to your sharing with us the result of the research study. If you need further assistance, please feel free to contact our Senior Engineer / Research & Development, Ms. Selina FONG, at [REDACTED]

Yours sincerely,



(Alice PANG)
Director of Drainage Services

Outlook

Re: [Internet]Re: [Internet]Re: [Internet] Re: [Internet] Re: [Internet] seeking research support

From Tsz Chiu LAM [REDACTED]

Date Tue 25/03/2025 11:47

To STOCCHINO, alessandro (CEE) [REDACTED]

Cc Albert Ka Fai TSE [REDACTED]; DE LEO, Annalisa (CEE) [REDACTED]

[REDACTED]; Shing Hei YU [REDACTED]; Yujing QIU [REDACTED]

1 attachment (1 MB)

Option 1 & 2.pdf;

CAUTION: External email. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Professor Stocchino,

I refer to your below email concerning your proposal to host a server of the radar systems inside the Imhoff plant at Tai O. While we support your proposal, we have the following comments.

As we understand from your proposal, the radar system will comprise antennas and a hardware server. While the antennas will be installed outside the Imhof Tank site along the rocky costal line, the server is proposed to be installed within the Tai O Imhof tank site, with two options available (i.e. Option 1 and option 2) as outlined in the attached slides (p. 5 and p. 6). The installation will require access to the plant for a few days and the maintenance will require access to the plant of 1 day once every 12-18 months. Regarding the anticipated years of operation of the system, we note that you are discussing with Lands Department and the initial discussions indicated to commence a 5 years temporary use of the land, with the possibility to extend it for more years.

Given the small size of the proposed server and the site is along the seaside subject to possible storm during typhoon, utilizing the existing store room to house the server (i.e. Option 2) is advisable. Reversely, if additional container is chosen (i.e. Option 1), it must be securely fixed to address safety issue during severe weather condition or typhoons. Please note that for any option, DSD will not be responsible for any damages of the system.

Please arrange a public consultation to collect and address public opinions/comments from the stakeholder (e.g. Tai O village) before the commencement of the works. You might wish to seek assistance from liaison officer of Islands District Office, Home Affairs Department (HAD), Mr. Wong Chi Wing, Nathan (Tel: 2852 3740), in facilitating you to conduct the public consultation.

Please kindly note our comments from management and maintenance viewpoints:

1. The proposed sewer shall be placed in a manner that it would not obstruct the existing safety and working access necessary for use by DSD's in house staff to carry out operation and maintenance works;
2. The proposed sewer shall equip with a separate electricity power line (i.e. there no need for DSD to provide power to support the system in all time). Also, the electricity power line to be equipped shall not interrupt the existing power supplying to sewage treatment facilities;
3. Please install a AC unit, if there need to keep temperature and humidity under control. There is no any A/C system in existence inside the storm room;
4. Please apply the necessary permits to obtain certificate from DSD, namely, the Site Work Authorisation Certificate (SWAC), prior to installation and periodical maintenance;
5. Please note DSD will not be responsible for any damage and security of your proposed system.
- 6.

Please note our comment from project planning viewpoints.

1. There is potential upgrading works for the Tai O Sewage Treatment Plant (i.e. the Imhoff plant site) which is currently under design stage. If any upgrading works are to be carried out during the operation period of your system if future, please address any potential interface issues that may arise. Subject to on-site coordination, you might be requested to relocate the equipment and/or power line at your own cost if any conflict with the upgrading works needed to be addressed.

