

Comments from: Geotechnical Engineering Office, Civil Engineering and Development Department

Contact Person: Mr. T K TSE Tel.: 2762 5384

The Geotechnical Engineering Office has the following comments on the Geotechnical Planning Review Report (GPRR) for the captioned application.

1. Section 3: It is noted that the proposed development includes the placement of a portable cabin on the crest side of an unregistered existing wall. Although the global slope stability has been reviewed in the GPRR, the applicant should include assessment of the wall stability, with consideration of the wall dimensions. Furthermore, the full input and output of the slope stability analyses should be provided in the GPRR.

We have now included the full input and output file of slope stability analysis. The wall stability calculations are also included. Please note that as the wall is unregistered, we can only estimate its dimensions based on our observations and measurements on site.

2. Apart from the existing wall, the applicant should discuss whether the proposed development may affect or be affected by other existing man-made features nearby.

The cabin will be located underneath the slope feature No. 9SW-C/C 15 and may be affected in case a slope failure occurs at this feature. However, since this feature has been designed and upgraded to meet current slope standards, we believe the risks are minimal.

No existing man-made features or registered/unregistered geotechnical features were identified within the zone of influence of the proposed development.

3. It is noted from the Supporting Statement that the proposed portable cabin is for housing the server equipment and is small in nature, which is not intended to be a manned facility. Given the statement in Section 3 of the GPRR that ‘the slope stability is evaluated based on the Category 1 (High) “Consequence-to-Life” requirement’, please clarify the Consequence-to-Life category of the cabin and update the report text as necessary.

We agree that the portable cabin is small in nature and not intended to be a manned facility. We had initially followed the criteria for the registered slope

feature (No. 9SW-C/C 15) above the cabin, which was Category 1 “Consequence-to-Life”. We showed that the global slope stability can satisfy the requirements even for this category. We have no objection to if this can be lowered.

4. In connection to para. 2 above, the applicant may consider to relocate the proposed portable cabin to the toe side of the unregistered existing wall. Should the Consequence-to-Life category be defined as Category 3 (as an unmanned facility), the requirement of the wall stability analysis can be waived.

Unfortunately, relocating the cabin to the toe side would not be suitable for our purposes, since the area at the toe is a beach subject to high tidal excursions, meaning that, in case of a temporary storm surge, the cabin could be exposed to seawater. The sensitive electrical and server equipment could be damaged in this case.

Comments from District Planning Officer/Sai Kung & Islands, Planning Department

Contact Person: Mr. Dicky CHAN Tel.: 2158 6056

Please note our comments below on the captioned application for clarification purpose.

- (a) Please elaborate on site selection criteria for suitable location(s) to set up the radar installation within AOI1.

The selection of the radar installation locations within AOI1 (Pearl River Estuary) was guided by the following technical and environmental criteria:

- **Unobstructed Sightlines:** The radar technology requires an open, uninterrupted line of sight to the horizon across the water to ensure accurate data collection and maximum signal propagation. Both selected shorelines offer clear paths mostly free of physical obstruction.
- **Safety and Security (Non-Recreational Isolation):** To eliminate potential public conflicts, accidental interference, or vandalism, sites with naturally restricted or non-existent public access were prioritized. The rugged, rocky, and steep coastal nature of these locations naturally deters public traffic.

- **Proximity to Existing Infrastructure:** Sites were chosen where they could leverage existing technical facilities or retaining structures to minimize new land footprint, environmental disruption, and visual impact. Radar operation requires power supply, the vicinity to an available power line is a fundamental requirement.
- **Strategic Meteorological Positioning:** Locations directly exposed to incoming coastal weather dynamics were selected to facilitate the earliest possible detection of storm surges and wave phenomena, maximizing the system's value as a hazard early-warning tool.

The design of the HF radar network followed the international best practice used worldwide for the deployment and operation of coastal radars for ocean monitoring. The best practices have been published in several technical and scientific reports, see for example.:

Cook, T., Hazard, L., Otero, M., & Zelenka, B. (2008). Deployment and Maintenance of a High-frequency Radar (HFR) for Ocean Surface Current Mapping: Best Practices.

Mantovani, C., Corgnati, L., Horstmann, J., Rubio, A., Reyes, E., Quentin, C., ... & Griffa, A. (2020). Best practices on high frequency radar deployment and operation for ocean current measurement. *Frontiers in Marine Science*, 7, 512304.

(b) In view of (a), please elaborate on the suitability of the two locations in Tai O, any interrelationship between these two locations, and the need to have two separate locations for the proposed installation.

