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LOCAL VESSELS ADVISORY COMMITTEE

Arrangement for Extended Deployment of Real-time Water Quality Monitoring Station off Tsuen Wan Park

Purpose

Members are invited to note the details of the arrangement for extended deployment of a real-time water quality monitoring station off Tsuen Wan Park as set out in this information paper.

Background

2. With an objective of strengthening regional marine environmental monitoring in the Greater Bay Area, the Environmental Protection Department (EPD) conducted a 2-year trial scheme on the application of a real-time on-line water quality monitoring system (System) in local coastal waters in 2021. The System was installed on a tailor-made scientific buoy deployed off Tsuen Wan Park.

3. The two-year pilot trial was successfully completed and demonstrated that the monitoring system could operate and work well in respect of its monitoring function, maintenance and operational marine safety. It played an important role in regional marine environmental monitoring for Hong Kong waters. The system is equipped with multiple sets of sensors and data transmission equipment, which can monitor hydrological and water quality conditions at high frequency where the monitoring data could be continuously transmitted in real time to the Smart Water Science Centre of EPD, supplementing the existing routine monitoring plan. The real-time data collected serves the following purposes, including (i) the calibration and verification of the hydrodynamic and water quality model; (ii) the real-time analysis of changes in environmental factors such as tidal level, hydrology and weather conditions, etc.; and (iii) the provision of accurate real-time hydrological and water quality information, thereby facilitating the

formulation of quick response actions to tackle occasional pollution or emergency environmental incidents.

Proposal

4. For maintaining the consistency in the real-time water quality monitoring approach, we propose to redeploy the scientific buoy after servicing at the same location as adopted in the pilot trial (22° 21.942' N 114° 06.646' E, which is about 80m offshore in between Tsuen Wan Ferry Pier and Tsuen Wan Park) (**Appendix A and B**).

5. The concerned scientific buoy comprises of three main components including scientific instruments for measurement and sensing; communication and data transmitting equipment; and a power unit to harness and store solar energy. The system is self-contained and running automatically to conduct real-time monitoring of water quality, tidal and meteorological conditions. No discharge will be generated during the operation of monitoring system as all the analyses will be carried out optically or acoustically with no chemical reaction needed. The performance of the buoy will be closely monitored via remote terminals and mobile phones. Routine maintenance needs to be conducted only monthly, at most.

6. The sensing instruments installed on the scientific buoy include an Acoustic Doppler Current Profiler (ADCP) for capturing the wave and current data; multi-parameter water quality sensors for monitoring the water quality status; a compact weather station for recording meteorological conditions; and cameras for capturing the condition of the surrounding environment near the buoy when anomaly is picked up by the water quality sensors.

7. The scientific buoy is designed with a diameter of 3m and focal height of 4m (**Appendix C**). Safety features include lights, top mark, signs, radar reflector and automatic identification system. The scientific buoy is designed in compliance with the specifications and requirements of the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Guideline No. 1099 on the Hydrostatic design of buoys (Edition 1 May 2013) published by the IALA. According to the Navguide 2018 Marine Aids to Navigation Manual (8th Edition) published by the IALA, the minimum length of

mooring chain should be two times of the water depth. For the water depth of about 5.7-6.5m, an about 13m long single mooring chain connected to a concrete block sinker with total weight of about 10 tonnes will be used for the scientific buoy. The particulars of the scientific buoy are as follows:

Name	: EPD-1
Position (WGS 84 Datum)	: 22° 21.942' N 114° 06.646' E
Shape	: Pillar
Colour	: Yellow
Light Characteristics	: Fl (5)Y.20s
Top Mark	: Yellow "X"
Radar Reflector	: Fitted
Automatic Identification System	: Fitted

8. The position of the scientific buoy will be real-time monitored by GPS device in the buoy. Any drift of the buoy from its original position for more than 30m, the contractor will perform inspection and relocate the buoy back to its original position within 1 day if the weather allows.

9. In view of the functionality of the system for monitoring hydrological and water quality conditions, we plan to set up the concerned system for long-term operation at the above location.

Way Forward

10. Members are invited to note the details of the proposal described in paragraphs 4 to 9 above.

Water Policy and Science Group
Environmental Protection Department
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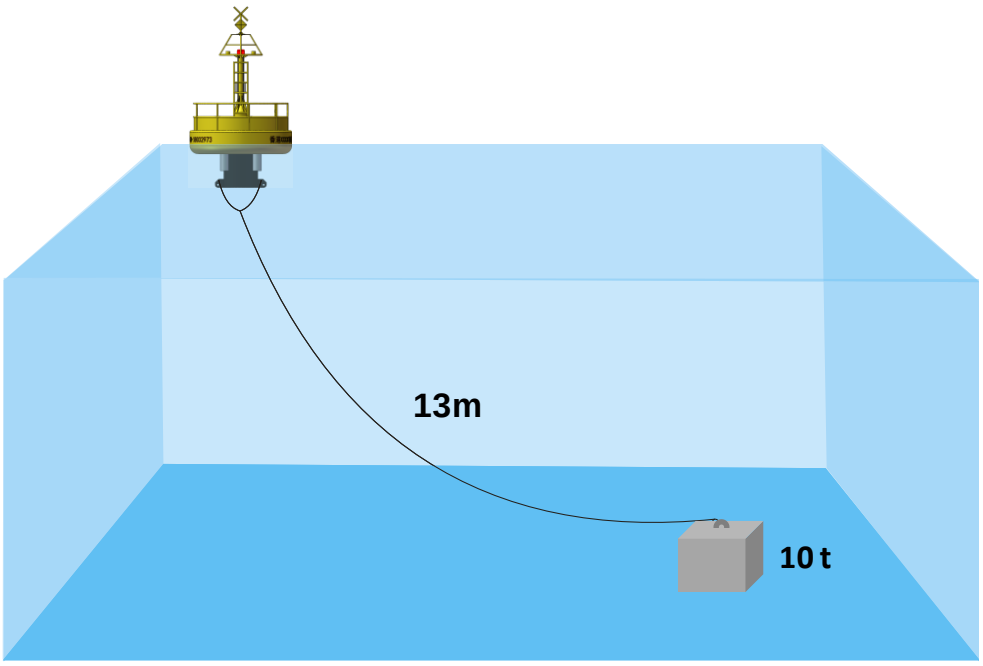
Appendix A

Location of the proposed real-time water quality monitoring station

Position: 22° 21.942' N 114° 06.646' E (WGS 84 datum)

Appendix B

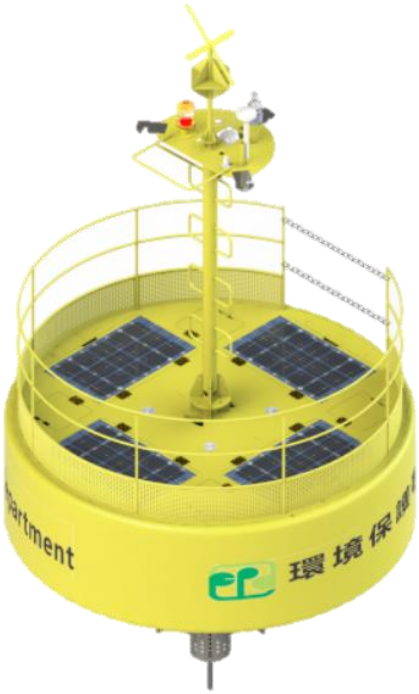
Schematic diagram of real-time water quality monitoring station deployment



Appendix C

Design of the scientific buoy

Isometric view of buoy



Dimension and components of buoy