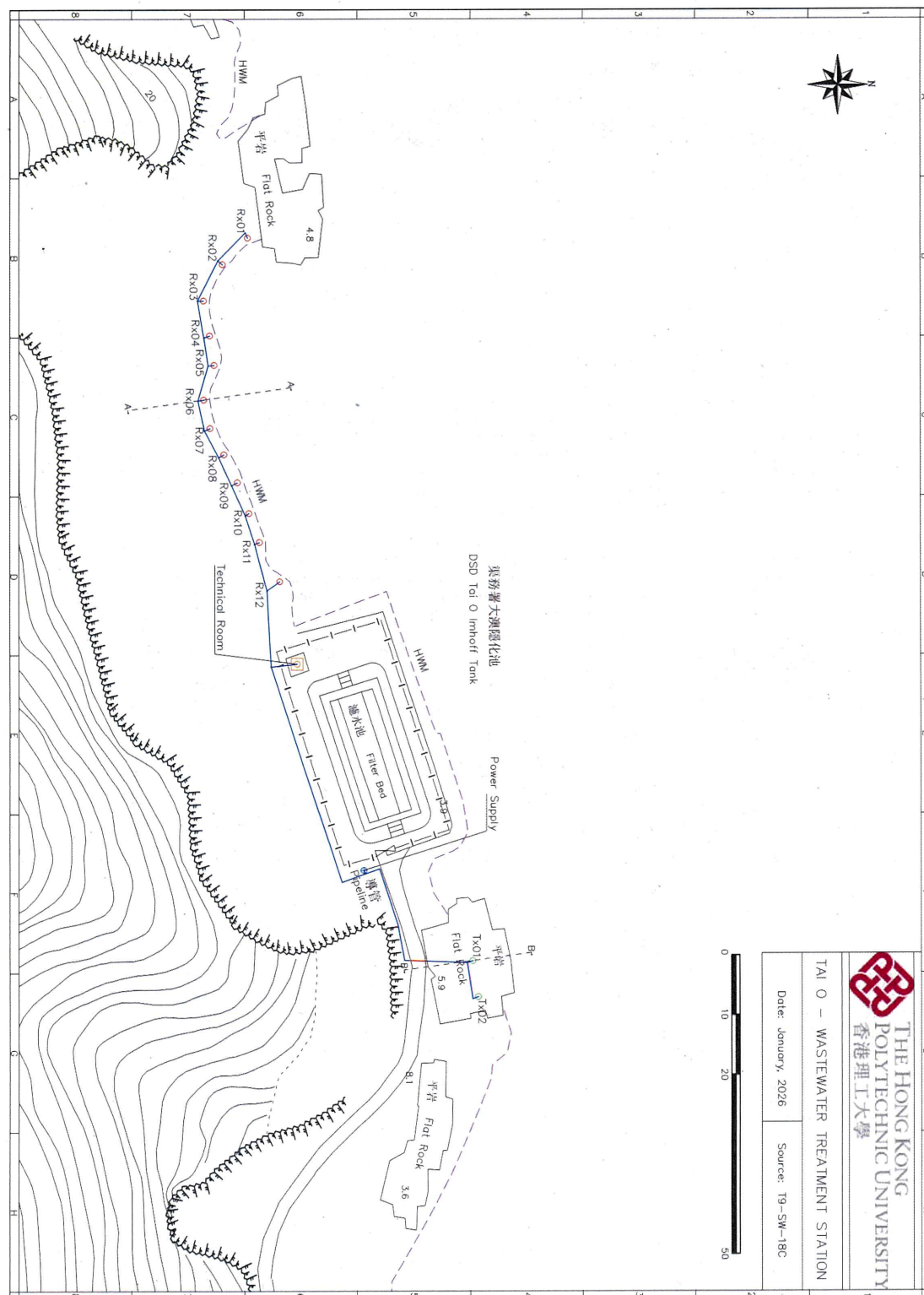
Regards,

George Lam

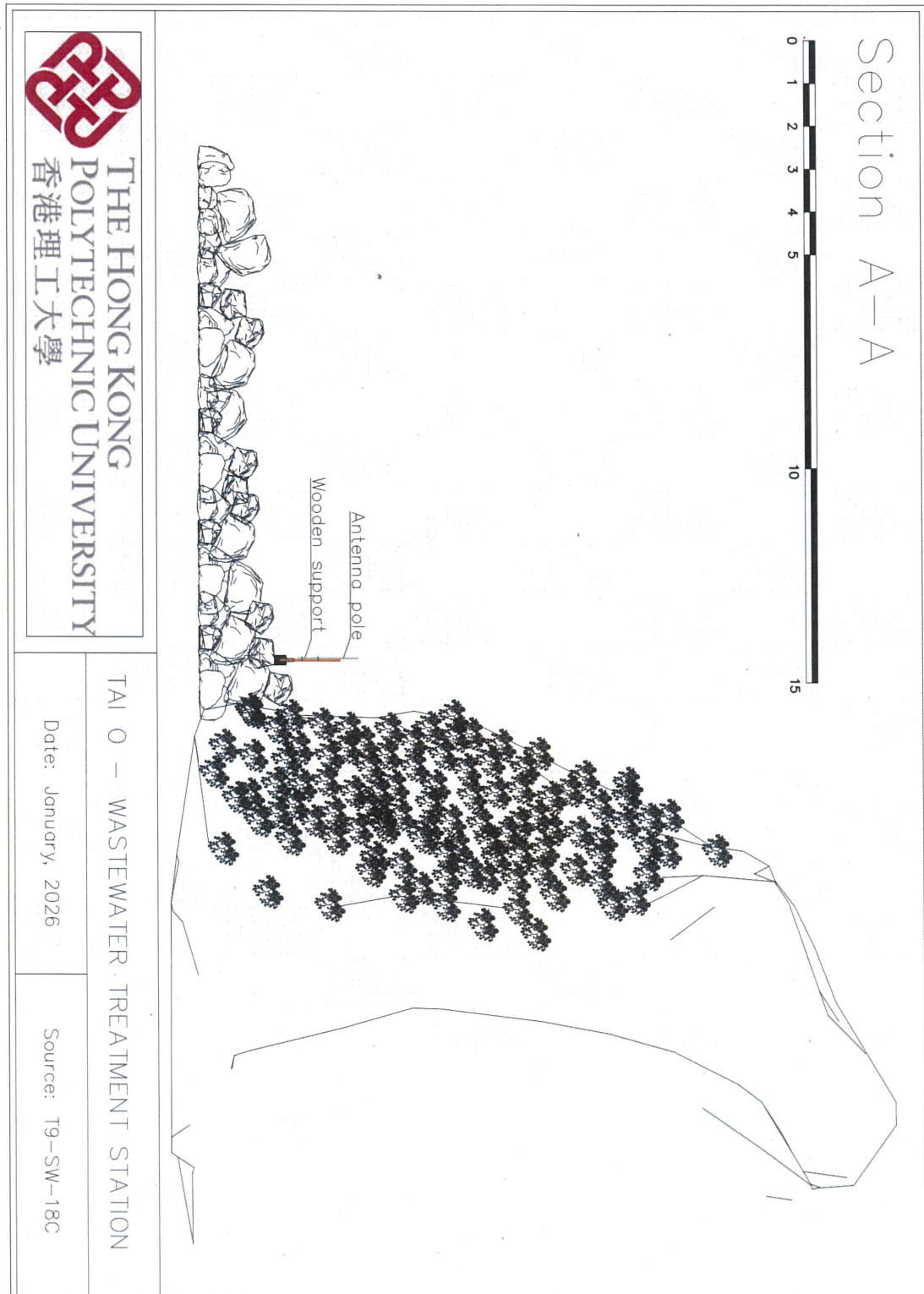
E/RD2, BCM, DSD

Tel.: [REDACTED]

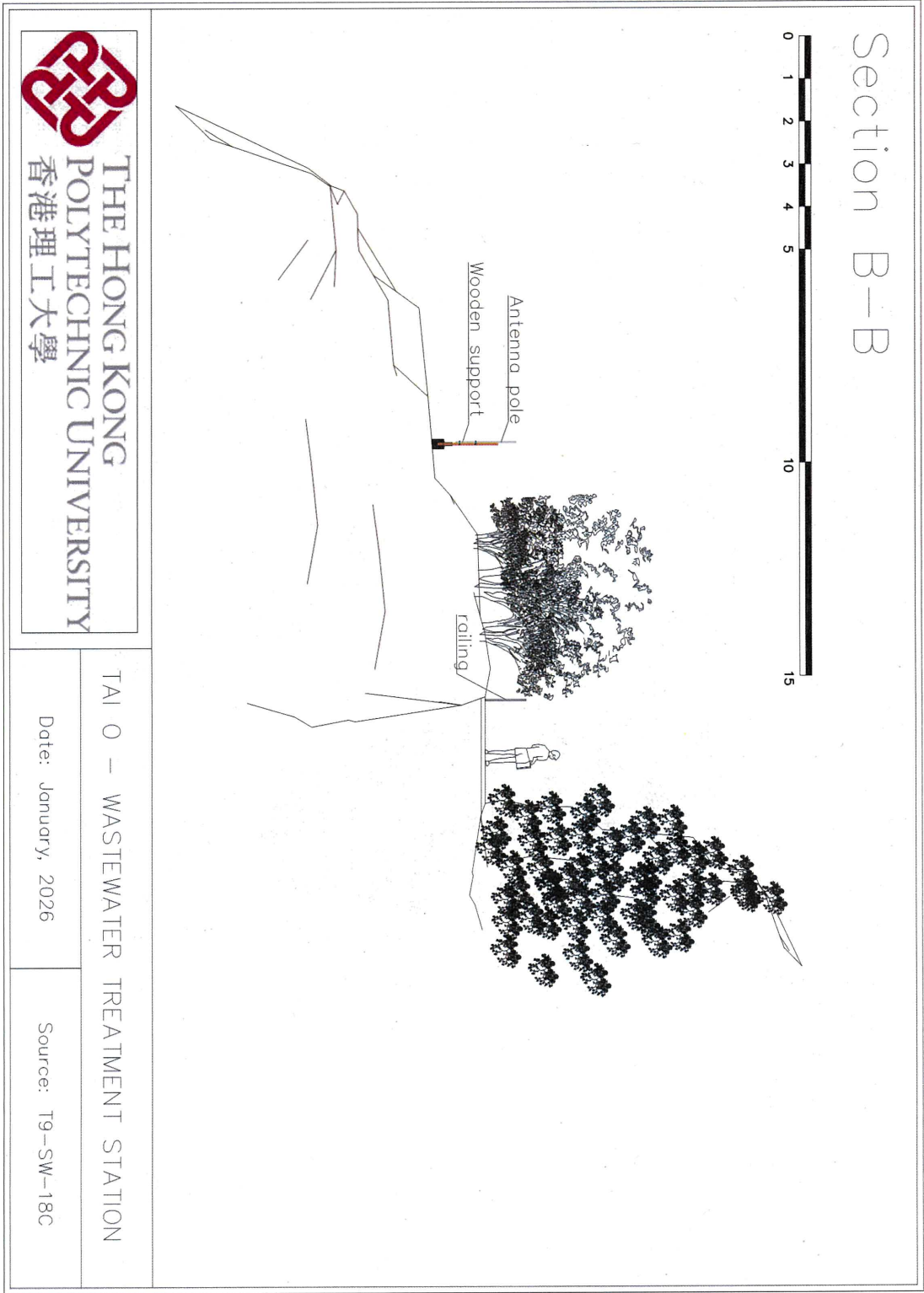
A Tai O - Wastewater Treatment Station - Detailed Plan View