Both Tai O sites perfectly meet the site criteria. The Wastewater Treatment Station site features an isolated rocky coastline and an existing technical utility room, while the Tai O Pier site uses an offline, non-public retaining wall structure with a direct, unobstructed horizon line facing toward the Pearl River Estuary.

Indeed, High-Frequency Radar (HFR) networks operate using spatial cross-bearing principles. A single radar station can only measure radial components of sea surface velocities. To continuously map comprehensive, two-dimensional total

velocity fields and wave dynamics across a broad zone like AOI1, a multi-station network configuration is mandatory. Operating both the Wastewater Treatment and Pier stations simultaneously fills the localized observational gaps, expanding high-resolution monitoring coverage seamlessly across the Pearl River Estuary and Hong Kong's Central Waters. Moreover, both stations in Tai O will be overlapped with a station placed in Tuen Mun to cover an area of approximately 600 km².

(c) Please elaborate if the proposed installation will have any safety concerns and potential nuisance during construction and operation stages.

□ **Construction Stage:**

- **Negligible Noise & Air Pollution:** No heavy machinery will be utilized. Installation involves manual placement of pre-assembled equipment and hand-held tools. There will be minimal concrete usage, no burning, or earth-moving activities that generate dust or environmental runoff.
- **No Ecological Disruption:** All cabling will either follow existing pathways, sit directly on surface rocks/soil, or navigate underneath paved slabs via a highly restricted, temporary shallow trench. No trees or root systems will be cut, trimmed, or felled.

□ **Operation Stage:**

- **Acoustic Mitigation:** The only fixed source of noise is the external server AC unit, strictly designed not to exceed **50 dB**, making it acoustically imperceptible against ambient coastal sounds.
- **No electromagnetic pollution:** the HF radar are designed to work with a minimal power not harmful for humans or animals. The equipment that will be installed has been certified by the EU. Moreover, High Frequency (HF) radars do not represent a physical risk for marine mammals like dolphins. Operating primarily above the water's surface to track ocean surface currents, they transmit electromagnetic waves rather than underwater sound waves. Consequently, they do not interfere with marine life's acoustic communication or echolocation. This is important since white dolphins are frequently observed around Lantau Island.
- **Visual Footprint:** The receiving antennas have a very small profile (approx. 3 cm in diameter) and are virtually invisible from land. All antennas will be

coated in a neutral sandy colour to harmonize with the shoreline rock. At the Pier site, the compact server cabin will be fully masked utilizing a camouflage net or painting the cabin to better match the existing natural tree canopy.

- (d) According to the supporting statement, please provide the permission proof for the operation the HF-radars emissions issued by the Office of the Communications Authority (OFCA).

Please find attached to the revised application the official permit copy issued by OFCA for your verification

- (e) Please concisely provide information on the operational details of the proposed installation, from (i) how the cables support the antennas and server room from power supply; (ii) how the antennas collect data from the sea; (iii) how the collected data is processed by the server room and transmitted to the laboratory; and (iv) how the data will be shared with government departments.

□ **(i) Power Supply and Cabling:** Main electrical power will be fed directly from separate, designated lines co-located seamlessly next to pre-existing utility supply boxes on-site. High-bandwidth coaxial cables (7 mm housed within protective 75 mm corrugated tubes) bundle all data streams together cleanly. These are secured directly to rock faces via minimal cemented strips or integrated along facility boundaries without earthworks.

□ **(ii) Ocean Data Collection:** The active transmitting (TX) antennas emit safe, low-power high-frequency radio waves across the target marine environment. The 12-element passive receiving (RX) antenna arrays capture the backscattered waves reflecting off the moving sea surface, calculating superficial current speeds and wave heights in real time.

□ **(iii) Processing and Lab Transmission:** Raw incoming signals move sequentially through the main cable run into the central computational workstation housed securely within the server rooms (the existing DSD storeroom at the Wastewater plant or the portable cabin at the Pier). Automated onsite software processes the data, which are subsequently sent to the university server using built-in **Data Management Framework** software. The framework allows direct integration into environmental data servers. Data can be transferred and shared via **OPENDAP**, **THREDDS** (Thematic Real-Time Environmental Distributed Data Services), or **OGC Web Services** (such as WMS and WCS).

□ **(iv) Government Data Sharing:** Collected current and wave data will be fully integrated into an open-access, non-profit data-sharing platform. This data will be supplied completely free of charge to key partner departments—including the Hong Kong Observatory (HKO), Civil Engineering and Development Department (CEDD), and Drainage Services Department (DSD)—to refine real-time marine weather forecasting, coastal defence designs, and regional flood mitigation schemes.

