

## **LOCAL VESSELS ADVISORY COMMITTEE**

### **Temporary Deployment of Real-time Water Quality Monitoring Station off Tsuen Wan Park**

#### **Purpose**

Members are invited to note the details of the temporary 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) will conduct a 2-year trial scheme on the application of a real-time on-line water quality monitoring system (System) in local coastal waters in 2020. The System will be installed on a new tailor-made scientific buoy. In addition to the evaluation on performance of such new monitoring system in Hong Kong waters, it is also anticipated that the bulk water quality data collected could enhance our understanding on the influence of diurnal and tidal changes on nearshore water quality.

3. In 1996, EPD had a trial on telemetric monitoring by deploying a scientific buoy in the Victoria Harbour. The trial revealed that there were quite a lot of technical difficulties encountered in terms of system operation and stability. With advancement of technologies over the years, there have been new solutions to technical problems such as data transmission and biofouling. Furthermore, new equipment nowadays could cover more water quality parameters with higher resolution to give a more meaningful picture for monitoring purpose. All these enable newly developed on-line automatic monitoring system more feasible, reliable and pragmatic in terms of manpower involved in maintenance work and data return. Under the OCEAN-HK theme-based project, the City University of Hong Kong and The Hong Kong University of Science and Technology have together deployed a similar scientific buoy for automatic on-line water quality monitoring outside Tai A Chau, Soko Islands.

## **Proposal**

4. The proposed real-time monitoring station in the form of a scientific buoy will be placed at 22° 21.942' N 114° 06.646' E, which is about 80m offshore in between Tsuen Wan Ferry Pier and Tsuen Wan Park (*Appendices A and B*).

5. The proposed scientific buoy comprise 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. During the early phase of deployment, weekly inspection would be arranged, though 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 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 3.4m (*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 (8<sup>th</sup> 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. The buoy system as well as the sinker will be removed after the 2-year trial period.

### **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

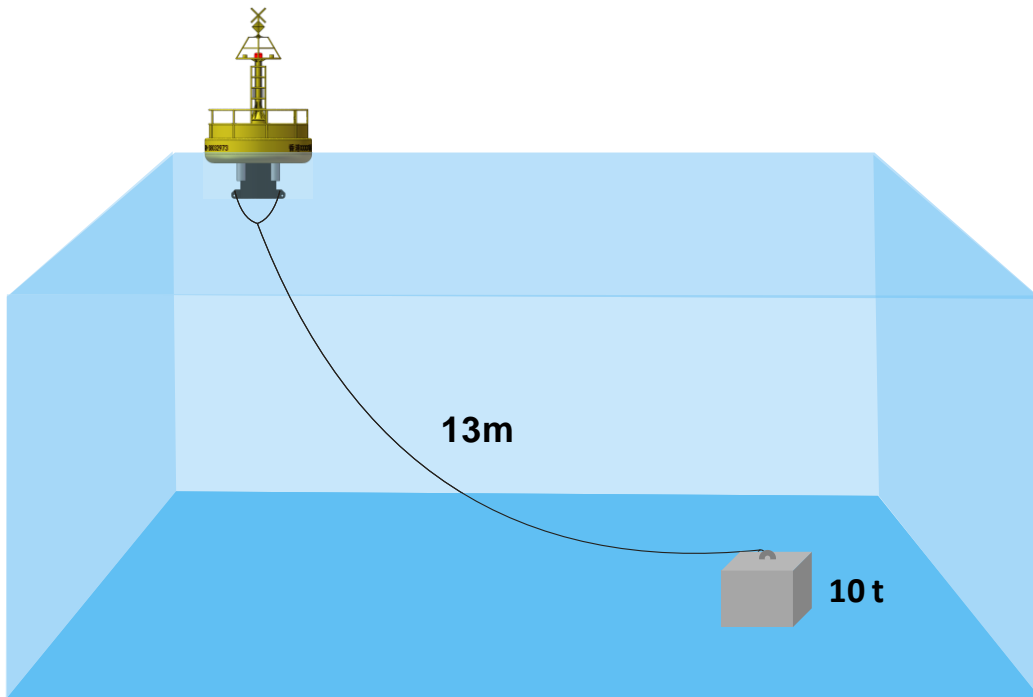
Location of the proposed real-time water quality monitoring station



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

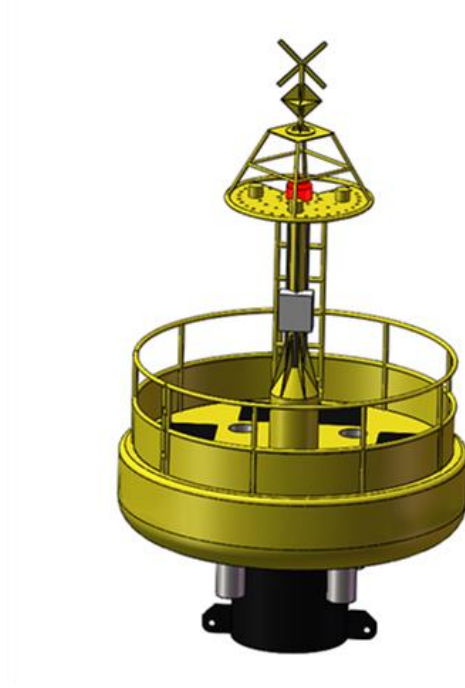


**Schematic diagram  
of real-time water quality monitoring station deployment**



# Design of the scientific buoy

## Isometric view of the buoy



## Dimension and components of the buoy