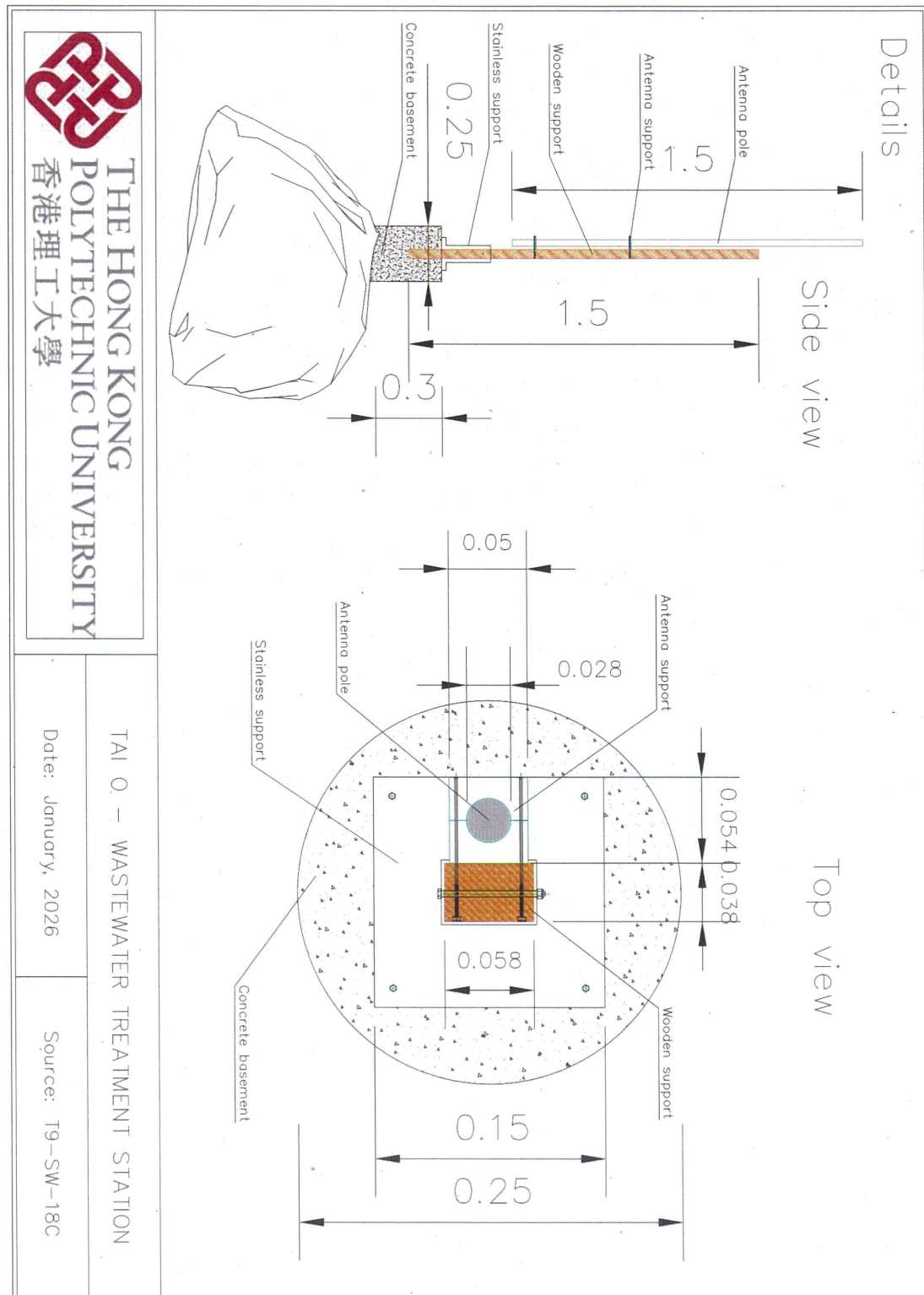
B Tai O - Wastewater Treatment Station - Section AA



C Tai O - Wastewater Treatment Station -
Section BB



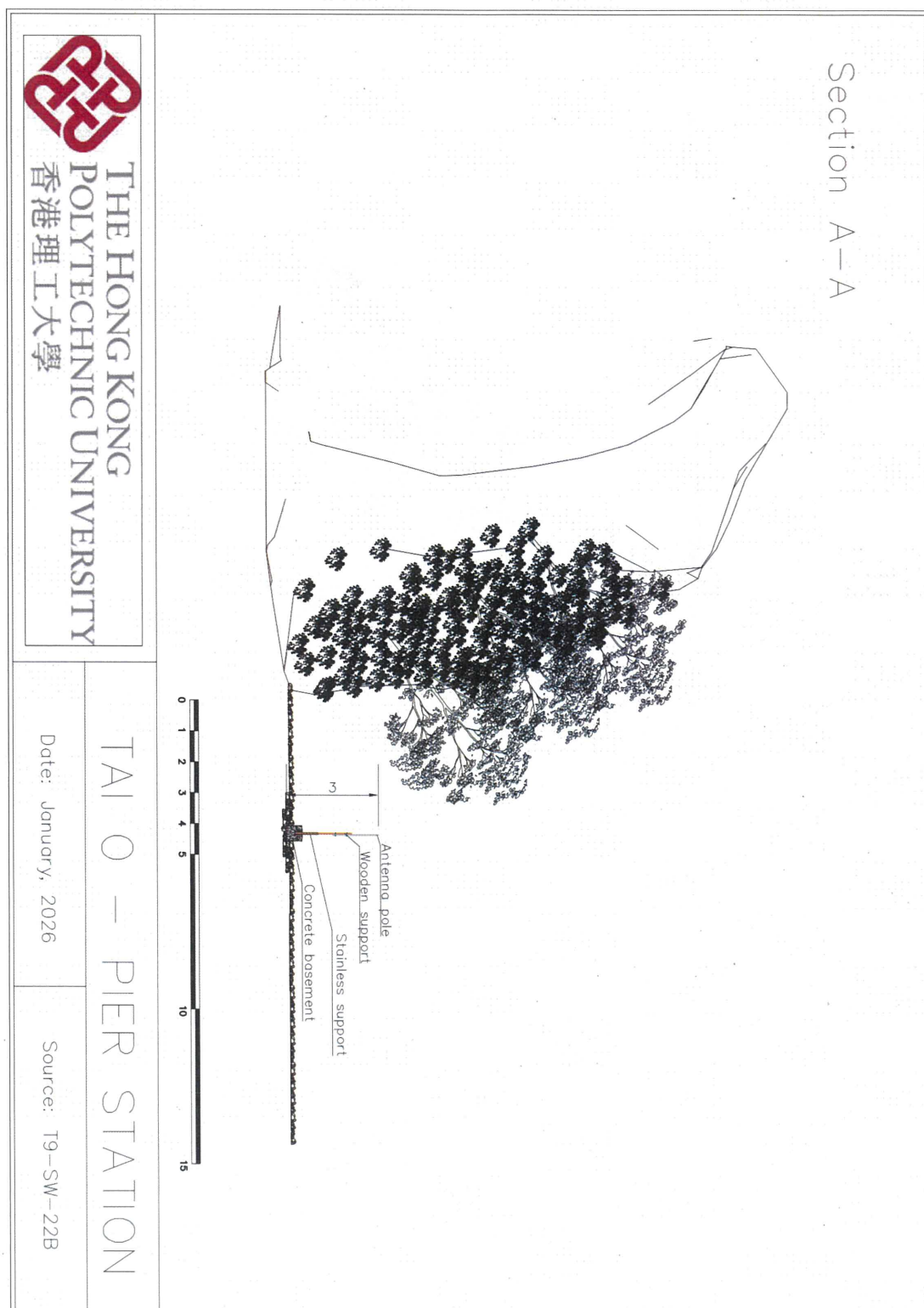
D. Tai O - Wastewater Treatment Station - Antennas Details