(f) Please provide information for the below table for better clarify on the proposed installation. Attached please find 2 site plans for reference.

(g) It is noted that the server cabin height is stated as 2.2m in Appendix G but 2m in the Application form. Please revise.

As formally designated in the cross-section of **Appendix G (Section B-B)**, the structural height of the portable server cabin is **2.2 meters**. The text within the standard Application Form will be promptly revised and corrected to **2.2m** to maintain alignment with the official architectural layout drawings.

Locations	Zoning	Antennas	Sub-Area (A)	Cables	Sub-Area (B)	Server Room	Sub-Area (C)	Total (A+B+C)
Location (a) Tai O – DSD Imhoff Wastewater Treatment	“OU(STW)”	10 Antennas (0.25m x 0.25m x 2m) (W x L x H)	0.625m ²	35.15 m x 0.1m in width	3.515 m ²			4.14 m ²
	“CPA”	4 antennas (0.25m x 0.25m x 2m) (W x L x H)	0.25m ²	86.85 m x 0.1m in width	8.685 m ²			8.935 m ²
	Sub-Total		0.875m²	122m	12.2 m²			13.075m²
Location (b) Tai O – Public Pier	“CPA”	12 Antennas (0.3m x 0.3m x 2.8m) (W x L x H)	1.08m ²	108.05 m x 0.1m in width	10.805 m ²			11.885 m ²
	“GB”	2 antennas (0.3m x 0.3m x 2.8m) (W x L x H)	0.18m ²	52.95 m x 0.1m in width	5.295 m ²	1.2m x 1.2m x 2.2m (W x L x H)	1.44 m ²	6.915 m ²
	Sub-Total		1.26m²	161m	16.1 m²		1.44 m²	18.8 m²
<u>Grand Total</u>			<u>2.135 m²</u>	<u>283m</u>	<u>28.3 m²</u>		<u>1.44 m²</u>	<u>31.875m²</u>

**Comments from Landscape Unit, Urban Design & Landscape Section,
Planning Department**

Contact Person: Mr. HUI Chun Sing Tel.: 3565 3951

1. Section 5.3.5 of the Supporting Statement mentions that “*the proposed installation area is entirely clear of any tree root systems or overhead canopy coverage.*” However, in the same paragraph, the applicant mentions that the cabling will traverse the wooded area behind the Sewage Treatment Plant. The information provided cannot demonstrate that the installation will not cause adverse impacts on the existing trees and distinctive landscape character/resources, i.e., coastal protection area and green belt;

The proposed cable routing does not involve any traditional trenching or sub-surface excavation within the natural terrain. Instead, the cables will be entirely enclosed inside a high-durability, flexible conduit and laid on the surface of the ground.

Field surveys demonstrate that the corridor behind the existing facility consists predominantly of a thick, natural layer of leaf litter, fallen twigs, and clear organic ground coverage, with no structural living root systems breaching the surface along this specific path. Because the flexible conduit simply rests on top of this superficial organic layer, it exerts minimal mechanical pressure on the underlying soil and eliminates the risk of root severance or bark damage.

The flexibility of the conduit allows for real-time adjustments during the physical installation phase, enabling the field team to manually guide the path around any minor surface vegetation, trunks, or natural obstacles without causing any physical impact. Furthermore, this method ensures that no heavy machinery or mechanical excavators will enter the wooded zone, as the entire deployment process will be carried out manually with zero disturbance to the subterranean root systems of the surrounding trees. Upon completion of the installation, the local ground profile and landscape character will remain entirely unaltered, ensuring full compliance with the strict non-intrusive

preservation guidelines required for the area.

2. the dimensions of the power supply and connection mentioned in Figures 11 and 20 are not provided to demonstrate that no adverse landscape impact would be caused.

To demonstrate that the proposed power supply connection will not cause any adverse visual or landscape impact, we provide the exact dimensions and specifications below:

- **Dimensions:** The proposed power supply enclosure will be highly compact, with dimensions **not exceeding 500mm (W) x 700mm (H) x 250mm (D)** and will be planned to be attached to the existing facilities.
- **Visual Mitigation:** The enclosure is highly compact and will be finished in an **earth-tone / matte dark green / grey colour** to match the existing utility infrastructure of the nearby facilities.
- **Placement:** It will be installed directly adjacent to existing concrete structures/utilities to ensure it does not create a new visual intrusion or disrupt the natural skyline of the Coastal Protection Area.