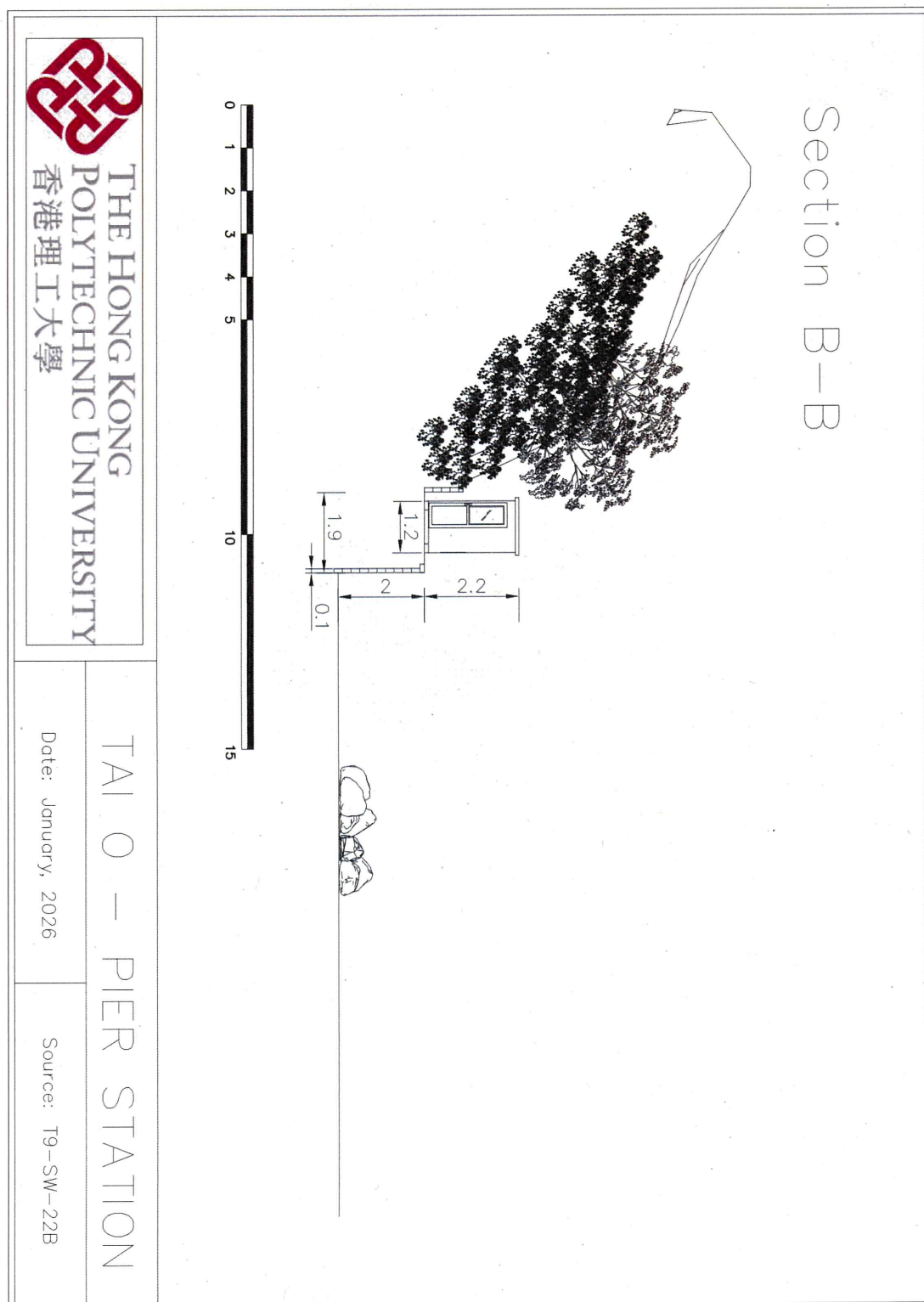
E Tai O - Pier Station - Detailed Plan View



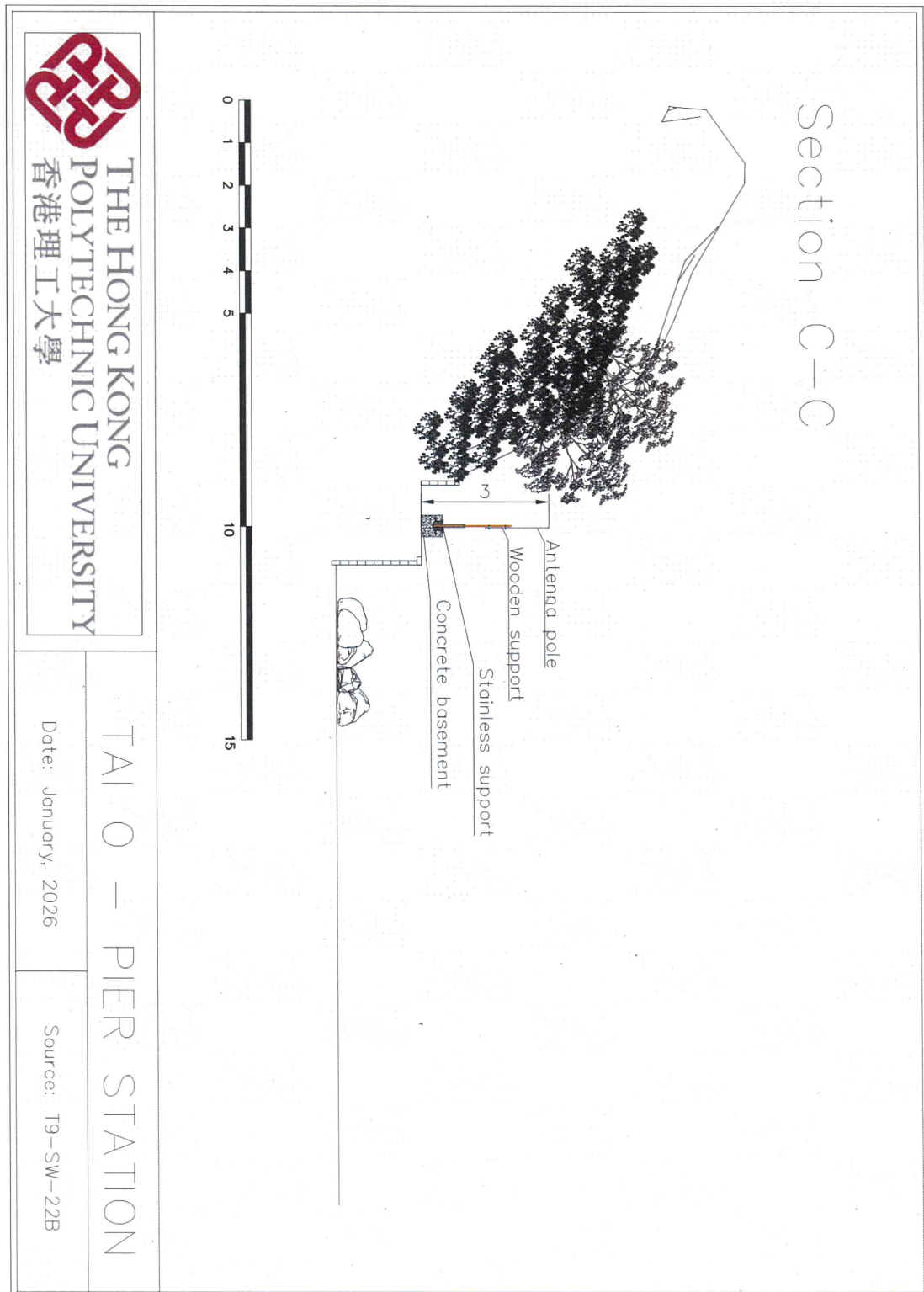
F Tai O - Pier Station - Section AA



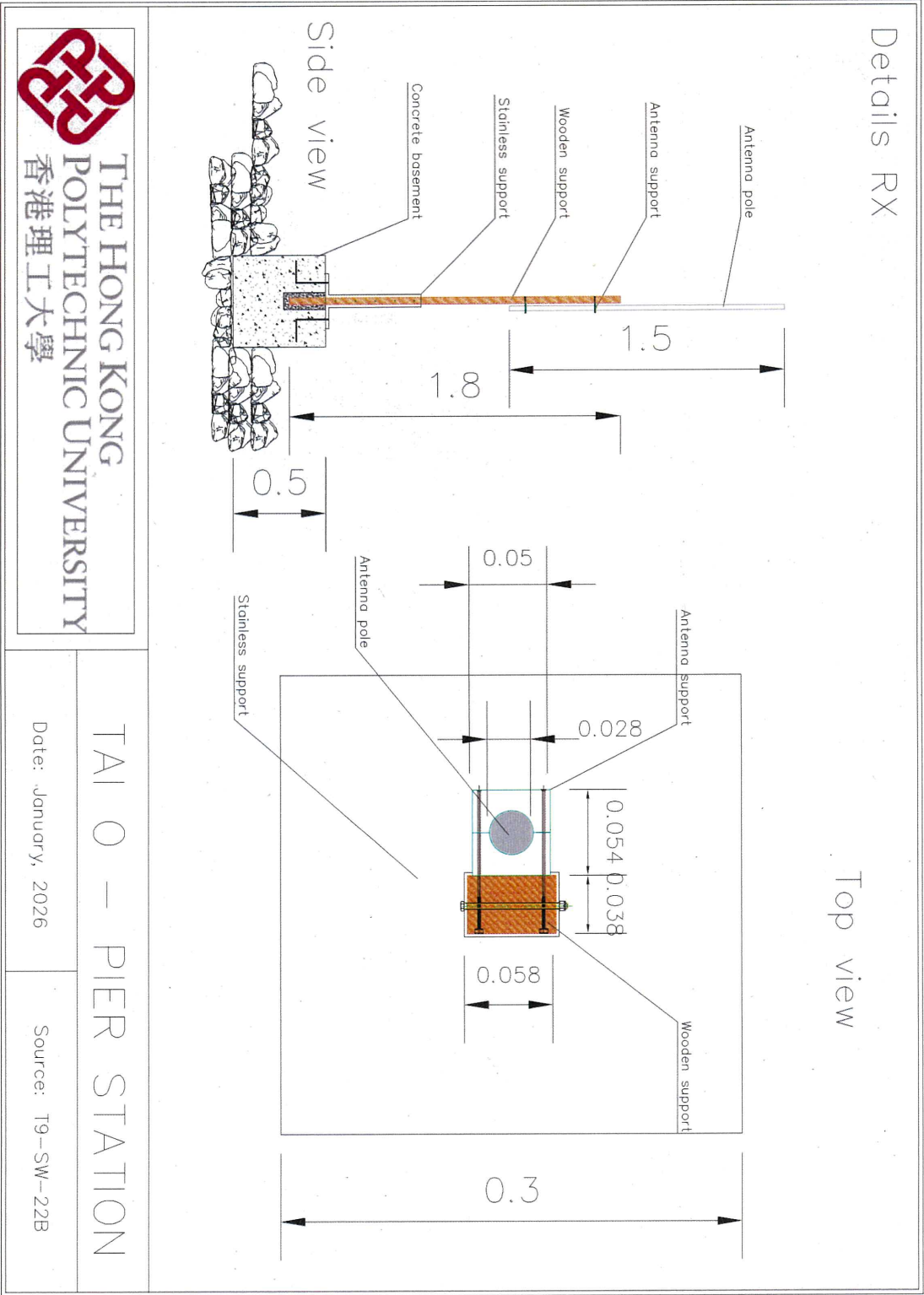
G Tai O - Pier Station - Section BB



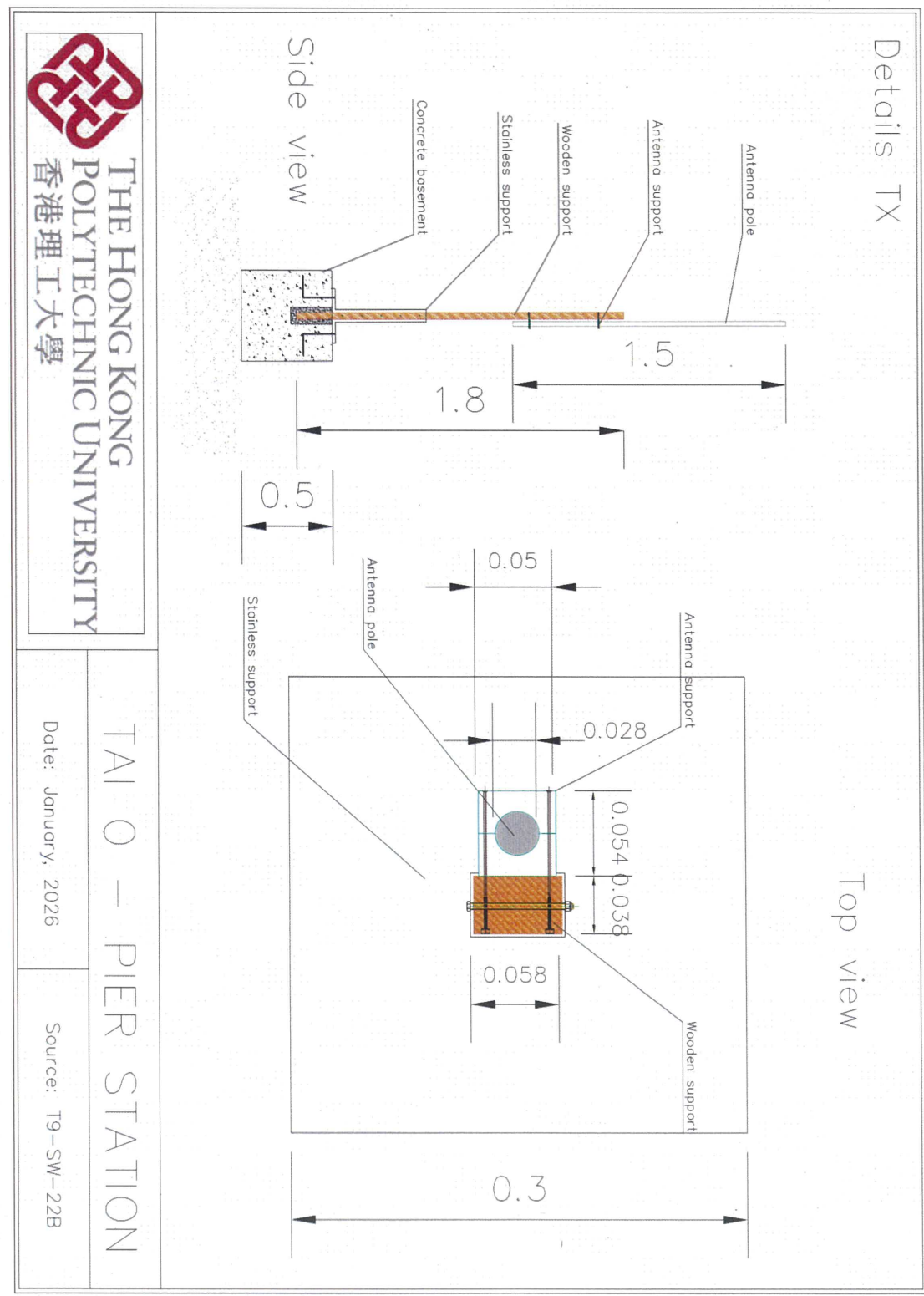
H Tai O - Pier Station - Section CC



I Tai O - Pier Station - RX Details



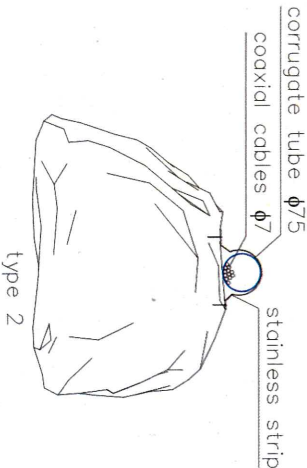
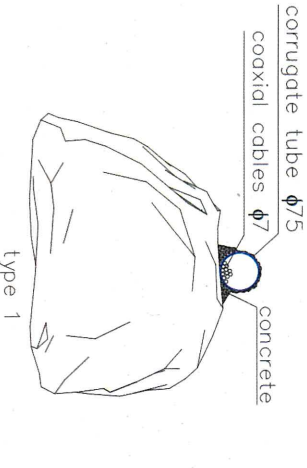
J Tai O - Pier Station - TX Details