Comments from District Planning Officer/Sai Kung & Islands, Planning Department

Contact Person: Mr. Dicky CHAN Tel.: 2158 6056

In view of the above comments from the Landscape Unit, please consider whether a Landscape Proposal should be prepared to properly assess the potential landscape impacts of the proposal.

Comments from Environmental Protection Department

Contact Person: Ms. Tiffany CHEUNG Tel.: 2835 1836

1. Section 5.3.3 and 6.3.3

- a. Please clarify if the concrete basement is existing structure near the Tai O sewage treatment facility / sandy beach. If not, the relevant waste arising should be addressed.

We clarify that the concrete basement for the antennas is a **new, strictly pre-cast concrete basements**, see details in the next point.

- b. Since concrete basement would be used for antennas supports, please confirm and state that the concrete is pre-cast and directly placed over the rocks, and no concreting works would be involved during construction phase.

We confirm that the main structural support blocks are pre-cast to eliminate major on-site concrete works. To ensure structural stability against wind loads and properly adhere the pre-cast bases to the uneven natural rock surface, only localized anchoring works will be involved:

- The pre-cast blocks will be secured via mechanical rock-bolts or dowels.
- A **minimal, localized amount of high-strength non-shrink grout/bonding mortar** will be applied strictly beneath the footprint of the pre-cast base for levelling and adhesion purposes.
- **No mass wet concreting works or concrete mixing** will take place near the shoreline.
- To eliminate any risk of runoff into the sea, dry-grouting or ready-to-use pre-mixed mortar bags will be used, and protective bunding (such as plastic sheets/sandbags) will be placed around the immediate work area during application and curing.

2. Section 5.3.4

- a. It is noted that excavation would be involved. Please confirm whether only hand held tools would be used, and supplement key mitigation measures for dust control.

We confirm that any minor excavation required (e.g., for cable laying)

will be carried out **strictly using hand-held tools**. Heavy machinery will not be used.

- b. Please confirm that the project would have no emission, and would not introduce any project ASR during operation phase.

We confirm that the proposed project is fully electrically powered and will have **no gaseous emissions**. Furthermore, as this is an unmanned utility installation, it **will not introduce any project Air Sensitive Receivers (ASRs)** during the operation phase.

3. Section 5.3.5 and 6.3.5

- a. Please advise the waste estimation, handling arrangement, reuse/disposal outlet of various waste types (e.g. inert C&D materials, non-inert C&D materials, chemical waste and general refuse from workforce, etc.) and any mitigation measures for the waste management of the proposed works at Section 5 (refers to as “Station: Tai O - Wastewater Treatment Station”) and Section 6 (refers to as “Station: Tai O - Pier”) respectively.

Due to the pre-fabricated nature of the system, waste generation will be minimal:

- **Inert C&D materials: Zero.** There will be no excavation of natural terrain, hence no generation of inert C&D waste.
- **Non-inert C&D materials & General Refuse:** Minimal packaging materials and general refuse during the installation works. This will be collected daily in garbage bags (Estimated at less than 0.01 m^3) and disposed of at designated **FEHD** refuse collection points.

Based on the detailed construction specifications, the excavation for the under-paved cable routing is minor and localized:

- **Dimensions:** The trench measures 2.43 meters in length, 13.5 centimetres in width, and 23.5 centimetres in depth, yielding a total excavation volume of approximately **0.077 m^3** .
- **Handling & Disposal Arrangement:** Since the trench will be backfilled with a sand cushion envelope around the $\phi\ 75\text{ mm}$

corrugated tube, topped with soil, and reinstated with concrete to the finished ground level, the net surplus inert C&D material generated for disposal (mainly the broken concrete crust from the initial opening) is negligible, **less than 0.03 m³** (equivalent to a couple of standard buckets).

- **Disposal Outlet:** This minimal surplus will be sorted on-site, bagged, and transported by the contractor to a designated CEDD public filling facility (e.g., Tuen Mun Area 38 Fill Bank) in accordance with the Trip Ticket System.

- **Chemical Waste: Zero.** No chemical waste will be generated during construction or operation.

- b. Please revise the following sentence: ~~“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. The planned fixed noise sources (e.g. external AC units, communication equipment, ventilation/cooling fans in server rooms, etc.) will be designed, with necessary noise mitigation measures, to fully comply with the relevant requirements in HKPSG.”~~

As requested, we have updated the Application to include the required commitment.

1. Please highlight all changes in the next submission.

Noted.

Comments from District Planning Officer/Sai Kung & Islands, Planning Department

Contact Person: Mr. Dicky CHAN Tel.: 2158 6056

Please note our further comments below on the captioned application for clarification purpose.