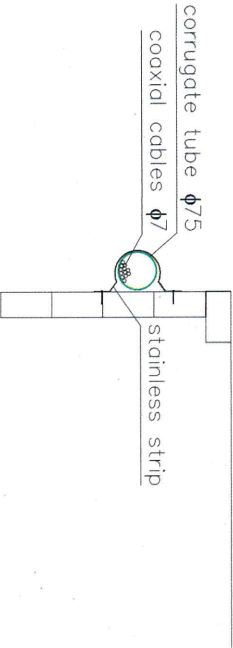
K Cable details - Section 1

Cable laying layouts

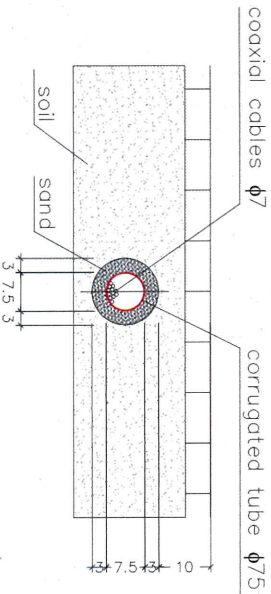
Rock/Soil



Concrete Wall



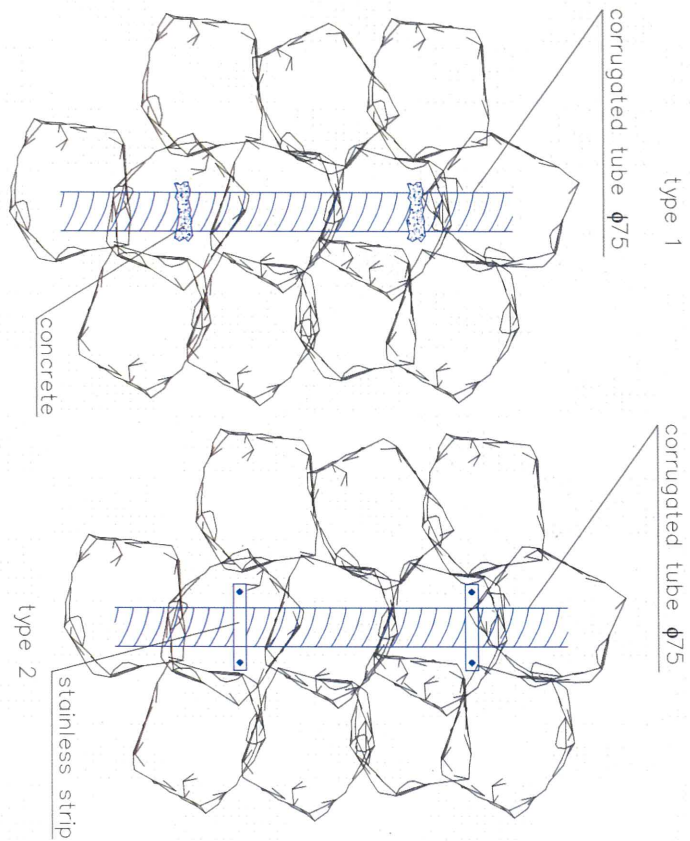
Under-paved



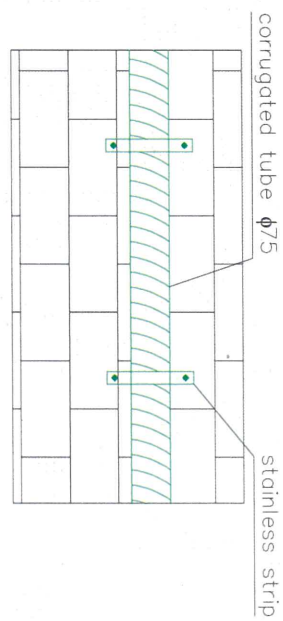
L Cable details - Section 2

Cable laying layouts

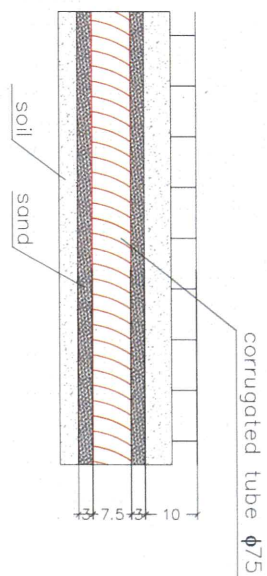
Rock/Soil



Concrete Wall



Under-paved



THE HONG KONG
POLYTECHNIC UNIVERSITY
香港理工大學

CABLE LAYING LAYOUTS

Date: May, 2026

Top/side views

Geotechnical Planning Review Report (GPRR) for Small technical room in Tai O Pier within the RGC project No. C5032-22EF - Hong Kong Coastal HF-Radar Network

1. Introduction

This document contains the geotechnical planning review for placing a small technical room atop the coastal defence wall adjacent to the Old Pier in Tai O. This installation will serve as server room to control and collect data from the new Radar network that will be deployed across Hong Kong waters to enhance the region's coastal resilience to flooding.

This report has been prepared to seek approval from the Town Planning Board under section 16 of the Town Planning Ordinance (cap. 131).

This report contains the following as listed.

- (a) an outline of the topography and geology of the site;
- (b) a general description of the proposed works and discussion of how the existing geotechnical features (such as slopes and retaining walls) and adjacent foundations will affect or be affected by such works.

2. Outline of the topography and geology of the site

The Tai O Pier is a significant feature of the Tai O fishing village on Lantau Island. The Tai O Pier has been a crucial part of the local community for many years, serving as a hub for transportation and trade. It has facilitated the movement of people and goods, connecting Tai O to other parts of Hong Kong and the mainland. The area of coastline behind Tai O Old Pier is not open to the public, with no designated entry points or infrastructure for public use.

The site is characterized by a gently sloping beach that reaches the base of the containment wall. This 2-meter-high vertical structure is built of squared rock; its schematic representation, along with the proposed installation, is shown in *Figure 1*.

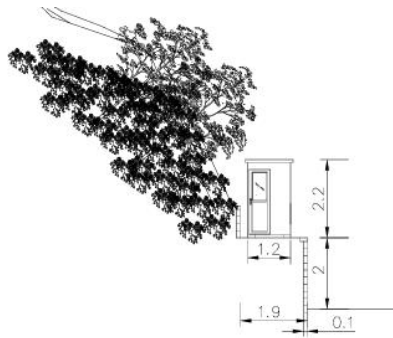


Figure 1 Schematic representation of the containment wall

The location site is shown in *Figure 2*.

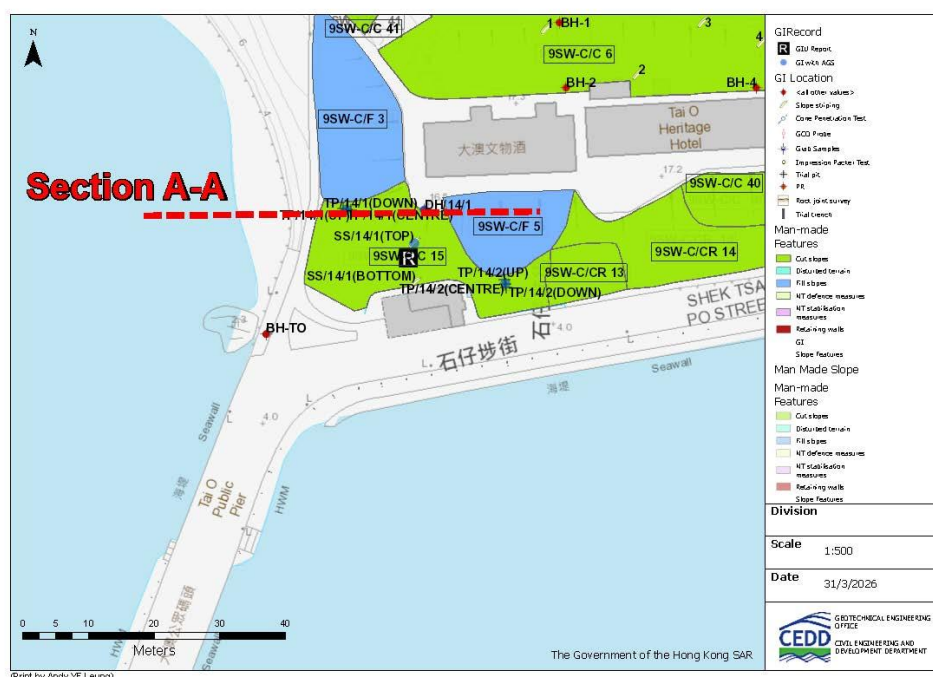


Figure 2 Site layout

The ground investigation information belongs to previous works (LGL, 2001) and the results are summarized in *Table 1*.

Table 1 Nearby borehole information

Borehole ID	Depth range	Soil type
DH/14/1	16.85 to 15.85 meters	Fill
	15.85 to 12.95 meters	Colluvium
	12.95 to 12.75 meters	Colluvium
	12.75 to 10.55 meters	CDT
	10.55 to 5.95 meters	CDT/HDT
	5.95 to 5.83 meters	HDT/MDT
	5.83 to 4.25 meters	CDT/HDT
	4.25 to 4.10 meters	MDT
	4.10 to -3.15 meters	CDT/HDT
	-3.15 to -3.58 meters	MDT
TP/14/1	10.14 to 9.44 meters	Colluvium
	9.44 to 6.54 meters	CDT

The soil parameters employed for analysis and design are based on Halcrow, 2004. The unit weight γ , the effective cohesion c' and the effective angle of friction ϕ' for each type of soil in the area are listed in *Table 2*.

Table 2 Soil strength parameters

Soil Type	γ (kN/m ³)	c' (kPa)	ϕ' (degrees)
Fill	17	0	28

Colluvium	18	6	28
CDT	19	6	35

The design groundwater table is assumed at the toe of the slope according to previous monitoring records (the highest monitored groundwater level: +2.23 mPD).

The slope ground profile was established using the 2020 LiDAR data and field observations (<https://sdportal.cedd.gov.hk/#/en/lidar>).

3. Proposed works

Within the framework of the RGC Project, the primary objective is to deploy a network of low-impact pole-mounted antennas at strategic locations throughout Hong Kong

The data gathered by this network is critical for ongoing hydrological studies and, crucially, for enhancing emergency response protocols during flood events. The system is intended to provide vital real-time information that can support early warning systems, thereby improving public safety and resilience.

The small technical cabin, which is the subject of this geotechnical assessment, is an essential component of this network. Its fundamental purpose is to house on-site server equipment dedicated to the continuous collection, processing, and storage of the radar data transmitted by the antennas.

Based on a comprehensive site evaluation, the optimal location for this cabin has been identified atop the existing beach containment wall, without any foundation works given the temporary nature of the project. Consequently, a detailed assessment of the wall's structural integrity and overall stability is a prerequisite for the safe and feasible installation of this critical infrastructure.

The components are as follows:

- Portable cabin
- Server rack
- AC unit

The embedment depth of the masonry wall is assumed as 0.5 m and its thickness is about 0.1 m. The surcharge load is around 4 kPa with a footprint of the portable cabin of 1.2 m by 1.2 m.

The slope stability is evaluated based on the Category 1 (High) ‘Consequence-to-Life’ requirement.

The geological model was constructed based on the nearby boreholes and information from Section A-A of the feature No. 9SW-C/C 15 (Halcrow, 2004).

In *Table 3* a summary of the stability analysis is provided.

Table 3 Summary of stability analysis with and without surcharge load

Case	Critical FOS (Morgenstern-Price Method)		Acceptable
	Calculated	Required	
Without surcharge load	1.51	1.40	Yes
With surcharge load	1.46	1.40	Yes

Figure 3 and Figure 4 present the results of the stability analysis for both the unloaded condition and the condition with the cabin surcharge load applied.

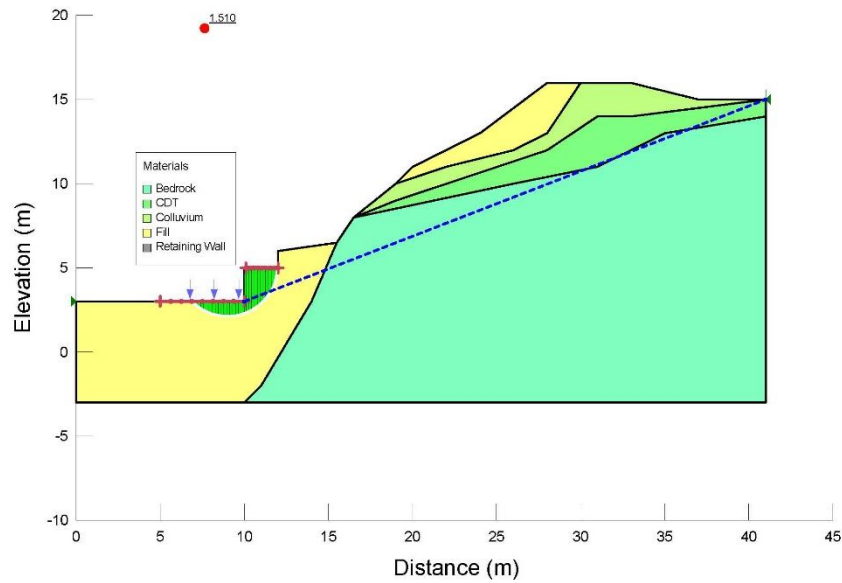


Figure 3 Slope stability analysis without surcharge load

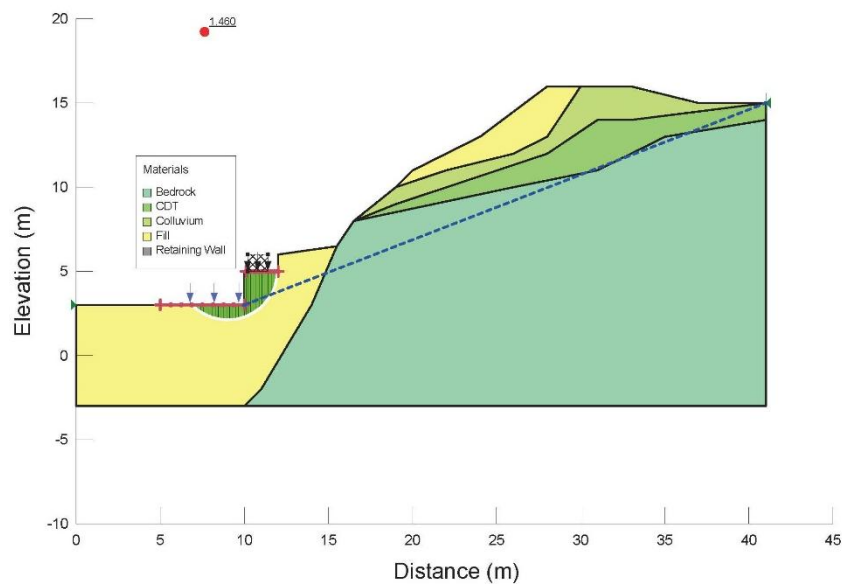


Figure 4 Slope stability analysis with surcharge load

4. Impact on adjacent premises/ geotechnical features

As the existing registered retaining walls and slope might be affected by the positioning of the

portable cabin, consideration shall be taken in the design of the proposed works.

Given the temporary nature of the proposed installation and the intrinsic characteristics of the structure, a lightweight, prefabricated outdoor cabin requiring no foundational excavation, its impact on adjacent structures is considered negligible. This assessment is based on the structure minimal weight and surface-mounted placement. The cabin will be positioned atop the existing wall as a fixed surface load.

Consequently, groundwater control measures are deemed unnecessary for this project, as no excavation or ground penetration works will be conducted.

5. Conclusion

Based on the available geotechnical information, the following conclusions and recommendations are drawn:

- (a) The proposed installation as presented is considered as a geotechnical feasible scheme.
- (b) No groundwater control scheme shall be considered in design.
- (c) Stability of all slopes (man-made and natural terrains) and retaining walls within or in vicinity to the lot resulted not to be affected by the presence of the portable cabin.

Based on the current assessment, the proposed development is considered geotechnically feasible.

References

- De la Varga, M., Schaaf, A., & Wellmann, F. (2019). GemPy 1.0: open-source stochastic geological modelling and inversion. *Geoscientific Model Development*, 12(1), 1-32.
- LGL (2001). Ground investigation fieldwork report. *Works Order No. GE 2001/08/GI/14*
Feature No. 9SW-C/C15. Contract No. GE/2001/08.
- Halcrow China Ltd (2004). Feature No. 9SW-C/C 15 Tai O police station, Tai O, Lantau. *CED*
Contract No. GE/2002/17.