(h) Referring to some public comments made on the application, please advise the follows:

- (i) given the distant coastal locations of the proposed installation, please advise the protective and monitoring measures in case of malfunctioning or damage of the facilities caused by adverse weather and strong storm surges;

While every effort will be made to safeguard the field equipment, the installation is designed with a decentralized architecture to minimize financial and operational risk. The most high-value and critical component (the main server) is housed safely indoors/onshore, away from the exposed coastal elements.

For the field components, the following protective and monitoring measures are implemented:

- **Physical Protection and Lightning Mitigation:** The outdoor antennas and structural mounts are designed to be low-profile and ruggedized to withstand coastal weather. Furthermore, the installation is equipped with a dual lightning protection system to mitigate the risk of electrical surges and damage during extreme weather events.
- **Remote Monitoring:** The system uses continuous remote monitoring system. In the event of extreme weather causing a malfunction or physical displacement of an antenna, the technical team will receive an immediate automated alert, allowing for rapid deployment and replacement of the low-cost components as soon as conditions are safe.

- (ii) please justify if the proposed installation would cause impacts on marine creatures, fishery operations and use of coastal area by nearby residents;

The proposed installation is anticipated to have no adverse impact on marine life, local fishery operations, or nearby residents due to the physical nature and safety parameters of the technology used:

- **Electromagnetic Safety and Low Power Output:** The high-frequency (HF) radar system operates at an extremely low power output and emits exclusively non-ionizing radiofrequency radiation. As recognized by the World Health Organization (WHO), this type of energy lacks the power to cause cellular or thermal damage to human or animal health. The emission levels are minimal and safe, operating at parameters comparable to standard everyday technologies such as mobile phone networks.
- **No Acoustic Impact on Marine Mammals (Chinese White Dolphins):** Unlike sonar or other underwater technologies, HF radars operate entirely above the water's surface to track ocean currents and waves. They transmit electromagnetic waves through the air rather than acoustic waves underwater. Consequently, the system does not interfere with the acoustic communication, echolocation, or behaviour of marine mammals, including the Chinese White Dolphin.
- **Spatial and Operational Compatibility:** The physical footprint of the radar equipment does not obstruct marine navigation, local fishery operations, or the general public use of the coastal area by nearby residents.

(iii) as mentioned in the supporting letter from DSD in your submission, please advise whether local consultation has been arranged to collect and address public concerns before the commencement of the works; and

To clarify the procedural timeline, a formal local public consultation has not been initiated at this stage. In line with standard administrative practices for high-technology research infrastructure, it was understood that public or stakeholder consultation would be more appropriately coordinated following the initial land allocation/approval from the relevant authorities. We remain open to provide technical clarifications to local stakeholders through the appropriate government channels if required.

(iv) whether the proposed installation would be further expanded in Tai O in a later stage of the research in addition to the current scale and extent.

There is no plan to expand the physical scale, footprint, or dimension of the current installation in Tai O. The objective of any future phase of this research would be an extension in **time**, not in size. Gathering data over a longer duration will allow capturing seasonal variations, which translates to more

reliable and accurate meteorological forecasts without increasing the physical imprinting of the equipment in the area.

We note that any such future arrangement would proceed through the appropriate planning review channels via the Town Planning Board.

Comments from District Planning Officer/Sai Kung & Islands, Planning Department

Contact Person: Mr. Dicky CHAN Tel.: 2158 6056

Please find the following concerned departmental comments (Batch 5) as at 6.7.2026 of the captioned application No. A/I-TOF/9 for your information and necessary action.

- (i) It is noted from your detailed plans D, I and J, the heights of the whole antennas (concrete basement, stainless support, wooden support, antenna support and antenna pole) seem to exceed 2m as stated in the application form. Please clarify the correct heights for antennas of two locations.

We would like to clarify the heights indicated in Plans D, I, and J, and provide the exact measurements for both locations:

- **Tai O Wastewater Treatment Works Location:** At this location, all antennas (both RX and TX), including their respective basements, supports, and poles have a total height of **2.0 meters** from the finished ground level.
- **Tai O Pier Location:** The total combined height at this location is **2.8 meters**. This additional height is an engineering requirement driven by localized environmental conditions. Specifically, the structure must be elevated to **withstand extreme tidal fluctuations and storm surges** at the pier, ensuring the sensitive antenna equipment remains safely above the maximum high-water level during adverse weather.

Please note that the structural base and supports remain minimal, and the upper section consists solely of lightweight, thin antenna poles with negligible visual bulk or physical footprint.